

ATTACHMENT (1)

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The response provided below clarifies the following information from References 1 and 2.

NRC Question:

Regarding ISI-020, Table 2 in the original request [Reference 1] mentions an indication in a plate that did not meet the allowable flaw requirements for the proposed voluntary PTS rule. It says that additional information regarding the flaw is provided in Table 3. We don't see anything in Table 3 of the original request and no mention in Table A of the answer to RAI question #1 [Reference 2] of a flaw in plate material.

CCNPP Response:

We believe this question emerges because the subject plate indication is listed under the scanned weld number (weld number 2-203A) in our submittals [i.e., designated as indication 1 on Figure 1 of Attachment 1 (Reference 1) and designated as indication 3 of Table A in Attachment 1 (Reference 2)]. Plotting of the indication in relationship to the weld centerline coordinates puts it in the region of plate material adjacent to the weld. Treating it as a flaw in the plate was the more conservative approach under the risk informed assessment.

Revised information is indicated by a vertical line in the margin.

From Reference 1.

Inspection methodology:	ASME Section XI and Regulatory Guide 1.150 (Reference 7) inspections were Performance Demonstration Initiative (PDI) qualified per Reference 8 and were therefore performed in accordance with the requirements of ASME Section XI Appendix VIII.
Number of past inspections: ⁽¹⁾	All welds have been inspected at least twice with the exception of 5 lower head Meridional welds which have been inspected once.
Number of indications found:	A total of 9 indications were detected in the most recent ISI. All 9 indications are acceptable in accordance with IWB-3500 of Section XI of the ASME Code. Four of these indications are located in the reactor vessel beltline region. Three of these indications meet the "Allowable Number of Flaws" requirements for the proposed voluntary PTS Rule (10 CFR 50.61a) in SECY-07-0104 (Reference 9). One indication, in plate material with a through-wall extent of 0.60", does not meet the requirements in SECY-07-0104. See Note 1 in Table 3 below for additional information regarding this flaw.
Proposed inspection schedule for balance of plant life:	The third ISI is currently scheduled for 2009. The third ISI is proposed to be performed in 2019. The fourth ISI is proposed to be performed in 2039.

NOTE:

⁽¹⁾ Note that the inspections were performed on the original RPV head. The Unit 2 RPV head was replaced in 2007. Therefore, the replacement head-to-flange weld has not received a prior ISI examination.

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Table 3. Details of TWCF Calculation at 60 EPY⁽¹⁾

Inputs								
Reactor Coolant System Temperature, T _{RCS} [°F]:				548		T _{wall} [inches]:		8.625
#	Region/Component Description	Material	Cu [wt%]	Ni [wt%]	P [wt%]	Mn [wt%]	Un-Irradiated RT _{NDT(u)} [°F]	Fluence [10 ¹⁹ Neutron/cm ² , E>1 MeV]
1	Low. Shell Axial Weld	Linde 0091	.240	.160	.014	1.630	-80	7.22
2	Low. Shell Axial Weld	Linde 0091	.240	.160	.014	1.630	-80	7.22
3	Low. Shell Axial Weld	Linde 0091	.240	.160	.014	1.630	-80	7.22
4	Int. Shell Axial Weld	Linde 124	.160	.100	.012	1.630	-56	7.22
5	Int. Shell Axial Weld	Linde 124	.160	.100	.012	1.630	-56	7.22
6	Int. Shell Axial Weld	Linde 124	.160	.100	.012	1.630	-56	7.22
7	Int./Low. Circ Weld	Linde 0091	.210	.060	.014	1.630	-60	7.22
8	Lower Shell Plate	A 533B	.150	.600	.005	1.45	-8	7.22
9	Lower Shell Plate	A 533B	.140	.660	.005	1.45	20	7.22
10	Lower Shell Plate	A 533B	.110	.740	.006	1.45	-16	7.22
11	Inter. Shell Plate	A 533B	.150	.560	.006	1.45	10	7.22
12	Inter. Shell Plate	A 533B	.140	.550	.005	1.45	5	7.22
13	Inter. Shell Plate	A 533B	.110	.560	.007	1.45	10	7.22
Outputs								
Methodology Used to Calculate ΔT ₃₀ :				NUREG-1874				
	Controlling Material Region # (From Above)	RT _{MAX-XX} [R]	Fluence [10 ¹⁹ Neutron/cm ² , E>1 MeV]	φ (flux)	ΔT ₃₀ [°F]	TWCF _{95-XX}		
Axial Weld – AW		9	639.17	7.22	3.81E+10	159.48	8.45E-11	
Circumferential Weld - CW		9	639.17	7.22	3.81E+10	159.48	1.63E-16	
Plate – PL		9	639.17	7.22	3.81E+10	159.48	3.50E-11	
TWCF _{95-TOTAL} (α _{AW} TWCF _{95-AW} + α _{PL} TWCF _{95-PL} + α _{CW} TWCF _{95-CW})								2.89E-10

NOTE:

⁽¹⁾ As indicated in Table 2, there are four flaws in the beltline region of the reactor vessel. Three of these flaws meet the “Allowable Number of Flaws” criteria in SECY-07-0104. However, one flaw, with a through wall extent of 0.60 inches exceeds the criteria. The location of all four flaws relative to the beltline materials is illustrated in Figure 1. The circled numbers in Figure 1 correspond to the regions in Table 3. While one flaw is outside the limits in SECY-07-0104 it is not expected that this flaw would increase the Calvert Cliffs Unit 2 TWCF value above that of the pilot plant for the following reasons:

- This plate which the flaw is located in has a maximum RT_{NDT} + ΔT₃₀ of 141.74°F and is not the limiting material in the beltline region. Furthermore, the peak fluence occurs at the 10, 80, 100, 170, 190, 260, 280, and 350 degree positions and was used to calculate the ΔT₃₀ shift for this plate. The fluence at the 30 degree position where longitudinal weld 2-203A is located in less than 60% of that of the peak fluence. Therefore, the actual RT_{NDT} + ΔT₃₀ at the specific location of this flaw is less than 141.74°F ([projected to be below 130°F](#)).

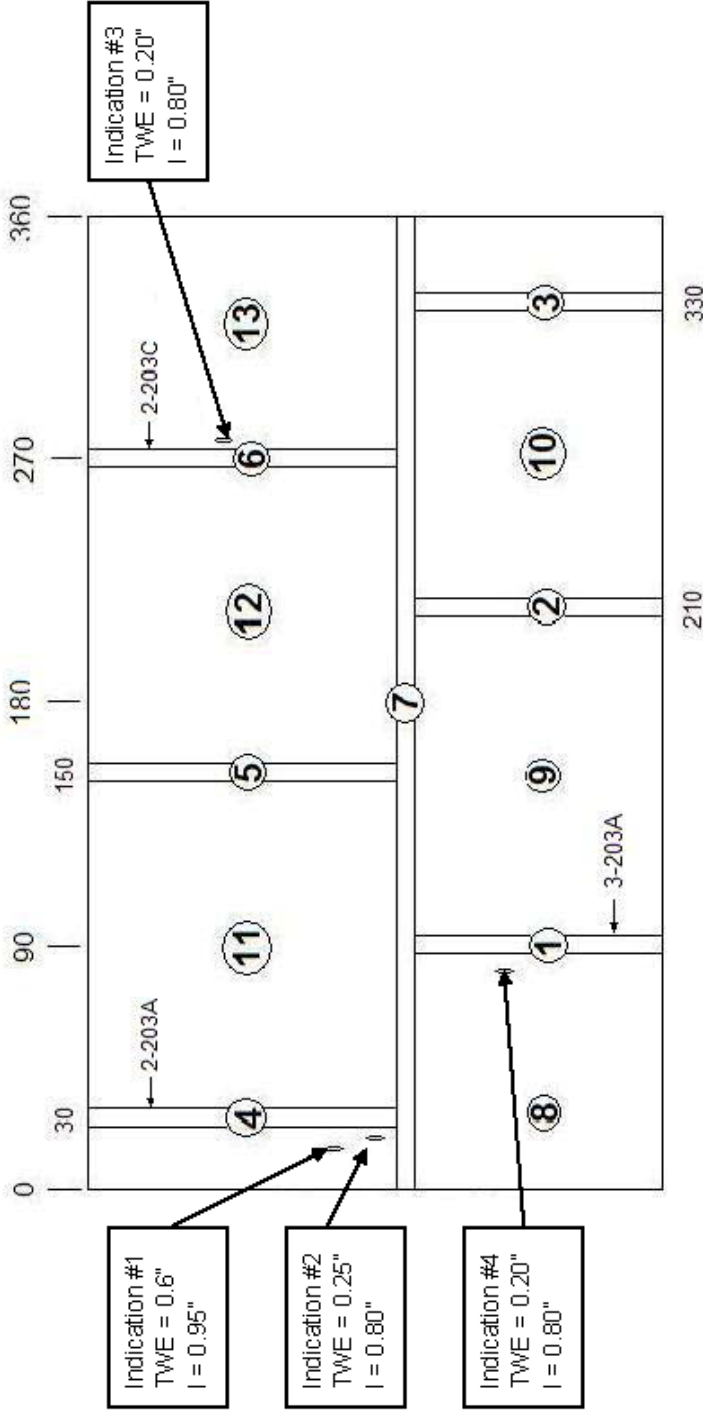
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- The total number of flaws detected in the Calvert Cliffs Unit 2 beltline is far less than that allowed in Tables 2 and 3 of SECY-07-0104.
- The TWCF for the Calvert Cliffs Unit 2 reactor vessel is more than 3 orders of magnitude below that for the bounding pilot plant vessel in WCAP-16168-NP-A, Revision 2.

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Figure 1: Calvert Cliffs Unit 2 Beltline Flow Map



Note that Indication #1 is the indication that exceeds the limits in SECY-07-0104. The indication has a through-wall extent of 0.6", a length of 0.95" and is 0.4" beneath the cladding-to-base-metal interface.

TWE = Through-Wall Extent, l = Length

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From Reference 2.

Table A - Calvert Cliffs Unit 2 Automated Ultrasonic Reactor Pressure Vessel Exams Indication Summary and Comparison⁽⁴⁾								
Weld Number	Ind. # (3)	Flaw Location Azimuthal / Elevation	1999 - 2nd ISI		1987 - 1st ISI ⁽¹⁾		1976 Pre-Service (PSI)	
			a/t %	length (in.)	a/t %	length (in.)	a/t %	length (in.)
405A	1	77.8° / 86.2"	2.19	1.44	Not Recordable	Not Recordable	Not Recordable	Not Recordable
1-203B	2	210.5° / 111.5"	0.56	1.12	Not Recordable	Not Recordable	Not Recordable	Not Recordable
2-203A	3	28.8° / 217.6"	3.36	0.96	Spot ⁽²⁾	1.00	Not Recordable	Not Recordable
Middle Shell Long @ 30°	4	29.5° / 224.7"	1.39	0.8	Not Recordable	Not Recordable	Not Recordable	Not Recordable
2-203C	5	271.8° / 173.9"	1.1	0.8	Not Recordable	Not Recordable	Not Recordable	Not Recordable
3-203A	6	88.1° / 261.3"	1.04	0.79	Not Recordable	Not Recordable	Not Recordable	Not Recordable
8-203	7	19.6° / 132.5"	1.49	1.23	Not Recordable	Not Recordable	Not Recordable	Not Recordable
Upper-to-Middle Shell Circ	8	9.8° / 328.7"	1.94	0.94	Not Recordable	Not Recordable	Not Recordable	Not Recordable
Lower Shell-to-Lower Head Circ	9	25.1° / 328.8"	2.63	0.79	Not Recordable	Not Recordable	Not Recordable	Not Recordable

NOTES:

- (1) The 1987 Examination was conducted in accordance with earlier Editions of the ASME Section XI Code which required examination of only 5% of the length of some circumferential welds and only 10% of the length of some longitudinal welds. Therefore, some weld areas that contained indications in 1999 may not have been examined in 1987.
- (2) Spot reflectors have no measurable through-wall dimension.
- (3) Indication numbers 3, 4, 5, and 6 shown in Table A above corresponds to indication numbers 1, 2, 3 and 4 respectively shown in Attachment 1, Figure 1 of Reference 1.
- (4) The indication size (a/t % and length) shown in this table are not rounded-off per ASME Code for the purpose of comparison.

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REFERENCES

1. Letter from Mr. M. D. Flaherty (CCNPP) to Document Control Desk (NRC), dated October 1, 2008, Revised Request to Extend the Inservice Inspection Interval for Reactor Vessel Weld Examinations – Relief Requests (ISI-020 and ISI-021)
2. Letter from Mr. M. D. Flaherty (CCNPP) to Document Control Desk (NRC), dated December 18, 2008, Response to Request for Additional Information Calvert Cliffs 2: Proposed Alternative ISI-020 Reactor Vessel Weld Examination Extension (TAC No. MD9773)