



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

March 31, 1992

Docket Nos. 50-317
and 50-318

Mr. G. C. Creel
Vice President - Nuclear Energy
Baltimore Gas and Electric Company
Calvert Cliffs Nuclear Power Plant
MD Rts. 2 & 4
P. O. Box 1535
Lusby, Maryland 20657

Dear Mr. Creel:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION CONCERNING BALTIMORE GAS AND ELECTRIC COMPANY'S RESPONSE TO THE 1991 PRESSURIZED THERMAL SHOCK RULE, CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 1 (TAC NO. M82504) AND UNIT 2 (TAC NO. M82505)

By letter dated December 13, 1991, Baltimore Gas and Electric Company (BG&E) responded to the requirements of paragraphs(b)(1) and (b)(4) of 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events." The projected values of RT_{pts} , the reference temperature calculated by the method given in paragraph(b)(2) of 10 CFR 50.61, were provided for the Calvert Cliffs Nuclear Power Plant, Units 1 and 2, vessel beltline materials as required by paragraph(b)(1) of the Rule. It was noted that the Unit 1 RT_{pts} value will exceed the screening criteria prior to the expiration date of its current license and in accordance with paragraph(b)(4) of 10 CFR 50.61, BG&E's plans for further flux reduction were provided.

The staff is currently reviewing your submittal and has determined that additional information is needed to complete its review. Enclosure 1 provides the staff's request for additional information (RAI). In addition, your submittal indicated MIL B-4 Modified weld wire was used in the fabrication of the Calvert Cliffs reactor vessels. Enclosure 2 provides a compilation of other facilities which have used MIL B-4 Modified or MIL B-4 weld wire which may be of help in addressing the staff's RAI.

We request that the information be provided as soon as possible to allow for timely completion of our review. Should you have any questions, please contact me at (301) 504-1408.

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Mr. G. C. Creel

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March 31, 1992

This requirement affects one respondent and, therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Sincerely,



Daniel G. McDonald, Senior
Project Manager
Project Directorate 1-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. RAI
2. C-E Fabricated Reactor Vessels with
MIL B-4 Modified or MIL B-4
Weld Wire

cc w/enclosures:
See next page

Mr. G. C. Creel
Baltimore Gas & Electric Company

Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2

cc:

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Request for Additional Information

The following additional information is needed for the staff to complete its review of the BG&E submit¹, Response to the 1991 Pressurized Thermal Shock Rule, dated December 13, 1991.

1. Section 1.0 of "Calvert Cliffs Unit No. 1 and No. 2. Reactor Vessel Beltline Materials," Revision 2, indicates MIL B-4 Modified weld wire with nickel in the range of 0.6 to 1.1 wt. % was used to fabricate the reactor vessels. Heats no. 33A277 and 10137 are reported to have 0.23 wt. % and 0.05 wt. %, respectively. If MIL B-4 Modified weld wire was used to fabricate the welds in the Calvert Cliffs reactor vessels, why do welds using heat no. 33A277 and 10137 wire have less than 0.6 wt. % nickel?
2. Do the test results from the Calvert Cliffs reactor vessel surveillance program indicate that the values of Pressurized Thermal Shock (PTS) calculated using the methodology specified in the PTS rule are applicable to the Calvert Cliffs reactor vessels?

For weld wire heats not in the Calvert Cliffs reactor vessel surveillance program, do test results from other vessel surveillance programs (NRC data source provided with this RAI) indicate that the values of the PTS calculated using the methodology specified in the PTS Rule are applicable to the Calvert Cliffs reactor vessels?

3. How were the embrittlement effects of operating the Calvert Cliffs reactors with the core critical and cold leg temperatures less than 525 °F considered? If the reactor vessels were irradiated (fluence greater than 10^{16} n/cm²) at temperatures less than 525 °F, what was the neutron fluence at the various irradiation temperatures? What was the effect of this low temperature irradiation on the RT_{pts} value for the reactor vessels?

C-E Fabricated Reactor Vessels
with MIL-B4 Modified or
MIL-B4 Weld Wire

<u>Plant</u>	<u>Comments</u>
Cook 1	MIL-B4 Modified, heats 13253 and 12008 (Linde 1092, lot 3791) for nozzle shell axial welds (1-442A, B, C), intermediate shell axial welds (2-442A, B, C), and lower shell axial welds (3-442A, B, C). Heat 20291 (Linde 1092, lot 3833) for nozzle to intermediate shell circumferential (8-442). Source: November 7, 1977, letter from J. Tillinghast (I&MPCo) to E. G. Case (USNRC), subject: Response to D. K. Davis' Letter of May 20, 1977.
Diablo Canyon 1	MIL-B4 Modified, heat 21935 (Linde 1092, lot 3869) for intermediate to lower shell circumferential weld. Sources: FSAR, Table 5.2-20A; WCAP-11567.
Diablo Canyon 2	MIL-B4 Modified, heat 21935 (Linde 1092, lot 3889) for nozzle shell to intermediate shell circumferential weld. Heats 21935 and 12008 (Linde 1092, lot 3869) for intermediate shell axial welds (this is also the surveillance weld). Heat 33A277 (Linde 124, lot 3878) for lower shell axial welds. Source: FSAR, Table 5.2-20B; WCAP-11851.
Kewaunee	MIL-B4 Modified, heat 21935 (Linde 1092, lot 3869) for intermediate to lower shell circumferential weld. Source: February, 1978, letter from E. W. James (WPS) to A. Schwencer (USNRC), subject: Reactor Vessel Material Surveillance Program; WCAP-12020
Maine Yankee	MIL-B4 Modified, heats 13253 and 12008 (Linde 1092, lots 3774, 3791, 3833) for welds 1-203A, B, C and 3-203A, B, C. Source: January 21, 1986, letter from G. D. Whittier (YAPCo) to A. C. Thadani (USNRC), subject: Response to Requirement of 10 CFR 50.61.
Pilgrim	MIL-B4 Modified: heats 27204 and 12008 (Linde 1092, lot 3774) for lower intermediate shell axial welds (1-338A, B, C) and lower shell axial welds (2-338A, B, C). Heat 21935 (Linde 1092, lot 3869) for lower intermediate to lower shell circumferential weld (1-344). Source: TR-6052B-1. (No data on surveillance material.)
<u>These are labeled as being MIL-B4</u>	
Calvert Cliffs 1	MIL-B4: heats 20291 and 12008 (Linde 1092, lot 3833) for weld seams 2-203A, B, C. Heat 21435 (Linde 1092, lot 3869) for weld seam 3-203A. Heat 21935 (Linde 1092, lot 3869) for weld seams 3-203B, C. Heat 33A277 (Linde 0091, lot 3922)

<u>Plant</u>	<u>Comments</u>
	for seam 9-203 (surveillance weld). Heats 20291 and 12008 (Linde 1092, lot 3833) for seams 1-203A, B, C. Source: December 29, 1977, letter from A. E. Lundvall, Jr. (BG&E) to D. K. Davis (USNRC), subject: Reactor Vessel Material Surveillance Program.
Calvert Cliffs 2	MIL-B4: heat 8741 (Linde 124, lot 3878) for weld 2-203A; heat 8746 (Linde 124, lot 3878) for welds 2-203B, C. Heat 33A277 (Linde 0091, lot 3922) for welds 3-203A, B, C. Heat 33A277 (Linde 0091, lot 3922) for weld 8-203. Heat 10137 (Linde 0091, lot 3995) for weld 9-203 (surveillance weld). Heats 21935 and 12008 (Linde 1092, lot 3869) for weld 1-203A; heat 12008 (Linde 1092, lot 3869) for welds 1-203B, C. Source: December 29, 1977, letter from A. E. Lundvall, Jr. (BG&E) to D. K. Davis (USNRC), subject: Reactor Vessel Material Surveillance Program.
Cooper	MIL-B4: heat 21935 (Linde 1092, lot 3869) for weld lower intermediate to lower shell course circumferential weld 1-240. Heat 20291 (Linde 1092, lot 3833) for surveillance weld. Source: SAIC-85/1136.
Farley 1	MIL-B4: heat 33A277 (Linde 0091, lot 3922) for surveillance weld. Source: SAIC-85/1136; WCAP-11563
Fermi 2	MIL-B4: heats 13253 and 12008 (Linde 1092, lot 3833) for lower shell axial welds. Heat 33A277 (Linde 124, lot 3878) for lower-intermediate shell axial welds. Heat 10137 (Linde 0091, lot 3999) for circumferential weld. Source: February 21, 1991, letter from W. S. Orser (DE) to USNRC Document Control Desk, subject: Proposed Technical Specification Change--Pressure-Temperature Limits; and November 28, 1988, letter from B. R. Sylvia (DECo) to USNRC Document Control Desk, subject: Response to NRC Generic Letter 88-11
FitzPatrick	MIL-B4: heats 27204 and 12008 (Linde 1092, lot 3774) for lower shell axial welds (2-233A, B, C). Heats 13253 and 12008 (Linde 1092, 3774) for lower intermediate shell axial welds (1-233A, B, C) (this is the surveillance weld). Source: May 15, 1978, letter from L. R. Bennett (PASNY) to G. E. Lear (USNRC), subject: James A. FitzPatrick Nuclear Power Plant Reactor Vessel Material Surveillance Program Data; MDE-49-0386 (GE surveillance capsule report)
Ft. Calhoun	MIL-B4: heats 12008, 13252, and 27204 (Linde 1092, lot 3774) for lower shell axial weld (3-410A, C). Heat 20291 (Linde 1092, lot 3774) for intermediate to lower shell circumferential weld (this is also the surveillance weld). Source: TR-O-MCM-001, Rev. 1 (Capsule W-225 report).

<u>Plant</u>	<u>Comments</u>
Hatch 1	MIL-B4: heat 90099 and 33A277 (Linde 0091, lot 3977) for circumferential weld. Source: NEDC-30997, Table 3-1.
Hatch 2	Weld wire type not available from information in my files. Heat 10137 ¹ (Linde 0091, lot 3999) for lower shell axial welds (101-842). Source: SASR 90-104, Table 3-1
LaSalle 1	Weld wire type not available from information in my files. Heats 305424 ¹ (Linde 1092, lot 3889) and IP3571 (Linde 1092, lot 3958) for middle shell axial welds (3-308A, B, C). Heats 305414 and 12008 (Linde 1092, lot 3947) for lower intermediate shell axial welds (4-308A, B, C). Heats 21935 and 12008 (Linde 1092, lot 3889) for lower shell axial welds (2-307A, B, C). Source: SASR 88-10, Table 2-1 McGuire 1: MIL-B4: heats 20291 and 12008 (Linde 1092, lot 3854) for intermediate shell axial welds (surveillance weld). No other data are available in my files.
McGuire 1	MIL-B4: heats 20291 and 12008 (Linde 1092, lot 3854) for intermediate shell axial welds (surveillance weld). No other data are available in my files. Source: WCAP-12354, Table 4-1.
Millstone 2	MIL-B4: heat 8746 (Linde 124, lot 3878) for welds 2-203A, B, C; 3-203A, B, C. Heats 33A277 (Linde 0091, lot 3922) and 10137 (Linde 0091, lot 3999) for weld 8-203A, B, C. Heats 10137 (Linde 0091, lot 3999) and 90136 (Linde 0091, lot 3998) for weld 9-203. Surveillance weld is representative of 9-203; its ID side was made with MIL-B4 Modified wire [heat 90136] with Linde 0091 flux [batch 3998]. The OD side was made with MIL-B4 Modified wire [heat 10137] with Linde 0091 flux [batch 3999]. Note that MIL-B4 was used in the vessel welds, but that MIL-B4 Modified was used in the surveillance weld. Source: December 9, 1977, letter from D. C. Switzer (NNECo) to G. Lear (USNRC), subject: Millstone Nuclear Power Station, Unit 2 Reactor Pressure Vessel Material Surveillance Program; TR-N-MCM-008.
St. Lucie 1	MIL-B4: heats A-8746 and 348009 (Linde 124, lots 3878 and 3688) for the intermediate shell axial welds (2-203A, B, C). Source: TR-F-MCM-004, Table III-2.

¹ This is probably MIL-B4 weld wire.

Mr. G. C. Creel

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March 31, 1992

This requirement affects one respondent and, therefore, is not subject to Office of Management and Budget review under P.L. 96-511.

Sincerely,

Original Signed By

Daniel G. McDonald Jr., Senior
Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. RAI
2. C-E Fabricated Reactor Vessels with
MIL B-4 Modified or MIL B-4
Weld Wire

cc w/enclosures:
See next page

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