

WOLF CREEK NUCLEAR OPERATING CORPORATION

Russell A. Smith
Site Vice President and Chief Nuclear Operating Officer

January 8, 2014
WO 14-0002

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

Subject: Docket 50-482: 10 CFR 50.55a Requests I3R-08 and I3R-09 for the Third Inservice Inspection Program Interval

Gentlemen:

Pursuant to 10 CFR 50.55a(a)(3)(ii), Wolf Creek Nuclear Operating Corporation (WCNOC) hereby requests Nuclear Regulatory Commission (NRC) approval of 10 CFR 50.55a Request Number I3R-08 for the Third Ten-Year Interval of WCNOC's Inservice Inspection (ISI) Program. Attachment I provides 10 CFR 50.55a Request I3R-08, which requests an alternative from the schedule requirements of ASME Section XI, IWB-2412, Inspection Program B, and IWA-2430(d)(1), Inspection Intervals. The alternative requests an extension of the interval by approximately three months beyond the ASME Section XI IWA-2430(d)(1) Code-allowed end of interval extension for performance of ASME Section XI Category B-N-2 and B-N-3 examinations of the reactor pressure vessel interior attachments and core support structure.

Pursuant to 10 CFR 50.55a(a)(3)(i) WCNOC hereby requests NRC approval of 10 CFR 50.55a Request Number I3R-09 for the Third Ten-Year Interval of WCNOC's ISI Program. Attachment II provides 10 CFR 50.55a Request I3R-09, which requests an alternative from the requirement of ASME Section XI, IWB-2412, Inspection Program B, that volumetric examination of essentially 100% of reactor pressure vessel pressure-retaining Examination Category B-A and B-D welds be performed once each 10-year interval. The alternative requests extension of the interval between examinations of Category B-A and B-D welds from 10 years to up to 20 years.

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NRR

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4156, or Mr. Michael J. Westman at (620) 364-4009.

Sincerely,

A handwritten signature in black ink, appearing to read 'RAS', with a long horizontal flourish extending to the right.

Russell A. Smith

RAS/rt

Attachment I: 10 CFR 50.55a Request Number I3R-08
Attachment II: 10 CFR 50.55a Request Number I3R-09

cc: M. L. Dapas (NRC), w/a
C. F. Lyon (NRC), w/a
N. F. O'Keefe (NRC), w/a
Senior Resident Inspector (NRC), w/a

**Wolf Creek Nuclear Operating Corporation
10 CFR 50.55a Request I3R-08
Request for Relief from the Schedule
Requirements of ASME Section XI
Category B-N-2 and B-N-3 Examinations**

10 CFR 50.55a Request I3R-08

**Request for Relief from the Schedule Requirements of ASME
Section XI Category B-N-2 and B-N-3 Examinations**

**Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii)
Hardship or Unusual Difficulty Without Compensating
Increase in Level of Quality or Safety**

1.0 ASME Code Components Affected

The affected components are the reactor vessel interior attachments beyond the beltline region and the core support structure at Wolf Creek Generating Station (WCGS). The identified examinations are the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI, Category B-N-2 and B-N-3, Item No.(s) B13.60 and B13.70 Examinations.

Examination

<u>Category</u>	<u>Item No.</u>	<u>Description</u>
B-N-2	B13.60	Interior Attachments Beyond Beltline Region
B-N-3	B13.70	Removable Core Support Structures

Components:

- RV-CSL-104-142-A, Core Support Lug
- RV-CSL-104-142-B, Core Support Lug
- RV-CSL-104-142-C, Core Support Lug
- RV-CSL-104-142-D, Core Support Lug
- RV-CSL-104-142-E, Core Support Lug
- RV-CSL-104-142-F, Core Support Lug
- RV-Core Struct, REMOVABLE CORE SUPPORT STRUCTURES

2.0 Applicable Code Edition and Addenda

ASME Code Section XI, 1998 Edition through 2000 Addenda

3.0 Applicable Code Requirement

IWB-2412, Inspection Program B, requires visual examination of the reactor vessel (RV) interior attachments and core support structure (core barrel) identified in Table IWB-2500-1 to be performed once each ten year Interval. The WCGS third inservice inspection (ISI) interval is currently scheduled to conclude on September 2, 2015.

4.0 Reason for Request

An alternative is requested from the requirements of IWB-2412, Inspection Program B, and Table IWB-2500-1 Examination Categories B-N-2 and B-N-3 which requires a VT-3 examination of RV interior attachments and the core barrel once each inspection interval (Same as for 1st Interval). An extension is requested to allow performance of the Category B-N-2, Interior Attachments Beyond Beltline Region Examinations and Category B-N-3, Core Support Structure Examinations in Refueling Outage 21 (RF21), which is approximately 3 months beyond the ASME Section XI IWA-2430(d)(1) Code allowed end of interval extension. This alternative is requested because compliance with the specified requirements would result in hardship without a compensating increase in the level of quality or safety.

ASME Section XI requires that the visual examinations of the RV interior attachments and the core support structure (core barrel), required by Examination Categories B-N-2 and B-N-3, be performed once every inspection interval. These examinations are typically performed at the end of the interval in conjunction with RV volumetric examinations of Cat. B-A and B-D welds. However, Wolf Creek Nuclear Operating Corporation (WCNOC) is also submitting a related Request for Relief I3R-09 to extend examination of the RV B-A and B-D welds from 10 years to 20 years. As a result, WCNOC has no other requirements or activities that require removing the core barrel in RF20.

WCNOC is currently planning a full core offload and core barrel removal during RF21 to perform scheduled examination and mitigation activities on the RV hot leg and cold leg nozzle dissimilar metal welds. By performing the B-N-2 and B-N-3 examinations in RF21, it will eliminate the tasks necessary to remove the core barrel during RF20. The deferral of these examinations will allow them to be performed during the planned core barrel removal during RF21, which will reduce the dose and risk of having to perform the core barrel removal twice.

5.0 Proposed Alternative and Basis for Use

The end of the third period of the third inspection interval as published in the WCGS ISI Inspection Plan is September 2, 2015. The examinations required by ASME Section XI, Table IWB-2500-1, Examination Categories B-N-2 and B-N-3 were scheduled originally for the last outage in Period 3 for Interval 3. The proposed alternative is to perform the required examinations in RF21. Per ASME Section XI, IWA-2430(d)(1), Inspection Interval 3 can be extended by up to 1 year. The performance of these examinations during RF21 will occur outside the 1-year extension window by approximately 3 months. In accordance with 10 CFR 50.55a(a)(3)(ii), this interval extension is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Examinations required by Categories B-N-2 and B-N-3 involve removing all of the fuel and the core barrel from the RV. These examinations were last performed at WCGS in RF14 during the spring of 2005 with no relevant indications noted during the examinations.

An unnecessary risk is created by removal of the core barrel for the sole purpose of performing visual examinations. Further, the radiation exposure to perform the ASME Examination Categories B-N-2 and B-N-3 examinations would essentially double if the subject examinations are not extended for performance in conjunction with scheduled examination and mitigation activities on the RV hot leg and cold leg nozzle dissimilar metal welds.

During RF20, which is currently the last refueling outage in ISI Interval 3, the ASME Category B-N-1, Reactor Vessel Interior, visual examinations will be performed as scheduled. This includes the space above and below the reactor core that is made accessible for examination by the removal of components during normal refueling outages. This examination is required once each period with acceptance standards as defined in ASME Section XI IWB-3520.2.

Therefore, in accordance with 10 CFR 50.55a(a)(3)(ii), this interval extension by approximately 3 months past the ASME Code allowed extension of 1 year is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

6.0 Duration of Proposed Alternative

The alternative is requested to extend the WCGS ISI Interval 3 by approximately 3 months past the ASME Section XI IWA-2430(d)(1) Code allowed extension of 1 year for the components identified in Section 1.0 of this request. This request is applicable to the third inspection interval only. If this relief request is approved, the third inspection interval will end at the conclusion of RF21, (Fall of 2016).

This extension will not affect the start of the fourth inspection interval so it will not impact the overall schedule of WCGS's ISI examinations.

7.0 Precedents

NRC Safety Evaluation dated January 27, 2006, for Palisades Nuclear Plant. Request for Authorization to Extend Third 10-Year Inservice Inspection (ISI) Interval for the Reactor Vessel Visual Examination, (TAC NO. MC6546) (DOCKET NO. 50-255) (ML060120104).

NRC Safety Evaluation dated August 27, 2010, for Palo Verde Nuclear Generating Station, Units 2 and 3. Relief Request No. RR-44, Reactor Vessel Weld Visual Examination Interval Extension, (TAC NOS. ME2335 and ME2336) (DOCKET NO.(s) 50-529 and 50-530) (ML102160487).

**Wolf Creek Nuclear Operating Corporation
10 CFR 50.55a Request I3R-09
Request for Relief from the Requirements of
ASME Section XI, Extension of the Interval
Between Examinations of Reactor Vessel
Category B-A and B-D Welds from 10 Years
to 20 Years**

10 CFR 50.55a Request I3R-09

Request for Relief from the Requirements of ASME Section XI, Extension of the Interval Between Examinations of Reactor Vessel Category B-A and B-D Welds from 10 Years to 20 Years

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i) Alternative Provides Acceptable Level of Quality and Safety

1.0 ASME Code Components Affected

The affected component is the Wolf Creek Generating Station (WCGS) 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."

<u>Examination Category</u>	<u>Item No.</u>	<u>Description</u>
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.")

2.0 Applicable Code Edition and Addenda

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1998 Edition through 2000 Addenda (Reference 1).

3.0 Applicable Code Requirement

IWB-2412, Inspection Program B, requires volumetric examination of essentially 100% of reactor vessel pressure-retaining welds identified in Table IWB-2500-1 once each 10-year interval. The WCGS third 10-year inservice inspection (ISI) interval is scheduled to end on September 2, 2015. The applicable Code for the fourth 10-year ISI interval will be selected in accordance with the requirements of 10 CFR 50.55a.

4.0 Reason for Request

An alternative is requested from the requirement of IWB-2412, Inspection Program B, that volumetric examination of essentially 100% of reactor vessel 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 up to 20 years will result in a reduction in man-rem exposure and examination costs.

5.0 Proposed Alternative and Basis for Use

Wolf Creek Nuclear Operating Corporation (WCNOC) proposes to not perform the ASME Code required volumetric examination of the WCGS reactor vessel full penetration pressure-retaining Examination Category B-A and B-D welds, nor the NRC conditionally accepted Code Case N-648-1 alternative VT-1 examinations for Category B-D Item B3.100 Nozzle Inside Radius Sections, for the third ISI interval. WCNOC will perform the third ASME Code required volumetric examination of the WCGS reactor vessel full penetration pressure-retaining Examination Category B-A and B-D welds (except that WCNOC may perform applicable Nuclear Regulatory Commission (NRC) accepted alternative visual examinations for Category B-D Item B3.100 Nozzle Inside Radius Sections) in the fourth ISI interval in 2025 plus or minus one refueling outage, in accordance with the applicable Code for the fourth 10-year ISI interval. The applicable Code for the fourth 10-year ISI interval will be selected in accordance with the requirements of 10 CFR 50.55a. The proposed inspection date is consistent with the latest revised implementation plan, OG-10-238 (Reference 2).

In accordance with 10 CFR 50.55a(a)(3)(i), an alternate inspection interval is requested on the basis that the current interval can be revised with negligible change in risk by satisfying the risk criteria specified in Regulatory Guide 1.174 (Reference 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 4). This study focuses on risk assessments of materials within the beltline region of the RV wall. The results of the calculations for WCGS 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 WCGS are bounded by the results of the Westinghouse pilot plant qualifies WCGS 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 WCGS. Tables 2 and 3 provide additional information that was requested by the NRC and included in Appendix A of Reference 4.

Table 1: Critical Parameters for the Application of Bounding Analysis for Wolf Creek			
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 5)	PTS Generalization Study (Reference 6)	No
Through-Wall Cracking Frequency (TWCF)	1.76E-08 Events per year (Reference 4)	7.01E-14 Events per year (Calculated per Reference 4)	No
Frequency and Severity of Design Basis Transients	7 heatup/cooldown cycles per year (Reference 4)	Bounded by 7 heatup/cooldown cycles per year	No
Cladding Layers (Single/Multiple)	Single Layer (Reference 4)	Single Layer	No

Table 2 below provides a summary of the latest reactor vessel inspection for WCGS and an evaluation of the recorded indications. This information confirms that satisfactory examinations have been performed on the WCGS reactor vessel.

Table 2: Additional Information Pertaining to Reactor Vessel Inspection for Wolf Creek	
Inspection methodology:	The latest ISI was conducted in accordance with the WCGS Plant Technical Specifications and with the ASME Code, Section XI and Section V, 1989 Edition and 1995 Edition with the 1996 Addenda, as modified by 10 CFR 50.55a(b)(2)(xiv, xv and xvi). Previous inspections have been performed to Regulatory Guide 1.150 and future inservice inspections will be performed to ASME Section XI, Appendix VIII requirements.
Number of past inspections:	Examinations for two 10-year inservice inspection intervals have been performed on the reactor vessel, closure head, inlet nozzle welds, and outlet nozzle welds, as summarized below. <ul style="list-style-type: none"> - Category B-A welds (reactor vessel): RF8 – Spring 1996 and RF14 – Spring 2005 with the exception of weld RV-101-121 (reactor vessel flange to shell weld) which was also examined in RF2 – Spring 1987 and RF10 – Spring 1999 - Category B-A welds (closure head): Interval 1 examinations in RF1 – Fall 1986, RF4 – Spring 1990, and RF6 – Spring 1993. Interval 2 examinations were performed in RF9 – Fall 1997, RF11 – Fall 2000, and RF13 – Fall 2003. - Category B-D welds (outlet nozzles): RF3 – Fall 1988, RF8 – Spring 1996, RF14 – Spring 2005 - Category B-D welds (inlet nozzles): RF8 – Spring 1996, RF14 – Spring 2005
Number of indications found:	Zero reportable indications have been found to date. Any recordable indications have been acceptable per ASME Section XI IWB-3500. No flaws of concern were detected. Therefore, the WCGS ISI results are inherently acceptable per the requirements of the Alternate PTS Rule, 10 CFR 50.61a (Reference 7).
Proposed inspection schedule for balance of plant life:	The third inservice inspection is scheduled for 2015. This inspection will be performed in 2025 plus or minus one refueling outage. This proposed inspection date is consistent with the date provided in the latest revised implementation plan, OG-10-238 (Reference 2).

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

Table 3: Details of TWCF Calculation for Wolf Creek at 54 Effective Full-Power Years (EFPY)									
Inputs⁽¹⁾									
Reactor Coolant System Temperature, T _C [°F]:			N/A		T _{wall} [inches]:			8.79	
No.	Region and Component Description	Material Heat No.	Cu [wt%]	Ni [wt%]	R.G. 1.99 Pos.	CF [°F]	RTNDT(u) [°F]	Fluence [10 ¹⁹ Neutron/cm ² , E > 1.0 MeV]	
1	Intermediate Shell Plate R2005-1	NR61 836-1	0.040	0.660	1.1	26.0	-20	3.36	
2	Intermediate Shell Plate R2005-2	NR61 783-1	0.040	0.640	1.1	26.0	-20	3.36	
3	Intermediate Shell Plate R2005-3	NR61 799-1	0.050	0.630	1.1	31.0	-20	3.36	
4	Lower Shell Plate R2508-3	C4935-2	0.070	0.620	2.1	39.1	40	3.36	
5	Lower Shell Plate R2508-1	B8759-2	0.090	0.670	1.1	58.0	0	3.36	
6	Lower Shell Plate R2508-2	C4840-2	0.060	0.640	1.1	37.0	10	3.36	
7	Inter. Shell Longitudinal (Long.) Weld 101-124A	90146	0.040	0.080	2.1	29.7	-50	1.62	
8	Inter. Shell Long. Weld 101-124B	90146	0.040	0.080	2.1	29.7	-50	2.95	
9	Inter. Shell Long. Weld 101-124C	90146	0.040	0.080	2.1	29.7	-50	2.95	
10	Lower Shell Long. Weld 101-142A	90146	0.040	0.080	2.1	29.7	-50	1.62	
11	Lower Shell Long. Weld 101-142B	90146	0.040	0.080	2.1	29.7	-50	2.95	
12	Lower Shell Long. Weld 101-142C	90146	0.040	0.080	2.1	29.7	-50	2.95	
13	Inter. To Lower Shell Circumferential (Circ.) Weld 101-171	90146	0.040	0.080	2.1	29.7	-50	3.36	
Outputs									
Methodology Used to Calculate ΔT ₃₀ :					Regulatory Guide 1.99, Revision 2 ⁽²⁾				
	Controlling Material Region No. (From Above)	RTMAX-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	549.98	2.95		1.287	50.31	0.00E+00		
Limiting Plate - PL	4	551.17	3.36		1.317	51.50	2.80E-14		
Circumferential Weld - CW	4	551.17	3.36		1.317	51.50	0.00E+00		
TWCF ₉₅ -TOTAL(α _{AW} TWCF ₉₅ -AW + α _{PL} TWCF ₉₅ -PL + α _{CW} TWCF ₉₅ -CW):							7.01E-14		

Notes:

- (1) References 4, 8, and 9
- (2) Reference 10

6.0 Duration of Proposed Alternative

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

7.0 Precedents

- “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).
- “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).
- “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).
- “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).
- “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).
- “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).
- “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 ME 7330),” dated September 6, 2012 (ADAMS Accession Number ML12249A175).
- “Virgil C. Summer Nuclear Station, Unit 1, Alternative Relief Request (RR)-III-07 for Third Ten-Year Inservice Inspection Interval (TAC No. ME6879),” dated July 19, 2012 (ADAMS Accession Number ML12191A163).

8.0 References

1. ASME Boiler and Pressure Vessel Code, Section XI, 1998 Edition through 2000 Addenda, American Society of Mechanical Engineers, New York.
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-0120," July 12, 2010 (ADAMS Accession Number ML11153A033).
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," U.S. Nuclear Regulatory Commission, November 2002.
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 ML113060207).
5. NUREG-1874, "Recommended Screening Limits for Pressurized Thermal Shock (PTS)," U.S. Nuclear Regulatory Commission, March 2010.
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).
7. Code of Federal Regulations, 10 CFR Part 50.61a, "Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," U.S. Nuclear Regulatory Commission, Washington D. C., Federal Register, Volume 75, No. 1, dated January 4, 2010 and No. 22 with corrections to part (g) dated February 3, 2010, March 8, 2010, and November 26, 2010.
8. Westinghouse Report WCAP-16764-NP, Revision 1, "Ex-Vessel Neutron Dosimetry Program for Wolf Creek Cycle 15," April 2008.
9. Westinghouse Report WCAP-16030, Revision 0, "Evaluation of Pressurized Thermal Shock for Wolf Creek," May 2003.
10. NRC Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," U.S. Nuclear Regulatory Commission, May 1988.