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September 19, 2007
L-07-130

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

Subject: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Unit 1 Pressure and Temperature Limits Report, Revision 4

FirstEnergy Nuclear Operating Company (FENOC) hereby submits revised pages of the Pressure and Temperature Limits Report (PTLR) for Beaver Valley Power Station (BVPS) Unit No. 1 as required by Section 5.6.4 of the BVPS Technical Specifications. Revision 4 of the BVPS Unit No. 1 PTLR is enclosed.

The revisions to the Unit No. 1 PTLR, effective September 18, 2007, were made to change the applicability of the heatup and cooldown requirement to 30 effective full power years.

No regulatory commitments are contained in this submittal. If there are questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager - FENOC Fleet Licensing, at (330) 761-6071.

Sincerely,

Peter P. Sena III

Enclosure:

Beaver Valley Power Station Unit No. 1, Pressure and Temperature Limits Report, Revision 4

c: Ms. N. S. Morgan, NRR Project Manager
Mr. D. L. Werkheiser, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. J. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

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NRR

L-07-130 Enclosure

Beaver Valley Power Station

Unit No. 1

Pressure and Temperature Limits Report

Revision 4

5.2 Pressure and Temperature Limits Report

5.2.1.3 OPPS Enable Temperature (LCO 3.4.12)

Two different temperatures are used to determine the OPPS enable temperature, they are the arming temperature and the calculated enable temperature. The arming temperature (when the OPPS rendered operable) is established per ASME Section XI, Appendix G. At this temperature, a steam bubble would be present in the pressurizer, thus reducing the potential of a water hammer discharge that could challenge the piping limits. Based on this method, the arming temperature is 347°F.

The calculated enable temperature is based on either a RCS temperature of less than 200°F or materials concerns (reactor vessel metal temperature less than RT_{NDT} + 50°F), whichever is greater. The calculated enable temperature does not address the piping limit attributed to a water hammer discharge. The calculated enable temperature is 318°F.

As the arming temperature is higher and, therefore, more conservative than the calculated enable temperature, the OPPS enable temperature, as shown in Table 5.2-3, is set to equal the arming temperature.

The calculation method governing the heatup and cooldown of the RCS requires the arming of the OPPS at and below the OPPS enable temperature specified in Table 5.2-3, and disarming of the OPPS above this temperature. The OPPS is required to be enabled, i.e., OPERABLE, when any RCS cold leg temperature is less than or equal to this temperature.

From a plant operations viewpoint the terms "armed" and "enabled" are synonymous when it comes to activating the OPPS. As stated in the applicable operating procedure, the OPPS is activated (armed/enabled) manually before entering the applicability of LCO 3.4.12. This is accomplished by placing two keylock switches (one in each train) into their "automatic" position. Once OPPS is activated (armed/enabled) reactor coolant system pressure transmitters will signal a rise in system pressure above the OPPS setpoint. This will initiate an alarm in the control room and open the OPPS PORVs.

5.2.1.4 Reactor Vessel Boltup Temperature (LCO 3.4.3)

The minimum boltup temperature for the Reactor Vessel Flange shall be ≥ 60°F. Boltup is a condition in which the reactor vessel head is installed with tension applied to any stud, and with the RCS vented to atmosphere.

5.2 Pressure and Temperature Limits Report

5.2.3 Supplemental Data Tables

The following tables provide supplemental information on reactor vessel material properties and are provided to be consistent with Generic Letter 96-03. Some of the material property values shown were used as inputs to the P/T limits.

Table 5.2-4, taken from Reference 5, shows the calculation of the surveillance material chemistry factors using surveillance capsule data.

Table 5.2-4a, taken from Reference 2, shows the Calculation of Chemistry Factors based on St. Lucie and Fort Calhoun Surveillance Capsule Data.

Table 5.2-4b, taken from Reference 3, shows the St. Lucie and Fort Calhoun Surveillance Weld Data.

Table 5.2-5, taken from Reference 2, provides the reactor vessel beltline material property table.

Table 5.2-6, taken from Reference 12, provides a summary of the Adjusted Reference Temperature (ARTs) for 30 EFPY.

Table 5.2-7, taken from Reference 12, shows the calculation of ARTs for 30 EFPY.

Table 5.2-8 shows the Reactor Vessel Toughness Data (Unirradiated).

Table 5.2-9, taken from Reference 5, provides RT_{PTS} values for 28 EFPY.

Table 5.2-10, taken from Reference 11, provides RT_{PTS} values for 54 EFPY.

5.2 Pressure and Temperature Limits Report

5.2.4 References

1. WCAP-14040-NP-A, Revision 2, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," J. D. Andrachek, et al., January 1996.

2. WCAP-15570, Revision 2, "Beaver Valley Unit 1 Heatup and Cooldown Limit Curves for Normal Operation," T. J. Laubham, April 2001.

3. WCAP-15571, "Analysis of Capsule Y from Beaver Valley Unit 1 Reactor Vessel Radiation Surveillance Program," C. Brown, et. al., November 2000.

4. WCAP-8475, "Duquesne Light Company, Beaver Valley Unit No. 1 Reactor Vessel Radiation Surveillance Program," J. A. Davidson, October 1974.

5. WCAP-15569, "Evaluation of Pressurized Thermal Shock for Beaver Valley Unit 1," C. Brown, et al., November 2000.

6. 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements," Federal Register, Volume 60, No. 243, December 19, 1995.

7. 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events," May 15, 1991. (PTS Rule)

8. Regulatory Guide 1.99, Rev. 2, "Radiation Embrittlement of Reactor Vessel Materials," U.S. Nuclear Regulatory Commission, May 1988.

9. Deleted

10. FirstEnergy Nuclear Operating Company letter L-01-157, "Supplement to License Amendment Requests Nos. 295 and 167," dated December 21, 2001.

11. WCAP-15571, Supplement 1, "Analysis of Capsule Y from FirstEnergy Company Beaver Valley Unit 1 Reactor Vessel Radiation Surveillance Program," B. N. Burgos, June 2007.

12. WCAP-16799-NP, Revision 1, "Beaver Valley Power Station Unit 1 Heatup and Cooldown Limit Curves for Normal Operation," B. N. Burgos, June 2007.

13. FENOC-07-120, Transmittal of LTOPS Setpoint Analysis Report, July 26, 2007.

14. Westinghouse Calculation CN-SCS-07-27, Rev. 0, LTOPS Setpoint Evaluation for Beaver Valley Unit 1 at 30 EFPY.

MATERIAL PROPERTY BASIS
LIMITING MATERIAL: LOWER SHELL PLATE
LIMITING ART VALUES AT 30 EFPY: 1/4T, 245.7°F
3/4T, 207.6°F

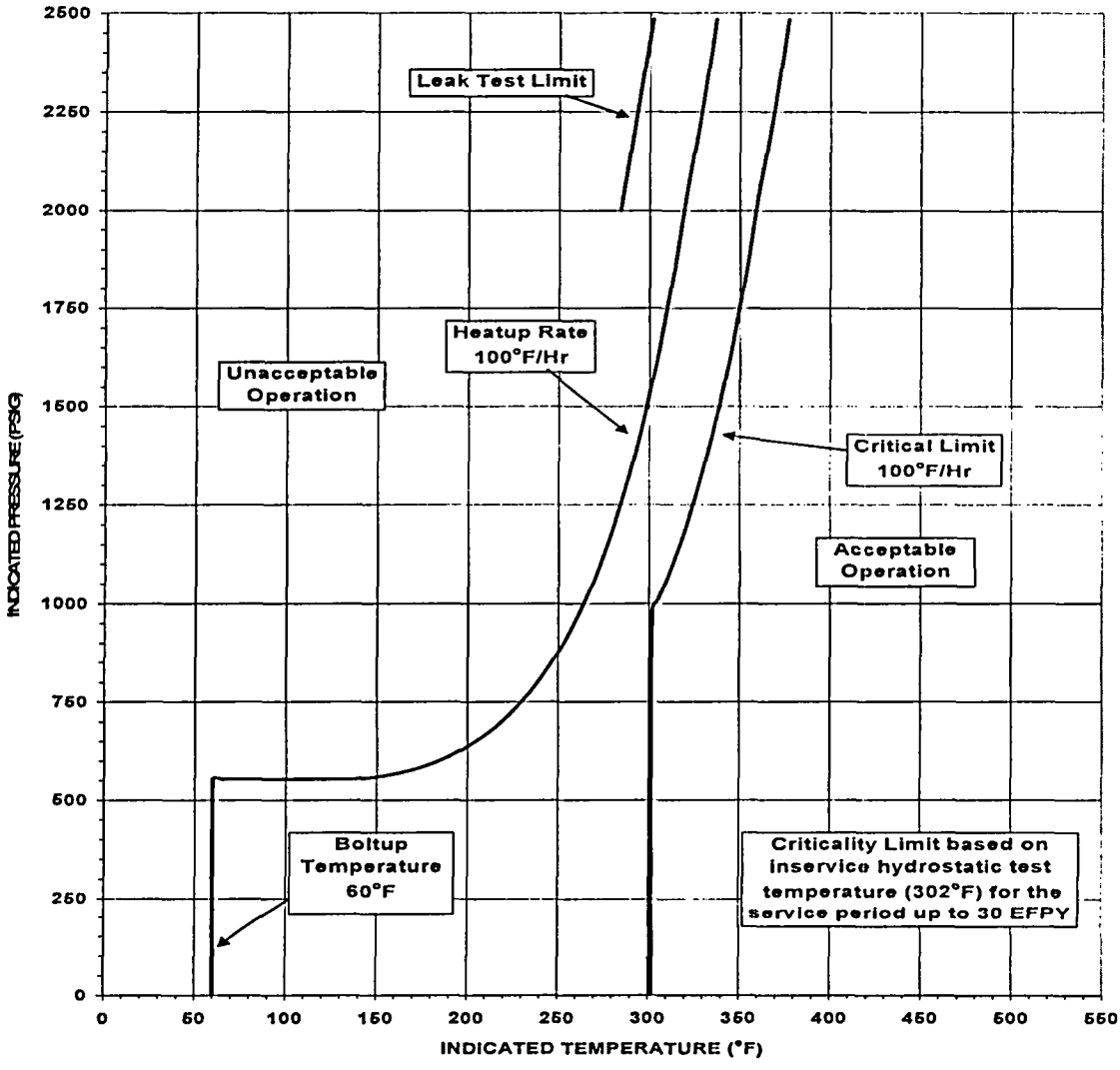

Figure 5.2-1 (Page 1 of 1)
Reactor Coolant System Heatup
Limitations Applicable for the First 30 EFPY (LCO 3.4.3)

MATERIAL PROPERTY BASIS
LIMITING MATERIAL: LOWER SHELL PLATE
LIMITING ART VALUES AT 30 EFPY: 1/4T, 245.7°F
3/4T, 207.6°F

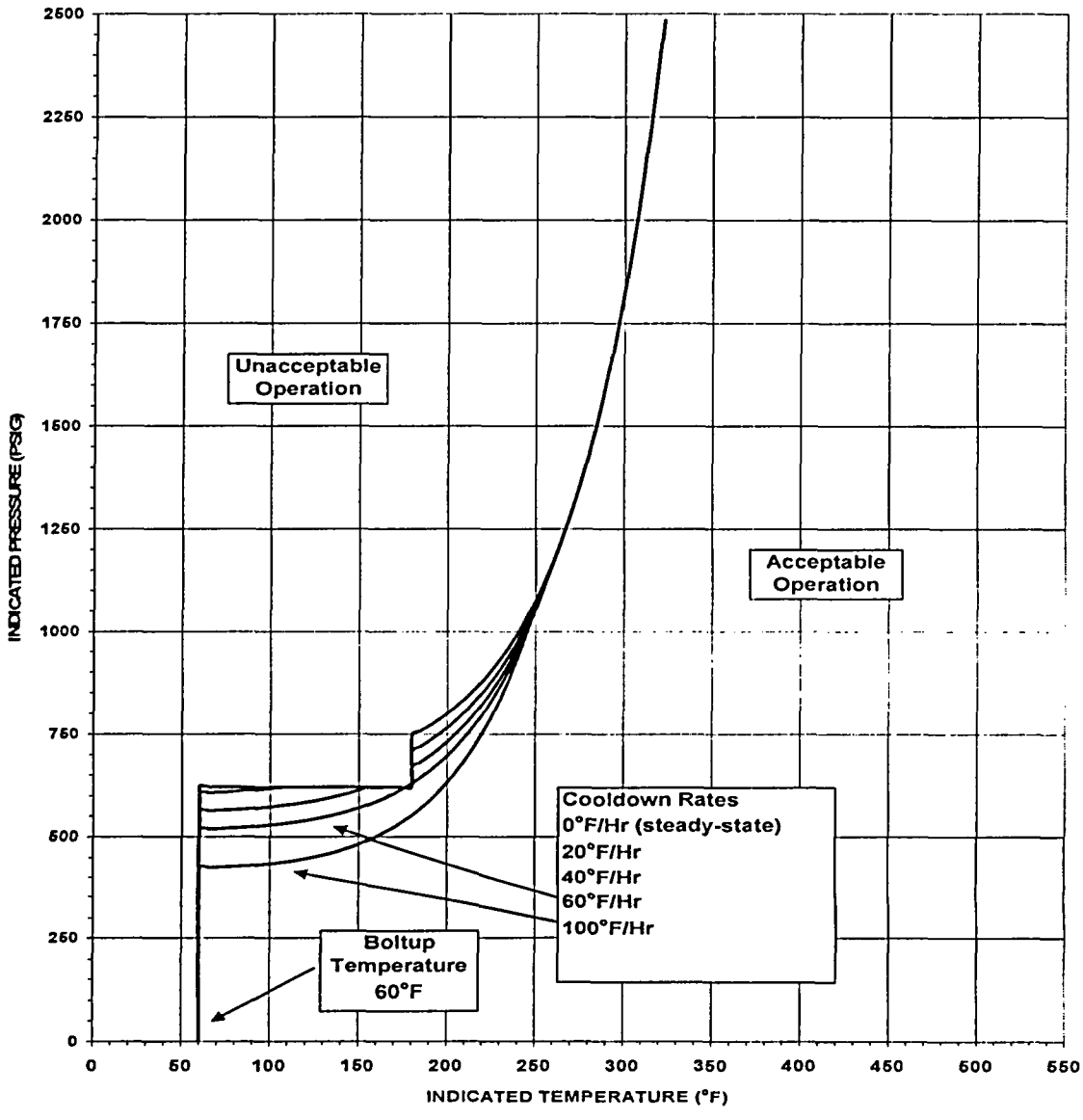

Figure 5.2-2 (Page 1 of 1)
Reactor Coolant System Cooldown
Limitations Applicable for the First 30 EFPY (LCO 3.4.3)

Table 5.2-1 (Page 1 of 1)
Heatup Curve Data Points for 30 EFPY (LCO 3.4.3)

100°F/hr Heatup		100°F/hr Heatup	
T (°F)	P (psig)	T (°F)	P (psig)
60	0	245	840
60	554	250	876
65	554	255	917
70	554	260	961
75	554	265	1010
80	554	270	1064
85	554	275	1124
90	554	280	1189
95	554	285	1262
100	554	290	1342
105	554	295	1431
110	554	300	1528
115	554	305	1636
120	554	310	1754
125	554	315	1885
130	554	320	2029
135	554	325	2151
140	555	330	2282
145	557	335	2426
150	560	336.8	2485
155	563		
160	567		
165	573		
170	579		
175	585		
180	593		
185	602		
190	613		
195	624		
200	637		
205	651		
210	667		
215	685		
220	705		
225	727		
230	751		
235	778		
240	807		

100°F/hr Criticality	
T (°F)	P (psig)
302	0
302	981
305	1010
310	1064
315	1124
320	1189
325	1262
330	1342
335	1431
340	1528
345	1636
350	1754
355	1885
360	2029
365	2151
370	2282
375	2426
376.8	2485

Leak Test Limit			
	Temperature (°F)	284	302
	Pressure (psig)	2000	2485

Table 5.2-2 (Page 1 of 2)
Cooldown Curve Data Points for 30 EFPY (LCO 3.4.3)

Steady State		20°F/hr		40°F/hr		60°F/hr		100°F/hr	
T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)
60	0	60	0	60	0	60	0	60	0
60	621	60	606	60	563	60	518	60	425
65	621	65	607	65	563	65	519	65	426
70	621	70	608	70	564	70	519	70	427
75	621	75	609	75	565	75	520	75	428
80	621	80	611	80	567	80	522	80	429
85	621	85	612	85	568	85	523	85	430
90	621	90	614	90	570	90	525	90	432
95	621	95	616	95	571	95	526	95	433
100	621	100	618	100	574	100	528	100	435
105	621	105	620	105	576	105	531	105	438
110	621	110	621	110	578	110	533	110	441
115	621	115	621	115	581	115	536	115	444
120	621	120	621	120	585	120	540	120	448
125	621	125	621	125	588	125	544	125	452
130	621	130	621	130	592	130	548	130	457
135	621	135	621	135	597	135	553	135	462
140	621	140	621	140	602	140	558	140	468
145	621	145	621	145	607	145	564	145	475
150	621	150	621	150	614	150	571	150	483
155	621	155	621	155	621	155	578	155	491
160	621	160	621	160	621	160	586	160	501
165	621	165	621	165	621	165	595	165	512
170	621	170	621	170	621	170	606	170	524
175	621	175	621	175	621	175	617	175	537
180	621	180	621	180	621	180	621	180	552
180	747	180	708	180	669	180	630	185	569
185	758	185	720	185	682	185	644	190	588
190	771	190	733	190	696	190	660	195	608
195	784	195	748	195	713	195	677	200	631
200	800	200	765	200	730	200	697	205	657
205	816	205	783	205	750	205	718	210	685
210	835	210	803	210	772	210	742	215	717
215	856	215	825	215	796	215	768	220	752
220	878	220	850	220	823	220	797	225	791
225	903	225	877	225	853	225	830	230	835
230	931	230	908	230	886	230	866	235	883
235	962	235	941	235	922	235	906	240	936
240	996	240	978	240	962	240	950	245	995
245	1033	245	1019	245	1007	245	999	250	1053
250	1075	250	1064	250	1056	250	1053	255	1111

Table 5.2-2 (Page 2 of 2)
Cooldown Curve Data Points for 30 EFPY (LCO 3.4.3)

Steady State		20°F/hr		40°F/hr		60°F/hr		100°F/hr	
T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)	T (°F)	P (psig)
255	1121	255	1114	255	1111	255	1111	260	1169
260	1171	260	1169	260	1169	260	1169	265	1227
265	1227	265	1227	265	1227	265	1227	270	1289
270	1289	270	1289	270	1289	270	1289	275	1357
275	1357	275	1357	275	1357	275	1357	280	1433
280	1433	280	1433	280	1433	280	1433	285	1516
285	1516	285	1516	285	1516	285	1516	290	1608
290	1608	290	1608	290	1608	290	1608	295	1710
295	1710	295	1710	295	1710	295	1710	300	1823
300	1823	300	1823	300	1823	300	1823	305	1947
305	1947	305	1947	305	1947	305	1947	310	2085
310	2085	310	2085	310	2085	310	2085	315	2237
315	2237	315	2237	315	2237	315	2237	320	2405
320	2405	320	2405	320	2405	320	2405	322.1	2485
322.1	2485	322.1	2485	322.1	2485	322.1	2485		

Table 5.2-3 (Page 1 of 1)

Overpressure Protection System (OPPS) Setpoints (LCO 3.4.12)

FUNCTION	SETPOINT
OPPS Enable Temperature	347°F
PORV Setpoint	≤ 397 psig

Table 5.2-6 (Page 1 of 1)

Summary of Adjusted Reference Temperature (ARTs) for 30 EFPY

MATERIAL DESCRIPTION	30 EFPY	
	1/4T ART(°F)[a]	3/4T ART(°F)[a]
Intermediate Shell Plate B6607-1	201.4	175.8
Intermediate Shell Plate B6607-2	231.4	205.8
Lower Shell Plate B7203-2	176.2	151
Lower Shell Plate B6903-1	243.2	205.7
- Using S/C Data[b]	245.7	207.6
Intermediate Shell Longitudinal Weld 19-714A/B	161.9	115.4
- Using S/C Data[b]	159.6	113.8
Intermediate to Lower Shell Circ. Weld 11-714	163.4	131.7
- Using S/C Data [c]	93.0	71.4
Lower Shell Longitudinal Weld 20-714A/B	176.8	125.8
- Using S/C Data[d]	187.5	133.2

Notes:

(a) $ART = I + \Delta RT_{NDT} + M$.

(b) Based on Beaver Valley Unit 1 surveillance data. (Data not credible. ART calculated with a full σ_Δ.)

(c) Based on credible St. Lucie Unit 1 surveillance data.

(d) Based on Fort Calhoun Unit 1 surveillance data. (Data not credible. ART calculated with a full σ_Δ.)

Table 5.2-7 (Page 1 of 1)

Calculation of Adjusted Reference Temperatures (ARTs) for 30 EFPY

Parameter	VALUES	
Operating Time	30 EFPY	
Material	Plate B6903-1	Plate B6903-1
Location	Lower Shell Plate 1/4T ART(°F)	Lower Shell Plate 3/4T ART(°F)
Chemistry Factor, CF (°F)	149.2	149.2
Fluence (f), n/cm^2 (E>1.0 Mev)[a]	2.4194×10^{19}	9.404×10^{18}
Fluence Factor, FF	1.238	.9828
ΔRT_{NDT} = CF x FF(°F)[c]	184.7 [c]	146.6
Initial RT_{NDT}, I(°F)[a]	27	27
Margin, M(°F)	34 [c]	34
ART = I+(CF*FF)+M, °F[b] per RG 1.99, Revision 2	245.7	207.6

Notes:

(a) Initial RT_{NDT} values are measured values for plate material.

(b) This value was rounded per ASTM E29, using the "Rounding Method."

(c) Based on Beaver Valley Unit 1 surveillance data. (Data not credible. ART calculated with a full σ_{Δ}.)

Table 5.2-10 (Page 1 of 1)

RT_{PTS} Calculation for Beltline Region Materials at Life Extension (54 EFPY)

Material	Fluence (10^{19} n/cm^2, E>1.0 MeV)	FF	CF (°F)	ΔRT_{PTS}[c] (°F)	Margin (°F)	$RT_{NDT(U)}$[a] (°F)	RT_{PTS}[b] (°F)
Intermediate Shell Plate B6607-1	6.06	1.44	100.5	144.6	34	43	221.6
Intermediate Shell Plate B6607-2	6.06	1.44	100.5	144.6	34	73	251.6
Lower Shell Plate B7203-2	6.09	1.44	98.7	142.1	34	20	196.1
Lower Shell Plate B6903-1	6.09	1.44	147.2	211.9	34	27	272.9
→ Using S/C Data[e]	6.09	1.44	149.2	214.7	34	27	275.7
Inter. Shell Long. Weld 19-714A/B	1.17	1.04	191.7	200.1	65.5	-56	209.6
→ Using S/C Data[e]	1.17	1.04	188.8	197.1	65.5	-56	206.6
Lower Shell Long. Weld 20-714A/B	1.17	1.04	210.5	219.7	65.5	-56	229.2
→ Using S/C Data[f]	1.17	1.04	223.9	233.7	65.5	-56	243.2
Circumferential Weld 11-714	6.07	1.44	124.3	178.8	65.5	-56	188.3
→ Using S/C Data[d]	6.07	1.44	84.8	122.0	44	-56	110.0

Notes:

(a) Initial RT_{NDT} values of the plate material are measured values while the weld material values are generic.

(b) $RT_{PTS} = RT_{NDT(U)} + \Delta RT_{PTS} + \text{Margin}$ (°F).

(c) $\Delta RT_{PTS} = CF * FF$.

(d) Based on credible St. Lucie Unit 1 surveillance data.

(e) Based on non-credible Beaver Valley Unit 1 surveillance data with a full σ_Δ.

(f) Based on non-credible Fort Calhoun Unit 1 surveillance data with a full σ_Δ.