FENOC

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September 13, 2001
L-01-116

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
Reactor Vessel Capsule W Test Report

Attached is a copy of WCAP-15675 "Analysis of Capsule W from FirstEnergy Nuclear Operating Company Beaver Valley Unit 2 Reactor Vessel Radiation Surveillance Program," Revision 0, dated August 2001.

A technical summary of the results of the mechanical property tests conducted on the third capsule withdrawn from Beaver Valley Unit 2 is provided in this report. The report is being provided in accordance with 10 CFR 50 Appendix H, Section III. The report includes the data required by ASTM E185 as specified in 10 CFR 50 Appendix H paragraph III.B.1. The analysis results indicate that changes to the technical specifications are required for operation beyond the number of effective full power years currently approved for the heatup and cooldown curves. In accordance with 10 CFR 50, Appendix H, Section IV.C, the necessary changes will be proposed in a license amendment request. The license amendment request will consist of a LAR requesting the relocation of the heatup and cooldown curves currently contained in the technical specifications to a licensee controlled Pressure and Temperature Limits Report (PTLR). The PTLR is presently being prepared in accordance with the WCAP-14040-NP-A, Rev. 2, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," dated January 1996 and the guidance of Generic Letter 96-03, "Relocation of the Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits." This LAR is expected to be submitted for NRC review by November 2001. After this LAR is approved, the BVPS Unit 2 PTLR including the heatup and cooldown curves will be revised by FENOC under the provisions of 10 CFR 50.59 to reflect the results of WCAP-15675.

Updated capsule lead factors are provided in Table 7-1 of WCAP-15675. These updates are based on state-of-the-art methodology and nuclear data including recently released neutron transport and dosimetry cross-section libraries derived from the ENDF/B-VI database. The withdrawal schedule shown in Table 7-1 of the WCAP differs from what

A008

is presently shown in Table 5.3-6 of the Unit 2 Updated Final Safety Analysis Report (UFSAR). The capsule withdrawal schedule, Table 5.3-6 of the UFSAR, will be updated to be consistent with the Table 7-1 of WCAP-15675 following NRC approval of the withdrawal schedule. As required by 10 CFR 50, Appendix H, Section III.B.3, FirstEnergy Nuclear Operating Company is requesting NRC approval of the Capsule W withdrawal schedule change (14 Effective Full Power Years) by July 1, 2002.

This letter also transmits WCAP-15676, "Evaluation of Pressurized Thermal Shock for Beaver Valley Unit 2," Revision 0, dated August 2001. The purpose of WCAP-15676 is to determine the RT_{PTS} values for Beaver Valley Unit 2 reactor vessel beltline materials based on the results of the Capsule W evaluations documented in WCAP-15675.

Although not required by 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurizer Thermal Shock," WCAP-15676 is being provided as an informational update to the assessment of the RT_{PTS} values for Beaver Valley Unit 2 reactor vessel beltline materials. As per 10 CFR 50.61(8)(b), an update to the assessment of the RT_{PTS} values is required only when there is a significant change in projected values of RT_{PTS} . This section of 10 CFR 50.61 states that changes to RT_{PTS} are considered significant if the screening criteria are exceeded prior to expiration of the operating license; i.e., End-of-Life. The conclusion of WCAP-15676 is that all the beltline materials in the Beaver Valley Unit 2 reactor vessel have RT_{PTS} values below the screening criteria of 270°F for plates or forgings and longitudinal welds, and 300°F for circumferential welds at End-of-Life; i.e., 32 Effective Full Power Years.

This letter also provides revised information for the NRC Reactor Vessel Integrity Database (RVID2) that reflects the Beaver Valley Power Station Unit 2 surveillance Capsule W analysis. The revised information is provided as Attachment A, which contains markups of RVID screens and revisions to tables within RVID2, reflecting the results of the Capsule W analysis. Incorporation of this information into RVID2 will provide the most current data available from the Unit 2 BVPS surveillance program.

If there are any questions concerning this submittal, please contact Mr. Thomas S. Cosgrove, Manager, Regulatory Affairs at 724-682-5203.

Sincerely,

Lew W. Myers

Lew W. Myers

c: Mr. L. J. Burkhart, Project Manager
Mr. D. M. Kern, Sr. Resident Inspector
Mr. H. J. Miller, NRC Region I Administrator

The Tables Titled, "PTS Summary Report Beaver Valley 2" and "Upper Shelf Energy Summary Report Beaver Valley 2" have changes that are all reflected in Tables 1 through 6. It is assumed that the updates in those tables will be automatically changed throughout RVID2. However, the Table Titled "Surveillance Data Summary Beaver Valley 2," does have additional changes and is reflected in Tables 7 through 11. Note that new data exists for Capsule W, which is shown on Tables 10 and 11.

TABLE 1

Category	**Intermediate Shell B9004-1 (Heat ID: C0544-1)**	
	Change From	**Change To**
Cu:	0.070	0.065
Ni:	0.53	0.55
Fluence(ID) EOL:	3.850	3.847
Chemistry Factor:	44.0	40.5
ΔRTndt @ EOL	59.9	54.6
RTpts @ EOL:	153.3	149.0*
USE @ EOL (1/4T):	63.6	64.0*
% Drop @ EOL (1/4T):	23.3	23.0

* Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 2

Category	**Intermediate Shell B9004-2 (Heat ID: C0544-2)**	
	Change From	**Change To**
Fluence(ID) EOL:	3.850	3.847
Unirr USE:	76.6	79.0
Chemistry Factor:	35.5	41.9
ΔRTndt @ EOL	47.0	56.5
RTpts @ EOL:	104.3	114.0*
USE @ EOL (1/4T):	67.7	71.0*
% Drop @ EOL (1/4T):	10.3	10.0

* Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 3

Category	Lower Shell B9005-1 (Heat ID: C1408-2)	
	Change From	**Change To**
Fluence(ID) EOL:	3.850	3.847
ΔRTndt @ EOL	68.8	68.7
RTpts @ EOL:	130.8	131.0*
USE @ EOL (1/4T):	62.9	63.0*
% Drop @ EOL (1/4T):	23.3	23.0

* Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 4

Category	Lower Shell B9005-2 (Heat ID: C1408-1)	
	Change From	**Change To**
Fluence(ID) EOL:	3.850	3.847
Unirr USE:	77.5	78.0
USE @ EOL (1/4T):	59.4	60.0*
% Drop @ EOL (1/4T):	23.3	23.0

* Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 5

Category	Axial Welds (Heat ID: 82642)	
	Change From	**Change To**
Cu:	0.047	0.046
Ni:	0.085	0.086
Fluence(ID) EOL:	1.210	3.847*
Unirr USE	144.5	145
Fluence Factor @ EOL:	1.053	1.348*
Chemistry Factor:	15.2	10.6
ΔRTndt @ EOL	16.0	14.3
σ(u)	Blank	0.0 Plant Specific
σ(Δ)	Blank	7.15 Surveillance Data
Margin	16.0 Override	14.3 Position 2.1 (S. Data)
RTpts @ EOL:	2.0	-1.0**
USE @ EOL (1/4T):	139.0	137.0**
Fluence (1/4T) @ EOL	0.754	2.400*
% Drop @ EOL (1/4T):	3.8	5.4

* Westinghouse conservatively used the peak fluence projection for all welds, not location specific.

** Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 6

Category	Circ. Weld (Heat ID: 82642)	
	Change From	**Change To**
Cu:	0.047	0.046
Ni:	0.085	0.086
Fluence(ID) EOL:	3.850	3.847*
Unirr USE	144.5	145
Chemistry Factor:	15.2	10.6
ΔRTndt @ EOL	20.5	14.3
σ(u)	Blank	0.0 Plant Specific
σ(Δ)	Blank	7.15 Surveillance Data
Margin	29.4 Override	14.3 Position 2.1 (S. Data)
RTpts @ EOL:	10.9	-1.0**
USE @ EOL (1/4T):	137.3	137.0**
% Drop @ EOL (1/4T):	5.0	5.4

* Westinghouse conservatively used the peak fluence projection for all welds, not location specific.

** Westinghouse rounded calculated value per ASTM E29, using the "Rounding Method".

TABLE 7

Surveillance Data Summary Table Changes				
	PLATE LONGITUDINAL (Cap. U)		**PLATE TRANSVERSE (Cap. U)**	
Category	**Change From**	**Change To**	**Change From**	**Change To**
Capsule, Lead Factor	U, 3.27	U, 3.17	U, 3.27	U, 3.17
Neutron Fluence	0.60	0.608	0.60	0.608
Group CF	35.5	41.9	35.5	41.9
Predicted ΔRTndt	30.4	36.0	30.4	36.0
Predicted – Measured ΔRTndt	6.1	11.7	12.8	21.8
Credible RG1.99 Scatter	Yes	Yes	Yes	No

NOTE: NRC to Update the "σ of Pred-Meas ΔRTndt" & "% Drop in USE Line Offset" Columns

TABLE 8

Surveillance Data Summary Table Changes				
	PLATE LONGITUDINAL (Cap. V)		**PLATE TRANSVERSE (Cap. V)**	
Category	**Change From**	**Change To**	**Change From**	**Change To**
Capsule, Lead Factor	V, 3.67	V, 3.64	V, 3.67	V, 3.64
Neutron Fluence	2.64	2.629	2.64	2.629
Group CF	35.5	41.9	35.5	41.9
Predicted ΔRTndt	44.7	52.8	44.7	52.8
Predicted – Measured ΔRTndt	-11.2	-3.1	-1.6	6.5

NOTE: NRC to Update the "σ of Pred-Meas ΔRTndt" & "% Drop in USE Line Offset" Columns

TABLE 9

Surveillance Data Summary Table Changes				
	WELD (Cap. U)		**WELD (Cap. V)**	
Category	**Change From**	**Change To**	**Change From**	**Change To**
Capsule, Lead Factor	U, 3.27	U, 3.17	V, 3.67	V, 3.64
Neutron Fluence	0.60	0.608	2.64	2.629
Group CF	15.2	10.6	15.2	10.6
Predicted ΔRTndt	13.0	9.1	19.1	13.4
Predicted – Measured ΔRTndt	9.4	5.5	-6.4	-12.1
Cu%	0.080	0.065	0.080	0.065
Ni%	0.070	0.065	0.070	0.065

NOTE: NRC to Update the "σ of Pred-Meas ΔRTndt" & "% Drop in USE Line Offset" Columns

TABLE 10

New Additions for Surveillance Plate on the "Surveillance Data Summary" Table				
	PLATE LONGITUDINAL (Cap. W)		**PLATE TRANSVERSE (Cap. W)**	
Category	**Change From**	**Change To**	**Change From**	**Change To**
Capsule, Lead Factor	N/A	W, 3.29	N/A	W, 3.29
Neutron Fluence	N/A	3.625	N/A	3.625
Fluence Factor	N/A	1.335	N/A	1.335
Group CF	N/A	41.9	N/A	41.9
Used in CF Calcs	N/A	Yes	N/A	Yes
Predicted ΔRTndt	N/A	55.9	N/A	55.9
Measured ΔRTndt	N/A	71.0	N/A	63.4
Predicted – Measured ΔRTndt	N/A	15.1	N/A	7.5
Credible RG1.99 Scatter	N/A	Yes	N/A	Yes
Unirr USE	N/A	95	N/A	79
Meas USE	N/A	94	N/A	75
% Drop in USE	N/A	1.0	N/A	5.0

NOTE: NRC to Update the "σ of Pred-Meas ΔRTndt" & "% Drop in USE Line Offset" Columns

TABLE 11

New Additions for Surveillance Weld on the "Surveillance Data Summary" Table		
	WELD (Cap. W)	
Category	**Change From**	**Change To**
Capsule, Lead Factor	N/A	W, 3.29
Neutron Fluence	N/A	3.625
Fluence Factor	N/A	1.335
Group CF	N/A	10.6
Used in CF Calcs	N/A	Yes
Predicted ΔRTndt	N/A	14.2
Measured ΔRTndt	N/A	6.2
Predicted – Measured ΔRTndt	N/A	8.0
Credible RG1.99 Scatter	N/A	Yes
Unirr USE	N/A	139
Meas USE	N/A	136
% Drop in USE	N/A	2.0
Cu%	N/A	0.065
Ni%	N/A	0.065

NOTE: NRC to Update the "σ of Pred-Meas ΔRTndt" & "% Drop in USE Line Offset" Columns

File Edit Help

BEAVER VALLEY 2

Print | Close

Log Date/Time: 11/24/99 8:52:11 AM

Docket No:	50-412
License No:	NPF-73
Manufacturer:	COMBUSTION ENGINEERING
NSSS Designer:	WESTINGHOUSE
Owmergroup:	WOG
Reactor Type:	PWR
EOL Years:	32
EOL Date:	5/27/27
Vessel Thickness:	7.88
Vessel Radius:	78.5

Additional Data

Additional Notes | Closure Flange

Copper and nickel contents for circumferential and axial welds fabricated from heat number 83642 are from the July 9, 1998 letter from S. Jain (DLC) to the USNRC Document Control Desk, subject: "Response to Request for Additional Information, Generic Letter 92-01, Revision 1, Supplement 1, Reactor Vessel Structural Integrity."

Revised copper & nickel contents for the Beaver Valley Unit 2 (BV2) beltline plates, the revised PTS assessment for BV2, and confirmation of revised neutron fluences are from WCAP-14484, which was submitted in the

NRC will update upon submittal of capsule w WCAP-Report.

FORGINGS, PLATES, WELDS | SURVEILLANCE DATA

FORGINGS, PLATES, WELDS FOR THIS PLANT

		HEAT ID	BASE METAL FLUX TYPE	BELTLINE ID
PLATE	DETAIL	C0544-1	A 533B	INTERMEDIATE SHELL B9004-1
PLATE	DETAIL	C0544-2	A 533B	INTERMEDIATE SHELL B9004-2
PLATE	DETAIL	C1408-1	A 533B	LOWER SHELL B9005-2
PLATE	DETAIL	C1408-2	A 533B	LOWER SHELL B9005-1

Record: 1 of 6

Form View

Reactor Vessel Integrity Database - [Plate Detail]

File Edit Help

Plate Detail

Print | Close

Plant: BEAVER VALLEY 2
Docket No: 50-412 | Log Date/Time: 12/29/98 2:38:39 PM
Reactor Type: PWR | Vessel Thickness: 7.88
Plate ID (generated by system): 71

INPUT DATA

Heat ID: C0544-1 | Yrs Calc: 32
Beltline ID: INTERMEDIATE SHELL B9004-1
Base Metal: A 533B

Chemistry

Cu: ~~0.070~~ 0.065 | Ni: ~~0.050~~ 0.55
P: 0.000 | S: 0.000

	Value	Method
RTndt(u):	60.0	PLANT SPECIFIC
Fluence(ID) EOL:	~~3.050~~ 3.847	
Chem Factor:		ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
σ(u):		
σ(Δ):		
Margin:		
Limiting Material:	YES	
Unirr USE:	83.0	DIRECT

CALCULATED DATA

	Value	Method	
RTndt(u):	60.0	PLANT SPECIFIC	RTndt(u)
Fluence Factor @ EOL:	1.348	fluence(ID)^(.28 - 1.log(fluence(ID)))	
Chemistry Factor:	~~44.0~~ 40.5	TABLE	
Δ RTndt @ EOL:	~~59.3~~ 54.6	#NUM!	
σ(u)	0.0	PLANT SPECIFIC	RTndt(u)
σ(Δ)	17.0	NO SURVEILLANCE DATA	
Margin:	34.0	POSITION 1.1 (NO S DATA)	
RTpts @ EOL	~~153.3~~ 149	RTndt(u) + DRTndt + Margin	
USE @ EOL (1/4T):	~~68.6~~ 64.0	2.400	Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T):	~~23.3~~ 23.0	POSITION 1.2 (NO S DATA)	

Record: 1 of 6

Form View | FLTR

(SEE Table 1)

Reactor Vessel Integrity Database - [Plate Detail]

File Edit Help

Plate Detail

Print Close

Plant: BEAVER VALLEY 2

Docket No: 50-412 Log Date/Time: 12/29/98 2:22:38 PM

Reactor Type: PWR Vessel Thickness: 7.88

Plate ID (generated by system): 72

INPUT DATA

Heat ID: C0544-2 Yrs Calc: 32

Beltline ID: INTERMEDIATE SHELL B9004-2

Base Metal: A 533B

Chemistry

Cu: 0.060 Ni: 0.570

P: 0.010 S: 0.016

	Value	Method
RTndt(u):	40.0	PLANT SPECIFIC
Fluence(ID) EOL:	~~3.250~~ 3.847	
Chem Factor:		ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
σ(u):		
σ(Δ):		
Margin:		
Limiting Material		
Unirr USE:	~~76.6~~ 79	DIRECT

CALCULATED DATA

	Value	Method	
RTndt(u):	40.0	PLANT SPECIFIC	RTndt(u)
Fluence Factor @ EOL:	1.348	~~fluence(ID)^(.28 - 1 log(fluence(ID)))~~	
Chemistry Factor:	~~36.6~~ 41.9	SURVEILLANCE NON-RATIO (NOTE: RATIO = 1.0)	
Δ RTndt @ EOL:	~~47.0~~	~~FF x CF~~	SURVEY CALC DETAIL
σ(u):	0.0	PLANT SPECIFIC	RTndt(u)
σ(Δ):	8.5	SURVEILLANCE DATA	
Margin:	17.0	POSITION 2.1 (S DATA)	
RTpts @ EOL:	~~104.9~~ 114.0	~~RTndt(u) + DRTndt + Margin~~	
USE @ EOL (1/4T):	~~67.7~~ 71	2.400	Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T):	~~10.3~~ 10	POSITION 2.2 (S DATA)	

Record: 2 of 6

Form View

(See Table 2)

Reactor Vessel Integrity Database - [Plate Detail]

File Edit Help

Plate Detail

Print | Close

Plant: BEAVER VALLEY 2 | Reactor Type: PWR | Vessel Thickness: 7.88

Docket No: 50-412 | Log Date/Time : 12/29/96 2:28:00 PM | Plate ID (generated by system): 73

INPUT DATA

Heat ID: C1408-2 | Yrs Calc: 32

Beltline ID: LOWER SHELL B9005-1

Base Metal: A 533B

Chemistry

Cu:	0.080	Ni:	0.580
P:	0.000	S:	0.000

	Value	Method
RTndt(u):	28.0	PLANT SPECIFIC
Fluence(ID): EOL:	~~3.850~~ 3.847	
Chem Factor:		ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
σ(u):		
σ(Δ):		
Margin:		
Limiting Material:		
Uniir USE:	82.0	DIRECT

CALCULATED DATA

	Value	Method
RTndt(u):	28.0	PLANT SPECIFIC RTndt(u)
Fluence Factor @ EOL:	1.348	fluence(ID)^(.28-.1 log(fluence(ID)))
Chemistry Factor:	51.0	TABLE
Δ RTndt @ EOL:	~~69.0~~	FFxCF
σ(u):	0.0	PLANT SPECIFIC RTndt(u)
σ(Δ):	17.0	NO SURVEILLANCE DATA
Margin:	34.0	POSITION 1.1 (NO S DATA)
RTpts @ EOL:	~~131.0~~	RTndt(u) + DRTndt + Margin
USE @ EOL (1/4T):	~~63.0~~	2.400 Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T):	~~23.0~~	POSITION 1.2 (NO S DATA)

68.7

131.0

63.0

23.0

Record: 4 of 6

Form View

(SEE TABLE 3)

Reactor Vessel Integrity Database - [Plate Detail]

File Edit Help

Plate Detail

Print | Close

Plant	BEAVER VALLEY 2	Reactor Type: PWR	Vessel Thickness: 7.88
Docket No:	50-412	Log Date/Time: 12/29/98 2:29:46 PM	Plate ID (generated by system): 74

INPUT DATA

Heat ID: 21408-1 Yrs Calc: 32

Beltline ID: LOWER SHELL B9005-2

Base Metal: A 533B

Chemistry

Cu:	0.070	Ni:	0.570
P:	0.000	S:	0.000

	Value	Method
RTndt(u):	33.0	PLANT SPECIFIC
Fluence(ID) EOL:	~~2.969~~ 3.847	
Chem Factor:		ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
σ(u):		
σ(Δ):		
Margin:		
Limiting Material:		
Unirr USE:	~~77.6~~ 78	DIRECT

CALCULATED DATA

	Value	Method	
RTndt(u):	33.0	PLANT SPECIFIC	RTndt(u)
Fluence Factor @ EOL:	1.348	fluence(ID)^(.28-.1 log(fluence(ID)))	
Chemistry Factor:	44.0	TABLE	
Δ RTndt @ EOL:	59.3	FFxCF	
σ(u):	0.0	PLANT SPECIFIC	RTndt(u)
σ(Δ):	17.0	NO SURVEILLANCE DATA	
Margin:	34.0	POSITION 1.1 (NO S DATA)	
RTpts @ EOL:	126.3	RTndt(u) + DRTndt + Margin	
USE @ EOL (1/4T):	~~59.1~~ 60.0	2.400	Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T):	~~23.3~~ 23.0	POSITION 1.2 (NO S DATA)	

(NOTE: WCAP Rounds to 126)

Record: 3 of 6

Form View

(SEE TABLE 4)

Reactor Vessel Integrity Database - [Weld Detail]

File Edit Help

Weld Detail

Print | Close

Plant: BEAVER VALLEY 2 | Reactor Type: PWR | Vessel Thickness: 7.88

Docket No: 50-412 | Log Date/Time: 12/29/98 3:11:26 PM | Weld ID (generated by system): 904

INPUT DATA

Heat ID: 83642 | Yrs Calc: 32 | Location: | Orientation:

Beltline ID: AXIAL WELDS | Capsules:

Flux Type: LINDE 0091 | Heat Wire: 83642 | Flux Lot: | Weld Code: LINDE 0091

Chemistry

Cu: ~~0.047~~ 0.046 | Ni: ~~0.086~~ 0.066

P: 0.000 | S: 0.000

	Value	Method
RTndt(u):	-30.0	PLANT SPECIFIC
Fluence(10) EOL:	~~1.218~~ 3.847 *	
Chem Factor:		ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
σ(u):		
σ(Δ):		
delete Margin:	~~16.0~~	
Limiting Material:		
Unirr USE:	~~144.6~~ 146	DIRECT

CALCULATED DATA | Show Notes

	Value	Method
RTndt(u):	-30.0	PLANT SPECIFIC RTndt(u)
Fluence Factor @ EOL:	~~1.063~~ 1.348 *	~~fluence(10)/(28-1 log(fluence(10)))~~
Chemistry Factor:	~~15.2~~ 10.6 (RATIO = 1.0)	~~SURVEILLANCE NON-RATIO~~
Δ RTndt @ EOL:	~~16.0~~ 14.3	~~FFxCF~~ SURVEY CALC DETAIL
σ(u):	0.0	Plant Specific RTndt(u)
σ(Δ):	7.15	Surv. Data
Margin:	~~16.0~~ 14.3 Position 2.1 (S. Data)	OVERRIDE
RTpts @ EOL:	~~-3.0~~	RTndt(u) + DRTndt + Margin
USE @ EOL (1/4T):	~~130.0~~ 137	~~0.754~~ 2.400 * Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T):	~~-3.0~~ 5.4	POSITION 2.2 (S DATA)

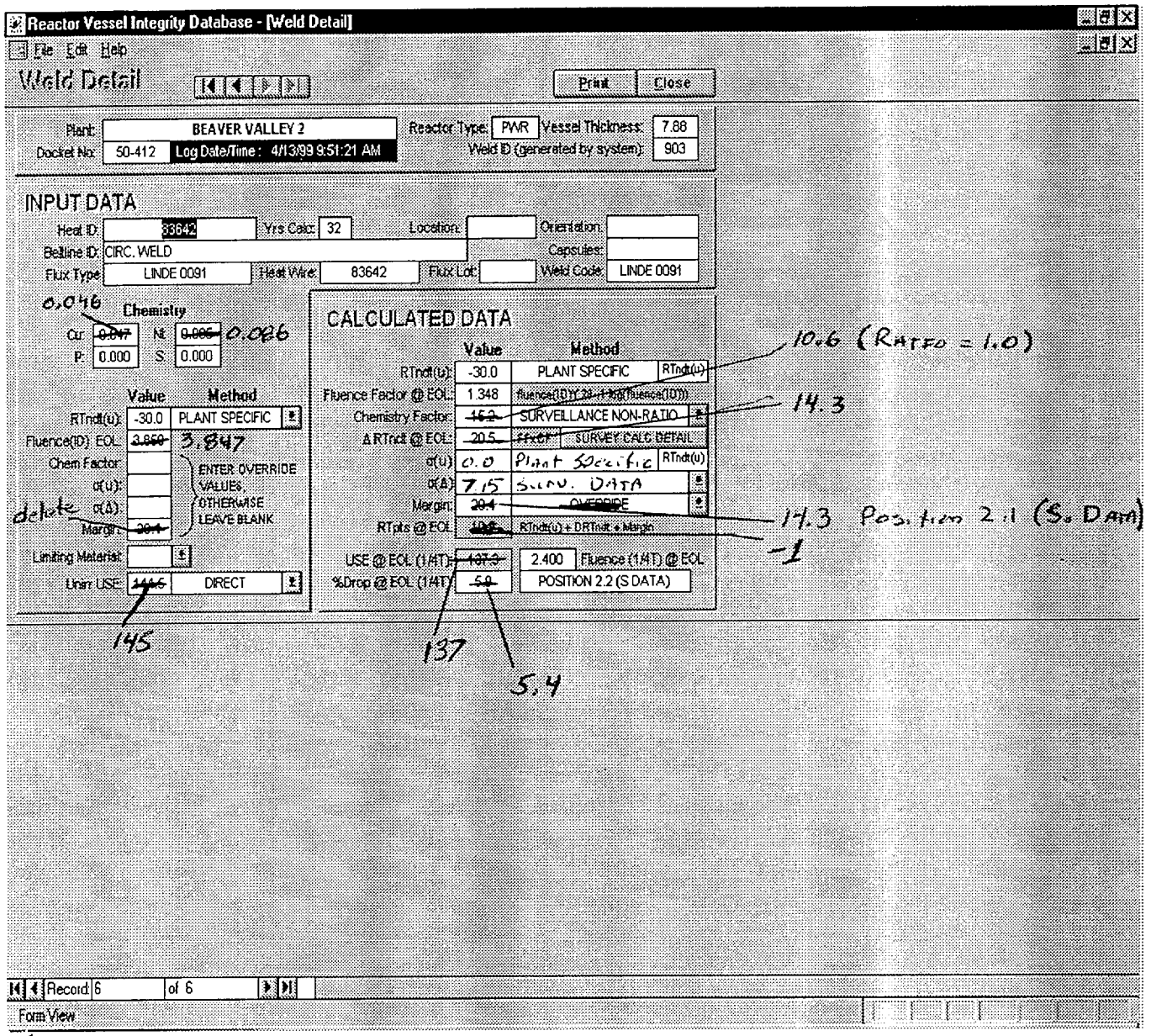
-1

Record: 5 of 6

Form View

* Conservatively used peak fluence projection on the vessel for all welds.

(See Table 5)


Reactor Vessel Integrity Database - [Weld Detail]
File Edit Help
Weld Detail
Print
Close
Plant: BEAVER VALLEY 2
Docket No: 50-412
Log Date/Time: 4/13/99 9:51:21 AM
Reactor Type: PWR
Vessel Thickness: 7.88
Weld ID (generated by system): 903
INPUT DATA
Heat ID: 83642
Yrs Calc: 32
Location:
Orientation:
Beltline ID: CIRC. WELD
Capsules:
Flux Type: LINDE 0091
Heat Wire: 83642
Flux Lot:
Weld Code: LINDE 0091
Chemistry
Cu: 0.047
Ni: 0.085
P: 0.000
S: 0.000
Value
Method
RTndt(u): -30.0 PLANT SPECIFIC
Fluence(ID) EOL: 3.850
Chem Factor:
σ(u):
σ(Δ):
Margin: 20.4
ENTER OVERRIDE VALUES, OTHERWISE LEAVE BLANK
Limiting Material:
Unirr USE: 144.5 DIRECT
CALCULATED DATA
Value
Method
RTndt(u): -30.0 PLANT SPECIFIC
Fluence Factor @ EOL: 1.348
Chemistry Factor: 15.2 SURVEILLANCE NON-RATIO
ΔRTndt @ EOL: 20.5 SURVEY CALC DETAIL
σ(u): 0.0 Plant Specific
σ(Δ): 7.15 SURV. DATA
Margin: 20.4 OVERRIDE
RTpts @ EOL: 10.6 RTndt(u) + DRTndt + Margin
USE @ EOL (1/4T): 137.3
2.400 Fluence (1/4T) @ EOL
%Drop @ EOL (1/4T): 5.9
POSITION 2.2 (S DATA)
Record: 6 of 6
Form View
0.046
0.086
3.847
delete
145
137
5.4
10.6 (RATIO = 1.0)
14.3
14.3 Position 2.1 (S. DATA)
-1

(SEE Table 6)

Reactor Vessel Integrity Database - [PTS/PT-Limits Summary Report]

File Edit Help

Main Screen

NRC - Reactor Vessel Integrity Database

PTS Summary Report

BEAVER VALLEY 2

Printed 8/17/2001 8:17:36 A

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Docket No: 50-412

EOL Date: 05/27/2027

Beltline Identification		RTpts @EOL	Neutron Fluence @ EOL	RTndt(u)	RTndt(u) METHOD	ΔRTndt(u) @ EOL	Fluence Factor @ EOL	Chem Factor	Chemistry Factor Method	Margin	Margin Method	Cu %	Ni %	P %	S %
INTERMEDIATE SHELL B9004-1		~~159.5~~ 149	~~3.050~~ 3.847	60.0	PLANT SPECIFIC	~~50.0~~ 54.6	1.348	~~44.00~~ 40.5	TABLE	34.0	POSITION 1.1 (NO S DATA)	~~0.070~~ 0.065	~~0.510~~ 5	0.000	0.000
PLATE	C0544-1														
INTERMEDIATE SHELL B9004-2		~~194.9~~ 17.4	~~3.050~~ 3.847	40.0	PLANT SPECIFIC	~~47.0~~ 56.5	1.348	~~25.46~~ 41.9	SURVEILLANCE NON-RATIO	17.0	POSITION 2.1 (S DATA)	0.080	0.570	0.010	0.016
PLATE	C0544-2														
LOWER SHELL B9005-2		126.3	~~0.850~~ 3.847	33.0	PLANT SPECIFIC	59.3	1.348	44.00	TABLE	34.0	POSITION 1.1 (NO S DATA)	0.070	0.570	0.000	0.000
PLATE	C1408-1														
LOWER SHELL B9005-1		~~120.0~~ 131	~~3.850~~ 3.847	28.0	PLANT SPECIFIC	~~60.0~~ 68.7	1.348	51.00	TABLE	34.0	POSITION 1.1 (NO S DATA)	0.080	0.580	0.000	0.000
PLATE	C1408-2														
AXIAL WELDS		~~2.0~~ -1 *	~~1.010~~ * 3.847	-30.0	PLANT SPECIFIC	~~18.0~~ * 14.3	~~1.050~~ * 1.348	~~15.17~~ 10.6	SURVEILLANCE NON-RATIO	~~18.0~~ 14.3	~~OVERRIDE~~ →	~~0.047~~ 0.046	~~0.005~~ 0.006	0.000	0.000
WELD	83642														
CIRC. WELD		~~10.0~~ -1	~~2.050~~ 3.847	-30.0	PLANT SPECIFIC	~~20.5~~ 14.3	1.348	~~15.17~~ 10.6	SURVEILLANCE NON-RATIO	~~20.4~~ 14.3	~~OVERRIDE~~ →	~~0.047~~ 0.046	~~0.005~~ 0.006	0.000	0.000
WELD	83642														

Plant References and Beltline Material Notes

Copper and nickel contents for circumferential and axial welds fabricated from heat number 83642 are from the July 9, 1998 letter from S. Jain (DLC) to the USNRC Document Control Desk, subject: "Response to Request for Additional Information, Generic Letter 92-01, Revision 1, Supplement 1, Reactor Vessel Structural Integrity."

Revised copper & nickel contents for the Beaver Valley Unit 2 (BV2) beltline plates, the revised PTS assessment for BV2, and confirmation of revised neutron fluences are from WCAP-14484, which was submitted in the February 13, 1997 letter from S.C. Jain (DLC) to the USNRC Document Control Desk. The submittal also includes WCAP-14784, Revision 2, "Evaluation of Pressurized Thermal Shock for Beaver Valley Unit 2," dated February, 1997.

Unirradiated upper shelf energies (UUSE) are from the July 8, 1992 letter from J.D. Sieber to the USNRC Document Control Desk, subject: "Beaver Valley Power Station, Units No. 1 and No. 2, Response to Generic Letter 92-01".

Credible surveillance data are available for the evaluation of axial and circumferential welds fabricated from heat number 83642. Therefore, Position 2.1 of Regulatory Guide (RG) 1.99, Revision 2, is applicable for determining the chemistry factor and margin values for these welds; however, the margin method for these welds is "override" since sigma delta need not be greater than 1/2 delta RTndt per RG 1.99, Revision 2.

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* Conservatively used peak fluencer Projections on all welds.

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Upper Shelf Energy Summary Report

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BEAVER VALLEY 2

Docket No: 50-412

EOL Date: 05/27/2027

Beltline Identification Type	Heat ID	Material Type	USE @ EOL @ 1/4T	1/4 T Neutron Fluence @ EOL	Unirradiated USE	Unirradiated USE Method	% Drop in USE @ EOL @ 1/4T	% Drop in USE Method	Cu %
INTERMEDIATE SHELL B9004-1		A533B	~~82.84~~ 64	2.400	83.00	DIRECT	~~22.39~~ 23	POSITION 1.2 (NO S DATA)	~~0.078~~ 0.065
PLATE	C0544-1								
INTERMEDIATE SHELL B9004-2		A533B	~~67.70~~ 71	2.400	~~75.60~~ 71	DIRECT	~~10.29~~ 10	POSITION 2.2 (S DATA)	0.060
PLATE	C0544-2								
LOWER SHELL B9005-2		A533B	~~59.43~~ 60	2.400	~~77.60~~ 78	DIRECT	~~29.31~~ 23	POSITION 1.2 (NO S DATA)	~~0.078~~ OK AS IS
PLATE	C1408-1								
LOWER SHELL B9005-1		A533B	~~62.80~~ 63	2.400	82.00	DIRECT	~~29.31~~ 23	POSITION 1.2 (NO S DATA)	0.080
PLATE	C1408-2								
AXIAL WELDS		LINDE0091	~~139.99~~ 137	~~0.764~~ 2.400*	~~144.50~~ 145	DIRECT	~~3.79~~ 5.4	POSITION 2.2 (S DATA)	~~0.047~~ 0.046
WELD	83642								
CIRC. WELD		LINDE0091	~~137.98~~ 137	2.400	~~144.80~~ 145	DIRECT	~~4.80~~ 5.4	POSITION 2.2 (S DATA)	~~0.047~~ 0.046
WELD	83642								

Plant References and Beltline Material Notes

Copper and nickel contents for circumferential and axial welds fabricated from heat number 83642 are from the July 9, 1998 letter from S. Jain (DLC) to the USNRC Document Control Desk, subject: "Response to Request for Additional Information, Generic Letter 92-01, Revision 1, Supplement 1, Reactor Vessel Structural Integrity."

Revised copper & nickel contents for the Beaver Valley Unit 2 (BV2) beltline plates, the revised PTS assessment for BV2, and confirmation of revised neutron fluences are from WCAP-14484, which was submitted in the February 13, 1997 letter from S.C. Jain (DLC) to the USNRC Document Control Desk. The submittal also includes WCAP-14784, Revision 2, "Evaluation of Pressurized Thermal Shock for Beaver Valley Unit 2," dated February, 1997.

Unirradiated upper shelf energies (UUSE) are from the July 8, 1992 letter from J.D. Sieber to the USNRC Document Control Desk, subject: "Beaver Valley Power Station, Units No. 1 and No. 2, Response to Generic Letter 92-01".

Credible surveillance data are available for the evaluation of axial and circumferential welds fabricated from heat number 83642. Therefore, Position 2.1 of Regulatory Guide (RG) 1.99, Revision 2, is applicable for determining the chemistry factor and margin values for these welds; however, the margin method for these welds is "override" since sigma delta need not be greater than 1/2 delta RTndt per RG 1.99, Revision 2.

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* Conservatively used Peak Fluence Projection on All welds.

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Surveillance Data Summary

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BEAVER VALLEY 2

Docket No: 50-412

EOL Date: 05/27/2027

	Type / Direction	Heat ID / Capsule, Lead Factor	Neutron Fluence	Fluence Factor	Group CF *	Used in CF Calcs	Predicted Δ RTndt	Measured Δ RTndt	Predicted - Measured Δ RTndt	Credible RG1.99 Scatter	σ of Pred-Meas Δ RTndt	Unir USE	Meas USE	% Drop in USE	% Drop in USE Line Offset	Cu %	Ni %	P %	S %
See Table 7	PLATE	C0544-2	~~0.88~~ 0.608	0.86	~~25.5~~ 41.9	YES	~~29.4~~ 36.0	24.3	~~8.4~~ 11.7	YES	8.9	95.0	105.0	0.00	-3.94771	0.050	0.560	0.010	0.016
	LONGITUDINAL	U, ~~2.27~~ 3.17																	
	PLATE	C0544-2	~~0.88~~ 0.608	0.86	~~25.5~~ 41.9	YES	~~30.4~~ 36.0	17.6	~~12.8~~ 21.8	~~YES~~ NO	8.9	79.0	87.0	0.00	-3.94771	0.050	0.560	0.010	0.016
	TRANSVERSE	U, ~~2.27~~ 3.17																	
See Table 8	PLATE	C0544-2	~~2.84~~ 2.629	1.26	~~25.5~~ 41.9	YES	~~44.7~~ 52.8	55.9	~~-11.2~~ -3.1	YES	8.9	95.0	85.0	10.5	0.92258	0.050	0.560	0.010	0.016
	LONGITUDINAL	V, ~~3.87~~ 3.64																	
	PLATE	C0544-2	~~2.84~~ 2.629	1.26	~~25.5~~ 41.9	YES	~~44.7~~ 52.8	46.3	~~-1.8~~ 6.5	YES	8.9	79.0	76.0	~~3.80~~ 4.0	0.47980	0.050	0.560	0.010	0.016
	TRANSVERSE	V, ~~3.87~~ 3.64																	
Table 9	WELD	83642	~~0.88~~ 0.608	0.86	~~15.2~~ 10.6	YES	~~18.0~~ 9.1	3.6	~~9.4~~ 5.5	YES	7.9	139.0	134.0	~~3.80~~ 4.0	0.80771	~~0.060~~ 0.065	~~0.070~~ 0.065	0.008	0.011
	N/A	U, ~~2.27~~ 3.17																	
	WELD	83642	~~2.84~~ 2.629	1.26	~~15.2~~ 10.6	YES	~~18.1~~ 13.4	25.5	~~-0.4~~ -12.1	YES	7.9	139.0	136.0	~~2.18~~ 2.0	0.23543	~~0.060~~ 0.065	~~0.070~~ 0.065	0.008	0.011
	N/A	V, ~~3.87~~ 3.64																	
Table 10	PLATE	C0544-2	3.625	1.335	41.9	Yes	55.9	71.0	15.1	Yes		95	94	1.0		No Change			
	LONG.	W, 3.29																	
	PLATE	C0544-2	3.625	1.335	41.9	Yes	55.9	63.4	7.5	Yes		79	75	5.0		No Change			
	TRANS.	W, 3.29																	
Table 11	WELD	83642	3.625	1.335	10.6	YES	14.2	6.2	8.0	Yes		139	136	2.0		0.065	0.065	0.008	0.011
	N/A	W, 3.29																	

* Calculated using Surv. Capsule Data.

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