



March 9, 2015

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

Serial No. 15-070
NSSL/MLC R0
Docket No. 50-423
License No. NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
ALTERNATIVE REQUEST IR-3-27 FOR IMPLEMENTATION OF EXTENDED
REACTOR VESSEL INSERVICE INSPECTION INTERVAL

Pursuant to 10 CFR 50.55a(z)(1), Dominion Nuclear Connecticut, Inc. (DNC) requests an alternative to the requirement of the American Society of Mechanical Engineers (ASME) Code, Section XI, Paragraph IWB-2412, Inspection Program B, for Millstone Power Station Unit 3 (MPS3) which requires examination of identified reactor vessel pressure-retaining welds (Examination Category B-A and B-D) once each 10-year interval. The proposed alternative would extend the current examination frequency from 10 years to 20 years.

The current interval can be extended based on the negligible change in risk by satisfying the risk criteria specified in Regulatory Guide 1.174. The methodology used to conduct this analysis is defined in the study WCAP-16168-NP-A, Revision 3, "Risk Informed Extension of the Reactor Vessel In-Service Inspection [ISI] Interval." This study focuses on risk assessments of materials within the beltline region of the reactor vessel wall. The results of the calculations for MPS3 were compared to those obtained from the Westinghouse pilot plant evaluated in WCAP-16168-NP-A, Revision 3. The parameters for MPS3 are bounded by the results of the Westinghouse pilot plant, which qualifies MPS3 for an ISI interval extension.

DNC has concluded that the proposed alternative provides an acceptable level of quality and safety, in accordance with 10 CFR 50.55a(z)(1). The justification for the proposed alternative along with the supporting information is provided in Attachment 1.

The next examinations of the Examination Category B-A and B-D welds are scheduled for spring 2016 (Refueling Outage 17); therefore, DNC requests approval of this alternative by March 30, 2016 to support extension of these examinations.

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

Sincerely,

Gianna C. Clark
Vice President – Nuclear Support Services

A047
NRR

Commitments made in this letter: None

Attachment:

- 1) Proposed Alternative Request IR-3-27

cc:

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ATTACHMENT 1

PROPOSED ALTERNATIVE REQUEST IR-3-27

**MILLSTONE POWER STATION UNIT 3
DOMINION NUCLEAR CONNECTICUT, INC.**

Proposed Alternative Request IR-3-27 for Millstone Power Station Unit 3

In Accordance with 10 CFR 50.55a(z)(1) -Alternative Provides Acceptable Level of Quality and Safety-

1. ASME Code Component(s) Affected

The affected component is the Millstone Power Station Unit 3 (MPS3) reactor vessel (RV); specifically, the following American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI (Reference 1) examination categories and item numbers covering examinations of the RV. These examination categories and item numbers are from IWB-2500 and Table IWB-2500-1 of the ASME BPV, Code Section XI.

Category B-A welds are defined as "Pressure Retaining Welds in Reactor Vessel"
Category B-D welds are defined as "Full Penetration Welded Nozzles in Vessels"

Examination Category	Item No.	Description
B-A	B1.11	Circumferential Shell Welds
B-A	B1.12	Longitudinal Shell Welds
B-A	B1.21	Circumferential Head Welds
B-A	B1.22	Meridional Head Welds
B-A	B1.30	Shell-to-Flange Weld
B-A	B1.40	Head-to-Flange Weld
B-D	B3.90	Nozzle-to-Vessel Welds
B-D	B3.100	Nozzle Inside Radius Section

(Throughout this request the above examination categories are referred to as "the subject examinations" and the ASME BPV Code, Section XI, is referred to as "the Code.")

2. Applicable Code Edition and Addenda

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2004 Edition (Reference 8.1).

3. Applicable Code Requirement

IWB-2412, Inspection Program B, requires volumetric examination of essentially 100% of RV pressure-retaining welds, identified in Table IWB-2500-1, once each 10-year interval. The MPS3 third 10-year inservice inspection (ISI) interval is scheduled to end on April 22, 2019. The applicable Code for the fourth 10-year ISI interval will be selected in accordance with the requirements of 10 CFR 50.55a.

4. Reason for Request

An alternative is requested from the requirement of IWB-2412, Inspection Program B, that volumetric examination of essentially 100% of RV pressure-retaining Examination Category B-A and B-D welds, be performed once each 10-year interval. Extension of the interval between examinations of Category B-A and B-D welds from 10 years to 20 years will result in a reduction in man-rem exposure and examination costs. DNC has concluded that the proposed alternative provides an acceptable level of quality and safety.

5. Proposed Alternative and Basis for Use

Dominion Nuclear Connecticut, Inc. (DNC) proposes to perform the third ASME Code required volumetric examination of the MPS3 RV full penetration pressure-retaining Examination Category B-A and B-D welds in the fourth ISI interval in 2027 plus or minus one refueling outage. The proposed inspection date for MPS3 is consistent with the schedule presented in the latest implementation plan, OG-10-238 (Reference 8.2).

In accordance with 10 CFR 50.55a(z)(1), an alternate ISI interval is requested on the basis that the current ISI interval can be revised with negligible change in risk by satisfying the risk criteria specified in Regulatory Guide 1.174 (Reference 8.3).

The methodology used to conduct this analysis is based on that defined in the study WCAP-16168-NP-A, Revision 3, "Risk-Informed Extension of the Reactor Vessel In-Service Inspection Interval" (Reference 8.4). This study focuses on risk assessments of materials within the beltline region of the RV wall. The results of the calculations for MPS3 were compared to those obtained from the Westinghouse pilot plant evaluated in WCAP-16168-NP-A, Revision 3. Appendix A of the WCAP identifies the parameters to be compared. Demonstrating that the parameters for MPS3 are bounded by the results of the Westinghouse pilot plant qualifies MPS3 for an ISI interval extension. Table 1 below lists the critical parameters investigated in the WCAP and compares the results of the Westinghouse pilot plant to those of MPS3. Tables 2 and 3 provide additional information that was requested by the NRC and included in Appendix A of Reference 8.4.

Table 1: Critical Parameters for the Application of Bounding Analysis for MPS3			
Parameter	Pilot Plant Basis	Plant-Specific Basis	Additional Evaluation Required?
Dominant Pressurized Thermal Shock (PTS) Transients in the NRC PTS Risk Study are Applicable	NRC PTS Risk Study (Reference 8.5)	PTS Generalization Study (Reference 8.6)	No
Through-Wall Cracking Frequency (TWCF)	1.76E-08 Events per year (Reference 8.4)	1.44E-13 Events per year (Calculated per Reference 8.4)	No
Frequency and Severity of Design Basis Transients	7 heatup/cooldown cycles per year (Reference 8.4)	Bounded by 7 heatup/cooldown cycles per year	No
Cladding Layers (Single/Multiple)	Single Layer (Reference 8.4)	Single Layer	No

Table 2 provides a summary of the latest RV inspection for MPS3 and evaluation of the recorded indications. This information confirms that satisfactory examinations have been performed on the MPS3 RV.

Table 2: Additional Information Pertaining to Reactor Vessel Inspection for MPS3	
Inspection methodology:	The latest RV ISI was conducted in accordance with the requirements of Appendix VIII of the ASME Code, Section XI, 1995 Edition with Editions and Addenda through 2000, as modified by the Performance Demonstration Initiative program. Evaluation of recordable indications was performed to the acceptance standards of Section XI, 1989 Edition. Future ISIs will be performed to ASME Section XI, Appendix VIII requirements.
Number of past inspections:	Two 10-year ISIs have been performed.
Number of indications found:	There were ten indications identified in the beltline region during the most recently completed ISI. These subsurface indications are located in a nozzle shell longitudinal weld seam (Item 10 in Table 3), two intermediate shell longitudinal weld seams (Items 14 and 15 in Table 3), and a lower shell longitudinal weld seam (Item 17 in Table 3). The ten indications are acceptable per Table IVB-3510-1 of Section XI of the ASME Code. None of these indications are within the inner 1/10th or 1 inch of the reactor vessel thickness; therefore, they are inherently acceptable per the requirements of the Alternate PTS Rule, 10 CFR 50.61a (Reference 8.7).
Proposed inspection schedule for balance of plant life:	The third ISI is scheduled for 2016. This inspection will be performed in 2027 plus or minus one refueling outage. The proposed inspection date for MPS3 is consistent with the schedule presented in the latest implementation plan, OG-10-238 (Reference 8.2).

Table 3 summarizes the inputs and outputs for the calculation of through-wall cracking frequency (TWCF).

Table 3: Details of TWCF Calculation for MPS3 at 54 Effective Full-Power Years (EFPY)								
Inputs								
Reactor Coolant System Temperature, T_c [°F]			N/A	Inter. & Lower Shell T_{wall} [inches]				8.781
				Nozzle Shell T_{wall} [inches]				10.906
No.	Region and Component Description	Material Heat No.	Cu ⁽¹⁾ [wt%]	Ni ⁽¹⁾ [wt%]	R.G. 1.99 Pos. ⁽¹⁾	CF ⁽¹⁾ [°F]	RT _{NDT(u)} ⁽¹⁾ [°F]	Fluence [10 ¹⁹ n/cm ² , E>1.0 MeV] ⁽²⁾
1	Nozzle Shell Plate B9804-1	C4036-1	0.05	0.62	1.1	31.0	40	0.0814
2	Nozzle Shell Plate B9804-2	C4021-2	0.08	0.64	1.1	51.0	20	0.0814
3	Nozzle Shell Plate B9804-3	C4068-2	0.05	0.65	1.1	31.0	0	0.0814
4	Intermediate Shell Plate B9805-1	C4039-2	0.05	0.63	1.1	31.0	60	2.72
5	Intermediate Shell Plate B9805-2	C4068-1	0.05	0.64	1.1	31.0	10	2.72
6	Intermediate Shell Plate B9805-3	C4028-1	0.05	0.65	1.1	31.0	0	2.72
7	Lower Shell Plate B9820-1	B8961-1	0.08	0.63	1.1	51.0	10	2.72
8	Lower Shell Plate B9820-2	D1242-2	0.07	0.60	1.1	44.0	40	2.72
9	Lower Shell Plate B9820-3	D1242-1	0.06	0.61	1.1	37.0	20	2.72
10	Nozzle Shell Long. Weld 101-122A	86998 & 87011	0.05	0.12	1.1	39.8	-10	0.0814
11	Nozzle Shell Long. Weld 101-122B	87011	0.05	0.12	1.1	39.8	-50	0.0814
12	Nozzle Shell Long. Weld 101-122C	87011	0.05	0.12	1.1	39.8	-50	0.0814
13	Intermediate Shell Long. Weld 101-124A	4P6052	0.05	0.05	1.1	31.8	-50	2.72
14	Intermediate Shell Long. Weld 101-124B	4P6052	0.05	0.05	1.1	31.8	-50	2.72
15	Intermediate Shell Long. Weld 101-124C	4P6052	0.05	0.05	1.1	31.8	-50	2.72
16	Lower Shell Long. Weld 101-142A	4P6052	0.05	0.05	1.1	31.8	-50	2.72
17	Lower Shell Long. Weld 101-142B	4P6052	0.05	0.05	1.1	31.8	-50	2.72
18	Lower Shell Long. Weld 101-142C	4P6052	0.05	0.05	1.1	31.8	-50	2.72
19	Nozzle To Inter. Shell Circ. Weld 103-121	87000	0.05	0.13	1.1	41.0	-40	0.0814
20	Inter. To Lower Shell Circ. Weld 101-171	4P6052	0.05	0.05	1.1	31.8	-50	2.72
Outputs								
Methodology Used to Calculate ΔT_{30} :			Regulatory Guide 1.99, Revision 2 ⁽³⁾					
	Controlling Material Region No. (From Above)	RT _{MAX-XX} [°R]	Fluence [10 ¹⁹ Neutron/cm ² , E > 1.0 MeV]	FF (Fluence Factor)	ΔT_{30} [°F]	TWCF _{95-XX}		
Limiting Axial Weld - AW	4	558.95	2.72	1.2671	39.28	0.00E+00		
Limiting Plate - PL	4	558.95	2.72	1.2671	39.28	5.78E-14		
Circumferential Weld - CW	4	558.95	2.72	1.2671	39.28	0.00E+00		
TWCF _{95-TOTAL} (α_{AW} TWCF _{95-AW} + α_{PL} TWCF _{95-PL} + α_{CW} TWCF _{95-CW}):							1.44E-13	

(1) Inputs per Reference 8.8

(2) Fluence values based on plant-specific analysis of record

(3) Reference 8.9

6. Duration of Proposed Alternative

This request is applicable to the MPS3 ISI program for the third and fourth 10-year inspection intervals.

7. Precedents

- 7.1 "Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Relief Request No. RR-40, Reactor Vessel Weld Examination Interval Extension (TAC Nos. ME1634, ME1635, and ME1636)," dated February 22, 2010 (ADAMS Accession Number ML100290415).
- 7.2 "Safety Evaluation of Relief Requests to Extend the Inservice Inspection Interval for Reactor Vessel Examinations for Salem Nuclear Generating Station, Unit Nos. 1 and 2 (TAC Nos. ME1478, ME1479, ME1480 and ME1481)," dated February 22, 2010 (ADAMS Accession Number ML100491550).
- 7.3 "Joseph M. Farley Nuclear Plant, Unit 2 (Farley Unit 2) – Relief Request for Extension of the Reactor Vessel Inservice Inspection Date to the Year 2020 (Plus or Minus One Outage) (TAC No. ME3010)," dated July 12, 2010 (ADAMS Accession Number ML101750402).
- 7.4 "Arkansas Nuclear One, Unit 2 – Request for Alternative ANO2-ISI-004, to Extend the Third 10-Year Inservice Inspection Interval for Reactor Vessel Weld Examinations (TAC No. ME2508)," dated September 21, 2010 (ADAMS Accession Number ML102450654).
- 7.5 "Three Mile Island Nuclear Station, Unit 1 (TMI-1) – Request to Extend the Inservice Inspection Interval for Reactor Vessel Weld and Internal Examinations, Proposed Alternative Request Nos. RR-09-01 and RR-09-02 (TAC Nos. ME2483 and ME2484)," dated September 21, 2010 (ADAMS Accession Number ML102390018).
- 7.6 "McGuire Nuclear Station, Unit 2, Relief 10-MN-002 to Extend the Inservice Inspection Interval for Reactor Vessel Category B-A and B-D Welds (TAC Nos. ME7329 and ME7330)," dated September 6, 2012 (ADAMS Accession Number ML12249A175).
- 7.7 "Surry Power Station Units 1 and 2 – Relief Implementing Extended Reactor Vessel Inspection Interval (TAC Nos. ME8573 and ME8574)," dated April 30, 2013 (ADAMS Accession Number ML13106A140).
- 7.8 "Vogtle Electric Generating Plant, Units 1 and 2 – Request for Alternatives VEGP-ISI-ALT-05 and VEGP-ISI-ALT-06 (TAC Nos. MF2596 and MF2597)," dated March 20, 2014 (ADAMS Accession Number ML14030A570).

- 7.9 "Catawba Nuclear Station Units 1 and 2: Proposed Relief Request 13-CN-003, Request for Alternative to the Requirement of IWB-2500, Table IWB-2500-1, Category B-A and Category B-D for Reactor Pressure Vessel Welds (TAC Nos. MF1922 and MF1923)," dated March 26, 2014 (ADAMS Accession Number ML14079A546).
- 7.10 "Sequoyah Nuclear Plant, Units 1 and 2 – Requests for Alternatives 13-ISI-1 and 13-ISI-2 to Extend the Reactor Vessel Weld Inservice Inspection Interval (TAC Nos. MF2900 and MF2901)," dated August 1, 2014 (ADAMS Accession Number ML14188B920).

8. References

- 8.1 2004 ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components.
- 8.2 PWROG Letter OG-10-238, "Revision to the Revised Plan for Plant Specific Implementation of Extended Inservice Inspection Interval per WCAP-16168-NP, Revision 1, "Risk-Informed Extension of the Reactor Vessel In-Service Inspection Interval." PA-MS-C-0120," July 12, 2010 (ADAMS Accession Number ML11153A033).
- 8.3 NRC Regulatory Guide 1.174, Revision 1, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002.
- 8.4 Westinghouse Report WCAP-16168-NP-A, Revision 3, "Risk-Informed Extension of the Reactor Vessel In-service Inspection Interval," October 2011 (ADAMS Accession Number ML11306A084).
- 8.5 NRC NUREG-1874, "Recommended Screening Limits for Pressurized Thermal Shock (PTS)," March 2010.
- 8.6 NRC Letter Report, "Generalization of Plant-Specific Pressurized Thermal Shock (PTS) Risk Results to Additional Plants," U.S. Nuclear Regulatory Commission, December 14, 2004 (ADAMS Accession Number ML042880482).
- 8.7 NRC Code of Federal Regulations, 10 CFR Part 50.61a, "Alternate fracture toughness requirements for protection against pressurized thermal shock events."
- 8.8 Dominion Nuclear Connecticut, Inc. Report, "Millstone Power Station Unit 3, Stretch Power Uprate Licensing Report," Docket No. 50-423 (ADAMS Accession Number ML072000400)
- 8.9 NRC Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," May 1988.