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NOV 30 2011

Dominion

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

Serial No.	11-620
NSSL/WDC	R0
Docket No.	50-336
License No.	DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE CYCLE 21 CORE OPERATING LIMITS REPORT (TAC NO. ME6365)

Dominion Nuclear Connecticut, Inc. (DNC) submitted the Millstone Power Station Unit 2 (MPS2) Cycle 21 Core Operating Limits Report (COLR) to the Nuclear Regulatory Commission (NRC) in a letter dated May 19, 2011. The COLR includes the values of cycle-specific parameter limits and is submitted to the NRC for information. In a letter dated October 24, 2011, the NRC transmitted a request for additional information (RAI) to DNC related to the MPS2 Cycle 21 COLR. DNC agreed to respond to the RAI by November 30, 2011.

Attachment 1 provides DNC's response to the NRC's RAI. Attachment 2 provides the 10 CFR 50.59 Screen supporting the Cycle 21 COLR as requested in RAI Question 5.

The AREVA calculation requested in RAI Question 4 contains proprietary information. A non-proprietary version of the calculation is being prepared by AREVA NP. The calculation and the non-proprietary version of the calculation will be submitted by January 31, 2012, as discussed with the NRC project manager.

If you have any questions regarding this submittal, please contact Wanda Craft at (804) 273-4687.

Sincerely,

R. K. MacManus
Director, Nuclear Station Safety and Licensing - Millstone

Attachments:
1. Response to Request for Additional Information Regarding the Cycle 21 Core Operating Limits Report
2. 10 CFR 50.59 Screen Supporting the Cycle 21 Core Operating Limits Report

Commitments made in this letter:
1. None

A001
NRR

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ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE CYCLE 21 CORE OPERATING LIMITS REPORT

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2

Dominion Nuclear Connecticut, Inc. (DNC) submitted the Millstone Power Station Unit 2 (MPS2) Cycle 21 Core Operating Limits Report (COLR) to the Nuclear Regulatory Commission (NRC) in a letter dated May 19, 2011. The COLR includes the values of cycle-specific parameter limits and is submitted to the NRC for information. In a letter dated October 24, 2011, the NRC transmitted a request for additional information (RAI) to DNC related to the MPS2 Cycle 21 COLR. This attachment provides DNC's response to the NRC's RAI.

INTRODUCTION

MPS2 has a 'fixed' Incore Instrument (ICI) system. The ICI system consists of 45 arrays and each array consists of four levels of Rhodium detector segments with nominal positioning at 20%, 40%, 60% and 80% of the core height. Within the core, the ICIs are located within Zircaloy thimble tubes. The thimble tubes are conduits which provide a means for quick removal and reinsertion of the ICIs during refueling outages and for centering and cooling of the ICIs within them.

The industry has experienced radiation induced growth of Zircaloy instrument thimble tubes. Dominion contracted Westinghouse to replace the 45 instrument thimble tubes with tubes that are 10.5 inches shorter than the original design. The shorter, replacement thimble tubes are necessary to ensure that the thimble tubes do not contact the fuel assembly lower end fitting due to radiation induced growth at the end of plant life. The replacement of the thimble tubes took place during the fall 2009 refueling outage (2R19) with Cycle 20 being the first cycle of operation with the replaced thimble tubes.

During field fabrication of the replacement tubes in 2R19, Westinghouse cut 26 of the 45 thimble tubes shorter than intended by 1.375 inches. By design, the ICIs should be 'free hanging' within the thimble tubes. However, the shortened thimble tubes raised the possibility that some of the ICI strings were bottomed out and slightly misaligned from the ideal location.

While some of the ICIs may still have been free hanging in the shortened thimble tubes, Dominion conservatively instructed AREVA to quantify the potential impact on the indications of core power distribution by assuming that the 26 affected ICI strings were misaligned by the maximum amount of 1.375 inches. Any potential impacts were addressed in the AREVA cycle-specific setpoint analysis. For Cycle 20 operation, no change was needed to the acceptable operation regions as defined in the COLR figures (i.e., tents) and the impact on F_Q^N (or Linear Heat Generation Rate (LHGR)) was accommodated within the known conservatism of the methodology.

For Cycle 21 operation, a slight change in the Linear Heat Rate limiting condition for operation (LCO) monitoring tent (COLR Figure 2.5-1, used only when monitoring with excore detectors) and the use of a F_Q^N penalty factor (used when monitoring with incore detectors) were needed to account for the maximum possible misalignment of the ICIs. An associated 1.0025 penalty factor was included in COLR Section 2.5 for Cycle 21.

Question 1

Please provide a detailed description of the methodology used to determine the linear heat rate measurement. Is this methodology approved by the NRC, and is it described in the documents referenced in TS 6.9.1.8b?

DNC Response

Reference 1-1, which is listed as Reference 1 in MPS2 Technical Specifications (TS) 6.9.1.8b, contains the approved methodology used to validate the INPAX-II method using PRISM results. In the NRC Safety Evaluation (SE) for the Reference 1-1 topical report, the use of INPAX-II for SAV95 application is identified as one of the SE restrictions for incore monitoring of Combustion Engineering design plants that use fixed incore detectors, and thus is appropriate for MPS2. A detailed description of the INPAX-II method which converts measured signals to power distributions is cited in Reference 1-1 as Reference 11 (denoted here as Reference 1-2).

REFERENCES

1-1 EMF-96-029(P)(A) Volumes 1 and 2, "Reactor Analysis System for PWRs, Volume 1 - Methodology Description, Volume 2 - Benchmarking Results," Siemens Power Corporation, January 1997.

1-2 XN-NF-83-01(P), "Exxon Nuclear Analysis of Power Distribution Measured Uncertainty for St. Lucie Unit 1," Exxon Nuclear Company, January 1983.

Question 2

Describe the methodology used to generate a penalty factor to account for the impact of the offset ICI detectors on the linear heat rate measurement. Is this methodology approved by the NRC, and is it described in the documents referenced in TS 6.9.1.8b?

DNC Response

A summary of the analytical procedure used to compute the misaligned ICI penalty factor, applied to the uncertainty on the F_Q^N (or LHGR) power distribution peaking factor, is presented below:

- The NRC-approved core simulator code PRISM (Reference 2-1) was used to generate predicted nodal power and activation rate information specific to the MPS2 Cycle 21 reactor core. Reference 2-1 is listed as Reference 1 in MPS2 TS 6.9.1.8b. Nodal power and activation rate information was generated at numerous axial points for each instrumented fuel assembly and at numerous times during core life.

- The PRISM-generated activation rate information was used to generate pseudo-measured (*or simulated*) incore detector signals at both "nominal" and "offset" ICI detector conditions throughout core life. The "nominal" detector configurations were centered at the standard positions of core height. In the "offset" detector configuration, the 26 identified incore detectors were conservatively offset by the maximum amount of 1.375 inches. For each incore detector, a pseudo-measured signal was generated in the nominal and offset configurations. At various times in core life, using the INPAX-II methodology that is cited in Reference 2-1, synthesized signals were used to create two power distributions. The "nominal" detector signals were used to generate a nominal pseudo-measured 3-D power distribution. This power distribution represents what the reconstructed power distribution would be if all detectors were in proper alignment. The "offset" detector signals were used to generate an offset pseudo-measured 3-D power distribution. This power distribution represents what the reconstructed power distribution would be if all 26 identified detectors were misaligned by the maximum amount.

- The relative difference between the reconstructed "nominal" and "offset" nodal power distributions represents the potential error due to the misaligned detectors. This error was calculated for limiting reactor core locations which are instrumented. The maximum under-prediction difference for limiting measured locations during any time in core life defines the maximum potential error due to the offset detectors. This maximum error was applied to the uncertainty calculated in Reference 2-1 and the amount over the TS measurement-calculational uncertainty factor was the additional penalty applied for this reload.

- The TS measurement-calculational uncertainty factor for F_Q^N (or LHGR) is 1.07 for the INPAX-II core monitoring system installed at MPS2 (Reference 2-1). Therefore, the additional penalty factor of 1.0025 will be applied to peak measured F_Q^N (or LHGR), as determined by the INPAX-II core monitoring system, to account for the potentially misaligned incore detectors.

- The total uncertainty factor for F_R^T, including the impact of the offset ICI detector strings, was also evaluated and remains bounded by the criteria of 1.06 (6.0%), documented in Table 2.1 of Reference 2-1.

Note that Reference 2-1 does not include a discussion regarding the development of penalty factors associated with the potential misalignment of the incore detectors. Since the development of penalty factors is not described in Reference 2-1, it is not part of the Reference 2-1 NRC approved methodology. The physical location of the incore detectors relative to the core is considered an input to an analysis utilizing the Reference 2-1 methodology which determines the predicted nodal power and activation rate information specific to the reactor core. As such, the physical location of the incore detectors relative to the core is not considered an element of the Reference 2-1 methodology.

As discussed above, the Cycle 21-specific calculation includes separate cases that utilize the Reference 2-1 methodology. The first case determined the predicted nodal power and activation rate information specific to the reactor core assuming the incore detector strings were at their nominal locations. The second case determined the predicted nodal power and activation rate information specific to the reactor core assuming 26 of the incore detector strings were offset by 1.375 inches. The maximum difference in predicted nodal power and activation rate between these two cases provides the basis for the penalty factors applied to the Cycle 21 core.

In summary, the analysis to determine a conservative penalty on peak measured F_Q^N (or LHGR) to account for ICI misalignment was performed using NRC-approved codes and methods (PRISM, INPAX-II) described in the documents referenced in MPS2 TS 6.9.1.8b. The approved methods do not preclude calculations and application of a penalty factor to address the location of ICI detectors.

REFERENCE

2-1 EMF-96-029(P)(A) Volumes 1 and 2, "Reactor Analysis System for PWRs, Volume 1 - Methodology Description, Volume 2 - Benchmarking Results," Siemens Power Corporation, January 1997.

Question 3

Is the impact of the offset ICI detectors on the revised acceptable operating region (Figure 2.5-1) conservative? Is the revised penalty factor specified in item 2.5 conservative?

DNC Response

The penalty factor of 1.0025 for the offset ICI detectors, which is discussed in the response to RAI Question 2, was applied to the setpoint verification calculations as a conservative bias on F_Q^N. The setpoint verification calculations were performed in accordance with AREVA topical report EMF-1961(P)(A), *Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors* (Reference 3-1), which is Reference 13 in MPS2 TS 6.9.1.8b.

The operating region provided in Figure 2.5-1 of the Cycle 21 COLR was updated to provide adequate margin with the application of the penalty. The impact of the offset ICI detectors on the revised acceptable operating region is conservative.

The penalty factor represents the additional margin needed to account for misaligned incore detectors, and ensures the INPAX-II measured nodal powers are not under-predicted.

A conservative penalty factor was determined based upon the following conditions:

- All 26 affected incore detector strings were conservatively assumed to be offset by the maximum amount of 1.375 inches relative to the nominal configuration.
- The relative difference in the power reconstruction due to the offset detectors was assessed using the INPAX-II methodology for limiting incore detector locations at multiple burnup intervals throughout the cycle.
- For Cycle 21, the maximum under-prediction in determining the "measured" nodal power as a result of the misaligned detectors is used to formulate the penalty. The histogram in Figure 3-1 shows the resulting distribution of the "relative error in nodal power" between the misaligned and normal incore detector configurations.

REFERENCE

3-1 EMF-1961(P)(A), "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors," Siemens Power Corporation, July 2000.

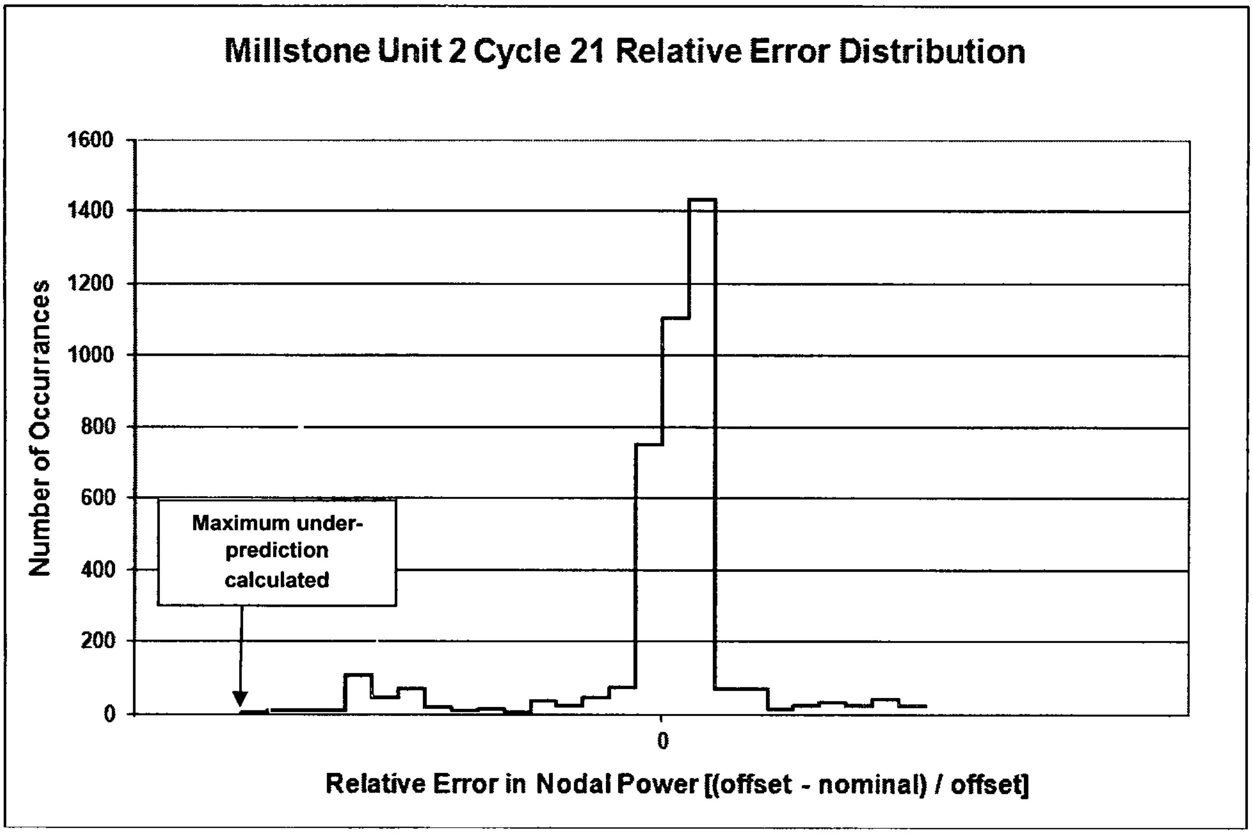

Figure 3-1
Histogram showing the distribution of "Relative Error in Nodal Power" between the misaligned and normal incore detector configurations

Question 4

Provide documentation (e.g. any analysis or evaluation) of the impact of the offset ICI detectors on the linear heat rate measurement.

DNC Response

The analysis methodology, inputs, and results from the evaluation of the offset ICI detectors are described in the responses to RAI Questions 2 and 3 above. The technical document that calculates the penalty factor and provides the basis for the above RAI responses is a proprietary AREVA engineering calculation.

Typically, documents such as calculations, cycle specific vendor deliverables, and 10 CFR 50.59 screens/evaluations used to support licensing actions are made available for NRC review either at a Dominion facility, the vendor's local office, or at a vendor's facility. However, in this case, the information will be provided as requested. Accordingly, a non-proprietary version of the requested AREVA engineering calculation is being prepared by AREVA. The proprietary calculation, the associated non-proprietary version of the calculation, and the affidavit supporting withholding of the proprietary version from public disclosure will be provided by January 31, 2012.

Question 5

Please provide any Title 10 of the Code of Federal Regulations, Part 50.59 design change screening and/or evaluations related to the offset ICI detectors.

DNC Response

As discussed in the introduction, the penalty factor included in the Cycle 21 COLR was the result of an ICI thimble fabrication error that was introduced in the plant during 2R19, prior to Cycle 20 operation. A summary of the 10 CFR 50.59 evaluation performed for this change is included in the Reference 5-1 report. As part of the NRC's inspection of MPS2 and MPS3 changes, tests, or experiments and permanent modifications in November 2010, the NRC reviewed the Cycle 20 Reload Safety Evaluation (RSE) prepared by Dominion (Reference 5-2) and the 10 CFR 50.59 evaluation supporting the thimble tube error. Reference 5-3 was issued by the NRC at that time, and both the Cycle 20 RSE and the 10 CFR 50.59 evaluation are listed as reviewed documents in Attachment A of Reference 5-3. NRC review of the fabrication error is also mentioned in Reference 5-4.

As mentioned above, documents such as calculations, cycle specific vendor deliverables, and 10 CFR 50.59 screens/evaluations used to support licensing actions are typically made available for NRC review either at a Dominion facility or at a vendor's facility. In this case as well, the information is provided as requested. Accordingly, included in this response as Attachment 2 is a copy of the 10 CFR 50.59 screen (with names and signatures redacted) which was performed in support of the Cycle 21 RSE (Reference 5-5), and which incorporated the penalty factor calculated by AREVA into the Cycle 21 COLR. The 10 CFR 50.59 screen identified the use of NRC-approved methods.

REFERENCES

5-1 Letter from R. K. MacManus (Dominion) to USNRC, "Dominion Nuclear Connecticut, Inc. Millstone Power Station Units 1, 2, 3, and ISFSI 10 CFR 50.59, 10 CFR 72.48 Change Report for 2008 and 2009, and the Commitment Change Report for 2009," June 30, 2010.

5-2 Dominion Reload Safety Evaluation No. EVAL-ENG-RSE-M2C20, Rev. 1, "Reload Design for Millstone Unit 2 Cycle 20-Revised," approved November 12, 2009.

5-3 Letter from USNRC to Mr. David Heacock, "Millstone Power Station – NRC Evaluation of Changes, Tests, or Experiments and Permanent Modification Team Inspection Report 05000336/2010010 and 05000423/2010010," December 22, 2010.

5-4 Letter from USNRC to Mr. David Heacock, "Millstone Power Station – NRC Integrated Inspection Report 05000336/2009005 and 05000423/2009005," February 3, 2010.

5-5 Dominion Reload Safety Evaluation No. EVAL-ENG-RSE-M2C21, Rev. 0, "Reload Design for Millstone Unit 2 Cycle 21," approved April 5, 2011.

ATTACHMENT 2

10 CFR 50.59 SCREEN RELATED TO SUPPORTING THE CYCLE 21 CORE OPERATING LIMITS REPORT

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2

Applicable Station	Applicable Unit(s)		Parent Document / Revision
☐ North Anna Power Station ☐ Surry Power Station ☒ Millstone Power Station ☐ Kewaunee Power Station	☐ Unit 1 ☐ Unit 3	☒ Unit 2 ☐ ISFSI	EVAL-ENG-RSE-M2C21, Rev. 0 (Reload Safety Evaluation for Millstone Unit 2, Cycle 21)

Part I – Describe the Proposed Activity and Document Search Results

A. Describe the proposed activity and scope of activities. Appropriate descriptive materials may be referenced or attached.

This 50.59 Screening applies to the following activities / documents:

- EVAL-ENG-RSE-M2C21, Rev. 0 (Reload Design for Millstone Unit 2 Cycle 21), and
- LBDCR 11-MP2-004

Reload Safety Evaluation (RSE) EVAL-ENG-RSE-M2C21, Rev. 0 (Reload Design for Millstone Unit 2 Cycle 21) supports Cycle 21 operation in all MODES (MODE 1 to MODE 6) as defined by the Millstone Unit 2 Technical Specifications (Reference 1). The RSE is a Dominion fleet wide evaluation that is used to document the reload design changes at Millstone. The RSE has been used at Millstone starting with Millstone Unit 2 Cycle 19 as per Dominion Procedure NF-AA-NAF-200 (Reference 2). The Reference 2 Nuclear Analysis and Fuel (NAF) procedure refers to the Dominion Design Change Procedure (Reference 3) for reviews and evaluations related to the RSE. Supporting evaluations for Cycle 21 are provided by AREVA in References 4, 5, 6 and 7 and in EVAL-ENG-RSE-M2C21, Rev. 0.

EVAL-ENG-RSE-M2C21, Rev. 0 documents and evaluates the Millstone Unit 2 Cycle 21 core in order to demonstrate that the Cycle 21 core design and operation are acceptable and safe. The Cycle 21 core will be fueled with 80 fresh MIL2-21(AA), 68 once-burned MIL2-20(Z), 68 twice- burned MIL2-19(Y), and 1 twice burned MIB-8(W) fuel assemblies (Reference 4). All fuel in the Cycle 21 core is provided by AREVA. Reload MIL2-21 is the seventh reload to utilize the High Thermal Performance (HTP) spacers and FUELGUARD™ debris-resistant lower tie plates.

Based on the Cycle 21 Safety Analysis Report provided by AREVA (Reference 4) and other supporting documentation provided by AREVA (References 5, 6 and 7), the Cycle 21 core design and Cycle 21 operation in all MODES (MODE 1 to 6) are determined to be acceptable and safe. The safety analyses documented in Reference 4 supports Cycle 21 operation up to a nominal core power level of 2,700 MWt for up to 16,275 MWd/MTU. The Cycle 21 safety analyses are based on a Cycle 20 shutdown between 14,300 MWd/MTU and 16,000 MWd/MTU. A detailed evaluation is provided in Reference 4 to support the following areas for Cycle 21:

- Mechanical evaluation,
- Neutronics evaluation,
- Thermal-hydraulic evaluation,
- Setpoints verification, and
- Standard Review Plan (SRP) Chapter 15 Safety Analyses (i.e., MP2 Final Safety Analysis Report (FSAR) Chapter 14).

Reload MIL2-21 is the seventh reload to contain High Thermal Performance (HTP) spacers and FUELGUARD debris-resistant lower tie plates and the third reload with the Alloy 718 High Mechanical Performance (HMP) bottom spacer to provide additional rod restraint at end of life. The only significant mechanical design change from the MIL2-20 reload was the use of chamfered pellets in the fuel rods (Reference 6).

The first use of the HMP bottom spacer was in Cycle 19 (Batch MIL2-19) where the bottom zircaloy HTP spacer was replaced with the HMP bottom spacer to provide additional rod restraint at end of life. As reported by AREVA in the Reference 4 Safety Analysis Report, this change has been thoroughly evaluated in Reference 6, it meets the applicable design criteria and it has no adverse effects on the Safety Analysis. A feed batch of 80, MIL2-21 fuel assemblies is used for Cycle 21 (vs. the batch size of 68 fuel assemblies used in recent cycles) so that all core peripheral locations will contain a fuel assembly with the HMP bottom grid. It is anticipated that the Cycle 21 core will be more resistant to the spinning fuel rod/grid-to-rod fretting failures seen in peripheral fuel assemblies in Cycles 17, 18 and 19. Additionally, the MIL2-21 feed batch is unlike previous feed batches in that twelve of the MIL2-21 fuel assemblies (sub-batch AA6) are of very low enrichment (2.2 w/o) and they are intended for a maximum of 2 cycles of operation.

LBDCR 11-MP2-004 proposes the following three (3) revisions to Core Operating Limits Report (COLR):

- Change 1: Cycle specific editorial change ('Cycle 20' changed to 'Cycle 21')
- Change 2: In addition to the three uncertainty factors related to the Incore Detector Monitoring System that are already specified in COLR Section 2.5, an additional penalty factor is used for Cycle 21 and noted (a 1.0025 penalty factor is applied to account for the impact of the misaligned ICI detectors on the linear heat rate measurement). This penalty is conservative and bounds the anomaly for the Cycle 21 core (Reference 4).
- Change 3: Based on the misalignment of the ICIs and the supporting analysis for Cycle 21 (Reference 4), Break Point "E" on the Local Power Density-Limiting Condition for Operation (LPD-LCO) barn must be moved from (+0.30, 65) to (+0.25, 65) to create sufficient margin to the limits. COLR Figure 2.5-1 is revised to reflect the revised analyses and provide sufficient operating margin for positive values of ASI. Figure 6.5 of the Reference 4 Safety Analysis report illustrates the revised barn for the LPD-LCO.

The LBDCR noted above is fully supported by the Reference 4 and 7 AREVA documents.

REFERENCES:

1. Millstone Unit 2 Technical Specifications.
2. Dominion Administrative Procedure NF-AA-NAF-200, "Reload Management Process."
3. Dominion Administrative Procedure CM-AA-DDC-201, Rev. 6, "Design Changes."
4. ANP-2979, Rev. 001 "Millstone Unit 2 Cycle 21 Safety Analysis Report," dated March 2011.
5. AREVA Engineering Information Record No. 51-9142594-000, "Millstone Unit 2 Cycle 21 Final Fuel Management Plan", dated August 25, 2010.
6. ANP-2980P, Revision 0, PWR Fuel Design Criteria Review for Millstone Unit 2 Reload MIL2-21 and

Cycle 21 Assemblies (transmitted in FAB11-43, dated January 14, 2011).
7. M. M. Ruhland (AREVA) letter to R. W. Sterner (Dominion), "Review of Millstone Unit 2 COLR", FAB10-822, dated December 3, 2010.
8. Millstone Unit 2 Final Safety Analysis Report (FSAR).
9. EMF-1961(P)(A) Revision 0, "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors," Siemens Power Corporation, July 2000.
10. NRC Letter Dated March 29, 2001, "Millstone Nuclear Power Station Unit No. 2 – Issuance of Amendment [No. 255] RE: Fuel Centerline Melt Linear Heat Rate Limit (TAC No. MA9646)."
11. SPC Report XN-NF-82-06(P)(A), Revision 1 and Supplements 2, 4, and 5, "Qualification of Exxon Nuclear Fuel for Extended Burnup," Exxon Nuclear Company, October 1986.

B. Search the Technical Specifications and SAR including documents "Incorporated by Reference." Describe relevant SAR-described function(s), performance requirements, and methods of evaluation of the affected SSCs, and where this information is in the Technical Specifications and SAR, including documents "Incorporated by Reference."

The MP2 Technical Specifications (Reference 1) Sections 2.1 (Safety Limits), 2.2 (Limiting Safety System Settings), 3/ 4.1 (Reactivity Control Systems), 3/ 4.2 (Power Distribution Limits and 6.9 (Reporting Requirements) were reviewed. The relevant design functions include the ability of the Cycle 21 core to satisfy the FSAR Chapter 14 Safety Analysis requirements as well as the associated 10CFR50 Appendix A general design criteria. The design functions / design bases noted below are also potentially affected by a reload core design:

1. Fuel assembly mechanical design bases, including mechanical loads and fuel assembly handling.
2. Reactor core design.
3. Reactor internals design bases.
4. Control element drive design bases.
5. Nuclear design bases, including fuel burnup limits, reactivity coefficients, power distribution, and shutdown margin.
6. Thermal and hydraulic design bases, including core coolability, hydraulic stability, fuel pellet and cladding temperature limits, departure from nucleate boiling, and hot channel factors

The FSAR (Reference 8) Chapter 3 (Reactor) and Chapter 14 (Safety Analysis) were reviewed.

C. Does the Activity involve a change to the Operating License or Technical Specifications? ☐ Yes ☒ No

If the answer is YES, process Operating License or Technical Specification change according to the appropriate procedure.
If the answer is NO, describe the basis for the conclusion.
Basis:

The analytical methodologies that support the RSE and the related LBDCR have been previously applied to Millstone Unit 2 and therefore, no NRC approvals and no changes to Technical Specification Section 6.9 (references to approved methods) are required. Also, no changes to the Millstone Unit 2 Operating License are necessary to support Cycle 21 operation.

In summary, no changes to the Millstone Unit 2 Operating License or Technical Specifications are required due to the implementation of the MIL2-21 fuel product for the operation of Cycle 21 as described in EVAL-ENG-RSE-M2C21, Rev. 0 or the associated LBDCR.

Part II – Identify Areas Requiring Written Documentation

1. Does the proposed activity involve a change to a Safety Analysis?	☒ Yes	☐ No
2. Does the proposed activity involve a change to an SSC(s) credited in the Safety Analyses	☒ Yes	☐ No
3. Does the proposed activity involve a change to an SSC(s) that support SSC(s) credited in the Safety Analyses?	☐ Yes	☒ No
4. Does the proposed activity involve a change to an SSC(s) whose failure could initiate a transient (e.g., reactor trip, loss of feedwater, etc) or accident?	☐ Yes	☒ No
5. Does the proposed activity involve a change to SAR-described SSC(s) or procedure controls that perform functions that are required by or otherwise necessary to comply with regulations, license conditions, orders or Technical Specifications?	☐ Yes	☒ No
6. Does the activity involve a change to a method of evaluation described in the SAR?	☐ Yes	☒ No
7. Is the activity a test or experiment? (i.e., a non-passive activity which gathers data)	☐ Yes	☒ No
8. Does the activity exceed or potentially affect design basis limit for a fission product barrier (DBLFPB)?	☐ Yes	☒ No

If the answers to all of the questions are NO, answer PART III as Not Applicable, and proceed to Part IV. An Evaluation is not needed. IF any of the above questions are checked YES, continue to Part III.

Part III – Determine Whether the Activity Involves Adverse Effects

If all the questions in Part II were answered NO, then N/A this block ☐ N/A

Otherwise, identify below the specific SAR-described design function (YES from questions 1-5), method of evaluation (YES from question 6), test or experiment (YES from question 7), or DBLFPB (YES from question 8).

III.1 SAR-Described Design Functions

If the activity does not involve a SAR-described design function, then N/A this block ☐ N/A

Does the activity have an adverse effect on the SAR-described design function? ☐ Yes ☒ No

If the answer is YES an Evaluation is required. If the answer is NO, describe the basis for the conclusion.

The proposed activities, documented by EVAL-ENG-RSE-M2C21, Rev. 0 and the related LBDCR support the following :

1. The loading of the Cycle 21 core with 80 fresh (MIL2-21) fuel assemblies, and
2. COLR changes related to Cycle 21.

These changes do not adversely affect any Structure, System, or Component (SSC) and do not adversely affect their related design functions as described in the Millstone Unit 2 FSAR (Reference 8).

As noted previously, the fresh, MIL2-21 fuel is the seventh fuel batch/reload to utilize the High Thermal Performance (HTP) spacers and FUELGUARD™ debris-resistant lower tie plates. This fuel design was first utilized at Millstone Unit 2 in the Cycle 15 reload. Additionally, the Cycle 21 loading pattern meets all applicable mechanical and functional design criteria for operation in all MODES. The HMP bottom spacer satisfactorily meets all the design criteria of the previously-used HTP bottom spacer.

The design functions / design bases noted below are potentially affected by a reload core design. Based on evaluations provided by AREVA in References 4 and 6, these areas have been determined not to be adversely affected by the proposed change for MODE 1 to 6 conditions. :

1. Fuel assembly mechanical design bases, including mechanical loads and fuel assembly handling.
2. Reactor core design.
3. Reactor internals design bases.
4. Control element drive design bases.
5. Nuclear design bases, including fuel burnup limits, reactivity coefficients, power distribution, and shutdown margin.
6. Thermal and hydraulic design bases, including core coolability, hydraulic stability, fuel pellet and cladding temperature limits, departure from nucleate boiling, and hot channel factors.

Reference 4 demonstrates the ability of the Cycle 21 core to satisfy the FSAR Chapter 14 Safety Analysis requirements.

As noted in Section 6.0 of Reference 4, AREVA performed a trip setpoint verification in accordance with the Reference 9 NRC approved methodology. This trip setpoint verification is routinely performed on a cycle specific basis in accordance with that methodology. As part of this cycle specific setpoint verification effort for Cycle 21, AREVA updated the TM/LP and LPD related uncertainty calculations that are inputs for this setpoint verification effort. This uncertainty calculation update was based on lessons learned from work performed on other CE NSSS sister plants. Incorporation of updated uncertainties into the cycle specific trip setpoint verification effort is not considered to be a reanalysis of an existing safety analysis event that would require the development of a 10CFR50.59 evaluation in accordance with the NEI 96-07 guidance.

As discussed in Section 5.12 of the Cycle 21 RSE, 26 of the 45 new ICI thimble tubes are 1.375 inches (1 3/8") too short relative to the remaining 19 ICI thimble tube locations, resulting in the potential for misalignment of the ICIs. The cycle specific trip setpoint verification supporting the Reference 4 AREVA Safety Analysis Report specifically addresses this ICI misalignment similar to that done for Cycle 20. Explicitly including the ICI misalignment in the Cycle 21 trip setpoint verification is also not considered a reanalysis of an existing safety analysis event that would require the development of a 10CFR50.59 evaluation in accordance with the NEI 96-07 guidance. The change to the LPD LCO barn resulting from this setpoint verification effort was necessary to ensure the 15.1 kw/ft initial condition of the existing FSAR Chapter 14 safety analysis is maintained while monitoring linear heat rate using the excore detector monitoring system.

In summary, there are no aspects of the RSE or LBDCR that cause an adverse effect on a Design Function.

III.2 Method of Evaluation
If the activity does not involve a change to a method, then N/A this block ☐ N/A
Does the activity result in an adverse change to a method of evaluation as described in the SAR that is used in establishing the design bases or in the safety analyses? ☐ Yes ☒ No
If the answer is YES an Evaluation is required. If the answer is NO, describe the basis for the conclusion (attach additional discussion as necessary).
Basis:

The methodology used by AREVA in References 4 and 6 for Cycle 21 are unchanged from those used by AREVA in Cycle 20. The methodologies used in these evaluations are consistent with those listed in Section 6.9.8.1 b. of the Technical Specifications and Section 3 of the Core Operating Limit Report (Appendix 8.1 of the Technical Requirements Manual). Addressing the potential ICI misalignment and revising the TM/LP and LPD related uncertainties are considered design inputs to the cycle specific trip setpoint verification that does not involve a revision to the Reference 9 setpoint methodology or any other method of evaluation described in the FSAR.

Thus, the Safety Analysis supporting Cycle 21 operation (Reference 4) and the associated RSE, and LBDCR (see Part A) do not involve new or revised methodologies.

III.3 Design Basis Limits for a Fission Product Barrier (DBLFPB)
If the activity does not involve a change to a DBLFPB, then N/A this block ☐ N/A
Does the activity change or exceed a DBLFPB? ☐ Yes ☒ No
If the answer is YES an Evaluation is required. If the answer is NO, describe the basis for the conclusion (attach additional discussion as necessary).
Basis:

It is verified in Reference 6 that the Batch MIL2-21 fuel product meets all applicable design criteria. The analyses reported in Reference 4 confirmed that Cycle 21 operation complies with all applicable Safety Limits and Limiting Safety System Settings. There are no changes to the DNBR, fuel temperature, fuel enthalpy, clad strain, or fuel burnup fuel design basis limits. In accordance with the Reference 10 NRC approval, the fuel centerline melt linear heat rate limit is calculated on a cycle by cycle basis for Millstone 2 using the Reference 11 NRC approved methodology listed in the Technical Specifications, Core Operating Limits Report and FSAR Section 3.5. The results of that cycle specific fuel centerline melt linear heat rate limit assessment are contained in Section 6.2 of Reference 4. Since the cycle specific implementation of this limit is fully in accordance with the Reference 10 NRC approval, this is not considered a change to the fuel centerline melt linear heat rate design basis limit. In addition, there are no changes to any RCS boundary or containment fission product barrier design basis limits.

Therefore, the activities described in Part A of this Screen do not change or exceed a DBLFPB.

III.4 Tests or Experiment
If the activity does not involve a test or experiment, then N/A this block ☒ N/A
Is the proposed test or experiment not described in the SAR AND does it utilize an SSC outside the reference bounds for design or is inconsistent with the analyses and description in the SAR? ☐ Yes ☐ No
If the answer is YES an Evaluation is required. If the answer is NO, describe the basis for the conclusion.
Basis:

The proposed activities (EVAL-ENG-RSE-M2C21, Rev. 0 and the associated LBDCR) do not involve any tests or experiments not previously described in the FSAR. As such, the proposed change does not involve a test or experiment where an SSC in a manner outside the design bases or inconsistent with the FSAR.

PART IV Conclusion

Check all that apply

1. An Evaluation is ☒ NOT REQUIRED ☐ REQUIRED (Provide 50.59/72.48 Evaluation in accordance with Subsection 3.3)
2. A change to the SAR and/or any document "Incorporated by Reference" is:
   ☐ NOT REQUIRED ☒ REQUIRED (Process change in accordance with applicable procedure)

Additional Comments

EVAL-ENG-RSE-M2C21, Rev. 0 documents the acceptability of the Cycle 21 feed fuel product (Batch MIL2-21) and Cycle 21 operation. As part of the development of the RSE, it was determined that an FSARCR update/change is required. The implementation of the FSARCR is tracked by CA as noted in EVAL-ENG-RSE-M2C21, Rev. 0-Attachment 2 (Documents Required to be Updated List).

There are no aspects of EVAL-ENG-RSE-M2C21, Rev. 0 or the related LBDCR that require a 50.59/72.48 Evaluation.

The completed Screen is part of the document/activity/change package

Preparer Name (Print)	Preparer Signature	Date
[redacted]	[redacted]	03/31/11
Co-signer (only if Preparer is not qualified (Print)	Co-signer Signature	Date
Reviewer (Print)	Reviewer Signature	Date
[redacted]	[redacted]	03/31/11