Attachment 1

Evaluation for LOCA Aging at 1680 MWt

Page 1 of 6

CALCULATION COVER SHEET

Title *Evaluation For LOCA Aging At 1880 Mwt*

CA- *98-* - *106* Add. _____

Vendor No. _____

Associated Reference _____

Assigned Personnel

Name (Print)	Signature	Title	Initials
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Record of Issues

Rev	Description	Total No. of Sheets	Last Sheet No.	Preparer	Verifier	Verifier	Approval	Approval Date
1	Revision 1, addition of data to table 1 on page 5	16	1 of 3	BL	MSA		AW	4-7-98

☐ Vendor Verification/Approval in Document

Verification Method(s)

☒ Review ☐ Alternate Calculation ☐ Test ☐ Other

References/Filing Locations

1. _____

2. _____

Associated Subjects/Component - *EQ*

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PURPOSE

The purpose of this calculation is to evaluate specific environmentally qualified (EQ) equipment located in the Drywell for DBA LOCA accident aging at the Rerate power level of 1880 MWt in response to an NRC request for additional information to demonstrate margin. This will be accomplished by comparing the 1880 MWt DBA LOCA test profile to the test profile for the DG O'Brien containment penetrations and General Atomic Radiation monitors. These components were selected by the NRC for review based on meetings held at NRC headquarters in White Flint, MD on March 30, 1998.

BACKGROUND

EQ components located in the containment are qualified for their required operating time, plus margin as required by 10 CFR 50.49. For those components with a short operating time, the test profile bounds the required operating time of the component and qualification is demonstrated. In the case of equipment with a longer operating time requirement, the qualification test duration may not envelope the required operating time. In some cases due to the methodology used during the testing of equipment, portions of the test profile may not bound the accident profile (see figures in attachment 2) .

When required, component evaluations are made using the Arrhenius Methodology as provided in Reference 3. The Arrhenius Model establishes a correlation between thermal aging of different temperature time histories through consideration of material properties of the constituent components in an equipment item.

For this calculation, the following discussion is based on data appropriate for 1880 MWt with the use of the ANS 5.1 decay power time history as defined for the Power Rerate Program. For the DBA LOCA, at about 17 days it is expected that the drywell temperature will drop below 135°F [Ref. 6].

The limiting drywell parameters for the DBA LOCA for the first 24 hours are available in Reference 9, File 1880_DBA. Drywell parameters for the DBA LOCA from 1 day through 180 days are provided in Reference 6. These curves provide the basis for the composite profile at the 1880 MWt conditions

The function of the General Atomic Radiation monitor and associated DG O'Brien electrical penetration is to provide high range monitoring of the dose rates inside containment post accident. This function is not required for breaks evaluated in SBA and IBA since under these conditions there is no fuel damage assumed and therefore no high radiation doses that would require monitoring. The monitoring function is required for the DBA LOCA since this accident provides the source for high dose rates.

To provide an evaluation of margin the test profiles for these devices will be compared to the 1880 MWt DBA LOCA profile and margin quantified and compared to the margin calculated in CA-98-105 "Qualified Life Evaluation For Containment EQ Components" Rev 1 Dated 3/28/98 [10]. This calculation used a profile which included conservative steps for thermal aging as shown in the figure in attachment 3. An evaluation will be performed to compare the results of the test profiles to the actual curve of the 1880 MWt profile and the stepped profile, to demonstrate the margin in this approach.

METHODOLOGY

The bounding DBA LOCA accident profile for the 1880 MWt Rerate power level [Ref. 2] will be evaluated for the equivalent aging using the Arrhenius methodology [Ref. 3]. The equivalent aging for the 1880 MWt case will be compared to the test profile for the General Atomic Radiation monitor and associated DG O'Brien electrical penetration using the Arrhenius methodology . To demonstrate margin, the Arrhenius methodology will be applied to the DBA LOCA profile (Profile {2} in Table 1) using similar time steps to those used in calculation CA-98-105 [Ref. 10] and this will be compared to the results using the actual data time steps from the DBA profile (Profile {1} in Table 1) . This will result in a more realistic value of aging based on the 1880 MWt DBA LOCA curve for comparison to the aging data from CA-98-105.

ACCEPTANCE CRITERIA

The comparison of the 1880 MWt DBA LOCA profile to the test profiles must demonstrate that the test profile provides adequate margin between the accident profile and the test profile. This evaluation will be performed using an EXCEL spreadsheet in attachment 1. The margin calculated for the DBA LOCA curve at 1880 MWt must demonstrate an increase in margin over the value determined in CA-98-105 [Ref. 10].

INPUTS

Inputs to this calculation are listed below:

1. Output data from NSP calculation CA-97-176 "Equivalent Temperature Evaluation for EQ Equipment in Containment" Rev 2 . [Ref. 2]

2. DBA LOCA test data for the General Atomic Radiation monitor and associated DG O'Brien electrical penetration located in the MNGP containment as listed in the MNGP EQ Central File [Ref. 5].

3. Arrhenius methodology as defined in EWI 08.11.01 "Equipment Qualification User's Manual" [Ref. 3]

4. Output of Calculation CA-97-197, Evaluation of Drywell Response to DBA LOCA for EQ, Rev. 0 [Ref. 6]

5. Output of Calculation CA-98-105 "Qualified Life Evaluation For Containment EQ Components" [Ref. 10]

ASSUMPTIONS

1. Qualified life for EQ components is typically evaluated based on an average drywell temperature of 135°F over the life of the component prior to the accident. The mixed drywell temperature of 135°F is used as an initial assumption for primary containment accident response evaluations. Computer alarms along with administrative controls are established to insure appropriate actions are taken if this temperature is ever reached during normal plant operation. Therefore the use of 135° to evaluate aging of components while in service for the purposes of this calculation is an appropriate and conservative assumption.

ANALYSIS

The Arrhenius Methodology was used for all calculations in Attachment 1 [Reference 3 and Reference 1]. Activation energies used in the analysis are from Reference 5. The equation used for calculations in Attachment 1 is based on the Arrhenius equation from Appendix 14.2 of Reference 3. The Arrhenius equation is:

$$t_a = t_t \exp\{(eV) \times 1.16 \times 10^4 (1/T_a - 1/T_t)\}$$

where:

t_a is thermal aging life derived from the Arrhenius equation, exposure time limit at one specified temperature (T_a)

eV is the activation energy

t_t is the test exposure time, or in this case the time spent at the accident temperature associated with this time step

T_t is the test temperature, or in this case the accident temperature

T_a is the specified temperature to which the Arrhenius equation is doing the comparison

The first column of each spreadsheet calculation shows time after the start of the LOCA test in seconds. The second column shows the temperature of the containment at the time shown for each associated test or accident time history. The third column shows the equivalent thermal life based on a reference temperature of 135°F for that time interval. The equation used for the tested accident profile evaluation with an activation energy given in the top cell in the third column is shown below:

=(B4-B3)*EXP((0.8*11600)*((1/330.372)-(1/(((C3-32)/1.8)+273.15))))

Where:

(B4-B3) is the time from the previous time step to the current time step
* is indication of multiplication
EXP is indication of e raised to the power shown by the remaining equation
0.8 is the activation energy, i.e. 0.8 eV, which varies with component type

11600 is a conversion factor to convert eV to °K (Inverse of Boltzman's constant)

1/330.372 is 1 divided by 330.372°K or 135°F which is to determine the thermal aging life at this temperature

1/(((C3-32)/1.8)+273.15 is the test, or accident, temperature based on the value provided for the previous time step as shown in column 2

This results in evaluating accident aging by always maintaining the temperature at the higher temperature from the previous time step over the time from the previous time step to the current time step. This provides a conservative value for accident aging since the evaluation is essentially always done at values equal to or higher than the accident time history curve.

The test profile is evaluated by averaging the temperature of the previous and current time steps. This results in a conservatively lower value for temperature and therefore a more conservative evaluation of the test profile aging . This provides a conservative value for test aging since the evaluation is essentially done at values equal to or less than the aging time history curve.

CONCLUSION

The following table provides a summary of the results of the comparison of the component specific test profile to the DBA LOCA accident profile for the 1880 MWt case, as well as the 1670 MWt and 1880 MWt composite profiles from Ref. 10 .

Table 1 Aging Comparison

Accident Profile Case	General Atomic Radiation Monitor Aging / % Margin	DG O'Brien Ctmt Penetration Aging / % Margin
1670 MWt Composite [Ref 10]	0.42 Yr	0.13 Yr
1880 MWt Composite [Ref. 10]	1.17 Yr	0.24 Yr
Qualification Test Aging [Ref. 10] Test Profile	1.4 Yr	0.3 Yr
1880 MWt DBA LOCA {2} (with step curve function)	1.11 Yr /79.3%	0.238 Yr / 79.3%
1880 MWt DBA LOCA {1} (Actual profile)	0.34 Yr / 24.3%	0.14 Yr / 46.7%

The % Margin values given in the table above reflect the percent of total test profile aging that the accident profile represents. This value is derived by dividing the accident aging by the Qualification Test Aging.

above the test profile as demonstrated on figures in attachment 2. This does not impact the environmental qualification evaluation since the additional margin demonstrated in table 1 clearly shows that the test profile aging bounds the accident profile aging with significant margin.

The spreadsheet calculation as described in the Analysis section is provided as Attachment 1. A review of the aging results in table 1 shows that there is significant margin between the aging

defined for the test profile and the required accident aging for the 1880 MWt profile {2} above used for evaluation. Additionally, significant margin is demonstrated by a comparison of the test profile aging to the Arrhenius methodology applied to the actual DBA curve {1} above.

FUTURE NEEDS

None identified.

ATTACHMENTS

1. EXCEL Spreadsheet for Aging Analysis
2. Graphs showing linear and Log plots of accident and test temperature profiles
3. Graph showing Comparison on DBA LOCA profile at 1880 MW to the Step function profile
4. Verification Check List form 3495

REFERENCES:

1. Nuclear Power Plant Equipment Qualification Reference Manual, published by Electric Power Research Institute, Copyright 1992
2. CA-97-176 "Equivalent Temperature Evaluation for EQ Equipment in Containment" Rev 2
3. EWI 08.11.01 "Equipment Qualification Users Manual" Rev. 0
4. Letter from NRC to R.O. Anderson, NSP, "Monticello Nuclear Generating Plant - Request for Additional Information on License Amendment Request Entitled `Supporting the Monticello Nuclear Generating Plant (MNGP) Power Rerate Program' (TAC No. M96238)" February 11, 1998
5. Monticello Nuclear Generating Plant (MNGP) EQ Central File
6. CA-97-197, "Evaluation of Drywell Response to DBA LOCA for EQ", Rev. 0
7. Containment Response Evaluation, August 1997, GE-NE-T2300731-1, DRF T23-00731
8. AE-083-0983, "Monticello Nuclear Power Plant Extended Drywell Temperature Analysis", October 1983
9. GE letter from P. T. Tran to S. J. Hammer, GLN-97-031, Suppression Pool Temperature Time Histories for 400 Days (Task 6.0), dated September 3, 1997
10. CA-98-105 "Qualified Life Evaluation For Containment EQ Components" Rev 1 Dated 3/28/98

Spread Sheets for Evaluation of Test Data

The data below is for the Accident aging for the Composite Accident profile developed in Calculation CA-97-176. This is the 1880 MWt bounding curve.

DG OBRIEN			GA RAD MON		
Time, sec	CA-97-176	Accident Aging, sec	Time, Sec	CA-97-176	Accident Aging, Sec
0.1	335		0.1	335	
300	335	2.49E+04	300	335	3.52E+05
300	330	8.30E+00	300	330	1.18E+02
600	330	2.29E+04	600	330	3.09E+05
600	285	0.00E+00	600	285	0.00E+00
1500	285	3.09E+04	1500	285	2.58E+05
55000	230	1.84E+06	55000	230	1.53E+07
432000	163	4.23E+06	432000	163	1.81E+07
1140480	163	1.56E+06	1140480	163	2.51E+06
	Sum, sec	7.71E+06		Sum, sec	3.68E+07
	Sum, hr	2141		Sum, hr	10228
	Sum, yr	0.24		Sum, yr	1.17

DG OBRIEN		eV=0.5	GA RAD MON		eV=0.8
AGING FOR DBA @1880			AGING FOR DBA @1880		
Time,Sec	Temp	Accident Aging,Sec	Time, Sec	Temp	Accident Aging,Sec
0.1	285	10299	0.1	285	85955
300	285	0	300	285	0
300	285	10302	300	285	85984
600	285	30907	600	285	257952
1500	285	1837233	1500	285	15333828
55000	285	0	55000	285	0
55000	228	4050161	55000	228	16832585
432000	228	0	432000	228	0
432000	163	1560222	432000	163	2505542
1140480	163		1140480	163	
SUM, SEC		7499124	SUM, SEC		35101847
SUM, YR		0.237796	SUM, YR		1.113072

The data above is for the DBA LOCA 1880 MWt profile using the steps as evaluated in Calculations CA-97-197 and CA-97-176. This method of step function is used to evaluate the DBA LOCA profile in a conservative manner. This is presented visually in the graph in attachment 3.

D.G. OBrien		Act Enrgy	= 0.5
time, Sec	Test Temp	Aging,sec	
0.01	135		
10	225	3.44E+01	
20	280	1.81E+02	
30	315	4.33E+02	
40	330	6.73E+02	
60	330	1.53E+03	
120	331	4.62E+03	
180	340	5.02E+03	
240	340	5.40E+03	
360	338	1.06E+04	
540	340	1.59E+04	
570	340	2.70E+03	
600	300	1.93E+03	
720	260	3.75E+03	
780	200	6.74E+02	
960	165	6.60E+02	
1080	158	2.54E+02	
1200	150	2.07E+02	
1365	150	2.54E+02	
1410	340	6.97E+02	
1440	335	2.59E+03	
1680	340	2.07E+04	
1920	335	2.07E+04	
2100	300	1.11E+04	
2700	300	2.72E+04	
3120	300	1.90E+04	
3480	298	1.60E+04	
3660	297	7.79E+03	
3960	293	1.24E+04	
4260	290	1.16E+04	
4500	283	8.48E+03	
4680	280	5.79E+03	
4920	277	7.28E+03	
5220	274	8.60E+03	
5400	271	4.87E+03	
5580	269	4.63E+03	
5760	265	4.37E+03	
6060	262	6.79E+03	
6300	260	5.17E+03	
6480	258	3.72E+03	
6540	250	1.12E+03	
6720	248	3.03E+03	
6900	246	2.91E+03	
7080	246	2.85E+03	
7500	247	6.72E+03	
7620	247	1.94E+03	
7920	240	4.50E+03	
8460	239	7.45E+03	
8640	232	2.28E+03	

GENERAL ATOMIC	Act Enrgy	= 0.8
time, Sec	Test Temp	Aging,sec
0.1	75	
38	295	3.35E+02
90	355	4.68E+04
300	355	4.14E+05
300	365	0.00E+00
10800	365	2.65E+07
10800	345	0.00E+00
21600	345	1.65E+07
21600	270	0.00E+00
32400	270	1.95E+06
32400	78	0.00E+00
Aging Sum, Sec =		4.54E+07
Aging Sum, Yr =		1.4
REQ'D OP TIME		
1140480		
Accident Aging =		1.17

This data is a compilation of the aging for the Test profiles for the DG OBrien and General Atomic Rad monitor. This data is compiled in calculation CA-98-105 [Ref 10].

9660	231	1.18E+04						
10320	229	7.41E+03						
10860	223	5.55E+03						
11580	217	6.47E+03						
11820	215	1.97E+03						
12480	211	5.05E+03						
13020	221	4.43E+03						
16800	211	3.10E+04						
18660	213	1.39E+04						
25020	212	4.81E+04						
86400	209	4.44E+05						
172800	205	5.75E+05						
259200	208	5.69E+05						
345600	210	6.03E+05						
432000	212	6.32E+05						
518000	212	6.44E+05						
604000	212	6.44E+05						
691200	212	6.53E+05						
777600	210	6.32E+05						
864000	208	6.03E+05						
950400	200	5.36E+05						
1036800	200	4.87E+05						
1123200	202	4.99E+05						
1209600	202	5.11E+05						
1296000	206	5.36E+05						
1468800	82	2.25E+05						
Aging Sum,Sec =		9.22E+06						
Aging Sum,Yr =		0.3						

See Text box at end of Data below

DG OBRIEN		eV=0.5		GA RAD MON		eV=0.8
Time, Sec	DBA Tem	Accident Aging,Sec	Time, Sec	DBA Tem	Accident Aging, Sec	
0						
0.1	135	13	0.1	135	13	
13	284.9	411	13	284.9	3429	
25	278.2	211	25	278.2	1632	
32	278.2	151	32	278.2	1165	
37	278.2	181	37	278.2	1399	
43	278.8	183	43	278.8	1424	
49	277.2	207	49	277.2	1582	
56	277.6	209	56	277.6	1602	
63	277.6	209	63	277.6	1602	
70	277.4	178	70	277.4	1365	
76	277.3	237	76	277.3	1814	
84	277.3	178	84	277.3	1360	
90	277.2	207	90	277.2	1582	
97	277.2	1273	97	277.2	9720	
140	277.6	2058	140	277.6	15789	
209	277.3	2136	209	277.3	16325	
281	276.8	1998	281	276.8	15182	
349	276.4	1982	349	276.4	14996	
417	276.2	1830	417	276.2	13808	
480	276.3	1833	480	276.3	13851	
543	276.4	2216	543	276.4	16761	
619	276.5	7039	619	276.5	53313	
860	276.6	7228	860	276.6	54809	
1107	276.8	7344	1107	276.8	55817	
1357	276.6	7316	1357	276.6	55475	
1607	276.4	7288	1607	276.4	55134	
1857	276.1	7246	1857	276.1	54626	
2107	275.7	6931	2107	275.7	52013	
2348	274.6	5913	2348	274.6	43806	
2558	272.8	8456	2558	272.8	61348	
2869	269.9	8221	2869	269.9	57653	
3189	265.6	7104	3189	265.6	47346	
3490	261.5	7525	3490	261.5	47745	
3836	257.8	8436	3836	257.8	51186	
4254	254.6	8736	4254	254.6	50970	
4716	252.4	7772	4716	252.4	44133	
5146	251.2	8058	5146	251.2	45083	
5603	250.6	7697	5603	250.6	42746	
6045	249.9	7741	6045	249.9	42617	
6496	248.3	7704	6496	248.3	41573	
6960	246	6820	6960	246	35758	
7391	243.8	7509	7391	243.8	38292	
7888	241.4	7324	7888	241.4	36226	
8398	239.4	6949	8398	239.4	33507	

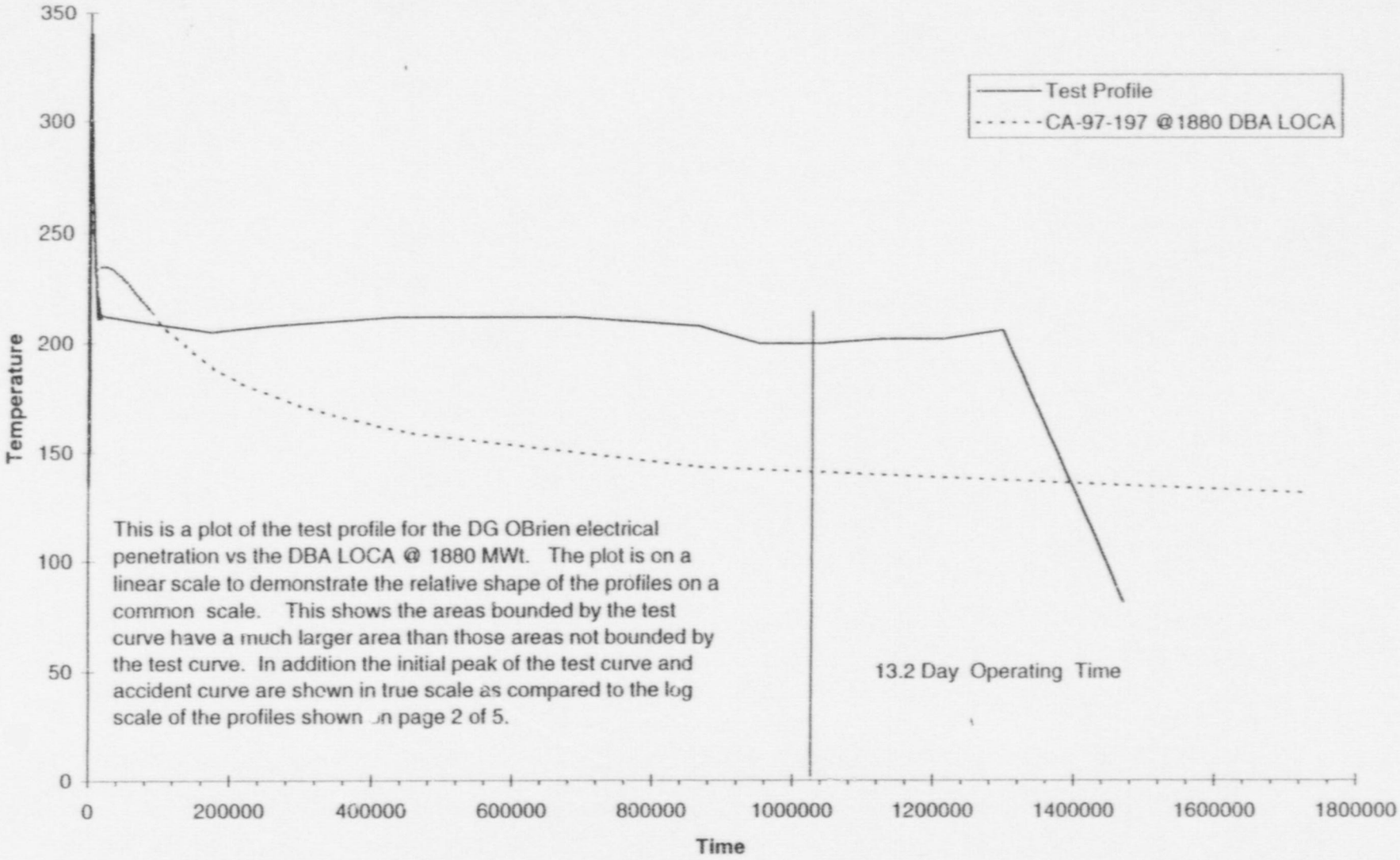
	8903	237.7	7298		8903	237.7	34428
	9453	236.4	7910		9453	236.4	36692
	10066	235.3	13243		10066	235.3	60565
	11117	234.2	13424		11117	234.2	60520
	12208	233.9	13019		12208	233.9	58465
	13273	234	13500		13273	234	60707
	14375	234.2	13337		14375	234.2	60131
	15459	234.5	13585		15459	234.5	61489
	16556	234.7	13321		16556	234.7	60449
	17627	234.8	13562		17627	234.8	61622
	18715	234.9	13304		18715	234.9	60528
	19780	234.9	13916		19780	234.9	63313
	20894	234.9	13641		20894	234.9	62063
	21986	234.9	13566		21986	234.9	61722
	23072	234.9	13541		23072	234.9	61608
	24156	234.9	13554		24156	234.9	61665
	25241	234.9	13691		25241	234.9	62290
	26337	234.7	13296		26337	234.7	60336
	27406	234.6	13516		27406	234.6	61252
	28495	234.5	13734		28495	234.5	62162
	29604	234.3	13317		29604	234.3	60118
	30684	234.1	13554		30684	234.1	61029
	31788	233.9	13679		31788	233.9	61430
	32907	233.6	13019		32907	233.6	58240
	33979	233.4	13459		33979	233.4	60048
	35092	233.1	13707		35092	233.1	60920
	36233	232.8	12640		36233	232.8	55954
	37292	232.5	13280		37292	232.5	58561
	38412	232.3	13010		38412	232.3	57220
	39514	232	12949		39514	232	56727
	40618	231.7	12433		40618	231.7	54254
	41685	231.4	13012		41685	231.4	56556
	42809	231.1	12490		42809	231.1	54073
	43895	230.8	12591		43895	230.8	54296
	44997	230.5	12349		44997	230.5	53046
	46085	230.1	12286		46085	230.1	52499
	47177	229.8	12720		47177	229.8	54137
	48315	229.4	12298		48315	229.4	52067
	49425	229	11631		49425	229	48981
	50484	228.7	12121		50484	228.7	50845
	51595	228.3	12015		51595	228.3	50133
	52706	227.8	12001		52706	227.8	49743
	53828	227.4	11715		53828	227.4	48301
	54933	227	11612		54933	227	47622
	56038	226.5	11681		56038	226.5	47590
	57162	226.1	11712		57162	226.1	47462
	58299	225.6	11419		58299	225.6	45969
	59420	225.1	11041		59420	225.1	44151
	60516	224.6	11128		60516	224.6	44202
	61633	224.2	10921		61633	224.2	43147
	62739	223.7	11141		62739	223.7	43724

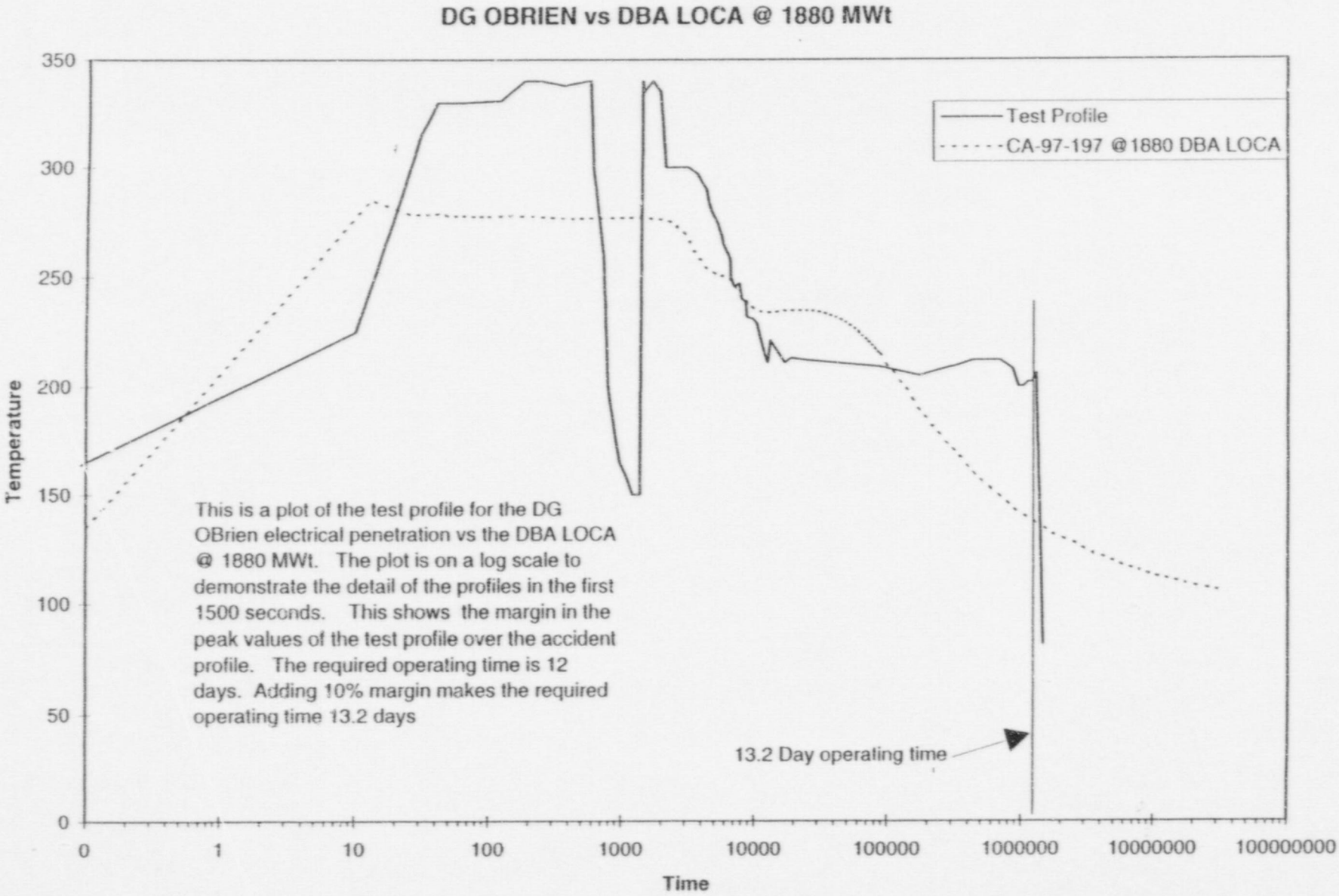
	63880	223.3	10732		63880	223.3	41893
	64989	222.9	10339		64989	222.9	40143
	66067	222.5	10523		66067	222.5	40635
	67174	222.1	10570		67174	222.1	40598
	68296	221.7	10186		68296	221.7	38913
	69387	221.2	10127		69387	221.2	38429
	70484	220.8	10018		70484	220.8	37810
	71579	220.4	10109		71579	220.4	37948
	72694	220	9965		72694	220	37202
	73803	219.6	9455		73803	219.6	35147
	74866	219.2	9742		74866	219.2	35977
	75970	218.7	9571		75970	218.7	35107
	77067	218.3	9208		77067	218.3	33591
	78132	217.9	9733		78132	217.9	35313
	79268	217.5	9653		79268	217.5	34833
	80405	217.1	9363		80405	217.1	33605
	81518	216.6	9266		81518	216.6	33027
	82632	216.2	9255		82632	216.2	32810
	83755	215.8	9269		83755	215.8	32679
	84890	215.4	8659		84890	215.4	30359
	85960	215	3544		85960	215	12358
	86402	214.8	159282		8640.	214.8	553889
	106358	207	200231		106358	207	624594
	136425	198.8	219206		136425	198.8	608276
	176429	188.2	169115		176429	188.2	401638
	216432	181.5	285812		216432	181.5	613559
	296438	171.6	138200		296438	171.6	254532
	346378	167.3	148353		346378	167.3	255256
	406426	162.5	108504		406426	162.5	172843
	456365	159.1	812809		456365	159.1	1225087
	866592	143.6	1106383		866592	143.6	1285652
	1728000	131.4			1728000	131.4	
	AGING SUM,Sec		4378342		AGING SUM,Sec		10776330
	AGING YRS		0.139		AGING YRS		0.342

The Data above is for the DBA LOCA at 1880 MWt with the methodology applied to each data point utilizing results from CA-97-176. This results in an evaluation with small time steps which closely match the DBA profile. This provides a much more realistic model of the actual curve.

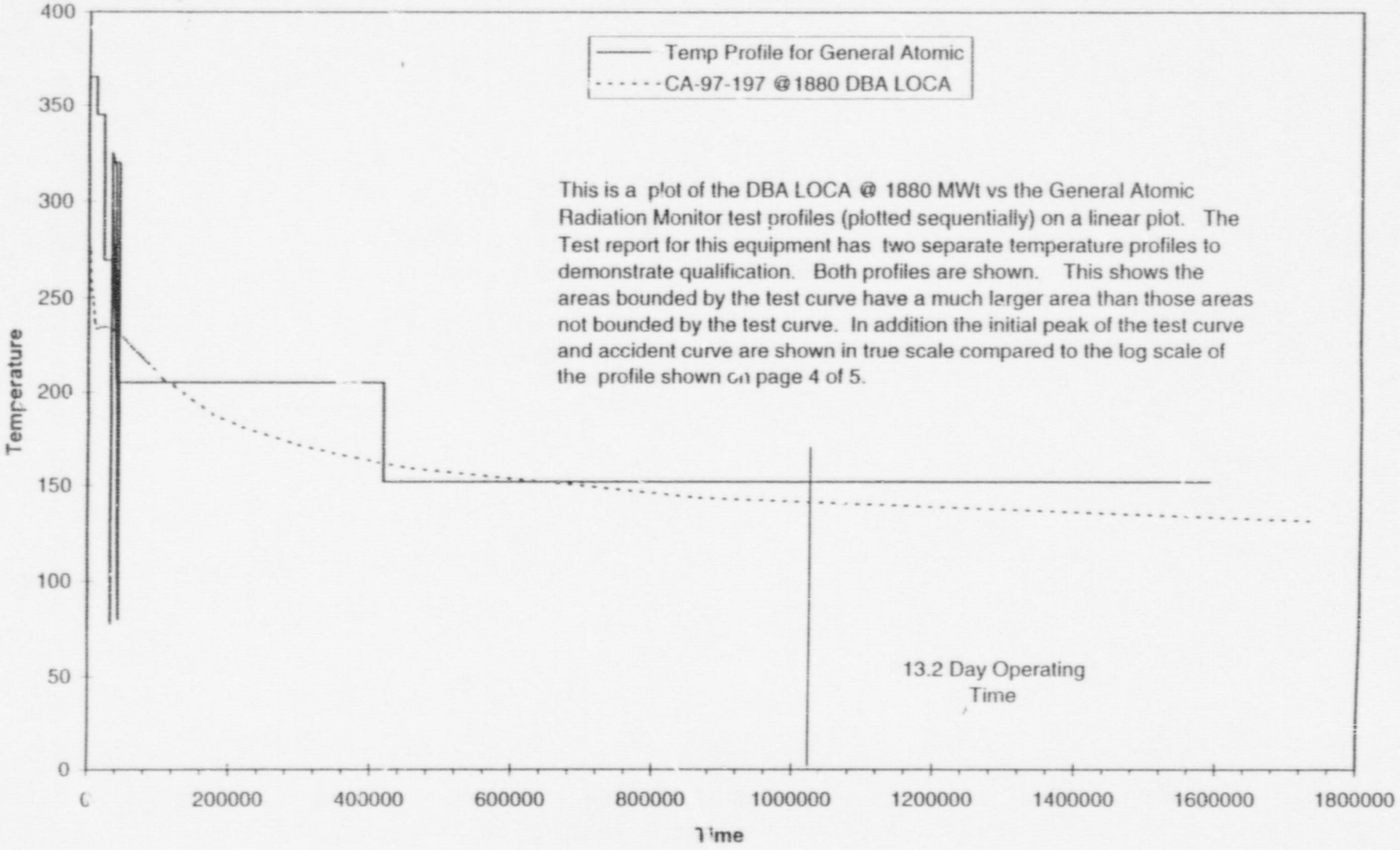
List of Figures :

DG OBRIEN vs DBA LOCA @ 1880 MWt

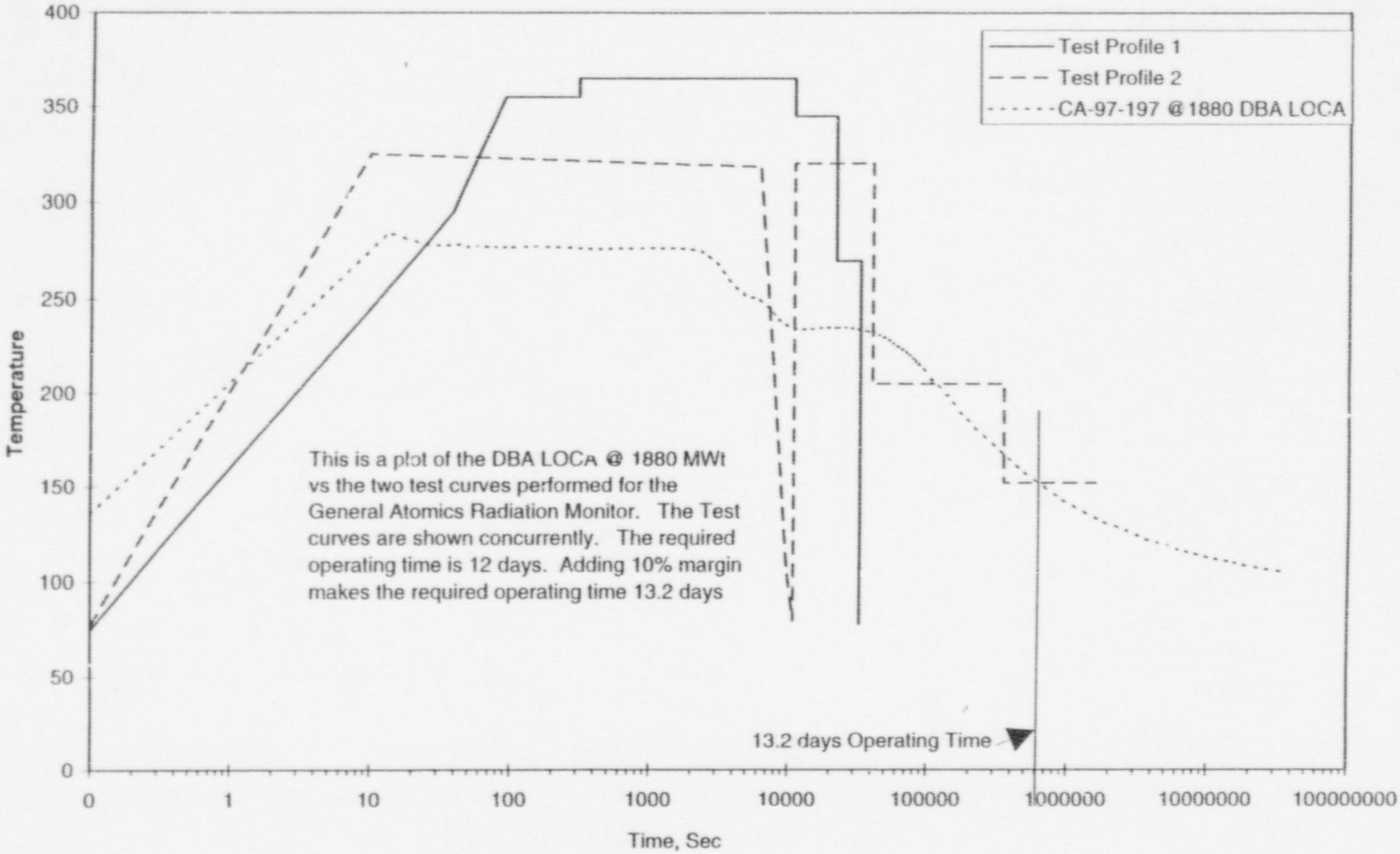



DG OBRIEN vs DBA LOCA @ 1880 MWt
Test Profile
CA-97-197 @1880 DBA LOCA
Temperature
Time
350
300
250
200
150
100
50
0
0
1
10
100
1000
10000
100000
1000000
10000000
100000000
This is a plot of the test profile for the DG OBrien electrical penetration vs the DBA LOCA @ 1880 MWt. The plot is on a log scale to demonstrate the detail of the profiles in the first 1500 seconds. This shows the margin in the peak values of the test profile over the accident profile. The required operating time is 12 days. Adding 10% margin makes the required operating time 13.2 days
13.2 Day operating time

GA Rad Monitor vs DBA LOCA @1880 MWt

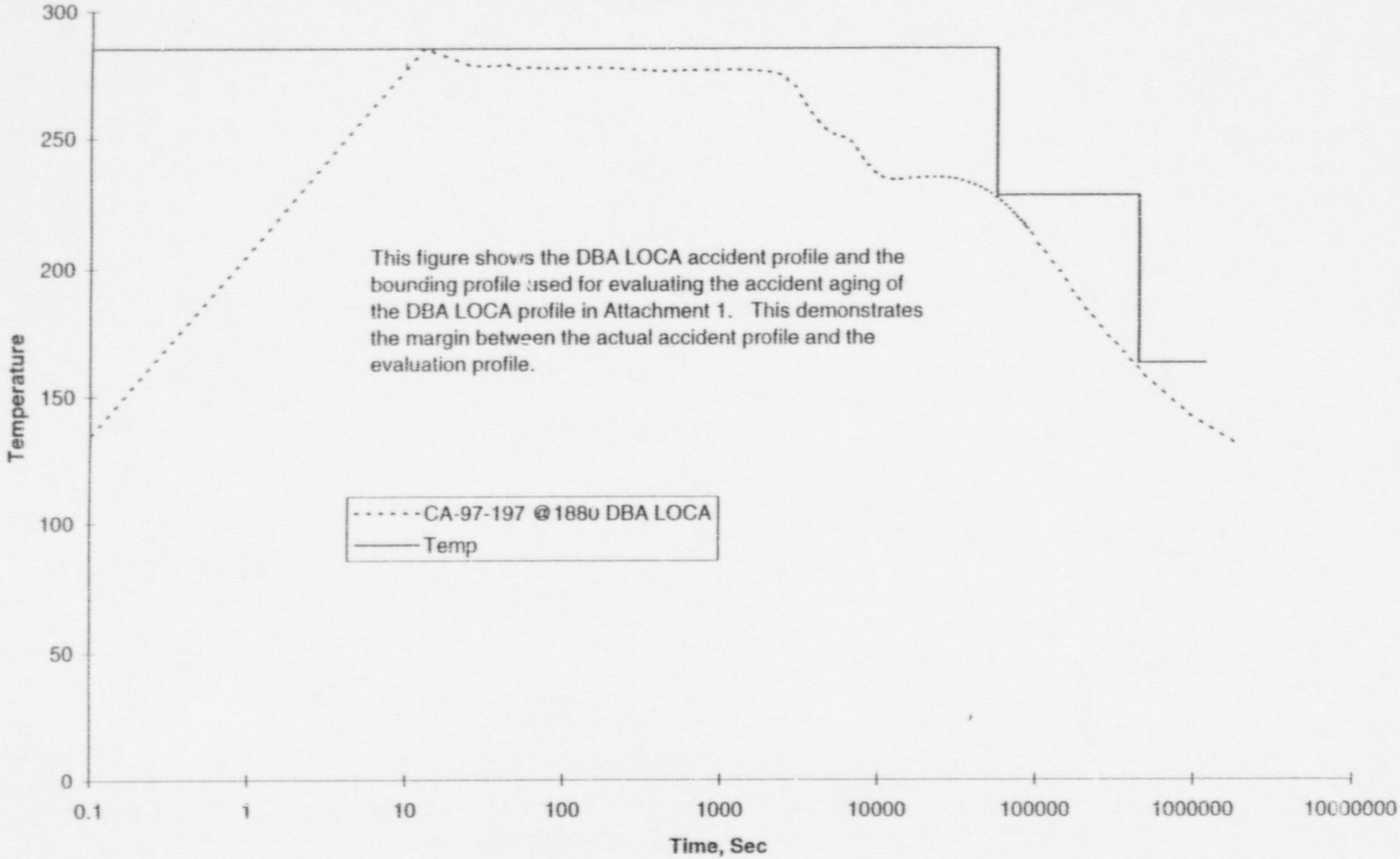


General Atomic RM vs DBA LOCA @ 1880 MWt



List of Figures :

Comparison of 1880 MWt DBA LOCA to Evaluation Curve



MONTICELLO NUCLEAR GENERATING PLANT		3495
TITLE:	CALCULATION/ANALYSIS VERIFICATION CHECKLIST	Revision 5
		Page 1 of 1

Place initial by items verified.

CA - 98 - 106
Attachment 4
Page 1 of 2 4/6/98

REVIEW		Verified
1.	Inputs correctly selected.	MSA
2.	Assumptions described and reasonable.	MSA
3.	Applicable codes, standards and regulations identified and met.	MSA
4.	Appropriate method used.	MSA
5.	Applicable construction and operating experience considered.	MSA
6.	Applicable structure(s), system(s), and component(s) listed.	MSA
7.	Formulas and equations documented, unusual symbols defined.	MSA
8.	Detailed to allow verification without recourse to preparer.	MSA
9.	Neat and legible, pages all correctly numbered.	MSA
10.	Signed by preparer.	MSA
11.	Interface requirements identified and satisfied.	MSA
12.	Acceptance criteria identified, adequate and satisfied.	MSA
13.	Result reasonable compared to inputs.	MSA
14.	Basis of all assumptions, acceptance criteria and inputs are identified.	MSA
15.	Conclusions not in conflict with previous analysis, USAR, Technical Specifications or NRC Safety Evaluations.	MSA

ALTERNATE CALCULATION		
16.	Alternate calc results consistent with original.	NA - MSA
17.	Items 1-4 above verified. (Required by ANSI N.45.2.11)	NA - MSA

TESTING		
18.	Testing requirements fully described and adequate.	NA - MSA
19.	Shows adequacy of tested feature at worst case conditions.	NA - MSA
20.	If test is for overall design adequacy, all operating modes considered in determining test conditions.	NA - MSA
21.	If model test, scaling laws and error analysis established.	NA - MSA
22.	Results meet acceptance criteria, or documentation of acceptable resolution is attached.	NA - MSA

OTHER (Explain) _____

FINAL DOCUMENTATION (Verify applicable items included)		
23.	Alternate or check calcs	NA MSA
24.	Summary of test results.	NA / MSA
25.	Comments (errors, discrepancies, recommendations).	MSA
26.	Method of resolution of comments.	MSA

Completed By: Matthew S. Antony Date: 4/4/98

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____

FOR ADMINISTRATIVE USE ONLY	Resp Supv: GSE-NGS	Assoc Ref: AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3495	Doc Type: 3042	Admin initials:	Date:

APPROVED (Signatures available in Master File)

Comments to CA-98-106

Complete 4/4/98 MSA

1. The purpose should address why these two components were used to demonstrate margin. It appears that the referenced components provided the slimmest margin in the CA-98-105 calculation. Is this information requested based on the CA-98-105 calculation?

Complete 4/4/98 MSA

2. The activation energy stated in the analysis Arrhenius definition is inconsistent with that used in the sample equation. It may be better to not use an example activation energy (just use eV). This may be less confusing.

Complete 4/4/98 MSA

3. Attachment No. 1 1880 MW DBA calculation for aging should indicate Reference 9 in addition to Calculation CA-97-197. They are both required to build the curve presented. Calculation CA-97-176 could also be referenced in lieu of CA-97-197 and Reference 9.

Complete 4/4/98 MSA

4. Add Verification Checklist as Attachment 4.

MONTICELLO NUCLEAR GENERATING PLANT		3495
TITLE:	CALCULATION/ANALYSIS VERIFICATION CHECKLIST	Revision 5
		Page 1 of 1

Place initial by items verified.

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Attachment 4
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MSA 4/16/98

REVIEW

		Verified
1.	Inputs correctly selected.	MSA
2.	Assumptions described and reasonable.	MSA
3.	Applicable codes, standards and regulations identified and met.	MSA
4.	Appropriate method used.	MSA
5.	Applicable construction and operating experience considered.	MSA 4-6 MSA
6.	Applicable structure(s), system(s), and component(s) listed.	MSA 4-6 MSA
7.	Formulas and equations documented, unusual symbols defined.	N/A - MSA
8.	Detailed to allow verification without recourse to preparer.	MSA
9.	Neat and legible, pages all correctly numbered.	MSA
10.	Signed by preparer.	MSA
11.	Interface requirements identified and satisfied.	MSA
12.	Acceptance criteria identified, adequate and satisfied.	MSA
13.	Result reasonable compared to inputs.	MSA
14.	Basis of all assumptions, acceptance criteria and inputs are identified.	MSA
15.	Conclusions not in conflict with previous analysis, USAR, Technical Specifications or NRC Safety Evaluations.	MSA

ALTERNATE CALCULATION

16.	Alternate calc results consistent with original.	N/A - MSA
17.	Items 1-4 above verified. (Required by ANSI N.45.2.11)	N/A - MSA

TESTING

18.	Testing requirements fully described and adequate.	N/A - MSA
19.	Shows adequacy of tested feature at worst case conditions.	N/A - MSA
20.	If test is for overall design adequacy, all operating modes considered in determining test conditions.	N/A - MSA
21.	If model test, scaling laws and error analysis established.	N/A - MSA
22.	Results meet acceptance criteria, or documentation of acceptable resolution is attached.	N/A - MSA

OTHER (Explain) _____

FINAL DOCUMENTATION (Verify applicable items included)

23.	Alternate or check calcs	N/A - MSA
24.	Summary of test results.	N/A - MSA
25.	Comments (errors, discrepancies, recommendations).	N/A - MSA
26.	Method of resolution of comments.	N/A - MSA

Completed By: Matthew S. Anthony Date: 4/6/98

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: 97-1042

FOR ADMINISTRATIVE USE ONLY	Resp Supv: GSE-NGS	Assoc Ref: AWI-05.01.25	SR: N	Freq: 10 yrs
	ARMS: 3495	Doc Type: 3042	Admin initials:	Date: 7/10/97

M/jrs

Attachment 2

MOV Information

1. What are NSP's improvement plans to address possible motor damage for MO-2034 and MO-4229 at rerate conditions?

NSP Response

Prior to operation at rerate conditions, NSP will initiate a condition report to evaluate whether the subject valves are capable of allowing a subsequent operation after the required isolation safety functions are completed. This evaluation may include an examination of assumptions and methodologies, additional administrative controls, and modifications. The evaluation will be completed in order to institute the corrective actions, if any, by the end of the next scheduled refueling outage.

2. What are NSP's improvement plans regarding MOVs with relatively low capacity margin at rerate conditions?

NSP Response

Of the five valves discussed with the staff, three valves now have acceptable excess capacity. These valves and the approximate margin values are listed below.

MO-2373 (Initial Margin 5%)
Actuator/Valve replaced this outage, now 32% margin.

MO-2015 (Initial Margin 6%)
Adjusted this outage to 9% based on rate of loading and full dp test.

MO-2006 (Initial Margin 6%)
Adjusted this outage to 17%.

The remaining valves include MO-2398 (3%) and MO-2034 (6%). These margins will be evaluated by a method similar to that described for issue 1. above. Prior to operation at rerate conditions, NSP will initiate a condition report to evaluate the capacity margin of MO-2398 and MO-2034. This evaluation may include an examination of assumptions and methodologies, additional administrative controls, and modifications. The evaluation will be completed in order to institute the corrective actions, if any, by the end of the next scheduled refueling outage.

Attachment 3

NSP Commitments for the Monticello Power Rerate

The following commitments apply to the implementation of the Monticello power rerate program.

All plant changes described in Exhibit D of NSP's power rerate license amendment request dated December 4, 1997 will be completed prior to implementation of power rerate.

All commitments contained in Exhibit H of NSP's power rerate license amendment submittal dated December 4, 1997 will be completed as described therein.

Feedwater and Condensate System area ambient temperatures will be monitored at rerate conditions to confirm that design temperatures are not exceeded.

Feedwater and Condensate System testing will be conducted as described by NSP's response to Question 17 contained in NSP's power rerate submittal dated March 26, 1998.

The rerate startup test program will include a requirement to monitor moisture separator drain system stability.

The adequacy of the service water system will be confirmed by monitoring the system and its loads during the rerate startup testing program.

The final empirical relation between turbine 1st stage pressure and percent reactor power will be determined during the rerate startup testing program.