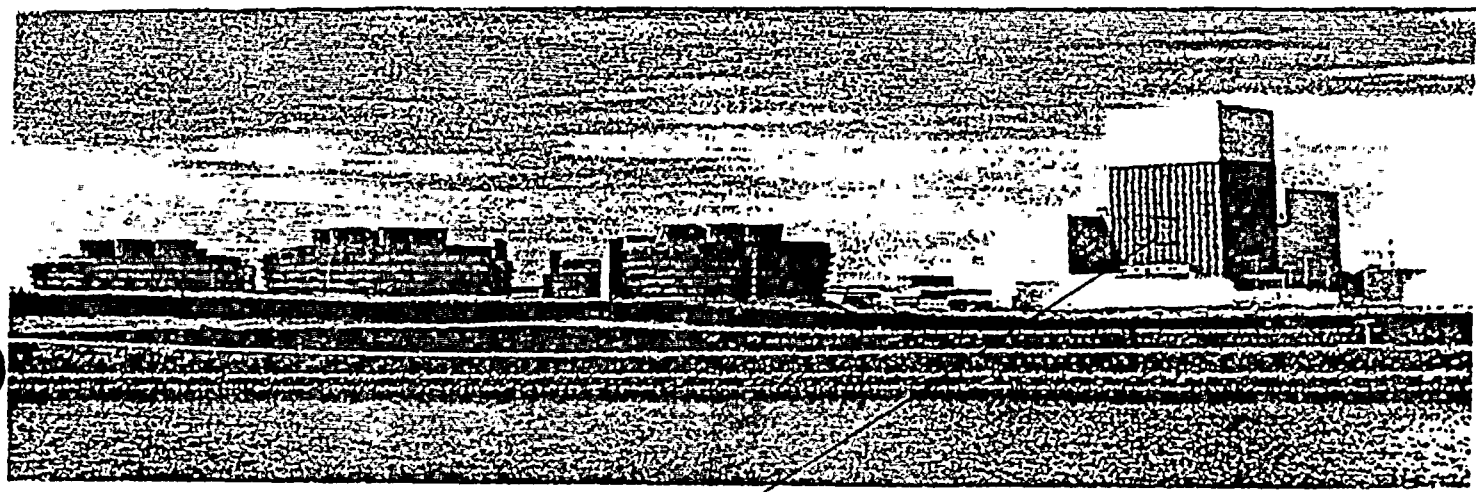
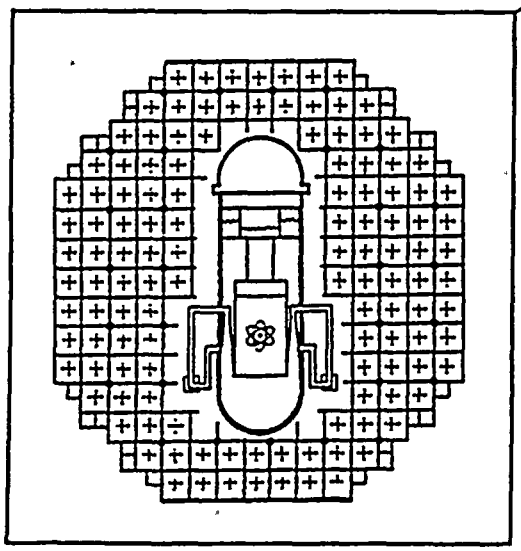
WNP2-FTS-148

WNP-2

Cycle 14 Reload Design Report

January 1998





WASHINGTON PUBLIC POWER
SUPPLY SYSTEM

WNP-2 Cycle 14 Reload Design Report

WNP2-FTS-148

January 1998

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CONTENTS

1.0 INTRODUCTION

A revised Cycle 14 reload design has been developed by the Supply System using the revised Cycle 13 energy projection which was provided in Reference 1. This report describes the core loading and cycle design that are used as the basis for the Cycle 14 licensing calculations. The core loading pattern, projected exposure distributions, projected control rod patterns and evaluations of thermal limits, shutdown margins, hot excess reactivities and cycle energy are presented for the Cycle 14 core design.

The calculations in this report use the NRC approved Supply System CASMO-2E/SIMULATE-E code methodologies and the Siemens CASMO-3/MICROBURN-B code methodologies.

2.0 SUMMARY

The revised Cycle 14 reload design utilizes a batch size of 132 SVEA-96 fuel assemblies, 24 from inventory with 3.33 w/o U-235 and 108 assemblies manufactured for Cycle 14 with 3.14 w/o U-235. The Cycle 14 core loading includes 216 irradiated ABB SVEA-96 assemblies and 416 irradiated SPC 9x9-9X assemblies. The total core weight is 130.89 MT which includes the total as-built weights for 632 irradiated assemblies and the total design weights for 132 unirradiated assemblies.

The revised Cycle 14 reload design was developed using the revised Cycle 13 energy production of 257 EFPD (Ref. 1). The Cycle 14 core design utilizes a Single Rod Sequence (SRS) strategy while maintaining one eighth core symmetry with A-2 rod patterns used throughout the cycle. The target control rod step-through uses one deep for shallow rod swap at 3500 MWD/MT. The predicted Cycle 14 energy production to EOFPL is 244 EFPD, 6500 MWD/MT. FFTR and coastdown will provide the capability to operate for the remainder of the cycle.

The Cycle 14 reload design results are summarized in Table 2.1. The design criteria specified in Reference 1 are also shown in Table 2.1. As can be seen from the data presented, the MICROBURN-B and SIMULATE-E predicted results, except SIMULATE-E MAPRAT, satisfy the required design criteria. Past experience indicates that the required thermal limits (MFLCPR, MFLPD and MAPRAT) are not always satisfied with SIMULATE-E when the MICROBURN-B developed control rod patterns are used. It is believed that the SIMULATE-E MAPRAT which exceeds the design limit by 0.002 in this design can be easily improved with control rod pattern adjustments (i.e., insert shallow rods). In this design 120 assemblies, 15.7% of the core, are not moved. The SPC fuel shuffling criteria for the SPC 9x9-9X fuel are satisfied.

In summary, the good agreement between independent results calculated by MICROBURN-B and SIMULATE-E provides a high degree of confidence that the Cycle 14 reload design is adequate for use in Cycle 14.

3.0 NUCLEAR DESIGN BASES

3.1 Cycle 13 Exposure Projection

Per Reference 1, Cycle 13 is projected to produce a cycle energy of 257 EFPD. With the core weight of 129.87 MT based on the as-built bundle weights input to POWERPLEX, this cycle energy corresponds to a cycle exposure of 6898.5 MWD/MT. Full core depletion calculations for Cycle 13 were performed using MICROBURN-B, starting with the POWERPLEX exposure distribution at 4321.7 MWD/MT which occurred on December 29, 1997 (the state point WK-9753 97DEC29-13.58.34). Quarter core depletion calculations were performed using SIMULATE-E, starting with the Cycle 13 core follow exposure distribution at 4125.1 MWD/MT which occurred on December 21, 1997 (the state point sp971221). The Cycle 14 results presented in this report are based on the Cycle 13 exposure projection from the mentioned cycle exposure to 4500 MWD/MT and then to 6898.5 MWD/MT shown in Appendix A. The control rod patterns used from 4500 to 6300 MWD/MT are from the Cycle 13 Startup and Operations Report (Ref. 2). FFTR and coastdown are used to reach 6898.5 MWD/MT. The projected exposure distribution at 6899 MWD/MT for Cycle 13 is shown in Figure 3.1 based on MICROBURN-B calculations.

3.2 Hot and Cold Target k-effectives

The WNP-2 MICROBURN-B hot and cold target k-effectives shown in Figure 3.2 were selected based on the core follow results from previous cycles. The SIMULATE-E hot target k-effectives were normalized to the MICROBURN-B hot target k-effectives as seen in Figure 3.3. The SIMULATE-E cold target k-effective was selected based on core follow results from previous cycles, independent from MICROBURN-B.

3.3 Operating Thermal Limits

Operating thermal limits for Cycle 14 were assumed to be the same as those used for Cycle 13 (Ref. 3). The MLHGR, MAPLHGR and MCPR operating limits for the existing 3.33 w/o U-235 assembly are assumed for the 3.14 w/o U-235 assembly.

4.0 BUNDLE DESIGN

The ABB SVEA-96 assembly for Cycle 14 was designed and documented in Reference 4. The physical bundle and channel design for Cycle 14 assembly are identical to that for Cycle 12 (Ref. 5). However, the bundle average enrichment was reduced from 3.33 w/o U-235 to 3.14 w/o U-235. Additionally the Cycle 14 bundle utilized the ABB revised standard enrichments of Reference 6. The Cycle 14 assembly design was provided to ABB CENO via Reference 7. ABB CENO verified this bundle design and concluded that this bundle design satisfied the ABB design and fabrication guidelines (Ref. 8).

The Cycle 14 bundle design contains a total of 96 fuel rods, twelve of them are gadolinia rods (10 rods with 4.0 w/o Gd_2O_3 and two rods with 1.0 w/o Gd_2O_3). All rods are equipped with approximately six-inch natural uranium blankets at the top and bottom of the rods. The enriched central portion of the bundle is approximately 138 inches in length and has an average enrichment of 3.350 w/o U-235. The bundle weight is 175.67 kg. The Supply System performed calculations using MICBURN-E and CASMO-2E to generate cross section data for SIMULATE-E (Ref. 4) and using MICBURN-3 and CASMO-3 to generate cross section data for MICROBURN-B (Ref. 4). The nominal and bowed R-factors for the Cycle 14 bundle design were also generated and documented in Reference 4.

5.0 CYCLE 14 RELOAD DESIGN

SIMULATE-E and MICROBURN-B have been used to perform the Cycle 14 reload design. The core loading is first developed by using SIMULATE-E to evaluate radial bundle powers, REMACCX penalties and shutdown margins. MICROBURN-B is then used to develop target control rod patterns. SIMULATE-E is then used to evaluate these control rod patterns. The iteration process continues until a successful core loading pattern is obtained. The detailed evaluation is documented in the calculation notebook (Ref. 9).

5.1 Core Loading Pattern

The WNP-2 Cycle 14 core employs the third reload of ABB SVEA-96 fuel. The core loading pattern utilizes 132 fresh ABB SVEA-96 fuel assemblies. The unirradiated assemblies include 24 assemblies from inventory with 3.33 w/o U-235 (Ref. 5) and 108 assemblies manufactured for Cycle 14 with 3.14 w/o U-235 (Refs. 4, 7 and 8). The WNP-2 Cycle 14 full core loading map is shown in Figure 5.1. The bundle identifications for the fresh SVEA-96 fuel assemblies are arbitrarily assigned as SA13 for 24 assemblies from inventory and as SA14 for 108 assemblies manufactured for Cycle 14. The actual bundle identifications for the fresh fuel assemblies will be made at a later date.

The MICROBURN-B assembly type distribution and the associated number of assemblies for each assembly type for the WNP-2 Cycle 14 are shown in Figure 5.2.

5.2 Cycle 14 Exposure Capability

The EOFPL exposure for Cycle 14 is projected to be 6500 MWD/MT at full power, rated core flow and normal feedwater temperature. With a total core weight of 130.89 MT as calculated by MICROBURN-B, the equivalent energy is 244 EFPD. The WNP-2 Cycle 14 projected exposure distributions at 0 and 6500 MWD/MT are shown in Figures 5.3 and 5.4, respectively, based on MICROBURN-B calculations.

5.3 Discharged And Shuffled Fuel Information

The Cycle 13 to Cycle 14 discharge and shuffle results are shown in Appendix B. Table B.1 shows the assembly average exposure for each of the discharged assemblies along with the batch average discharge exposures. Table B.2 shows the previous and current cycle locations for each assembly shuffled from Cycle 13 to Cycle 14.

The Cycle 14 design leaves 120 fuel assemblies, 15.7% of the core, in the same core locations as they were in Cycle 13. The Cycle 14 design contains no REMACCX penalties for SPC 9x9-9X fuel.

5.4 Thermal Limits

The control rod patterns for Cycle 14 were developed using MICROBURN-B. The results are presented in Appendix C. Tables 5.1 and 5.2 summarize the results of the Cycle 14 control rod step through. The required thermal margins for Cycle 14 reload design are satisfied with MICROBURN-B.

The control rod patterns shown in Appendix C were also used in SIMULATE-E to independently evaluate the thermal limits for Cycle 14. Table 5.3 summarizes the Cycle 14 control rod step through results calculated by SIMULATE-E. With the exception of MAPRAT at 200 MWD/MT where the design criterion is exceeded by 0.002, all other required thermal margins for Cycle 14 reload design are satisfied with SIMULATE-E. Note that the required thermal limits for the reload design are not always satisfied with SIMULATE-E when the MICROBURN-B developed control rod patterns are used. However, it is believed that the design thermal margins calculated by SIMULATE-E can be easily improved with control rod pattern adjustments.

Figures 5.5 and 5.6 show the plots of thermal limits calculated by MICROBURN-B and SIMULATE-E, respectively.

5.5 Cold Shutdown Margin

The cold shutdown margin was calculated based on the selected cold target k-effective shown in Figure 3.2 for MICROBURN-B and Figure 3.3 for SIMULATE-E. The shutdown margin results as a function of cycle exposure calculated by MICROBURN-B and SIMULATE-E are presented in Tables 5.4 and 5.5, respectively. The results are also plotted in Figure 5.7. The design criterion for cold shutdown margin is satisfied for both MICROBURN-B and SIMULATE-E.

5.6 Hot Excess Reactivity

Hot excess reactivities throughout Cycle 14 were calculated at full power, rated core flow and equilibrium xenon. The hot excess reactivity as a function of cycle exposure calculated by MICROBURN-B and SIMULATE-E is shown in Tables 5.6 and 5.7, respectively. The results are also plotted in Figure 5.8. The design criteria for hot excess reactivity is satisfied.

5.7 Cold Reactivity With Rod Group 1 Withdrawn

Cold calculations with the rod group 1A or the rod group 1B completely withdrawn were performed at 0.0, 0.2, 2.0, 4.0 and 6.0 GWD/MT cycle exposures. The results indicate that the reactor remains sub-critical when either the rod group 1A or the rod group 1B is fully withdrawn.

6.0 REFERENCES

1. Letter from RH Torres to RM Matheny, "WNP-2 Final Reload Design Criteria For Cycle 14, Contract No. C-30800, WNP-2 Nuclear Reload Fuel Fabrication and Services", WPABB-97-064, December 30, 1997.

2. ABB CENO Report, "Startup and Operations Report for Washington Public Power Supply System WNP-2 Cycle 13", CE NPSD-822-P, Rev. 1, September, 1997.

3. "WNP-2 Cycle 13 Core Operating Limits Report", COLR 97-13, Rev. 1, July 1997.

4. TC Hoang, "Cycle 14 SVEA-96 Cross Sections", NE-02-96-17, Rev. 0

5. MA Elmaghrabi and WR Harris, "Final Assembly Design For WNP-2 Cycle 12", CE NPSD-793-P, July 1995

6. Letter from RM Matheny to RA Vopalensky, "Transmittal of Revised Standard Enrichments", ABBWP-97-010, February 05, 1997.

7. Letter from RH Torres to RM Matheny, "WNP-2 Cycle 14 Assembly Design - Contract No. C-30800, WNP-2 Nuclear Reload Fuel Fabrication and Services", WPABB-97-031, May 27, 1997.

8. Letter from RM Matheny to RA Vopalensky, "WNP-2 Cycle 14 Reference Core Nuclear Design Verification", ABBWP-97-106, January 07, 1998.

9. TC Hoang, "Cycle 14 RLP Re-Design", NE-02-98-01, Rev. 0.

Table 2.1

Summary of Cycle 14 Reload Design Results

	MICROBURN-B	SIMULATE-E	Design Criteria
Maximum MFLCPR	0.881	0.889	≤ 0.920
Maximum MFLPD	0.820	0.814	≤ 0.909
Maximum MAPRAT	0.898	0.911	≤ 0.909
Minimum CSDM, %Δk - BOC - During Cycle	 1.96 1.71	 2.08 1.90	 ≥ 1.4
Minimum Hot Excess at 200 MWD/MT, %Δk	1.16	1.25	≥ 1.0
Maximum Hot Excess During Cycle, %Δk	1.16	1.25	≤ 2.0
Cold Reactivity with Rod Group 1 Withdrawn	Not Checked	sub-critical	sub-critical
Cycle 14 energy at EOFPL, EFPD	244 (6500 MWD/MT)	244 (6500 MWD/MT)	238 target with 230 minimum

Table 5.1

WNP-2 Cycle 14 Control Rod Step Through Summary - Part 1 (MICROBURN-B)

Cycle Exposure (GWd/MT)	Calculated K-eff	Control Rod Density	Total Core Power MWt	Total Core Flow (Mlb/hr)	Ref. Pressure (psia)	Inlet Sub-Cooling (Btu/lb)	Void Fraction	Core Minimum CPR	Core Maximum LHGR (kW/ft)	Core Maximum APLHGR (kW/ft)
0.000	1.00327	4.82	3486.0	108.50	1035.00	19.24	0.424	1.529	8.84	8.03
0.200	1.00364	5.90	3486.0	108.50	1035.00	19.24	0.423	1.497	9.15	8.22
0.500	1.00310	5.81	3486.0	108.50	1035.00	19.24	0.418	1.517	8.67	7.80
1.000	1.00340	5.09	3486.0	108.50	1035.00	19.24	0.427	1.513	8.70	7.85
1.500	1.00347	5.09	3486.0	108.50	1035.00	19.24	0.424	1.519	8.48	7.63
2.000	1.00343	4.68	3486.0	106.33	1035.00	19.66	0.426	1.522	8.84	7.45
2.500	1.00362	4.68	3486.0	108.50	1035.00	19.24	0.419	1.544	8.65	7.22
3.000	1.00349	4.50	3486.0	108.50	1035.00	19.24	0.416	1.526	8.82	7.49
3.500	1.00333	4.41	3486.0	108.50	1035.00	19.24	0.413	1.504	9.08	7.86
3.501	1.00322	4.14	3486.0	106.33	1035.00	19.66	0.413	1.533	8.56	7.41
4.000	1.00327	4.14	3486.0	108.50	1035.00	19.24	0.408	1.533	8.79	7.73
4.500	1.00366	3.96	3486.0	108.50	1035.00	19.24	0.403	1.521	8.64	7.68
5.000	1.00310	3.87	3486.0	108.50	1035.00	19.24	0.398	1.510	8.32	7.42
5.500	1.00317	3.65	3486.0	108.50	1035.00	19.24	0.386	1.512	8.34	7.83
6.000	1.00355	2.88	3486.0	108.50	1035.00	19.24	0.373	1.519	9.19	8.33
6.500	1.00344	0.00	3486.0	108.50	1035.00	19.24	0.384	1.520	7.48	6.86

Table 5.2

WNP-2 Cycle 14 Control Rod Step Through Summary - Part 2 (MICROBURN-B)

Cycle Exposure (GWd/MT)	Calculated K-eff	Control Rod Density	Core Limiting CPR	Fraction of Limiting CPR	Core Limiting LHGR (kW/ft)	Fraction of Limiting LHGR	Core Limiting APLHGR (kW/ft)	Fraction of Limiting APLHGR
0.000	1.00327	4.819	1.603	0.873	8.84	0.794	7.94	0.872
0.200	1.00364	5.900	1.606	0.872	9.06	0.820	8.15	0.898
0.500	1.00310	5.810	1.611	0.869	8.67	0.793	7.80	0.864
1.000	1.00340	5.089	1.513	0.859	8.69	0.802	7.81	0.878
1.500	1.00347	5.089	1.519	0.856	8.46	0.787	7.61	0.868
2.000	1.00343	4.684	1.522	0.854	8.20	0.769	7.37	0.853
2.500	1.00362	4.684	1.544	0.842	7.98	0.753	7.17	0.842
3.000	1.00349	4.504	1.526	0.852	7.58	0.755	7.08	0.832
3.500	1.00333	4.414	1.504	0.864	7.64	0.766	7.86	0.845
3.501	1.00322	4.144	1.533	0.848	7.09	0.711	7.41	0.797
4.000	1.00327	4.144	1.533	0.848	8.79	0.727	7.73	0.831
4.500	1.00366	3.964	1.521	0.855	8.64	0.727	7.68	0.826
5.000	1.00310	3.874	1.510	0.881	8.32	0.710	7.42	0.798
5.500	1.00317	3.649	1.512	0.879	7.96	0.726	6.24	0.734
6.000	1.00355	2.883	1.519	0.875	8.60	0.800	6.75	0.795
6.500	1.00344	0.000	1.520	0.875	7.37	0.696	6.08	0.715

Table 5.3

WNP-2 Cycle 14 Control Rod Step Through Summary (SIMULATE-E)

EXPOSURE GWD/MT	POWER MWT	FLOW MBLM/HR	MCPR	MLHGR KW/FT	MAPLHGR KW/FT	E-RATIO	PEAK NODAL EXP GWD/MT
.000	3486.0	108.5	1.526	8.83	8.11	1.0526	43.3098
.200	3486.0	108.5	1.508	9.03	8.30	1.0530	43.3553
.500	3486.0	108.5	1.531	8.62	7.92	1.0532	43.4219
1.000	3486.0	108.5	1.505	8.80	8.01	1.0531	43.5319
1.500	3486.0	108.5	1.508	8.82	7.83	1.0543	43.6483
2.000	3486.0	106.3	1.490	8.87	7.63	1.0552	43.7640
2.500	3486.0	108.5	1.516	8.83	7.71	1.0562	43.8830
3.000	3486.0	108.5	1.494	9.00	7.98	1.0569	44.0954
3.500	3486.0	108.5	1.470	9.28	8.33	1.0573	44.3398
3.500	3486.0	106.3	1.514	8.60	7.72	1.0573	44.3398
4.000	3486.0	108.5	1.520	8.72	7.87	1.0571	44.5717
4.500	3486.0	108.5	1.518	8.33	7.56	1.0568	44.8009
5.000	3486.0	108.5	1.504	7.73	7.04	1.0561	45.0250
5.500	3486.0	108.5	1.501	7.83	7.35	1.0551	45.2463
6.000	3486.0	108.5	1.496	8.37	7.87	1.0534	45.6098
6.500	3486.0	108.5	1.501	7.50	6.78	1.0512	46.1498

EXPOSURE GWD/MT	POWER %	FLOW %	MFLCPR	MFLPD	MAPRAT	K-EFF	CORE AVE EXP GWD/MT
.000	100.0	100.0	.853	.793	.891	1.00513	18.3071
.200	100.0	100.0	.862	.814	.911	1.00474	18.5071
.500	100.0	100.0	.849	.788	.878	1.00487	18.8071
1.000	100.0	100.0	.864	.804	.899	1.00549	19.3071
1.500	100.0	100.0	.862	.792	.892	1.00587	19.8071
2.000	100.0	98.0	.873	.769	.873	1.00627	20.3071
2.500	100.0	100.0	.858	.757	.867	1.00674	20.8071
3.000	100.0	100.0	.870	.756	.859	1.00693	21.3071
3.500	100.0	100.0	.884	.771	.895	1.00722	21.8071
3.500	100.0	98.0	.859	.709	.830	1.00694	21.8071
4.000	100.0	100.0	.855	.728	.847	1.00763	22.3071
4.500	100.0	100.0	.857	.706	.812	1.00862	22.8071
5.000	100.0	100.0	.884	.664	.757	1.00856	23.3071
5.500	100.0	100.0	.886	.670	.738	1.00889	23.8071
6.000	100.0	100.0	.889	.732	.800	1.00969	24.3071
6.500	100.0	100.0	.886	.664	.738	1.01063	24.8071

Table 5.4

WNP-2 Cycle 14 (MICROBURN-B)
Minimum Cold Shutdown Margin versus Cycle Exposure

Cycle Exposure MWD/MT	Cold Shutdown Margin dk, %	Limiting Location Plant Coordinates
0	1.96	50,27
200	1.71	50,27
500	1.83	50,27
1000	1.93	50,27
1500	2.00	50,27
2000	2.08	50,27
2500	2.17	50,27
3000	2.28	50,27
3500	2.39	50,27
4000	2.46	54,19
4500	2.50	54,19
5000	2.53	54,19
5500	2.55	54,19
6000	2.55	54,19
6500	2.56	54,19

Table 5.5

WNP-2 Cycle 14 (SIMULATE-E)
Minimum Cold Shutdown Margin versus Cycle Exposure

Cycle Exposure MWD/MT	Cold Shutdown Margin dk, %	Limiting Location Plant Coordinates
0	2.08	50,27
200	1.90	50,27
500	1.98	50,27
1000	2.08	50,27
1500	2.14	50,27
2000	2.17	50,15
2500	2.20	50,15
3000	2.24	50,15
3500	2.29	50,15
4000	2.30	54,19
4500	2.31	54,19
5000	2.30	54,19
5500	2.27	54,19
6000	2.22	54,19
6500	2.18	54,19

Table 5.6

WNP-2 Cycle 14 (MICROBURN-B)
Hot Excess Reactivity versus Cycle Exposure

Cyc. Exp.	k-rp	k-crit	k-haro	Hot Excess, %Δk
0.0	1.00327	1.00350	1.01200	0.850
0.2	1.00364	1.00350	1.01512	1.162
0.5	1.00310	1.00350	1.01411	1.061
1.0	1.00340	1.00350	1.01378	1.028
1.5	1.00347	1.00350	1.01383	1.033
2.0	1.00343	1.00350	1.01362	1.012
2.5	1.00362	1.00350	1.01325	0.975
3.0	1.00349	1.00350	1.01275	0.925
3.5	1.00333	1.00350	1.01220	0.870
4.0	1.00327	1.00350	1.01160	0.810
4.5	1.00366	1.00350	1.01091	0.741
5.0	1.00310	1.00350	1.00995	0.645
5.5	1.00317	1.00350	1.00858	0.508
6.0	1.00355	1.00350	1.00651	0.301
6.5	1.00344	1.00350	1.00344	-0.006

Table 5.7

WNP-2 Cycle 14 (SIMULATE-E)
Hot Excess Reactivity versus Cycle Exposure

Cyc. Exp.	k-rp	k-crit	k-haro	Hot Excess, %Δk
0.0	1.00513	1.00536	1.01521	0.985
0.2	1.00474	1.00460	1.01706	1.246
0.5	1.00487	1.00527	1.01711	1.184
1.0	1.00549	1.00559	1.01725	1.166
1.5	1.00587	1.00590	1.01750	1.160
2.0	1.00627	1.00634	1.01759	1.125
2.5	1.00674	1.00662	1.01748	1.086
3.0	1.00693	1.00694	1.01735	1.041
3.5	1.00722	1.00739	1.01725	0.986
4.0	1.00763	1.00786	1.01716	0.930
4.5	1.00862	1.00846	1.01697	0.851
5.0	1.00856	1.00896	1.01647	0.751
5.5	1.00889	1.00922	1.01550	0.628
6.0	1.00969	1.00964	1.01360	0.396
6.5	1.01063	1.01069	1.01057	-0.012

Figure 3.1

Projected WNP-2 Cycle 13 End-of-Cycle Exposure Distribution At 6899 MWD/MT

J: I:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1									36.813	38.565	38.088	37.787	38.320	38.979	38.709
2								38.458	36.443	17.756	32.608	14.457	35.569	14.774	19.819
3						38.032	38.681	26.330	37.152	20.529	36.513	8.032	16.092	8.255	26.358
4						38.583	24.609	15.070	8.199	16.270	22.300	17.059	36.820	22.456	27.659
5					33.038	37.559	35.643	8.369	17.092	9.245	36.747	9.400	29.910	9.372	23.957
6			37.979	38.593	37.582	12.981	21.451	16.443	37.111	30.244	29.475	17.253	34.712	22.450	29.826
7			38.708	24.636	35.478	21.448	22.793	30.452	17.462	9.169	26.473	22.578	36.538	9.275	30.559
8		38.375	26.431	15.037	8.356	16.510	30.480	23.276	23.197	34.723	22.816	29.281	17.076	22.582	27.881
9	36.922	36.465	37.141	8.179	17.064	36.930	17.449	23.310	30.304	9.057	35.344	8.864	35.248	9.201	23.385
10	38.576	17.688	20.138	16.326	9.213	30.333	9.155	34.605	9.054	30.794	21.719	30.565	23.685	35.012	33.305
11	38.124	32.550	36.501	22.894	36.731	29.419	26.436	22.756	35.281	23.536	27.248	22.949	17.171	9.010	28.918
12	37.826	14.339	7.983	16.515	9.360	16.718	22.242	29.160	8.821	30.162	23.138	29.393	29.665	22.322	25.264
13	38.230	35.449	16.022	36.778	29.909	34.647	36.346	16.854	35.274	23.720	17.145	29.804	37.235	9.104	23.604
14	38.973	14.662	8.150	23.012	9.276	22.038	9.024	22.366	9.101	34.889	8.978	22.290	9.095	17.028	37.165
15	38.623	21.192	26.091	27.533	23.880	29.806	30.432	27.730	23.406	33.207	28.829	25.253	23.652	37.160	28.580
16	38.647	21.156	26.274	27.533	23.873	29.787	30.414	27.703	23.420	33.188	28.829	25.278	23.638	37.188	28.497
17	38.952	14.630	8.152	22.980	9.304	22.017	9.238	22.588	9.167	34.878	9.000	22.244	9.103	17.015	37.198
18	38.276	35.485	16.003	36.776	29.942	34.757	36.516	17.014	35.366	23.705	17.142	29.809	37.190	9.114	23.597
19	37.768	14.378	7.983	16.488	9.369	16.755	22.329	29.365	8.863	30.064	23.108	29.345	29.819	22.259	25.310
20	38.016	32.581	36.497	22.850	36.764	29.399	26.486	22.790	35.272	23.523	27.214	23.108	17.171	9.026	28.927
21	38.580	17.657	20.130	16.283	9.228	30.333	9.184	34.550	9.070	30.828	21.751	30.463	23.671	35.005	33.291
22	36.935	36.445	37.118	8.191	17.015	36.983	17.442	23.293	30.282	9.081	35.339	8.887	35.297	9.218	23.407
23		38.432	26.396	15.026	8.368	16.413	30.483	23.172	23.299	34.603	22.778	29.332	17.042	22.650	27.888
24			38.701	24.611	35.505	21.405	22.760	30.502	17.437	9.187	26.365	22.625	36.475	9.284	30.518
25			37.880	38.602	37.587	12.924	21.388	16.395	37.013	30.291	29.409	17.231	34.671	22.471	29.890
26					33.145	37.531	35.697	8.362	17.011	9.236	36.794	9.391	29.962	9.386	23.997
27						38.566	24.569	15.018	8.195	16.282	22.272	17.017	36.814	22.377	27.679
28						38.016	38.744	26.354	37.248	20.451	36.515	8.038	16.072	8.274	26.323
29								38.413	36.391	17.771	32.621	14.386	35.540	14.733	19.819
30									36.872	38.506	38.102	37.841	38.326	39.090	38.709
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 3.1

Projected WNP-2 Cycle 13 End-of-Cycle Exposure Distribution At 6899 MWD/MT (Cont.)

J: / I:	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	38.704	38.900	38.362	37.790	38.093	38.562	36.906								
2	19.652	14.758	35.557	14.192	32.603	17.838	36.342	38.395							
3	26.294	8.291	16.105	8.095	36.561	18.436	36.824	26.426	38.555	37.964					
4	27.007	22.465	36.710	16.920	22.152	16.348	8.311	15.115	24.494	38.553					
5	23.961	9.403	29.926	9.447	36.807	9.327	16.999	8.452	35.684	37.538	33.096				
6	29.867	22.293	34.744	17.250	29.525	30.347	37.100	16.057	21.336	12.740	37.343	38.115	37.425		
7	30.516	9.297	36.431	22.591	26.442	9.244	17.500	30.501	22.647	21.189	35.614	22.866	37.659		
8	27.645	22.652	17.055	29.355	22.677	34.527	23.328	23.199	30.475	16.162	8.510	15.094	26.186	38.417	
9	23.445	9.222	35.224	8.917	35.335	9.137	30.308	23.109	17.384	36.752	17.098	8.310	37.149	35.836	36.746
10	33.217	34.958	23.675	30.521	21.765	30.812	9.150	34.573	9.274	30.248	9.340	16.305	19.869	17.400	38.490
11	28.871	9.040	17.190	23.130	27.249	23.307	35.274	22.832	26.454	29.500	36.800	22.781	36.387	32.350	37.873
12	25.342	22.165	29.840	29.204	23.036	30.040	8.955	29.265	22.313	16.830	9.493	16.421	8.125	14.449	37.723
13	23.616	9.135	37.214	29.759	17.044	23.717	35.388	17.070	36.524	34.707	29.866	36.824	16.108	35.404	38.226
14	37.191	17.033	9.145	22.274	9.077	34.876	9.289	22.576	9.374	22.115	9.466	23.131	8.348	14.720	37.609
15	28.510	37.196	23.647	25.172	28.704	33.228	23.319	27.906	30.495	29.873	23.823	27.658	25.866	20.943	38.558
16	28.550	37.209	23.695	25.170	28.253	33.245	23.401	27.950	30.330	29.251	23.830	27.671	25.144	18.206	38.564
17	37.245	17.040	9.191	22.353	9.144	34.652	9.335	22.538	9.425	22.213	9.521	23.164	8.430	14.649	38.493
18	23.624	9.178	37.039	29.621	16.911	23.483	35.340	16.942	36.445	34.394	29.895	36.875	16.158	34.515	38.341
19	25.374	22.074	29.810	28.717	23.002	29.774	9.033	29.166	22.287	16.832	9.571	15.927	8.224	14.375	37.786
20	28.630	9.100	17.217	23.165	27.023	22.368	35.137	22.883	26.549	29.584	36.927	22.633	36.503	32.140	37.734
21	33.207	34.986	23.611	30.191	21.839	30.904	9.252	34.406	9.348	30.304	9.438	16.159	19.358	17.193	38.303
22	23.496	9.286	34.884	9.015	35.288	9.249	30.307	23.144	17.231	36.809	16.934	8.412	37.248	35.626	36.533
23	27.185	22.710	17.002	29.397	22.379	33.948	23.441	23.083	30.545	15.169	8.590	15.101	23.521	38.381	
24	30.519	9.354	36.325	22.619	26.549	9.315	17.538	30.565	21.706	20.790	35.663	23.958	38.378		
25	29.831	22.432	34.678	17.233	29.502	30.368	37.150	14.875	21.161	12.503	37.297	38.310	37.732		
26	24.026	9.457	30.106	9.521	36.831	9.398	16.351	8.541	35.711	37.403	33.144				
27	26.283	22.511	36.641	16.244	21.792	16.291	8.343	15.109	24.599	38.506					
28	26.221	8.339	16.117	8.129	36.592	19.430	36.433	26.350	38.557	37.940					
29	19.456	14.739	35.426	10.835	32.637	17.828	36.236	38.389							
30	38.729	38.988	38.339	37.841	38.076	38.567	36.700								
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Figure 3.2 MICROBURN-B Cycle 14 Hot and Cold Target k-effectives

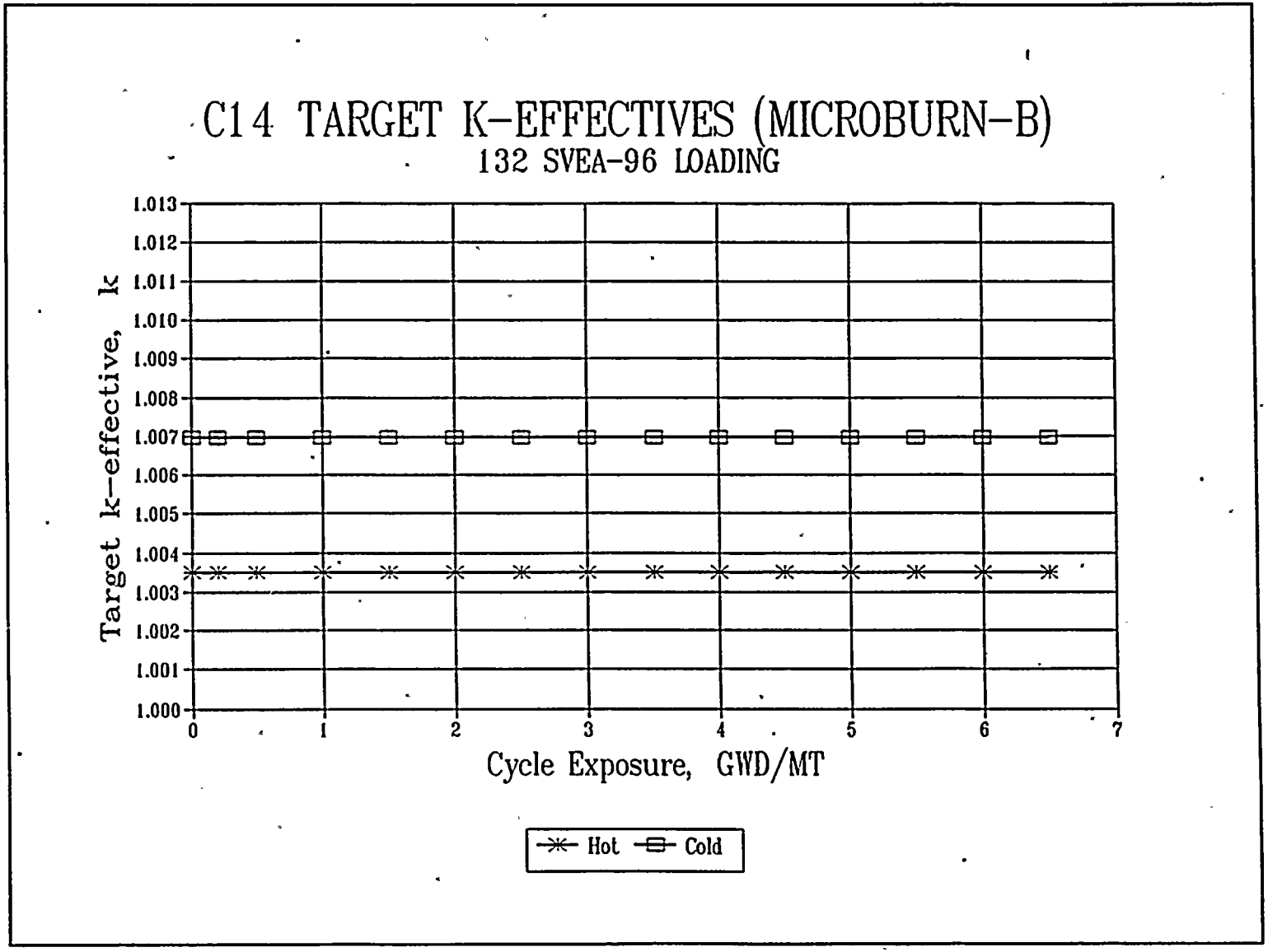


Figure 3.3 SIMULATE-E Cycle 14 Hot and Cold Target k-effectives

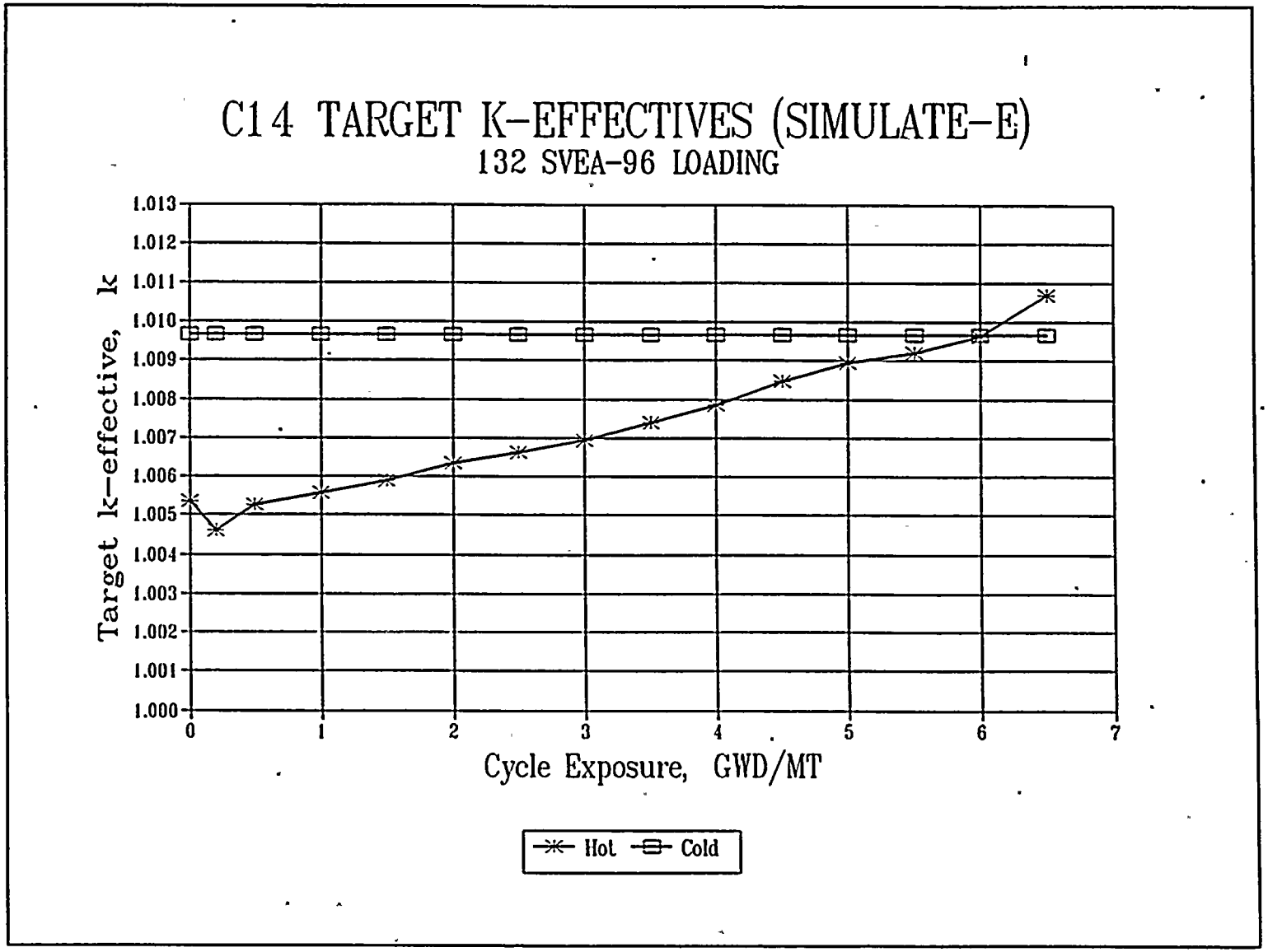


Figure 5.1

WNP-2 Cycle 14 Core Loading Pattern

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1:									UD7085	UD7059	UD8001	UD8096	UD8077	UD8066	UD7092
2:								UD8002	UD9093	UDA015	UD9003	UDA045	WAC108	WAC092	WQD003
3:						UD8067	UD7086	UD9082	UD9016	WAC050	UDA023	WQD001	WAC098	SA13	UDA123
4:						UD7064	UD9062	WQD038	SA14	WQD008	SA14	UD9150	SA14	UD9015	UDA019
5:					UD8016	UD9031	UD9127	WQD002	UD9014	SA14	WAC052	WQD006	WAC049	WAC106	UD9027
6:			UD7023	UD7090	UD9064	WAC043	SA13	WAC101	SA14	UD9103	SA14	UD8008	SA14	UDA042	SA14
7:			UD7071	UD9092	UD9072	SA13	UDA067	UDA047	WAC044	WQD007	UDA024	WAC097	UD8080	WAC110	UDA018
8:		UD8003	UD9077	WQD004	WQD031	WAC093	UDA025	UDA044	SA14	UD9075	UDA046	UDA051	SA14	WAC041	UDA052
9:	UD7068	UD9028	UD9104	SA14	UD9113	SA14	WAC042	SA14	WAC094	UDA020	WAC095	WQD005	UDA026	WAC109	UD9136
10:	UD7042	UDA048	WAC047	WQD030	SA14	UD9130	WQD027	UD9067	UDA043	UD8078	SA13	UD9085	SA14	UD7044	SA14
11:	UD8057	UD9059	UDA140	SA14	WAC100	SA14	UDA022	UDA049	WAC102	SA13	UDA016	UDA014	WAC104	WAC107	UDA021
12:	UD8099	UDA069	WQD028	UD9050	WQD029	UD8004	WAC103	UDA068	WQD033	UD9149	UDA139	UD9066	SA14	UD9051	UD9078
13:	UD8064	WAC142	WAC051	SA14	WAC048	SA14	UD8087	SA14	UDA041	SA14	WAC099	SA14	UD9004	WAC105	WAC046
14:	UD8083	WAC096	SA13	UD9133	WAC132	UDA066	WAC135	WAC045	WAC131	UD7006	WAC133	UD9114	WAC134	SA14	UD9116
15:	UD7008	WQD032	UDA040	UDA143	UD9098	SA14	UDA017	UDA092	UD9020	SA14	UDA050	UD9147	WAC040	UD9071	UDA142
16:	UD7029	WQD021	UDA114	UDA061	UD9129	SA14	UDA084	UDA059	UD9123	SA14	UDA057	UD9008	WAC004	UD9070	UDA108
17:	UD8041	WAC057	SA13	UD9054	WAC124	UDA082	WAC126	WAC008	WAC125	UD7028	WAC123	UD9060	WAC129	SA14	UD9080
18:	UD8049	WAC128	WAC054	SA14	WAC001	SA14	UD8085	SA14	UDA056	SA14	WAC062	SA14	UD9013	WAC150	WAC007
19:	UD8039	UDA128	WQD064	UD9094	WQD024	UD8005	WAC064	UDA087	WQD025	UD9122	UDA055	UD9063	SA14	UD9068	UD9148
20:	UD8053	UD9119	UDA062	SA14	WAC061	SA14	UDA089	UDA063	WAC065	SA13	UDA086	UDA081	WAC063	WAC149	UDA126
21:	UD7007	UDA065	WAC009	WAC130	SA14	UD9005	WQD020	UD9061	UDA112	UD8097	SA13	UD9073	SA14	UD7076	SA14
22:	UD7053	UD9029	UD9126	SA14	UD9002	SA14	WAC005	SA14	WAC059	UDA125	WAC058	WQD083	UDA133	WQD084	UD9041
23:		UD8024	UD9057	WQD047	WQD022	WAC012	UDA088	UDA064	SA14	UD9069	UDA107	UDA113	SA14	WAC003	UDA060
24:			UD7069	UD9034	UD9048	SA13	UDA132	UDA106	WAC002	WQD046	UDA085	WAC056	UD8079	WAC152	UDA091
25:			UD7047	UD7072	UD9032	WAC006	SA13	WAC060	SA14	UD9012	SA14	UD8047	SA14	UDA058	SA14
26:					UD8074	UD9049	UD9030	WQD051	UD9035	SA14	WAC053	WQD049	WAC011	WAC151	UD9036
27:						UD7083	UD9021	WQD023	SA14	WQD050	SA14	UD9081	SA14	UD9076	UDA090
28:						UD8070	UD7061	UD9151	UD9124	WAC010	UDA083	WQD048	WAC055	SA13	UDA127
29:								UD8009	UD9074	UDA134	UD9128	UDA105	WAC148	WAC013	WQD085
30:									UD7045	UD7014	UD8073	UD8015	UD8048	UD8071	UD7101

Figure 5.1

WNP-2 Cycle 14 Core Loading Pattern (Cont.)

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1:	UD7049	UD8060	UD8051	UD8019	UD8032	UD7074	UD7070								
2:	WQD014	WAC083	WAC120	UDA029	UD9108	UDA012	UD9152	UD8030							
3:	UDA001	SA13	WAC038	WQD019	UDA008	WAC035	UD9115	UD9088	UD7048	UD8061					
4:	UDA006	UD9091	SA14	UD9045	SA14	WQD016	SA14	WQD042	UD9044	UD7077					
5:	UD9010	WAC118	WAC027	WQD018	WAC084	SA14	UD9106	WQD015	UD9017	UD9024	UD8054				
6:	SA14	UDA035	SA14	UD8031	SA14	UD9033	SA14	WAC089	SA13	WAC030	UD9107	UD7022	UD7032		
7:	UDA005	WAC122	UD8084	WAC039	UDA010	WQD062	WAC031	UDA129	UDA009	SA13	UD9117	UD9112	UD7051		
8:	UDA037	WAC033	SA14	UDA031	UDA131	UD9023	SA14	UDA036	UDA110	WAC082	WQD052	WQD063	UD9037	UD8037	
9:	UD9089	WAC121	UDA003	WQD017	WAC080	UDA111	WAC081	SA14	WAC029	SA14	UD9065	SA14	UD9052	UD9118	UD7094
10:	SA14	UD7015	SA14	UD9046	SA13	UD8086	UDA039	UD9125	WQD045	UD9102	SA14	WQD043	WAC037	UDA027	UD7017
11:	UDA004	WAC119	WAC086	UDA002	UDA011	SA13	WAC088	UDA030	UDA007	SA14	WAC090	SA14	UDA032	UD9011	UD8010
12:	UD9144	UD9135	SA14	UD9026	UDA028	UD9086	WQD044	UDA053	WAC087	UD8014	WQD041	UD9043	WQD040	UDA054	UD8091
13:	WAC032	WAC127	UD9007	SA14	WAC091	SA14	UDA034	SA14	UD8059	SA14	WAC036	SA14	WAC085	WAC146	UD8072
14:	UD9090	SA14	WAC144	UD9047	WQD081	UD7041	WQD082	WAC028	WAC147	UDA109	WAC145	UD9040	SA13	WAC079	UD8021
15:	UDA079	UD9131	WAC034	UD9039	UDA130	SA14	UD9101	UDA038	UDA013	SA14	UD9083	UDA033	UDA080	WQD080	UD7037
16:	UDA121	UD9053	WAC017	UD9139	UDA117	SA14	UD9105	UDA076	UDA099	SA14	UD9132	UDA072	UDA073	WQD013	UD7108
17:	UD9109	SA14	WAC114	UD9018	WAC111	UD7003	WAC113	WAC019	WAC115	UDA095	WAC112	UD9137	SA13	WAC070	UD8093
18:	WAC020	WAC140	UD9140	SA14	WAC073	SA14	UDA077	SA14	UD8082	SA14	WAC022	SA14	WAC025	WAC116	UD8056
19:	UD9145	UD9134	SA14	UD9097	UDA070	UD9142	WQD011	UDA098	WAC077	UD8063	WQD010	UD9143	WQD053	UDA096	UD8075
20:	UDA136	WAC138	WAC078	UDA093	UDA138	SA13	WAC076	UDA074	UDA103	SA14	WAC074	SA14	UDA116	UD9055	UD8042
21:	SA14	UD7012	SA14	UD9146	SA13	UD8089	UDA075	UD9038	WQD012	UD9019	SA14	WQD054	WAC021	UDA118	UD7039
22:	UD9079	WAC136	UDA094	WQD034	WAC069	UDA104	WAC068	SA14	WAC014	SA14	UD9096	SA14	UD9141	UD9087	UD7057
23:	UDA120	WAC018	SA14	UDA071	UDA119	UD9138	SA14	UDA115	UDA144	WAC067	WQD009	WQD071	UD9006	UD8076	
24:	UDA135	WAC141	UD8095	WAC071	UDA097	WQD072	WAC015	UDA124	UDA101	SA13	UD9084	UD9001	UD7104		
25:	SA14	UDA078	SA14	UD8058	SA14	UD9009	SA14	WAC075	SA13	WAC016	UD9110	UD7016	UD7100		
26:	UD9025	WAC139	WAC023	WQD035	WAC026	SA14	UD9121	WQD037	UD9042	UD9058	UD8065				
27:	UDA141	UD9099	SA14	UD9100	SA14	WQD039	SA14	WAC117	UD9056	UD7050					
28:	UDA137	SA13	WAC072	WAC143	UDA102	WAC024	UD9111	UD9120	UD7038	UD8068					
29:	WQD036	WAC066	WAC137	UDA122	UD9095	UDA100	UD9022	UD8046							
30:	UD7073	UD8098	UD8052	UD8092	UD8045	UD7034	UD7036								

Figure 5.2
WNP-2 Cycle 14 Assembly Type Distribution

I: \ J:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1									20	20	21	21	21	21	20	20	21	21	21	21	20	20								
2								21	23	25	23	25	27	26	28	28	26	27	25	23	25	23	21							
3						21	20	23	23	26	25	28	26	29	25	25	29	26	28	25	26	23	23	20	21					
4						19	23	28	30	28	30	23	30	23	25	25	23	30	23	30	28	30	28	23	19					
5					21	23	23	28	23	30	26	28	26	27	23	23	27	26	28	26	30	23	28	23	23	21				
6			19	19	23	26	29	26	30	23	30	21	30	25	30	30	25	30	21	30	23	30	26	29	26	23	19	19		
7			20	23	23	29	25	25	26	28	25	26	22	27	25	25	27	22	26	25	28	26	25	25	29	23	23	20		
8		21	23	28	28	26	25	25	30	23	25	25	30	26	25	25	26	30	25	25	23	30	25	25	26	28	28	23	21	
9	19	23	23	30	23	30	26	30	26	25	26	28	25	27	23	23	27	25	28	26	25	26	30	26	30	23	30	23	23	19
10	20	25	26	28	30	23	28	23	25	22	29	23	30	20	30	30	20	30	23	29	22	25	23	28	23	30	28	26	25	20
11	21	23	25	30	26	30	25	25	26	29	25	25	26	27	25	25	27	26	25	25	29	26	25	25	30	26	30	25	23	21
12	21	25	28	23	28	21	26	25	28	23	25	23	30	23	24	24	23	30	23	25	23	28	25	26	21	28	23	28	25	21
13	21	27	26	30	26	30	22	30	25	30	26	30	23	27	26	26	27	23	30	26	30	25	30	22	30	26	30	26	27	21
14	21	26	29	23	27	25	27	26	27	20	27	23	27	30	23	23	30	27	23	28	20	28	26	27	25	27	23	29	26	21
15	20	28	25	25	23	30	25	25	23	30	25	24	26	23	25	25	23	26	24	25	30	23	25	25	30	23	25	25	28	20
16	20	28	25	25	23	30	25	25	23	30	25	24	26	23	25	25	23	26	24	25	30	23	25	25	30	23	25	25	28	20
17	21	26	29	23	27	25	27	26	27	20	27	23	27	30	23	23	30	27	23	27	20	27	26	27	25	27	23	29	26	21
18	21	27	26	30	26	30	22	30	25	30	26	30	23	27	26	26	27	23	30	26	30	25	30	22	30	26	30	26	27	21
19	21	25	28	23	28	21	26	25	28	23	25	23	30	23	24	24	23	30	23	25	23	28	25	26	21	28	23	28	25	21
20	21	23	25	30	26	30	25	25	26	29	25	25	26	27	25	25	27	26	25	25	29	26	25	25	30	26	30	25	23	21
21	20	25	26	27	30	23	28	23	25	22	29	23	30	20	30	30	20	30	23	29	22	25	23	28	23	30	28	26	25	20
22	19	23	23	30	23	30	26	30	26	25	26	28	25	28	23	23	27	25	28	26	25	26	30	26	30	23	30	23	23	19
23		21	23	28	28	26	25	25	30	23	25	25	30	26	25	25	26	30	25	25	23	30	25	25	26	28	28	23	21	
24			20	23	23	29	25	25	26	28	25	26	22	27	25	25	27	22	26	25	28	26	25	25	29	23	23	20		
25			19	19	23	26	29	26	30	23	30	21	30	25	30	30	25	30	21	30	23	30	26	29	26	23	19	19		
26					21	23	23	28	23	30	26	28	26	27	23	23	27	26	28	26	30	23	28	23	23	21				
27						19	23	28	30	28	30	23	30	23	25	25	23	30	23	30	28	30	27	23	19					
28						21	20	23	23	26	25	28	26	29	25	25	29	26	27	25	26	23	23	20	21					
29								21	23	25	23	25	27	26	28	28	26	27	25	23	25	23	21							
30									20	20	21	21	21	21	20	20	21	21	21	21	20	20								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

NEUTRONIC FUEL TYPE	NUMBER OF ASSEMBLIES	DESCRIPTION
19	16	SPC 9x9-9X 2.92 w/o U-235
20	36	SPC 9x9-9X 2.92 w/o U-235
21	56	SPC 9x9-9X 2.92 w/o U-235
22	12	SPC 9x9-9X 2.92 w/o U-235
23	144	SPC 9x9-9X 2.92 w/o U-235
24	8	SPC 9x9-9X 2.92 w/o U-235
25	144	SPC 9x9-9X 2.92 w/o U-235
26	104	ABB SVEA-96 3.33 w/o U-235
27	48	ABB SVEA-96 3.33 w/o U-235
28	64	ABB SVEA-96 3.33 w/o U-235
29	24	ABB SVEA-96 3.33 w/o U-235
30	108	ABB SVEA-96 3.14 w/o U-235

Figure 5.3

WNP-2 Cycle 14 Projected Exposure Distribution At 0 MWD/MT

J: / I:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1									36.501	35.569	35.344	34.712	35.248	35.012	34.605
2								35.643	27.881	22.793	27.659	22.578	8.255	14.457	9.245
3						36.820	36.538	26.330	29.910	14.774	17.756	8.032	17.462	0.000	19.819
4						36.443	24.609	8.199	0.000	9.057	0.000	30.452	0.000	30.244	23.197
5					33.038	26.358	29.475	8.369	26.473	0.000	17.059	9.400	17.064	9.372	28.580
6			37.152	36.465	26.091	17.028	0.000	16.443	0.000	28.918	0.000	33.305	0.000	22.816	0.000
7			36.346	24.636	29.419	0.000	23.957	21.451	16.092	9.169	22.450	17.253	29.665	9.275	23.012
8		35.478	26.431	8.179	8.356	16.510	21.448	23.880	0.000	30.565	20.529	23.385	0.000	16.854	22.300
9	36.922	28.829	29.909	0.000	26.436	0.000	16.022	0.000	12.981	22.290	16.326	8.864	22.949	9.201	29.281
10	35.449	23.276	14.662	9.054	0.000	27.730	9.155	30.162	22.322	27.248	0.000	30.304	0.000	32.550	0.000
11	35.281	27.533	17.688	0.000	16.515	0.000	22.038	20.138	16.270	0.000	23.536	23.604	17.171	9.010	23.685
12	34.647	22.242	7.983	30.480	9.360	33.207	16.718	23.406	8.821	30.794	23.652	29.826	0.000	30.432	22.582
13	35.274	8.150	17.449	0.000	17.092	0.000	29.804	0.000	23.138	0.000	17.145	0.000	29.806	9.104	15.070
14	34.889	14.339	0.000	30.333	9.276	22.756	9.024	17.076	9.101	32.608	8.978	30.559	9.095	0.000	25.264
15	34.723	9.213	21.192	23.310	29.393	0.000	22.456	22.894	29.160	0.000	23.720	22.366	15.037	25.253	21.719
16	34.603	9.228	21.156	23.293	29.345	0.000	22.377	22.850	29.365	0.000	23.705	22.588	15.026	25.278	21.751
17	34.878	14.378	0.000	30.333	9.304	22.790	9.238	17.042	9.167	32.621	9.000	30.518	9.103	0.000	25.310
18	35.366	8.152	17.442	0.000	17.011	0.000	29.809	0.000	23.108	0.000	17.142	0.000	29.787	9.114	15.018
19	34.757	22.329	7.983	30.483	9.369	33.188	16.755	23.420	8.863	30.828	23.638	29.890	0.000	30.414	22.650
20	35.272	27.533	17.657	0.000	16.488	0.000	22.017	20.130	16.282	0.000	23.523	23.597	17.171	9.026	23.671
21	35.485	23.172	14.630	9.070	0.000	27.703	9.184	30.064	22.259	27.214	0.000	30.282	0.000	32.581	0.000
22	36.935	28.829	29.942	0.000	26.486	0.000	16.003	0.000	12.924	22.244	16.283	8.887	23.108	9.218	29.332
23		35.505	26.396	8.191	8.368	16.413	21.405	23.873	0.000	30.463	20.451	23.407	0.000	17.014	22.272
24			36.516	24.611	29.399	0.000	23.997	21.388	16.072	9.187	22.471	17.231	29.819	9.284	22.980
25			37.248	36.445	26.274	17.015	0.000	16.395	0.000	28.927	0.000	33.291	0.000	22.778	0.000
26					33.145	26.323	29.409	8.362	26.365	0.000	17.017	9.391	17.015	9.386	28.497
27						36.391	24.569	8.195	0.000	9.081	0.000	30.502	0.000	30.291	23.299
28						36.814	36.475	26.354	29.962	14.733	17.771	8.038	17.437	0.000	19.819
29								35.697	27.888	22.760	27.679	22.625	8.274	14.386	9.236
30									36.497	35.540	35.339	34.671	35.297	35.005	34.550
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 5.3

WNP-2 Cycle 14 Projected Exposure Distribution At 0 MWD/MT (Cont.)

J:16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
I:														
1	34.573	34.958	35.224	34.744	35.335	35.557	36.387							
2	9.327	14.192	8.291	22.591	27.007	22.647	27.645	35.684						
3	19.652	0.000	17.500	8.095	17.838	14.758	29.926	26.426	36.431	36.710				
4	23.328	30.347	0.000	30.501	0.000	9.137	0.000	8.311	24.494	36.342				
5	28.510	9.403	17.098	9.447	16.920	0.000	26.442	8.452	29.525	26.294	33.096			
6	0.000	22.677	0.000	33.217	0.000	28.871	0.000	16.057	0.000	17.033	25.866	35.836	36.824	
7	23.131	9.297	29.840	17.250	22.293	9.244	16.105	21.336	23.961	0.000	29.500	22.866	36.524	
8	22.152	17.070	0.000	23.445	18.436	30.521	0.000	23.823	21.189	16.162	8.510	8.310	26.186	35.614
9	29.355	9.222	23.130	8.917	16.305	22.274	12.740	0.000	16.108	0.000	26.454	0.000	29.866	28.704	36.746
10	0.000	32.350	0.000	30.308	0.000	27.249	22.165	30.040	9.274	27.906	0.000	9.150	14.720	23.199	35.404
11	23.675	9.040	17.190	23.616	23.307	0.000	16.348	19.869	22.115	0.000	16.421	0.000	17.400	27.658	35.274
12	22.652	30.495	0.000	29.867	23.647	30.812	8.955	23.319	16.830	33.228	9.493	30.475	8.125	22.313	34.707
13	15.115	9.135	29.873	0.000	17.044	0.000	23.036	0.000	29.759	0.000	16.999	0.000	17.384	8.348	35.388
14	25.342	0.000	9.145	30.516	9.077	32.603	9.289	17.055	9.374	22.832	9.466	30.248	0.000	14.449	34.876
15	21.765	25.172	15.094	22.576	23.717	0.000	29.265	22.781	22.465	0.000	29.204	23.109	20.943	9.340	34.527
16	21.839	25.170	15.101	22.538	23.483	0.000	29.166	22.633	22.511	0.000	28.717	23.144	18.206	9.438	33.948
17	25.374	0.000	9.191	30.519	9.144	32.637	9.335	17.002	9.425	22.883	9.521	30.304	0.000	14.375	34.652
18	15.109	9.178	29.251	0.000	16.911	0.000	23.002	0.000	29.621	0.000	16.351	0.000	17.231	8.430	35.340
19	22.710	30.330	0.000	29.831	23.695	30.904	9.033	23.401	16.832	33.245	9.571	30.545	8.224	22.287	34.394
20	23.611	9.100	17.217	23.624	22.368	0.000	16.291	19.358	22.213	0.000	15.927	0.000	17.193	27.671	35.137
21	0.000	32.140	0.000	30.307	0.000	27.023	22.074	29.774	9.348	27.950	0.000	9.252	14.649	23.083	34.515
22	29.397	9.286	23.165	9.015	16.159	22.353	12.503	0.000	16.158	0.000	26.549	0.000	29.895	28.253	36.533
23	21.792	16.942	0.000	23.496	19.430	30.191	0.000	23.830	20.790	15.169	8.590	8.412	23.521	35.663	
24	23.164	9.354	29.810	17.233	22.432	9.315	16.117	21.161	24.026	0.000	29.584	23.958	36.445		
25	0.000	22.379	0.000	33.207	0.000	28.630	0.000	14.875	0.000	17.040	25.144	35.626	36.433		
26	28.550	9.457	16.934	9.521	16.244	0.000	26.549	8.541	29.502	26.221	33.144				
27	23.441	30.368	0.000	30.565	0.000	9.249	0.000	8.343	24.599	36.236					
28	19.456	0.000	17.538	8.129	17.828	14.739	30.106	26.350	36.325	36.641					
29	9.398	10.835	8.339	22.619	26.283	21.706	27.185	35.711							
30	34.406	34.986	34.884	34.678	35.288	35.426	36.503								

Figure 5.4

WNP-2 Cycle 14 Projected Exposure Distribution At 6500 MWD/MT

J: I:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1									37.903	37.434	37.550	37.292	38.134	37.986	37.646
2								37.525	30.813	26.786	31.852	27.643	14.838	20.740	15.905
3							38.133	38.644	29.924	34.260	21.133	24.103	15.731	24.704	7.535	26.264
4							38.487	28.455	14.695	6.978	17.135	8.056	36.866	8.154	36.509	29.662
5						35.186	30.000	34.174	15.871	32.906	8.286	25.184	18.197	25.292	17.986	34.953
6				38.416	38.513	29.738	22.700	6.920	23.899	8.205	35.639	8.333	39.542	8.494	30.183	8.123
7				38.461	28.485	34.130	6.931	30.130	28.216	24.196	17.796	29.003	24.392	36.310	17.961	29.129
8			37.361	30.025	14.696	15.884	23.982	28.222	30.678	8.449	37.043	27.105	29.891	8.455	24.948	28.389
9	38.267		31.727	34.266	7.014	32.904	8.259	24.166	8.473	21.397	29.459	24.320	17.569	30.381	17.978	35.768
10	37.310		27.256	21.055	17.189	8.358	34.568	17.855	36.702	29.503	33.875	8.156	36.716	8.394	38.969	8.332
11	37.500		31.747	24.077	8.111	24.754	8.415	28.673	26.781	24.287	8.156	29.343	29.412	25.097	17.817	30.901
12	37.240		27.347	15.705	36.920	18.208	39.486	23.945	29.934	17.536	37.141	29.449	35.240	8.205	37.168	29.902
13	38.158		14.741	24.693	8.163	25.339	8.527	36.467	8.468	30.554	8.381	25.068	8.203	36.645	18.165	23.507
14	37.851		20.609	7.491	36.567	17.889	30.138	17.744	25.152	17.875	39.011	17.782	37.295	18.155	8.729	32.144
15	37.747		15.818	27.480	29.712	35.726	8.118	28.628	28.920	35.642	8.314	30.922	29.703	23.470	32.129	27.539
16	37.633		15.828	27.442	29.697	35.667	8.116	28.544	28.871	35.835	8.313	30.906	29.898	23.459	32.162	27.574
17	37.838		20.641	7.491	36.573	17.916	30.162	17.934	25.110	17.931	39.026	17.799	37.253	18.164	8.736	32.207
18	38.247		14.738	24.684	8.163	25.257	8.527	36.471	8.468	30.523	8.383	25.069	8.207	36.628	18.181	23.464
19	37.344		27.425	15.695	36.921	18.207	39.475	23.987	29.954	17.570	37.181	29.432	35.318	8.216	37.158	29.977
20	37.488		31.739	24.046	8.115	24.738	8.429	28.670	26.788	24.312	8.167	29.331	29.402	25.111	17.844	30.910
21	37.351		27.158	21.021	17.201	8.371	34.575	17.902	36.635	29.457	33.853	8.171	36.699	8.406	39.012	8.361
22	38.282		31.733	34.298	7.022	32.962	8.279	24.165	8.500	21.369	29.432	24.297	17.594	30.541	18.007	35.850
23			37.389	29.994	14.714	15.908	23.903	28.203	30.691	8.477	36.967	27.044	29.921	8.469	25.105	28.388
24				38.628	28.468	34.117	6.950	30.190	28.173	24.198	17.847	29.033	24.385	36.469	17.986	29.112
25				38.516	38.497	29.932	22.701	6.942	23.875	8.230	35.667	8.355	39.538	8.517	30.167	8.164
26						35.298	29.972	34.125	15.878	32.821	8.309	25.164	18.197	25.260	18.025	34.908
27							38.439	28.421	14.703	6.994	17.175	8.076	36.933	8.181	36.566	29.791
28							38.130	38.581	29.949	34.311	21.100	24.130	15.756	24.706	7.578	26.322
29									37.581	30.824	26.764	31.882	27.706	14.883	20.709	15.960
30										37.901	37.408	37.558	37.267	38.191	38.007	37.647
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Figure 5.4

WNP-2 Cycle 14 Projected Exposure Distribution At 6500 MWD/MT (Cont.)

J:16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
I:														
1	37.618	37.941	38.121	37.340	37.561	37.439	37.803							
2	15.981	20.502	14.894	27.677	31.255	26.672	30.610	37.582						
3	26.115	7.548	24.752	15.803	24.206	21.146	34.297	30.039	38.554	38.040				
4	29.783	36.609	8.175	36.931	8.101	17.257	7.028	14.846	28.376	38.408				
5	34.893	18.032	25.345	18.271	25.106	8.353	32.932	16.003	34.271	29.987	35.275			
6	8.131	30.072	8.533	39.498	8.414	35.660	8.294	23.618	7.006	22.775	29.600	37.951	38.138	
7	29.240	18.000	36.510	24.446	28.940	17.972	24.292	28.190	30.201	7.027	34.275	26.924	38.685	
8	28.258	25.161	8.501	30.018	25.313	37.101	8.563	30.715	28.066	23.745	16.116	14.896	29.840	37.527
9	35.856	18.015	30.579	17.677	24.396	29.530	21.270	8.575	24.325	8.347	32.977	7.089	34.270	31.643	38.110
10	8.340	38.796	8.430	36.757	8.237	33.945	29.434	36.651	18.043	34.804	8.435	17.347	21.161	27.222	37.291
11	30.899	17.863	25.140	29.444	29.162	8.227	24.428	26.594	28.804	8.490	24.734	8.186	23.865	31.909	37.517
12	29.967	37.246	8.228	35.312	29.472	37.197	17.719	29.908	24.108	39.560	18.391	36.966	15.908	27.458	37.329
13	23.544	18.205	36.728	8.233	25.009	8.430	30.498	8.529	36.473	8.602	25.320	8.257	24.713	14.998	38.310
14	32.237	8.743	18.218	37.268	17.908	39.028	18.095	25.178	18.122	30.270	18.156	36.575	7.619	20.801	37.893
15	27.592	32.076	23.543	29.921	30.964	8.368	35.786	28.866	28.684	8.221	35.628	29.651	27.394	16.065	37.628
16	27.664	32.084	23.562	29.896	30.746	8.381	35.710	28.739	28.742	8.241	35.203	29.719	24.941	16.202	37.073
17	32.275	8.765	18.294	37.293	18.003	39.087	18.172	25.160	18.214	30.366	18.270	36.671	7.697	20.782	37.700
18	23.560	18.279	36.170	8.282	24.929	8.478	30.511	8.584	36.391	8.675	24.794	8.337	24.633	15.138	38.286
19	30.044	37.117	8.281	35.318	29.567	37.328	17.840	30.036	24.169	39.642	18.548	37.102	16.078	27.492	37.059
20	30.873	17.964	25.212	29.503	28.341	8.308	24.446	26.190	28.968	8.586	24.366	8.280	23.740	31.975	37.418
21	8.381	38.640	8.483	36.809	8.311	33.794	29.424	36.483	18.192	34.925	8.538	17.533	21.175	27.167	36.455
22	35.921	18.122	30.654	17.823	24.308	29.664	21.139	8.679	24.467	8.461	33.165	7.186	34.372	31.263	37.932
23	27.950	25.090	8.549	30.097	26.211	36.832	8.655	30.799	27.790	22.936	16.278	15.078	27.423	37.643	
24	29.314	18.108	36.514	24.478	29.116	18.101	24.391	28.115	30.361	7.140	34.423	27.960	38.651		
25	8.187	29.849	8.607	39.543	8.503	35.502	8.407	22.630	7.124	22.867	28.966	37.781	37.777		
26	34.974	18.156	25.270	18.438	24.574	8.460	33.115	16.194	34.317	29.970	35.368				
27	29.954	36.702	8.278	37.075	8.209	17.467	7.118	14.942	28.527	38.337					
28	26.023	7.694	24.898	15.932	24.290	21.216	34.539	30.008	38.486	37.998					
29	16.181	17.552	15.077	27.797	30.653	25.853	30.227	37.643							
30	37.531	38.071	37.868	37.334	37.572	37.360	37.961								
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Figure 5.5 Fraction of Limit versus Cycle exposure (MICROBURN-B)

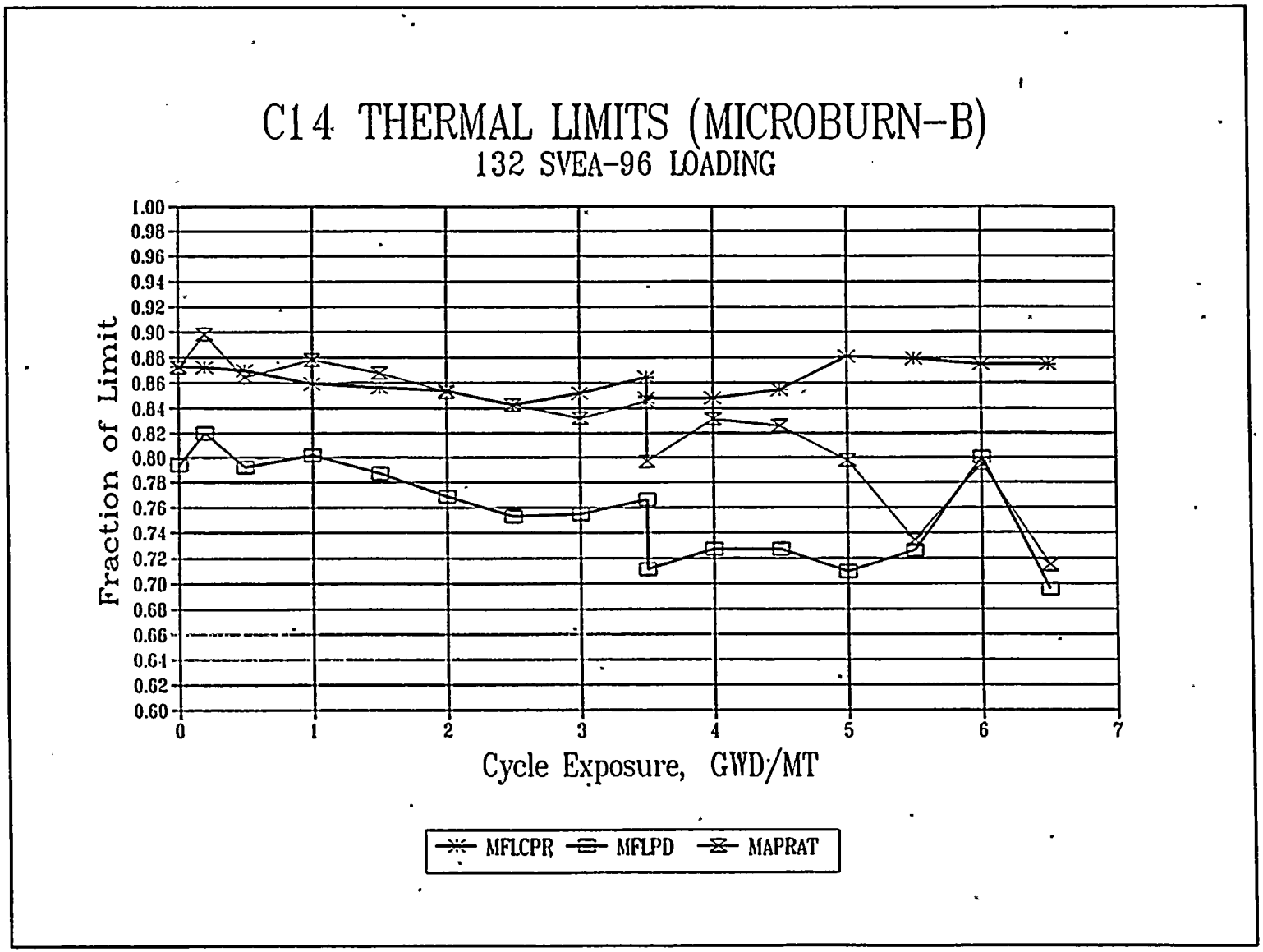


Figure 5.6 Fraction of Limit versus Cycle exposure (SIMULATE-E)

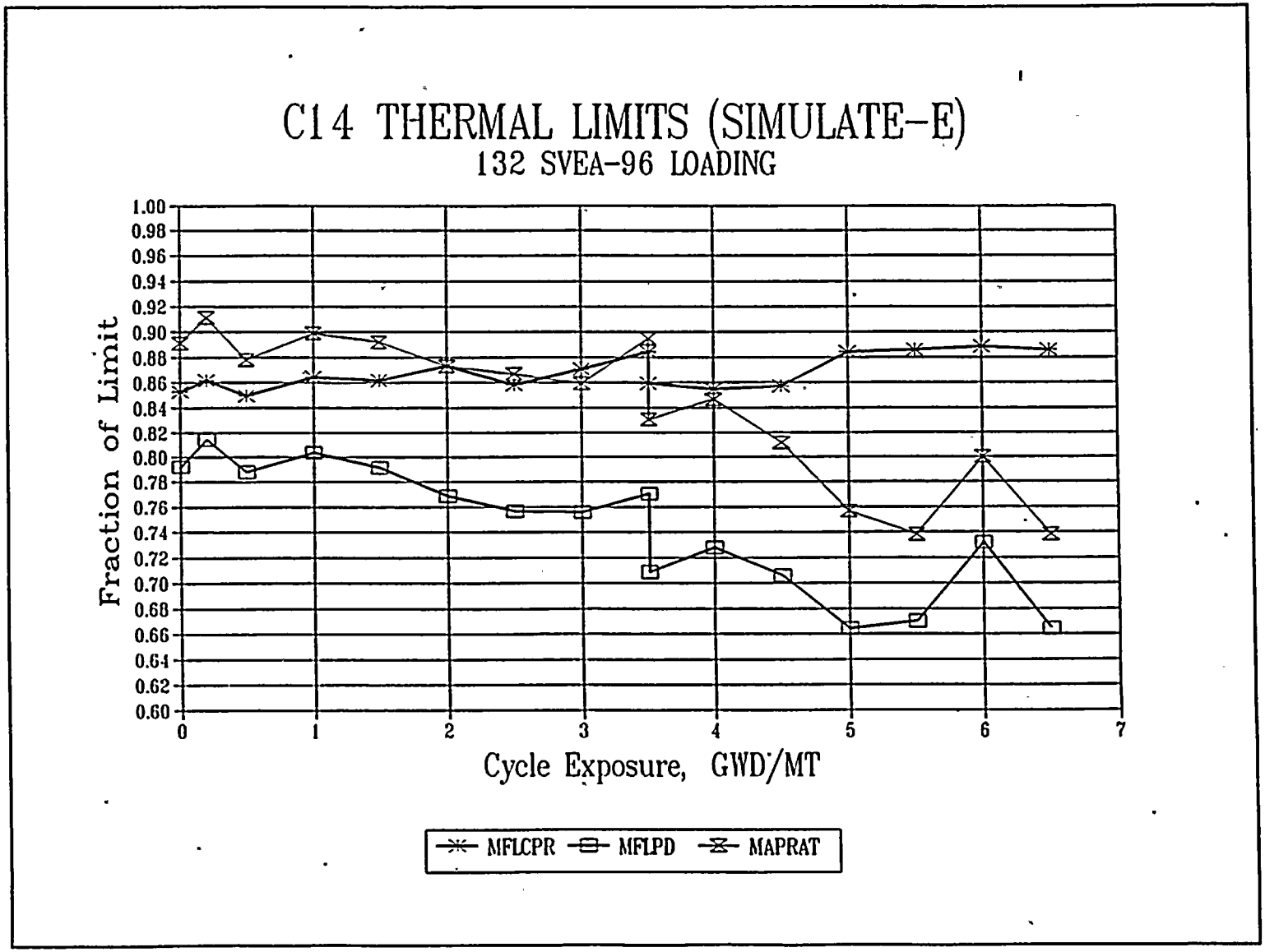


Figure 5.7 Cycle 14 Cold Shutdown Margin versus Cycle exposure

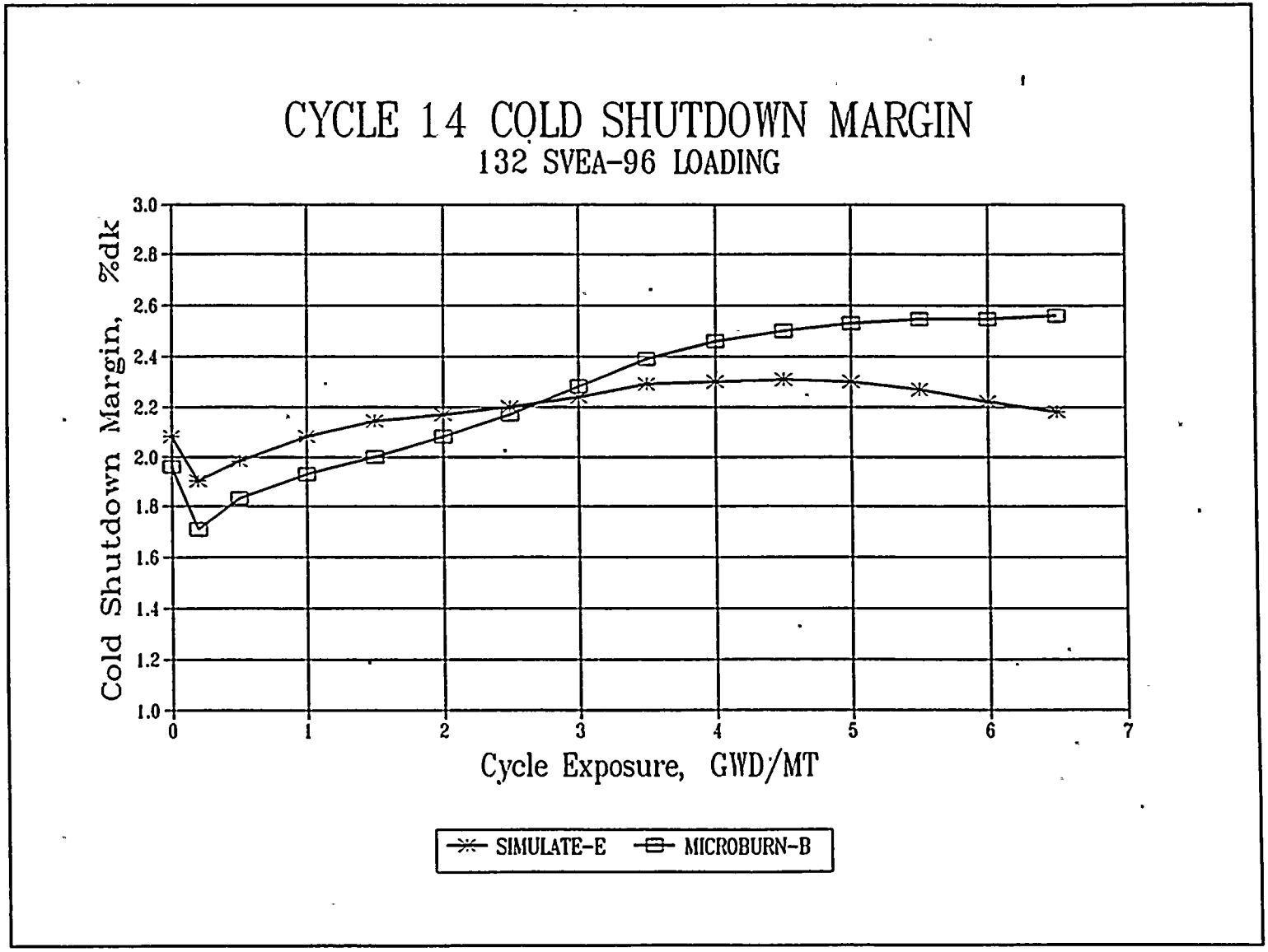
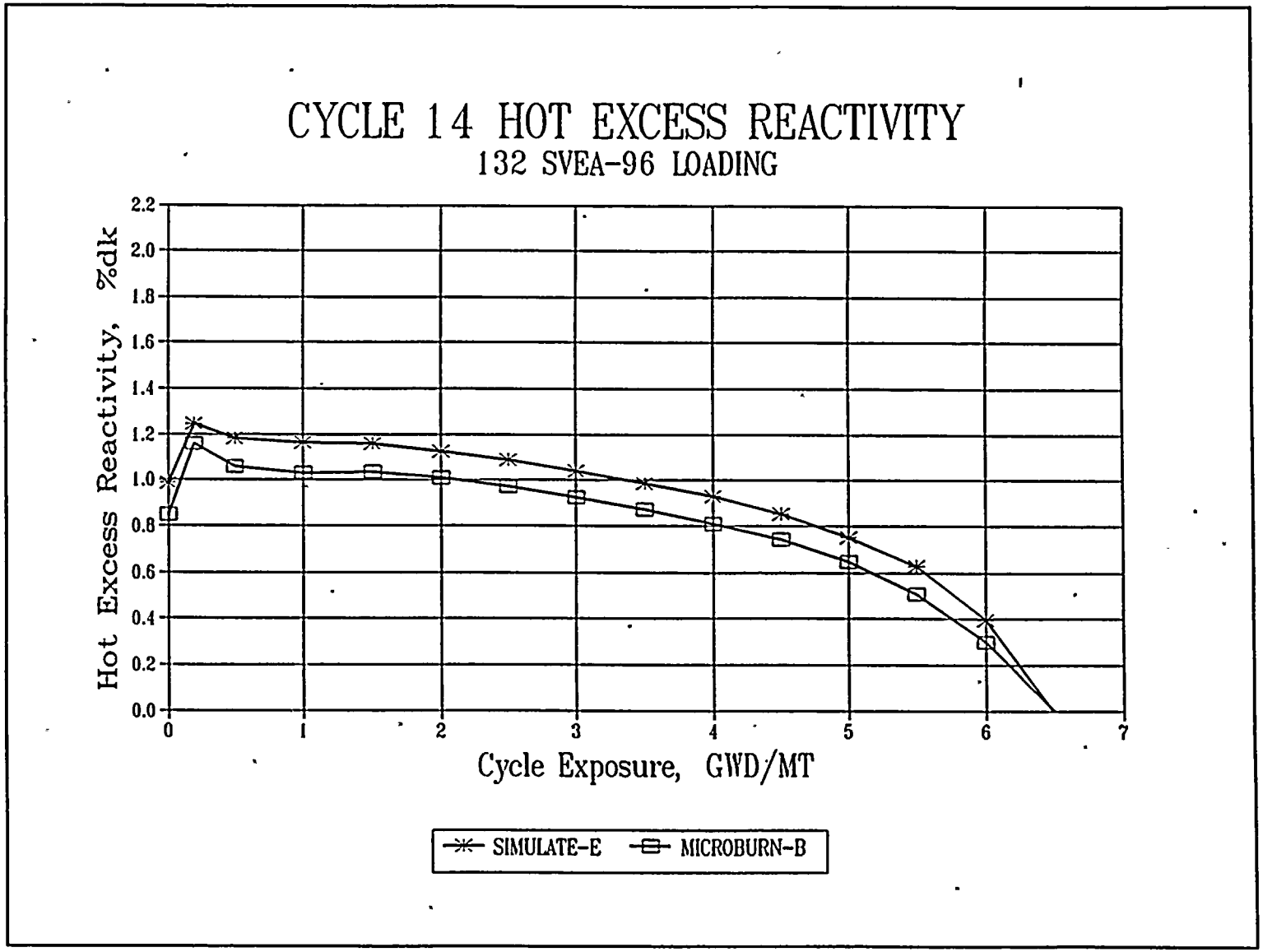


Figure 5.8 Cycle 14 Hot Excess Reactivity versus cycle exposure



Appendix A

Projected Control Rod Patterns

From 4500 To 6899 MWD/MT For Cycle 13

(MICROBURN-B)

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 14:57:17
Cycle 13 Exposure 4500.0 MWd/MTU
RP AT 4500 MWD/MT 584.4 GWd
Core Average Exposure 22668.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd)	178.3	(23.16)	
Power: MWt	3486.0	(100.00 %)	
Core Pressure: psia	1035.0		
Inlet Subcooling: Btu/lbm	-19.24		
Flow: Mlb/hr	108.50	(100.00 %)	

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --              59
55           -- -- -- -- -- -- -- -- --           55
51        -- -- -- -- -- -- -- -- -- -- -- --     51
47     -- -- 12 -- 38 --  8 -- 38 -- 12 -- --     47
43 -- -- -- -- -- 46 -- -- -- -- -- -- -- -- -- 43
39 -- -- -- 38 -- 16 -- -- -- 16 -- 38 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- --  8 -- -- --  8 -- -- --  8 -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 38 -- 16 -- -- -- 16 -- 38 -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15     -- -- 12 -- 38 --  8 -- 38 -- 12 -- --     15
11        -- -- -- -- -- -- -- -- -- -- --        11
 7           -- -- -- -- -- -- -- -- --           7
 3              -- -- -- -- -- -- --              3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	6.24
k-effective:	1.00401
Void Fraction:	0.382
Core Delta-P: psia	20.966
Core Plate Delta-P: psia	16.511
Coolant Temp: Deg-F	546.9
In Channel Flow: Mlb/hr	92.57
Source Convergence	0.00027

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.235	3.905	17	0.309	0.433	59 34
	24	0.502	7.427	18	0.388	0.398	59 24
	23	0.931	16.283	19	0.405	0.655	55 18
	22	1.120	19.927	20	0.839	1.056	45 20
	21	1.226	22.555	21	0.943	1.065	35 18
	20	1.265	24.144	22	1.048	1.116	37 26
	19	1.272*	25.102	23	0.982	1.201	37 30
	18	1.254	25.677	24	1.195	1.209	45 28
	17	1.228	26.081	25	1.081	1.271	37 28
	16	1.194	26.312	26	1.263	1.466	49 24
	15	1.168	26.475	27	1.412	1.496	39 28
	14	1.147	26.613	28	1.382	1.508	51 24
	13	1.131	26.742				
	12	1.118	26.868				
	11	1.107	26.993				
	10	1.099	27.112				
	9	1.092	27.218				
	8	1.084	27.293				
	7	1.073	27.324*				
	6	1.051	27.253				
	5	1.011	26.946				
	4	0.959	26.037				
	3	0.862	23.564				
	2	0.671	18.189				
Bottom	1	0.199	5.073				
% AXIAL TILT		5.150	-7.300				
AVG BOT 8ft/12ft		0.9692	1.0547				

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.508	28	51 24	1.488	0.941	25	33 24	7.24	0.826	15.9	26	35 22 19	9.33	0.828	29.6	23	37 24 19
1.500	28	37 10	1.501	0.933	25	47 24	7.14	0.811	15.6	26	39 26 19	9.95	0.828	23.7	25	39 24 18
1.496	27	39 28	1.508	0.929	25	37 28	9.31	0.802	23.7	25	39 24 18	9.92	0.827	23.9	25	37 22 18
1.490	27	35 28	1.526	0.918	25	37 14	8.79	0.802	29.6	23	37 24 19	9.45	0.823	27.8	22	39 22 19
1.489	27	33 26	1.538	0.910	25	39 16	9.28	0.801	23.9	25	37 22 18	8.42	0.753	30.2	23	37 20 19
1.488	27	33 22	1.539	0.910	25	45 22	8.89	0.797	27.8	22	39 22 19	8.38	0.752	30.5	22	35 24 19
1.486	28	39 34	1.434	0.907	28	51 24	7.27	0.782	9.0	28	51 20 5	8.46	0.751	29.5	23	41 24 19
1.472	28	51 20	1.449	0.897	27	33 22	7.24	0.779	6.5	27	33 22 18	8.35	0.743	29.8	23	15 24 18
1.470	28	47 20	1.566	0.894	25	35 20	6.58	0.770	17.6	26	51 18 5	8.34	0.742	29.7	23	37 16 18
1.466	27	51 28	1.570	0.892	25	49 28	7.14	0.768	9.0	28	41 10 5	7.96	0.740	15.9	26	35 22 19

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MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:03:15

ADJUST RP AT 4501 MWD/MT. Cycle 13 Exposure 4501.0 MWd/MTU
584.5 GWd
Core Average Exposure 22669.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 1.0 (0.13)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	36	--	--	--	36	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	32	--	--	--	6	--	--	--	32	--	--		47
43	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	43
39	--	36	--	--	--	8	--	--	--	8	--	--	--	36	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	6	--	--	--	4	--	--	--	6	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	36	--	--	--	8	--	--	--	8	--	--	--	36	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	32	--	--	--	6	--	--	--	32	--	--		15
11			--	--	--	--	--	--	--	--	--	--				11
7				--	--	36	--	--	--	36	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 6.01

k-effective: 1.00361
Void Fraction: 0.388
Core Delta-P: psia 21.072
Core Plate Delta-P: psia 16.618
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.49
Source Convergence 0.00057

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.214	3.905	17	0.317	0.429	59 34
	24	0.457	7.427	18	0.379	0.389	59 24
	23	0.845	16.284	19	0.415	0.670	55 18
	22	1.012	19.929	20	0.834	1.099	41 16
	21	1.102	22.556	21	0.934	1.057	49 18
	20	1.146	24.145	22	0.945	1.033	37 26
	19	1.172	25.104	23	0.984	1.227	47 22
	18	1.188	25.678	24	1.168	1.182	45 28
	17	1.199	26.082	25	1.084	1.284	47 24
	16	1.207	26.313	26	1.276	1.482	49 24
	15	1.213	26.476	27	1.376	1.459	51 28
	14	1.217	26.614	28	1.401	1.546	47 20
	13	1.220*	26.743				
	12	1.220	26.869				
	11	1.215	26.994				
	10	1.204	27.113				
	9	1.183	27.219				
	8	1.148	27.294				
	7	1.107	27.325*				
	6	1.053	27.254				
	5	1.008	26.947				
	4	0.953	26.038				
	3	0.855	23.565				
	2	0.666	18.189				
Bottom	1	0.198	5.073				
		% AXIAL TILT	0.743	-7.300			
		AVG BOT 8ft/12ft	1.0107	1.0547			

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR				APLHGR					LHGR				
Value	FT	Locat.		Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.546	28	47	20	1.502	0.932	25	47 24	7.53	0.863	16.2	26	7 24 9	8.35	0.778	16.2	26	7 24 9
1.540	28	41	14	1.400	0.928	28	47 20	7.25	0.837	16.7	26	23 8 9	9.07	0.761	24.5	25	15 16 12
1.512	28	51	20	1.519	0.921	25	45 18	6.93	0.798	16.6	26	47 18 11	8.03	0.752	16.7	26	23 8 9
1.507	28	51	24	1.525	0.918	25	37 14	7.40	0.795	7.4	28	51 24 9	7.98	0.744	33.7	23	15 14 12
1.506	28	41	10	1.423	0.914	28	41 14	6.81	0.788	16.9	26	43 14 11	7.99	0.744	33.6	23	13 16 11
1.499	28	37	10	1.535	0.912	25	45 22	6.86	0.783	16.0	26	49 24 10	8.77	0.736	24.6	25	7 22 9
1.485	28	43	20	1.535	0.912	25	39 16	7.27	0.781	7.5	28	51 20 9	8.62	0.718	23.9	25	45 18 12
1.484	28	41	18	1.427	0.911	28	51 20	7.26	0.781	7.4	28	37 10 9	8.57	0.717	24.3	25	21 8 9
1.482	26	49	24	1.430	0.909	28	51 24	6.70	0.771	16.5	26	51 18 9	7.64	0.714	16.6	26	47 18 11
1.477	26	47	18	1.540	0.909	25	43 16	7.17	0.771	6.9	28	47 20 11	6.96	0.714	41.2	21	51 22 11

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MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:07:10
Cycle 13 Exposure 5000.0 MWd/MTU
RP AT 5000 MWD/MT 649.3 GWd
Core Average Exposure 23168.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00077

Delta E: MWd/MTU, (GWd) 499.0 (64.80)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	36	--	--	--	36	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	32	--	--	--	14	--	--	--	32	--	--		47
43	--	--	--	--	--	46	--	--	--	--	--	--	--	--	--	43
39	--	36	--	--	--	8	--	--	--	8	--	--	--	36	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	14	--	--	--	8	--	--	--	14	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	36	--	--	--	8	--	--	--	8	--	--	--	36	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	32	--	--	--	14	--	--	--	32	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	36	--	--	--	36	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 5.61

k-effective: 1.00358
Void Fraction: 0.380
Core Delta-P: psia 20.983
Core Plate Delta-P: psia 16.529
Coolant Temp: Deg-F 546.8
In Channel Flow: Mlb/hr 92.56
Source Convergence 0.00035

	N	Axial Profile Power	Exposure
Top	25	0.226	4.011
	24	0.483	7.655
	23	0.891	16.706
	22	1.071	20.434
	21	1.176	23.107
	20	1.221	24.718
	19	1.241	25.689
	18	1.243*	26.272
	17	1.231	26.681
	16	1.222	26.916
	15	1.215	27.082
	14	1.209	27.222
	13	1.202	27.352
	12	1.194	27.478
	11	1.183	27.600
	10	1.167	27.715
	9	1.142	27.810
	8	1.104	27.867
	7	1.060	27.877*
	6	1.005	27.780
	5	0.960	27.450
	4	0.908	26.514
	3	0.816	23.992
	2	0.637	18.522
Bottom	1	0.190	5.172
% AXIAL TILT		4.468	-7.128
AVG BOT 8ft/12ft		0.9818	1.0537

Edit Zone	Radial Power Avg.	Max.	Location
17	0.312	0.425	59 34
18	0.375	0.385	37 2
19	0.408	0.661	55 18
20	0.829	1.085	41 16
21	0.932	1.051	49 26
22	0.941	1.029	37 26
23	0.993	1.211	47 22
24	1.201	1.215	45 28
25	1.077	1.273	47 24
26	1.264	1.469	49 24
27	1.405	1.484	51 28
28	1.408	1.546	47 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR				LHGR			
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp. FT	Location	Value	Margin	Exp. FT	Location
1.546	28	47 20	1.439	0.924	28	47 20	6.90	0.800	17.0 26	37 8 8	8.75	0.761	27.8 23	45 30 19
1.540	28	41 14	1.446	0.920	28	41 14	6.92	0.799	16.7 26	53 24 8	8.28	0.757	32.1 23	47 32 19
1.516	28	51 24	1.533	0.913	25	47 24	6.48	0.755	17.3 26	47 18 12	8.70	0.754	27.5 23	31 46 19
1.511	28	51 20	1.472	0.903	28	51 24	6.45	0.755	17.6 26	43 14 12	8.18	0.749	32.2 23	31 48 19
1.509	28	37 10	1.479	0.899	28	51 20	6.97	0.750	8.4 28	51 24 9	7.68	0.720	16.7 26	53 24 9
1.506	28	41 10	1.557	0.899	25	37 14	6.96	0.748	8.3 28	37 10 9	7.66	0.719	17.0 26	37 8 8
1.491	28	43 20	1.480	0.899	28	37 10	6.37	0.744	17.5 26	43 10 5	8.47	0.715	25.2 25	45 16 12
1.490	28	41 18	1.484	0.896	28	41 10	6.29	0.740	18.5 26	51 18 5	7.48	0.703	34.4 23	47 16 12
1.484	27	51 28	1.575	0.889	25	45 18	6.87	0.739	8.7 28	51 20 8	7.46	0.701	34.4 23	45 14 12
1.475	27	33 10	1.576	0.889	25	39 16	6.86	0.738	8.7 28	41 10 8	8.37	0.685	22.2 24	45 34 19

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MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:16:17
Cycle 13 Exposure 5500.0 MWd/MTU
RP AT 5500 MWD/MT 714.3 GWd
Core Average Exposure 23668.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 500.0 (64.93)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- 36 -- -- -- 36 -- --             55
51        -- -- -- -- -- -- -- -- -- -- --          51
47     -- -- 32 -- -- -- 18 -- -- -- 32 -- --       47
43 -- -- -- -- -- 46 -- -- -- -- -- -- -- -- -- 43
39 -- 36 -- -- -- 12 -- -- -- 12 -- -- -- 36 -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- 18 -- -- -- 12 -- -- -- 18 -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- 36 -- -- -- 12 -- -- -- 12 -- -- -- 36 -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15     -- -- 32 -- -- -- 18 -- -- -- 32 -- --       15
11        -- -- -- -- -- -- -- -- -- -- --          11
 7           -- -- 36 -- -- -- 36 -- --             7
 3              -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

	N	Axial Power	Axial Exposure
Top	25	0.237	4.123
	24	0.506	7.895
	23	0.927	17.152
	22	1.117	20.970
	21	1.233	23.695
	20	1.295	25.329
	19	1.317*	26.310
	18	1.310	26.894
	17	1.298	27.297
	16	1.278	27.527
	15	1.250	27.690
	14	1.228	27.827
	13	1.208	27.954
	12	1.188	28.076
	11	1.165	28.193
	10	1.138	28.299
	9	1.103	28.381
	8	1.055	28.419*
	7	1.002	28.408
	6	0.938	28.283
	5	0.885	27.931
	4	0.830	26.968
	3	0.742	24.400
	2	0.579	18.841
Bottom	1	0.173	5.266
		% AXIAL TILT	9.233 -6.884
		AVG BOT 8ft/12ft	0.9547 1.0522

Edit Zone	Radial Power Avg.	Max.	Location
17	0.306	0.418	59 34
18	0.369	0.381	37 2
19	0.401	0.653	55 18
20	0.821	1.077	41 16
21	0.932	1.052	35 18
22	0.975	1.050	37 26
23	0.997	1.196	47 22
24	1.212	1.226	45 28
25	1.076	1.260	47 24
26	1.252	1.451	49 24
27	1.425	1.489	51 28
28	1.413	1.544	47 20

Control Rod Density: % 5.20

k-effective: 1.00342
Void Fraction: 0.370
Core Delta-P: psia 20.878
Core Plate Delta-P: psia 16.423
Coolant Temp: Deg-F 546.7
In Channel Flow: Mlb/hr 92.64
Source Convergence 0.00039

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp. FT	Location	LHGR Value	Margin	Exp. FT	Location
1.544	28	47 20	1.449	0.918	28	47 20	6.74	0.789	17.7 26	45 26 18	9.09	0.804	29.3 23	45 30 18
1.538	28	41 14	1.455	0.914	28	41 14	7.30	0.785	8.2 27	47 28 18	8.59	0.798	33.4 23	47 32 18
1.514	28	51 24	1.539	0.910	25	47 24	6.70	0.784	17.6 26	37 8 9	9.00	0.795	29.2 23	29 16 18
1.508	28	37 10	1.479	0.899	28	51 24	6.73	0.784	17.3 26	53 24 9	8.50	0.790	33.5 23	31 14 18
1.506	28	51 20	1.564	0.895	25	37 14	6.68	0.783	17.7 26	35 16 18	8.77	0.778	29.5 23	37 24 20
1.504	28	43 20	1.486	0.895	28	37 10	6.77	0.780	16.5 26	39 26 20	9.33	0.775	23.7 25	39 24 20
1.503	28	41 18	1.571	0.891	24	45 28	6.74	0.779	16.8 26	35 22 20	9.30	0.774	23.9 25	37 22 20
1.501	28	41 10	1.493	0.891	28	51 20	7.25	0.779	8.3 27	43 28 18	8.81	0.767	27.8 22	39 22 20
1.489	27	51 28	1.493	0.891	28	43 20	8.56	0.778	29.3 23	45 30 18	8.86	0.735	23.6 24	45 34 18
1.482	27	43 28	1.495	0.890	28	41 18	7.23	0.777	8.3 28	43 34 18	7.47	0.732	37.7 21	43 36 19

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-150620
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-151527
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:20:17

ADJUST RP AT 5501 MWD/MT Cycle 13 Exposure 5501.0 MWd/MTU
714.4 GWd
Core Average Exposure 23669.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 1.0 (0.13)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	40	--	--	--	--	--	40	--	--			51
47		--	--	--	--	--	--	32	--	--	--	--	--	--		47
43	--	--	40	--	--	46	--	--	--	--	--	--	40	--	--	43
39	--	--	--	--	--	10	--	--	--	10	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	32	--	--	--	8	--	--	--	32	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	10	--	--	--	10	--	--	--	--	--	23
19	--	--	40	--	--	--	--	--	--	--	--	40	--	--	--	19
15		--	--	--	--	--	32	--	--	--	--	--	--	--		15
11			--	--	40	--	--	--	--	--	40	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 3.63

k-effective: 1.00385
Void Fraction: 0.387
Core Delta-P: psia 21.061
Core Plate Delta-P: psia 16.607
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.50
Source Convergence 0.00045

	N	Axial Profile Power	Exposure
Top	25	0.218	4.123
	24	0.465	7.896
	23	0.853	17.153
	22	1.024	20.971
	21	1.127	23.697
	20	1.178	25.330
	19	1.195	26.312
	18	1.205	26.896
	17	1.209	27.298
	16	1.210*	27.529
	15	1.209	27.691
	14	1.205	27.828
	13	1.200	27.955
	12	1.192	28.077
	11	1.181	28.194
	10	1.166	28.300
	9	1.146	28.382
	8	1.120	28.420*
	7	1.098	28.409
	6	1.073	28.284
	5	1.033	27.932
	4	0.962	26.969
	3	0.860	24.401
	2	0.671	18.841
Bottom	1	0.201	5.266
% AXIAL TILT		1.664	-6.883
AVG BOT 8ft/12ft		1.0003	1.0522

Edit Zone	Radial Power Avg.	Max.	Location
17	0.304	0.417	59 34
18	0.374	0.385	37 2
19	0.398	0.645	55 18
20	0.830	1.067	41 16
21	0.922	1.048	35 18
22	0.940	1.021	37 26
23	1.004	1.185	47 22
24	1.241	1.254	45 28
25	1.077	1.255	47 24
26	1.251	1.448	49 24
27	1.430	1.514	47 28
28	1.408	1.531	47 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.		MCPR Value	Margin	FT	Locat.		APLHGR Value	Margin	Exp.	FT	Location		LHGR Value	Margin	Exp.	FT	Location	
1.531	28	47	20	1.445	0.920	28	51	20	7.05	0.829	18.3	26	43	10	6	7.84	0.742	18.3	26	43 10 6
1.526	28	41	14	1.450	0.917	28	41	10	7.67	0.828	10.4	28	41	10	6	8.55	0.741	10.4	28	41 10 6
1.522	28	51	24	1.465	0.908	28	47	20	7.64	0.825	10.5	28	51	20	6	8.52	0.739	10.5	28	51 20 6
1.516	28	37	10	1.471	0.904	28	41	14	6.97	0.820	19.1	26	51	18	6	7.75	0.739	19.1	26	51 18 6
1.514	27	47	28	1.553	0.902	24	45	28	6.92	0.746	10.4	28	37	10	5	7.98	0.713	30.1	23	45 30 15
1.503	27	33	14	1.480	0.899	28	51	24	6.92	0.744	8.4	27	47	28	14	7.61	0.712	34.0	23	47 32 15
1.502	27	51	28	1.560	0.897	25	47	24	6.87	0.742	10.5	28	51	24	5	7.91	0.706	30.0	23	29 16 15
1.499	27	43	28	1.486	0.895	28	37	10	6.31	0.739	17.8	26	45	26	16	7.54	0.705	34.0	23	31 14 15
1.494	27	33	10	1.487	0.895	27	47	28	6.32	0.739	17.6	26	37	8	5	8.22	0.686	24.2	24	45 28 15
1.491	27	33	18	1.566	0.894	24	33	16	6.85	0.736	8.4	27	33	14	13	8.14	0.681	24.4	24	33 16 15

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-151527
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-151921
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:26:44

RP AT 6000 MWD/MT Cycle 13 Exposure 6000.0 MWd/MTU
779.2 GWd
Core Average Exposure 24168.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 499.0 (64.80)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	40	--	--	--	--	--	40	--	--			51
47		--	--	--	--	--	--	32	--	--	--	--	--	--	--	47
43	--	--	40	--	--	46	--	--	--	--	--	--	40	--	--	43
39	--	--	--	--	--	16	--	--	--	16	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	32	--	--	--	18	--	--	--	32	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	16	--	--	--	16	--	--	--	--	--	23
19	--	--	40	--	--	--	--	--	--	--	--	--	40	--	--	19
15		--	--	--	--	--	--	32	--	--	--	--	--	--		15
11			--	--	40	--	--	--	--	--	40	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 3.24

k-effective: 1.00252
Void Fraction: 0.377
Core Delta-P: psia 20.956
Core Plate Delta-P: psia 16.502
Coolant Temp: Deg-F 546.8
In Channel Flow: Mlb/hr 92.58
Source Convergence 0.00044

	N	Axial Profile Power	Axial Profile Exposure	Edit Zone	Radial Power Avg.	Radial Power Max.	Location
Top	25	0.229	4.231	17	0.300	0.410	59 34
	24	0.489	8.127	18	0.369	0.381	37 2
	23	0.890	17.579	19	0.392	0.638	55 18
	22	1.070	21.483	20	0.821	1.060	41 16
	21	1.182	24.260	21	0.925	1.054	35 18
	20	1.245	25.919	22	0.995	1.059	37 26
	19	1.277	26.909	23	1.005	1.170	47 22
	18	1.288*	27.497	24	1.233	1.247	45 28
	17	1.282	27.902	25	1.078	1.239	47 24
	16	1.259	28.133	26	1.241	1.426	49 24
	15	1.238	28.295	27	1.445	1.513	43 28
	14	1.219	28.430	28	1.409	1.524	47 20
	13	1.200	28.554				
	12	1.179	28.672				
	11	1.156	28.783				
	10	1.130	28.882				
	9	1.100	28.954				
	8	1.064	28.979*				
	7	1.033	28.957				
	6	1.001	28.820				
	5	0.958	28.448				
	4	0.892	27.450				
	3	0.801	24.830				
	2	0.629	19.177				
Bottom	1	0.189	5.366				
		% AXIAL TILT		6.459	-6.707		
		AVG BOT 8ft/12ft		0.9718	1.0511		

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.524	28	47 20	1.457	0.913	28	51 20	6.88	0.808	17.9	26	39 26 19	8.82	0.797	31.1	23	37 24 19
1.519	28	41 14	1.461	0.910	28	41 10	6.84	0.805	18.2	26	35 22 19	9.40	0.794	25.2	25	39 24 18
1.513	27	43 28	1.553	0.902	24	45 28	7.23	0.778	9.0	27	39 28 18	9.37	0.793	25.4	25	37 22 18
1.510	27	47 28	1.478	0.900	28	47 20	7.15	0.776	11.0	28	41 10 7	8.83	0.785	29.8	22	39 22 18
1.509	28	51 24	1.484	0.896	28	41 14	7.21	0.775	9.0	27	33 22 18	8.19	0.733	30.3	23	45 30 17
1.507	27	33 18	1.564	0.895	24	33 16	7.20	0.775	9.0	28	39 34 18	7.06	0.731	42.0	21	35 26 19
1.504	28	37 10	1.493	0.891	27	43 28	7.14	0.774	11.1	28	51 20 7	7.97	0.730	32.2	22	37 26 19
1.504	28	43 34	1.572	0.890	25	47 24	6.58	0.774	18.9	26	43 10 7	7.30	0.729	39.1	21	43 26 18
1.502	28	43 20	1.496	0.889	27	47 28	8.33	0.771	31.1	23	37 24 19	7.93	0.728	32.5	22	35 24 19
1.501	28	41 18	1.500	0.887	27	33 18	6.55	0.771	18.5	26	45 26 18	7.71	0.725	34.4	23	47 32 17

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-151921
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-152556
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:33:58

ADJUST RP AT 6001 MWD/MT

Cycle 13 Exposure 6001.0 MWd/MTU
779.3 GWd
Core Average Exposure 24169.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 1.0 (0.13)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --              59
55           -- -- -- -- -- -- -- -- --           55
51        -- -- 40 -- -- -- -- -- 40 -- --        51
47     -- -- -- -- -- -- -- -- -- -- -- -- --     47
43 -- -- 40 -- -- 46 -- -- -- -- -- -- 40 -- -- 43
39 -- -- -- -- -- 32 -- -- -- 32 -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- 6 -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- -- 32 -- -- -- 32 -- -- -- -- -- 23
19 -- -- 40 -- -- -- -- -- -- -- -- -- 40 -- -- 19
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15
11       -- -- 40 -- -- -- -- -- 40 -- --       11
 7          -- -- -- -- -- -- -- -- --          7
 3             -- -- -- -- -- -- --             3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: % 1.94

k-effective: 1.00362
Void Fraction: 0.386
Core Delta-P: psia 21.080
Core Plate Delta-P: psia 16.627
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.49
Source Convergence 0.00065

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.212	4.232	17	0.293	0.401	59 34
	24	0.454	8.128	18	0.361	0.372	37 2
	23	0.826	17.580	19	0.384	0.626	55 18
	22	0.992	21.484	20	0.814	1.058	41 16
	21	1.095	24.261	21	0.920	1.066	35 18
	20	1.157	25.920	22	1.068	1.091	37 26
	19	1.193	26.910	23	1.010	1.164	47 22
	18	1.215	27.499	24	1.251	1.264	45 28
	17	1.228	27.903	25	1.086	1.236	47 24
	16	1.234	28.134	26	1.232	1.432	45 26
	15	1.236*	28.296	27	1.448	1.536	43 28
	14	1.234	28.431	28	1.403	1.526	43 34
	13	1.227	28.556				
	12	1.216	28.674				
	11	1.200	28.785				
	10	1.179	28.883				
	9	1.150	28.955				
	8	1.115	28.981*				
	7	1.085	28.958				
	6	1.054	28.821				
	5	1.013	28.449				
	4	0.948	27.451				
	3	0.856	24.831				
	2	0.675	19.177				
Bottom	1	0.204	5.366				
% AXIAL TILT		1.595	-6.706				
AVG BOT 8ft/12ft		1.0063	1.0511				

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.536	27	43 28	1.549	0.904	24	45 28	7.20	0.780	11.0	28	41 10 7	8.65	0.732	25.4	25	39 24 13
1.530	27	33 18	1.473	0.903	27	43 28	7.18	0.779	11.1	28	51 20 7	8.03	0.731	31.8	23	37 24 16
1.528	27	47 28	1.479	0.899	27	33 18	6.60	0.777	19.0	26	43 10 7	8.62	0.731	25.5	25	37 22 13
1.526	28	43 34	1.481	0.898	28	51 20	6.60	0.776	18.0	26	39 26 14	8.17	0.730	30.1	22	39 22 16
1.524	27	39 28	1.482	0.897	27	39 28	6.57	0.773	18.3	26	35 22 14	7.98	0.704	11.5	28	41 10 6
1.519	27	33 14	1.482	0.897	27	47 28	6.55	0.771	19.7	26	51 18 7	7.95	0.701	11.5	28	51 20 6
1.518	27	33 22	1.561	0.897	24	33 16	6.32	0.744	18.6	26	45 26 15	7.55	0.699	33.1	23	41 24 15
1.516	28	27 18	1.484	0.896	28	43 34	6.92	0.744	8.9	27	39 28 14	6.90	0.698	40.2	21	43 26 16
1.515	28	43 24	1.485	0.896	28	41 10	6.91	0.743	9.0	28	43 24 14	7.33	0.698	19.0	26	43 10 7
1.515	28	43 20	1.489	0.893	27	33 22	6.89	0.741	8.9	28	37 18 14	7.49	0.697	33.6	23	37 20 15

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-152556
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-153305
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:37:58

RP AT 6100 MWD/MT

Cycle 13 Exposure 6100.1 MWd/MTU
792.2 GWd
Core Average Exposure 24268.8 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 99.1 (12.87)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- --             55
51        -- -- 40 -- -- -- -- -- 40 -- --          51
47     -- -- -- -- -- -- -- -- -- -- -- -- --       47
43 -- -- 40 -- -- 46 -- -- -- -- -- 40 -- -- --    43
39 -- -- -- -- -- 32 -- -- -- 32 -- -- -- -- --    39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --    35
31 -- -- -- -- -- -- -- 18 -- -- -- -- -- -- --    31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --    27
23 -- -- -- -- -- 32 -- -- -- 32 -- -- -- -- --    23
19 -- -- 40 -- -- -- -- -- -- -- -- 40 -- -- --    19
15    -- -- -- -- -- -- -- -- -- -- -- --          15
11       -- -- 40 -- -- -- -- -- 40 -- --          11
 7          -- -- -- -- -- -- -- -- --             7
 3             -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: % 1.80

k-effective: 1.00314
Void Fraction: 0.385
Core Delta-P: psia 21.069
Core Plate Delta-P: psia 16.615
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.50
Source Convergence 0.00042

Axial Profile

N	Power	Exposure
Top 25	0.214	4.252
24	0.457	8.172
23	0.831	17.662
22	0.999	21.583
21	1.105	24.370
20	1.167	26.035
19	1.203	27.028
18	1.224	27.619
17	1.235	28.025
16	1.239*	28.257
15	1.237	28.419
14	1.232	28.554
13	1.223	28.677
12	1.211	28.794
11	1.193	28.904
10	1.171	29.000
9	1.142	29.070
8	1.106	29.091*
7	1.076	29.066
6	1.046	28.925
5	1.006	28.549
4	0.944	27.545
3	0.855	24.916
2	0.676	19.244
Bottom 1	0.205	5.386

% AXIAL TILT 2.161 -6.673
AVG BOT 8ft/12ft 1.0024 1.0509

Edit Radial Power

Zone	Avg.	Max.	Location
17	0.292	0.400	59 34
18	0.359	0.371	37 2
19	0.383	0.624	55 18
20	0.810	1.053	41 16
21	0.923	1.064	35 18
22	1.074	1.100	37 26
23	1.012	1.158	47 22
24	1.247	1.260	45 28
25	1.085	1.238	37 28
26	1.230	1.426	45 26
27	1.452	1.535	43 28
28	1.400	1.525	43 34

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.535	27	43 28	1.472	0.904	27	39 28	6.62	0.779	18.1	26	39 26 14	8.08	0.737	31.9	23	37 24 16
1.535	27	39 28	1.474	0.902	27	43 28	6.58	0.774	18.4	26	35 22 14	8.64	0.733	25.5	25	39 24 15
1.530	27	33 18	1.555	0.900	24	45 28	7.13	0.774	11.2	28	41 10 7	8.61	0.732	25.7	25	37 22 13
1.528	27	33 22	1.478	0.900	27	33 22	7.11	0.772	11.2	28	51 20 7	8.16	0.730	30.2	22	39 22 16
1.525	28	43 34	1.481	0.898	27	33 18	6.54	0.769	19.1	26	43 10 7	7.54	0.699	33.3	23	41 24 15
1.524	28	39 34	1.483	0.897	28	39 34	6.49	0.763	19.9	26	51 18 7	6.89	0.699	40.3	21	43 26 16
1.522	27	47 28	1.485	0.895	28	43 34	6.97	0.749	9.1	27	39 28 15	7.90	0.698	11.6	28	41 10 6
1.515	28	27 18	1.486	0.895	28	51 20	6.94	0.746	9.1	27	33 22 15	7.48	0.698	33.8	23	37 20 15
1.514	27	33 14	1.566	0.894	24	33 16	6.93	0.745	9.1	28	39 34 15	7.86	0.695	11.7	28	51 20 6
1.513	28	43 24	1.489	0.893	27	47 28	6.90	0.742	9.1	28	43 24 15	6.61	0.694	42.9	21	35 26 17

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-153305
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-153715
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:41:20

ADJUST RP AT 6101 MWD/MT

Cycle 13 Exposure 6101.1 MWd/MTU
792.3 GWd
Core Average Exposure 24269.8 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTCT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 1.0 (0.13)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- --             55
51        -- -- 40 -- -- -- -- -- 40 -- --          51
47     -- -- -- -- -- -- -- -- -- -- -- --          47
43 -- -- 40 -- -- 46 40 -- 40 -- -- 40 -- -- --    43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --    39
35 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- --    35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --    31
27 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- --    27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --    23
19 -- -- 40 -- -- -- 40 -- 40 -- -- -- 40 -- --    19
15    -- -- -- -- -- -- -- -- -- -- -- -- --       15
11       -- -- 40 -- -- -- -- -- 40 -- --          11
 7          -- -- -- -- -- -- -- -- --             7
 3             -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: % 1.46

k-effective: 1.00363
Void Fraction: 0.387
Core Delta-P: psia 21.095
Core Plate Delta-P: psia 16.641
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.48
Source Convergence 0.00026

Axial Profile

	N	Power	Exposure
Top	25	0.211	4.253
	24	0.450	8.173
	23	0.819	17.663
	22	0.985	21.584
	21	1.088	24.371
	20	1.150	26.036
	19	1.186	27.030
	18	1.207	27.620
	17	1.220	28.026
	16	1.227	28.258
	15	1.229*	28.420
	14	1.228	28.555
	13	1.223	28.679
	12	1.215	28.795
	11	1.203	28.905
	10	1.189	29.001
	9	1.172	29.071
	8	1.151	29.092*
	7	1.125	29.067
	6	1.088	28.926
	5	1.029	28.550
	4	0.935	27.546
	3	0.829	24.917
	2	0.648	19.245
Bottom	1	0.195	5.386
		% AXIAL TILT	0.929 -6.672
		AVG BOT 8ft/12ft	1.0096 1.0509

Edit Radial Power

Zone	Avg.	Max.	Location
17	0.289	0.396	59 34
18	0.356	0.368	37 2
19	0.380	0.620	55 18
20	0.806	1.050	41 16
21	0.920	1.039	43 22
22	1.116	1.140	39 22
23	1.017	1.167	37 30
24	1.235	1.247	45 28
25	1.087	1.256	37 28
26	1.227	1.445	39 26
27	1.450	1.545	39 28
28	1.394	1.534	39 34

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.545	27	39 28	1.407	0.945	27	43 28	7.13	0.774	11.2	28	41 10 7	6.91	0.703	40.6	21	43 26 15
1.543	27	35 28	1.413	0.941	27	33 18	7.12	0.773	11.2	28	51 20 7	6.91	0.698	40.1	21	35 18 15
1.542	27	33 26	1.417	0.938	28	43 34	6.53	0.769	19.1	26	43 10 7	7.88	0.697	11.6	28	41 10 6
1.539	27	33 22	1.428	0.931	28	27 18	6.48	0.763	19.9	26	51 18 7	7.91	0.695	11.2	28	51 20 7
1.534	28	39 34	1.455	0.914	27	39 28	6.45	0.758	18.1	26	39 26 14	7.25	0.692	19.1	26	43 10 7
1.513	28	43 20	1.461	0.910	27	33 22	6.41	0.754	18.4	26	35 22 14	7.20	0.691	19.9	26	51 18 7
1.513	28	43 24	1.463	0.909	27	35 28	7.00	0.753	9.4	27	43 28 13	7.53	0.687	31.9	23	37 24 16
1.512	28	41 18	1.464	0.908	27	33 26	6.97	0.749	9.4	27	33 18 12	6.80	0.684	39.7	21	41 28 15
1.512	27	47 28	1.466	0.907	28	39 34	6.96	0.748	9.4	28	43 34 13	6.76	0.683	40.1	21	33 20 15
1.510	28	37 18	1.564	0.895	25	37 28	6.90	0.742	9.4	28	27 18 13	7.38	0.682	33.0	23	45 24 15

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-153715
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-154027
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:43:46

RP AT 6300 MWD/MT

Cycle 13 Exposure 6300.0 MWd/MTU
818.2 GWd
Core Average Exposure 24468.7 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 198.9 (25.83)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- -- --          55
51        -- -- 40 -- -- -- -- -- 40 -- --          51
47     -- -- -- -- -- -- -- -- -- -- -- -- --       47
43 -- -- 40 -- -- 46 40 -- 40 -- -- -- 40 -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- 40 -- -- -- 40 -- 40 -- -- -- 40 -- -- 19
15     -- -- -- -- -- -- -- -- -- -- -- -- --       15
11     -- -- 40 -- -- -- -- -- -- 40 -- --          11
 7        -- -- -- -- -- -- -- -- --                7
 3           -- -- -- -- -- -- --                   3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

N	Axial Profile Power	Exposure
Top 25	0.215	4.294
24	0.458	8.262
23	0.830	17.826
22	0.996	21.780
21	1.099	24.587
20	1.159	26.265
19	1.193	27.266
18	1.213	27.861
17	1.223	28.269
16	1.228	28.502
15	1.229*	28.665
14	1.226	28.799
13	1.220	28.922
12	1.210	29.037
11	1.197	29.144
10	1.181	29.238
9	1.162	29.304
8	1.140	29.321*
7	1.113	29.291
6	1.077	29.143
5	1.020	28.755
4	0.930	27.732
3	0.829	25.082
2	0.652	19.374
Bottom 1	0.197	5.425

Edit Zone	Radial Power Avg.	Max.	Location
17	0.291	0.398	59 34
18	0.359	0.370	37 2
19	0.382	0.623	55 18
20	0.807	1.048	41 16
21	0.920	1.036	43 22
22	1.111	1.134	39 22
23	1.016	1.162	37 30
24	1.231	1.243	45 28
25	1.086	1.252	37 28
26	1.228	1.439	39 26
27	1.452	1.544	39 28
28	1.398	1.533	39 34

Control Rod Density: % 1.46

k-effective: 1.00194
Void Fraction: 0.386
Core Delta-P: psia 21.079
Core Plate Delta-P: psia 16.625
Coolant Temp: Deg-F 546.9
In Channel Flow: Mlb/hr 92.49
Source Convergence 0.00032

% AXIAL TILT 1.528 -6.611
AVG BOT 8ft/12ft 1.0054 1.0506

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.544	27	39 28	1.411	0.943	27	43 28	7.04	0.767	11.6	28	41 10 7	6.89	0.703	40.9	21	43 26 15
1.543	27	35 28	1.416	0.939	27	33 18	7.03	0.766	11.6	28	51 20 7	6.88	0.698	40.4	21	35 18 15
1.542	27	33 26	1.421	0.936	28	43 34	6.45	0.759	19.5	26	43 10 7	7.78	0.691	12.0	28	41 10 6
1.538	27	33 22	1.431	0.930	28	27 18	6.40	0.753	20.2	26	51 18 7	7.81	0.690	11.6	28	51 20 7
1.533	28	39 34	1.458	0.912	27	39 28	6.40	0.752	18.5	26	39 26 14	7.17	0.685	19.5	26	43 10 7
1.513	28	43 20	1.464	0.908	27	33 22	6.97	0.749	9.8	27	43 28 13	7.11	0.684	20.2	26	51 18 7
1.512	28	43 24	1.465	0.908	27	35 28	6.36	0.749	18.8	26	35 22 14	6.79	0.683	39.8	21	41 28 16
1.512	28	41 18	1.466	0.907	27	33 26	6.94	0.746	9.8	27	33 18 13	6.73	0.682	40.4	21	33 20 15
1.511	27	47 28	1.470	0.905	28	39 34	6.93	0.745	9.8	28	43 34 14	7.37	0.681	33.0	23	45 24 16
1.510	28	37 18	1.569	0.892	25	37 28	6.88	0.739	9.7	28	27 18 13	7.44	0.681	32.2	23	37 24 16

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-154027
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-154305
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:54:55

FFTR TO 6550 MWD/MT

Cycle 13 Exposure 6550.0 MWd/MTU
850.6 GWd
Core Average Exposure 24718.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 250.0 (32.47)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -22.38
Flow: Mlb/hr 108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	40	--	--	--	--	--	40	--	--			51
47		--	--	--	--	--	--	--	--	--	--	--	--	--		47
43	--	--	40	--	--	46	40	--	40	--	--	--	40	--	--	43
39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	39
35	--	--	--	--	40	--	--	--	--	--	40	--	--	--	--	35
31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31
27	--	--	--	--	40	--	--	--	--	--	40	--	--	--	--	27
23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	23
19	--	--	40	--	--	--	40	--	40	--	--	--	40	--	--	19
15		--	--	--	--	--	--	--	--	--	--	--	--	--		15
11			--	--	40	--	--	--	--	--	40	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 1.46

k-effective: 1.00142
Void Fraction: 0.368
Core Delta-P: psia 20.795
Core Plate Delta-P: psia 16.326
Coolant Temp: Deg-F 546.2
In Channel Flow: Mlb/hr 92.68
Source Convergence 0.00041

	Axial Profile N	Power	Exposure
Top	25	0.219	4.347
	24	0.470	8.376
	23	0.850	18.034
	22	1.018	22.029
	21	1.120	24.863
	20	1.178	26.555
	19	1.209	27.564
	18	1.225	28.164
	17	1.233	28.575
	16	1.235*	28.809
	15	1.233	28.972
	14	1.228	29.106
	13	1.219	29.227
	12	1.208	29.340
	11	1.193	29.444
	10	1.175	29.533
	9	1.155	29.595
	8	1.131	29.607*
	7	1.101	29.569
	6	1.061	29.412
	5	1.000	29.010
	4	0.907	27.965
	3	0.806	25.289
	2	0.633	19.537
Bottom	1	0.191	5.473
% AXIAL TILT		2.761	-6.529
AVG BOT 8ft/12ft		0.9974	1.0501

Edit Zone	Radial Power Avg.	Max.	Location
17	0.292	0.399	59 34
18	0.360	0.372	37 2
19	0.384	0.629	55 18
20	0.810	1.048	41 16
21	0.919	1.034	43 22
22	1.103	1.126	39 22
23	1.014	1.151	37 30
24	1.225	1.236	45 28
25	1.084	1.241	37 28
26	1.230	1.428	39 26
27	1.449	1.535	39 28
28	1.402	1.524	39 34

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.535	27	39 28	1.433	0.928	27	43 28	7.05	0.771	12.1	28	41 10 7	6.92	0.707	40.9	21	43 26 16
1.531	27	35 28	1.438	0.925	27	33 18	7.04	0.770	12.1	28	51 20 7	6.92	0.702	40.4	21	35 18 16
1.530	27	33 26	1.444	0.921	28	43 34	6.47	0.761	19.9	26	43 10 7	7.84	0.698	12.1	28	41 10 7
1.530	27	33 22	1.453	0.915	28	27 18	6.41	0.755	20.6	26	51 18 7	7.83	0.697	12.1	28	51 20 7
1.524	28	39 34	1.479	0.900	27	39 28	6.34	0.746	18.9	26	39 26 15	7.19	0.690	19.9	26	43 10 7
1.508	28	43 20	1.484	0.896	27	33 22	6.92	0.746	10.3	27	43 28 14	7.13	0.688	20.6	26	51 18 7
1.507	28	41 18	1.488	0.894	27	35 28	6.90	0.743	10.2	27	33 18 14	6.79	0.687	40.1	21	41 28 16
1.507	28	43 24	1.488	0.894	27	33 26	6.31	0.742	19.2	26	35 22 15	6.76	0.686	40.4	21	33 20 16
1.505	27	47 28	1.491	0.892	28	39 34	6.88	0.741	10.3	28	43 34 15	7.38	0.685	33.4	23	45 24 16
1.505	28	37 18	1.496	0.889	28	51 20	6.83	0.736	10.2	28	27 18 14	6.68	0.681	40.8	21	43 22 16

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-154305
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-155414
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 15:58:35

COAST TO 6710.6 MWD/MT - 250 EFPD

Cycle 13 Exposure 6710.6 MWd/MTU
871.5 GWd
Core Average Exposure 24879.2 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 160.6 (20.86)
Power: MWt 3287.8 (94.31 %)
Core Pressure: psia 1028.7
Inlet Subcooling: Btu/lbm -21.30
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- -- --          55
51     -- -- 40 -- -- -- -- -- 40 -- --             51
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --     47
43 -- -- 40 -- -- 46 40 -- 40 -- -- -- 40 -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- 40 -- -- -- 40 -- 40 -- -- -- 40 -- -- 19
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15
11       -- -- 40 -- -- -- -- -- 40 -- --          11
 7          -- -- -- -- -- -- -- --                7
 3             -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

N	Axial Power	Axial Exposure
Top 25	0.228	4.382
24	0.490	8.451
23	0.887	18.170
22	1.063	22.193
21	1.167	25.043
20	1.223	26.745
19	1.251	27.759
18	1.264	28.361
17	1.267*	28.773
16	1.264	29.008
15	1.257	29.170
14	1.246	29.303
13	1.232	29.423
12	1.214	29.534
11	1.192	29.635
10	1.166	29.722
9	1.137	29.780
8	1.103	29.789*
7	1.062	29.746
6	1.010	29.583
5	0.939	29.171
4	0.842	28.111
3	0.742	25.419
2	0.581	19.639
Bottom 1	0.175	5.504

Edit Zone	Radial Power Avg.	Max.	Location
17	0.290	0.397	59 34
18	0.358	0.370	37 2
19	0.382	0.630	55 18
20	0.810	1.048	41 16
21	0.918	1.032	43 22
22	1.098	1.121	39 22
23	1.013	1.148	47 22
24	1.224	1.236	45 28
25	1.083	1.237	37 28
26	1.233	1.424	39 26
27	1.451	1.533	39 28
28	1.407	1.522	39 34

Control Rod Density: % 1.46

k-effective: 1.00285
Void Fraction: 0.349
Core Delta-P: psia 20.457
Core Plate Delta-P: psia 15.986
Coolant Temp: Deg-F 545.5
In Channel Flow: Mlb/hr 92.95
Source Convergence 0.00036

% AXIAL TILT 6.071 -6.469
AVG BOT 8ft/12ft 0.9786 1.0498

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.533	27	39 28	1.523	0.873	27	43 28	6.64	0.717	10.5	27	43 28 16	6.70	0.683	40.7	21	43 26 17
1.528	27	35 28	1.528	0.871	27	33 18	6.08	0.715	19.3	26	39 26 16	6.69	0.678	40.2	21	35 18 17
1.528	27	33 22	1.534	0.867	28	43 34	6.61	0.714	10.5	27	33 18 16	7.15	0.663	33.2	23	45 24 17
1.528	27	33 26	1.544	0.862	28	27 18	6.60	0.713	10.6	28	43 34 16	6.56	0.662	40.0	21	41 28 17
1.522	28	39 34	1.574	0.845	27	39 28	6.05	0.712	19.6	26	35 22 16	6.53	0.662	40.3	21	33 20 17
1.509	28	43 20	1.575	0.845	28	51 20	6.49	0.712	12.4	28	41 10 7	6.49	0.660	40.6	21	43 22 17
1.508	28	41 18	1.578	0.843	28	41 10	6.48	0.710	12.4	28	51 20 7	6.32	0.659	42.5	20	47 26 17
1.508	28	47 20	1.580	0.842	27	33 22	6.02	0.708	19.8	26	45 26 17	7.09	0.659	33.5	23	37 16 17
1.507	27	47 28	1.584	0.840	27	35 28	6.55	0.707	10.5	28	27 18 16	6.46	0.659	40.7	21	39 18 17
1.506	28	43 24	1.585	0.839	27	33 26	6.53	0.704	10.2	27	39 28 16	7.71	0.657	26.0	24	45 28 16

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-155414
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-155746
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

MICROBURN-B (DMAY95C) RUN: WASHINGTON NUCLEAR PLANT 2 DATE 12/29/97 TIME 16:01:52

COAST TO 6898.5 MWD/MT - 257 EFPD

Cycle 13 Exposure 6898.5 MWd/MTU
895.9 GWd
Core Average Exposure 25067.1 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00070

Delta E: MWd/MTU, (GWd) 187.9 (24.40)
Power: MWt 3150.7 (90.38 %)
Core Pressure: psia 1024.4
Inlet Subcooling: Btu/lbm -20.58
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- -- --          55
51        -- -- 40 -- -- -- -- -- 40 -- --        51
47     -- -- -- -- -- -- -- -- -- -- -- -- --     47
43 -- -- 40 -- -- 46 40 -- 40 -- -- -- 40 -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- 40 -- -- -- -- -- 40 -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- 40 -- -- -- 40 -- 40 -- -- -- 40 -- -- 19
15    -- -- -- -- -- -- -- -- -- -- -- -- --     15
11       -- -- 40 -- -- -- -- -- 40 -- --        11
 7          -- -- -- -- -- -- -- --              7
 3             -- -- -- -- -- -- --              3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

	Axial Profile		Edit	Radial Power		
N	Power	Exposure	Zone	Avg.	Max.	Location
Top 25	0.235	4.425	17	0.290	0.396	59 34
24	0.508	8.543	18	0.358	0.370	37 2
23	0.919	18.337	19	0.382	0.631	55 18
22	1.099	22.393	20	0.810	1.048	41 16
21	1.204	25.262	21	0.916	1.030	43 22
20	1.258	26.975	22	1.093	1.116	39 22
19	1.282	27.994	23	1.012	1.147	47 22
18	1.290*	28.599	24	1.222	1.233	45 28
17	1.289	29.011	25	1.082	1.232	37 28
16	1.282	29.245	26	1.235	1.419	39 26
15	1.270	29.407	27	1.452	1.529	39 28
14	1.255	29.538	28	1.412	1.518	39 34
13	1.236	29.655				
12	1.214	29.762				
11	1.187	29.860				
10	1.156	29.941				
9	1.120	29.994				
8	1.079	29.996*				
7	1.031	29.946				
6	0.972	29.773				
5	0.897	29.347				
4	0.800	28.269				
3	0.703	25.559				
2	0.550	19.748				
Bottom 1	0.166	5.537				
% AXIAL TILT	8.478	-6.375				
AVG BOT 8ft/12ft	0.9641	1.0492				

Control Rod Density: % 1.46

k-effective: 1.00310
Void Fraction: 0.336
Core Delta-P: psia 20.221
Core Plate Delta-P: psia 15.749
Coolant Temp: Deg-F 544.9
In Channel Flow: Mlb/hr 93.13
Source Convergence 0.00036

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.529	27	39 28	1.592	0.836	27	43 28	6.43	0.697	10.9	27	43 28 17	6.50	0.665	41.0	21	43 26 17
1.524	27	35 28	1.597	0.833	27	33 18	6.41	0.694	10.8	27	33 18 17	6.50	0.660	40.5	21	35 18 17
1.524	27	33 22	1.604	0.829	28	43 34	6.40	0.693	10.9	28	43 34 17	6.95	0.647	33.5	23	45 24 17
1.524	27	33 26	1.614	0.824	28	27 18	5.88	0.692	19.6	26	39 26 16	6.20	0.644	42.2	20	47 26 18
1.518	28	39 34	1.633	0.814	28	51 20	5.86	0.689	19.9	26	35 22 16	6.31	0.644	40.8	21	43 22 17
1.511	28	47 20	1.637	0.813	28	41 10	5.85	0.688	20.1	26	45 26 17	6.36	0.644	40.3	21	41 28 17
1.509	28	43 20	1.649	0.806	27	39 28	6.35	0.688	10.8	28	27 18 17	6.33	0.644	40.6	21	33 20 17
1.508	28	41 18	1.656	0.803	27	33 22	6.34	0.685	10.6	28	43 24 17	6.90	0.643	33.7	23	37 16 17
1.508	28	41 14	1.660	0.801	27	35 28	6.33	0.684	10.6	27	39 28 17	6.29	0.643	41.0	21	39 18 17
1.506	27	47 28	1.661	0.801	27	33 26	5.81	0.684	20.1	26	35 16 17	7.51	0.641	26.1	24	45 28 17

TAPE 1:DKA100:[HOANG.PREDICT]RST-97DEC29-155746
TAPE 20:DKA100:[HOANG.PREDICT]RST-97DEC29-160105
DECKPL :DKA100:[HOANG.PREDICT]SAV-97JUL08-140103

Appendix B

WNP-2 Cycle 14

Discharged and Shuffled Fuel Information

(MICROBURN-B)

Table B.1

Full Core WNP-2 Cycle 14 Shuffle Discharged Fuel Information

Fuel Assembly Identification	Fuel Type	Cycle 13 Core Location	Assembly Average Exposure (GWd/MTU)
UD7030	19	17-60	36.813
UD6013	17	19-60	38.565
UD6054	17	21-60	38.088
UD6075	18	23-60	37.787
UD7078	19	25-60	38.320
UD6120	17	27-60	38.979
UD7075	19	29-60	38.709
UD7103	19	31-60	38.704
UD6101	17	33-60	38.900
UD7082	19	35-60	38.362
UD6096	18	37-60	37.790
UD6046	17	39-60	38.093
UD6047	17	41-60	38.562
UD7027	19	43-60	36.906
UD7005	19	15-58	38.458
UD7040	19	45-58	38.395
UD6087	17	11-56	38.032
UD6036	17	13-56	38.681
UD7009	20	21-56	36.513
UD7107	20	39-56	36.561
UD6104	17	47-56	38.555
UD6010	17	49-56	37.964
UD6026	17	11-54	38.583
UD6020	17	49-54	38.553
UD7021	19	11-52	37.559
UD8036	21	21-52	36.747
UD8012	21	39-52	36.807
UD7043	19	49-52	37.537
UD6037	17	5-50	37.979
UD6094	17	7-50	38.593
UD7089	19	9-50	37.582
UD8069	21	17-50	37.111
UD8044	21	43-50	37.100
UD7025	19	51-50	37.343
UD6074	17	53-50	38.115
UD6011	17	55-50	37.425
UD6028	17	5-48	38.708
UD6049	17	55-48	37.659
UD7095	19	3-46	38.375
UD7067	19	57-46	38.417
UD7093	19	5-44	37.141
UD8055	21	11-44	36.930
UD8035	21	49-44	36.752
UD7105	19	55-44	37.149
UD6060	17	1-42	38.576
UD6045	17	59-42	38.490

Table B.1

Full Core WNP-2 Cycle 14 Shuffle Discharged Fuel Information (Cont.)

Fuel Assembly Identification	Fuel Type	Cycle 13 Core Location	Assembly Average Exposure (GWd/MTU)
UD6056	17	1-40	38.124
UD8017	21	9-40	36.731
UD8006	21	51-40	36.800
UD6040	17	59-40	37.873
UD6053	18	1-38	37.826
UD6097	18	59-38	37.723
UD7024	19	1-36	38.230
UD8050	21	7-36	36.778
UD8023	21	25-36	37.235
UD8011	21	35-36	37.214
UD8033	21	53-36	36.824
UD7018	19	59-36	38.226
UD6112	17	1-34	38.973
UD8034	21	29-34	37.165
UD8013	21	31-34	37.191
UD6099	17	59-34	37.609
UD7019	19	1-32	38.623
UD8043	21	27-32	37.160
UD8029	21	33-32	37.196
UD7102	19	59-32	38.558
UD7011	19	1-30	38.647
UD8040	21	27-30	37.188
UD8038	21	33-30	37.209
UD7066	19	59-30	38.564
UD6001	17	1-28	38.952
UD8022	21	29-28	37.198
UD8062	21	31-28	37.245
UD6003	17	59-28	38.493
UD7065	19	1-26	38.276
UD8090	21	7-26	36.776
UD8026	21	25-26	37.190
UD8018	21	35-26	37.039
UD8100	21	53-26	36.875
UD7058	19	59-26	38.341
UD6110	18	1-24	37.768
UD6086	18	59-24	37.786
UD6072	17	1-22	38.016
UD8007	21	9-22	36.764
UD8027	21	51-22	36.927
UD6084	17	59-22	37.734
UD6080	17	1-20	38.580
UD6093	17	59-20	38.303
UD7001	19	5-18	37.118
UD8088	21	11-18	36.983
UD8025	21	49-18	36.809
UD7084	19	55-18	37.248

Table B.1

Full Core WNP-2 Cycle 14 Shuffle Discharged Fuel Information (Cont.)

Fuel Assembly Identification	Fuel Type	Cycle 13 Core Location	Assembly Average Exposure (GWd/MTU)
UD7054	19	3-16	38.432
UD7052	19	57-16	38.381
UD6035	17	5-14	38.701
UD6005	17	55-14	38.378
UD6100	17	5-12	37.880
UD6117	17	7-12	38.602
UD7046	19	9-12	37.587
UD8081	21	17-12	37.013
UD8094	21	43-12	37.150
UD7096	19	51-12	37.297
UD6081	17	53-12	38.310
UD6118	17	55-12	37.732
UD7060	19	11-10	37.531
UD8028	21	21-10	36.794
UD8020	21	39-10	36.831
UD7055	19	49-10	37.403
UD6102	17	11- 8	38.566
UD6116	17	49- 8	38.506
UD6105	17	11- 6	38.016
UD6034	17	13- 6	38.744
UD7002	20	21- 6	36.515
UD7098	20	39- 6	36.592
UD6006	17	47- 6	38.557
UD6082	17	49- 6	37.940
UD7031	19	15- 4	38.413
UD7106	19	45- 4	38.389
UD7013	19	17- 2	36.872
UD6071	17	19- 2	38.506
UD6067	17	21- 2	38.102
UD6111	18	23- 2	37.841
UD7080	19	25- 2	38.326
UD6017	17	27- 2	39.090
UD7004	19	29- 2	38.709
UD7081	19	31- 2	38.729
UD6007	17	33- 2	38.988
UD7026	19	35- 2	38.339
UD6051	18	37- 2	37.841
UD6083	17	39- 2	38.076
UD6024	17	41- 2	38.567
UD7035	19	43- 2	36.700

Table B.1

Full Core WNP-2 Cycle 14 Shuffle Discharged Fuel Information (Cont.)

Number of Assemblies Discharged	Fuel Type	Batch Average Exposure (GWd/MTU)	Total Weight (MTU)
48	17	38.354	8.0585
8	18	37.795	1.3439
40	19	37.968	6.7090
4	20	36.545	0.6706
32	21	36.992	5.3750

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UD7085	5-40	17-60	UD7059	25-58	19-60
UD8001	21-44	21-60	UD8096	25-50	23-60
UD8077	25-44	25-60	UD8066	27-42	27-60
UD7092	15-42	29-60	UD7049	45-42	31-60
UD8060	33-42	33-60	UD8051	35-44	35-60
UD8019	35-50	37-60	UD8032	39-44	39-60
UD7074	35-58	41-60	UD7070	55-40	43-60
UD8002	13-52	15-58	UD9093	29-46	17-58
UDA015	13-48	19-58	UD9003	29-54	21-58
UDA045	23-48	23-58	WAC108	27-56	25-58
WAC092	23-58	27-58	WQD003	19-52	29-58
WQD014	41-52	31-58	WAC083	37-58	33-58
WAC120	33-56	35-58	UDA029	37-48	37-58
UD9108	31-54	39-58	UDA012	47-48	41-58
UD9152	31-46	43-58	UD8030	47-52	45-58
UD8067	25-54	11-56	UD7086	25-48	13-56
UD9082	15-56	15-56	UD9016	25-52	17-56
WAC050	27-58	19-56	UDA023	19-58	21-56
WQD001	23-56	23-56	WAC098	17-48	25-56
UDA123	29-58	29-56	UDA001	31-58	31-56
WAC038	43-48	35-56	WQD019	37-56	37-56
UDA008	41-58	39-56	WAC035	33-58	41-56
UD9115	35-52	43-56	UD9088	45-56	45-56
UD7048	35-48	47-56	UD8061	35-54	49-56
UD7064	17-58	11-54	UD9062	13-54	13-54
WQD038	17-54	15-54	WQD008	19-44	19-54
UD9150	15-48	23-54	UD9015	19-50	27-54
UDA019	17-46	29-54	UDA006	43-46	31-54
UD9091	41-50	33-54	UD9045	45-48	37-54
WQD016	41-44	41-54	WQD042	43-54	45-54
UD9044	47-54	47-54	UD7077	43-58	49-54
UD8016	9-52	9-52	UD9031	29-56	11-52
UD9127	21-50	13-52	WQD002	15-52	15-52
UD9014	21-48	17-52	WAC052	23-54	21-52
WQD006	23-52	23-52	WAC049	9-44	25-52
WAC106	27-52	27-52	UD9027	29-32	29-52
UD9010	31-32	31-52	WAC118	33-52	33-52
WAC027	51-44	35-52	WQD018	37-52	37-52
WAC084	37-54	39-52	UD9106	39-48	43-52
WQD015	45-52	45-52	UD9017	39-50	47-52
UD9024	31-56	49-52	UD8054	51-52	51-52
UD7023	17-56	5-50	UD7090	3-44	7-50
UD9064	5-32	9-50	WAC043	27-34	11-50
WAC101	15-50	15-50	UD9103	29-40	19-50
UD8008	29-42	23-50	UDA042	21-46	27-50
UDA035	39-46	33-50	UD8031	31-42	37-50

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UD9033	31-40	41-50	WAC089	45-50	45-50
WAC030	33-34	49-50	UD9107	55-32	51-50
UD7022	57-44	53-50	UD7032	43-56	55-50
UD7071	13-36	5-48	UD9092	7-48	7-48
UD9072	11-40	9-48	UDA067	29-52	13-48
UDA047	13-50	15-48	WAC044	25-56	17-48
WQD007	19-48	19-48	UDA024	27-50	21-48
WAC097	23-50	23-48	UD8080	25-38	25-48
WAC110	27-48	27-48	UDA018	7-34	29-48
UDA005	53-34	31-48	WAC122	33-48	33-48
UD8084	35-38	35-48	WAC039	37-50	37-48
UDA010	33-50	39-48	WQD062	41-48	41-48
WAC031	35-56	43-48	UDA129	47-50	45-48
UDA009	31-52	47-48	UD9117	49-40	51-48
UD9112	53-48	53-48	UD7051	47-36	55-48
UD8003	9-48	3-46	UD9077	5-46	5-46
WQD004	7-44	7-46	WQD031	9-46	9-46
WAC093	11-46	11-46	UDA025	11-48	13-46
UDA044	9-32	15-46	UD9075	23-42	19-46
UDA046	19-56	21-46	UDA051	29-44	23-46
WAC041	15-36	27-46	UDA052	21-54	29-46
UDA037	39-54	31-46	WAC033	45-36	33-46
UDA031	31-44	37-46	UDA131	41-56	39-46
UD9023	37-42	41-46	UDA036	51-32	45-46
UDA110	49-48	47-46	WAC082	49-46	49-46
WQD052	51-46	51-46	WQD063	53-44	53-46
UD9037	55-46	55-46	UD8037	51-48	57-46
UD7068	1-44	1-44	UD9028	21-32	3-44
UD9104	9-36	5-44	UD9113	13-40	9-44
WAC042	5-36	13-44	WAC094	11-50	17-44
UDA020	23-34	19-44	WAC095	7-42	21-44
WQD005	23-44	23-44	UDA026	23-40	25-44
WAC109	27-44	27-44	UD9136	23-46	29-44
UD9089	37-46	31-44	WAC121	33-44	33-44
UDA003	37-40	35-44	WQD017	37-44	37-44
WAC080	53-42	39-44	UDA111	37-34	41-44
WAC081	49-50	43-44	WAC029	55-36	47-44
UD9065	47-40	51-44	UD9052	51-36	55-44
UD9118	39-32	57-44	UD7094	59-44	59-44
UD7042	3-36	1-42	UDA048	15-46	3-42
WAC047	3-34	5-42	WQD030	17-42	7-42
UD9130	15-32	11-42	WQD027	13-42	13-42
UD9067	19-38	15-42	UDA043	27-38	17-42
UD8078	21-40	19-42	UD9085	17-44	23-42
UD7044	3-40	27-42	UD7015	57-40	33-42
UD9046	43-44	37-42	UD8086	39-40	41-42

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UDA039	33-38	43-42	UD9125	41-38	45-42
WQD045	47-42	47-42	UD9102	45-32	49-42
WQD043	43-42	53-42	WAC037	57-34	55-42
UDA027	45-46	57-42	UD7017	57-36	59-42
UD8057	17-40	1-40	UD9059	7-32	3-40
UDA140	3-42	5-40	WAC100	7-38	9-40
UDA022	11-34	13-40	UDA049	5-42	15-40
WAC102	19-54	17-40	UDA016	19-40	21-40
UDA014	29-36	23-40	WAC104	25-40	25-40
WAC107	27-40	27-40	UDA021	25-42	29-40
UDA004	35-42	31-40	WAC119	33-40	33-40
WAC086	35-40	35-40	UDA002	31-36	37-40
UDA011	41-40	39-40	WAC088	41-54	43-40
UDA030	55-42	45-40	UDA007	49-34	47-40
WAC090	53-38	51-40	UDA032	57-42	55-40
UD9011	53-32	57-40	UD8010	43-40	59-40
UD8099	11-36	1-38	UDA069	13-38	3-38
WQD028	5-38	5-38	UD9050	13-46	7-38
WQD029	9-38	9-38	UD8004	19-32	11-38
WAC103	11-38	13-38	UDA068	17-32	15-38
WQD033	17-38	17-38	UD9149	19-42	19-38
UDA139	25-32	21-38	UD9066	29-50	23-38
UD9051	13-32	27-38	UD9078	27-46	29-38
UD9144	33-46	31-38	UD9135	47-32	33-38
UD9026	31-50	37-38	UDA028	35-32	39-38
UD9086	41-42	41-38	WQD044	43-38	43-38
UDA053	43-32	45-38	WAC087	49-38	47-38
UD8014	41-32	49-38	WQD041	51-38	51-38
UD9043	47-46	53-38	WQD040	55-38	55-38
UDA054	47-38	57-38	UD8091	49-36	59-38
UD8064	17-36	1-36	WAC142	5-34	3-36
WAC051	13-44	5-36	WAC048	17-52	9-36
UD8087	23-36	13-36	UDA041	21-38	17-36
WAC099	21-36	21-36	UD9004	11-32	25-36
WAC105	27-36	27-36	WAC046	15-54	29-36
WAC032	45-54	31-36	WAC127	33-36	33-36
UD9007	49-32	35-36	WAC091	39-36	39-36
UDA034	39-38	43-36	UD8059	37-36	47-36
WAC036	43-52	51-36	WAC085	47-44	55-36
WAC146	55-34	57-36	UD8072	43-36	59-36
UD8083	19-34	1-34	WAC096	3-38	3-34
UD9133	11-42	7-34	WAC132	9-34	9-34
UDA066	15-40	11-34	WAC135	13-34	13-34
WAC045	25-46	15-34	WAC131	17-34	17-34
UD7006	21-58	19-34	WAC133	21-34	21-34
UD9114	29-48	23-34	WAC134	25-34	25-34

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UD9116	29-38	29-34	UD9090	31-38	31-34
WAC144	35-34	35-34	UD9047	31-48	37-34
WQD081	39-34	39-34	UD7041	39-58	41-34
WQD082	43-34	43-34	WAC028	35-46	45-34
WAC147	47-34	47-34	UDA109	45-40	49-34
WAC145	51-34	51-34	UD9040	49-42	53-34
WAC079	57-38	57-34	UD8021	41-34	59-34
UD7008	19-46	1-32	WQD032	9-42	3-32
UDA040	3-32	5-32	UDA143	15-44	7-32
UD9098	23-38	9-32	UDA017	27-54	13-32
UDA092	7-40	15-32	UD9020	15-38	17-32
UDA050	19-36	21-32	UD9147	15-34	23-32
WAC040	7-46	25-32	UD9071	23-32	27-32
UDA142	21-42	29-32	UDA079	39-42	31-32
UD9131	37-32	33-32	WAC034	53-46	35-32
UD9039	45-34	37-32	UDA130	41-36	39-32
UD9101	45-38	43-32	UDA038	53-40	45-32
UDA013	33-54	47-32	UD9083	37-38	51-32
UDA033	45-44	53-32	UDA080	57-32	55-32
WQD080	51-42	57-32	UD7037	41-46	59-32
UD7029	19-16	1-30	WQD021	9-20	3-30
UDA114	3-30	5-30	UDA061	15-18	7-30
UD9129	23-24	9-30	UDA084	27- 8	13-30
UDA059	7-22	15-30	UD9123	15-24	17-30
UDA057	19-26	21-30	UD9008	15-28	23-30
WAC004	7-16	25-30	UD9070	23-30	27-30
UDA108	21-20	29-30	UDA121	39-20	31-30
UD9053	37-30	33-30	WAC017	53-16	35-30
UD9139	45-28	37-30	UDA117	41-26	39-30
UD9105	45-24	43-30	UDA076	53-22	45-30
UDA099	33- 8	47-30	UD9132	37-24	51-30
UDA072	45-18	53-30	UDA073	57-30	55-30
WQD013	51-20	57-30	UD7108	41-16	59-30
UD8041	19-28	1-28	WAC057	3-24	3-28
UD9054	11-20	7-28	WAC124	9-28	9-28
UDA082	15-22	11-28	WAC126	13-28	13-28
WAC008	25-16	15-28	WAC125	17-28	17-28
UD7028	21- 4	19-28	WAC123	21-28	21-28
UD9060	29-14	23-28	WAC129	25-28	25-28
UD9080	29-24	29-28	UD9109	31-24	31-28
WAC114	35-28	35-28	UD9018	31-14	37-28
WAC111	39-28	39-28	UD7003	39- 4	41-28
WAC113	43-28	43-28	WAC019	35-16	45-28
WAC115	47-28	47-28	UDA095	45-22	49-28
WAC112	51-28	51-28	UD9137	49-20	53-28
WAC070	57-24	57-28	UD8093	41-28	59-28

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UD8049	17-26	1-26	WAC128	5-28	3-26
WAC054	13-18	5-26	WAC001	17-10	9-26
UD8085	23-26	13-26	UDA056	21-24	17-26
WAC062	21-26	21-26	UD9013	11-30	25-26
WAC150	27-26	27-26	WAC007	15- 8	29-26
WAC020	45- 8	31-26	WAC140	33-26	33-26
UD9140	49-30	35-26	WAC073	39-26	39-26
UDA077	39-24	43-26	UD8082	37-26	47-26
WAC022	43-10	51-26	WAC025	47-18	55-26
WAC116	55-28	57-26	UD8056	43-26	59-26
UD8039	11-26	1-24	UDA128	13-24	3-24
WQD064	5-24	5-24	UD9094	13-16	7-24
WQD024	9-24	9-24	UD8005	19-30	11-24
WAC064	11-24	13-24	UDA087	17-30	15-24
WQD025	17-24	17-24	UD9122	19-20	19-24
UDA055	25-30	21-24	UD9063	29-12	23-24
UD9068	13-30	27-24	UD9148	27-16	29-24
UD9145	33-16	31-24	UD9134	47-30	33-24
UD9097	31-12	37-24	UDA070	35-30	39-24
UD9142	41-20	41-24	WQD011	43-24	43-24
UDA098	43-30	45-24	WAC077	49-24	47-24
UD8063	41-30	49-24	WQD010	51-24	51-24
UD9143	47-16	53-24	WQD053	55-24	55-24
UDA096	47-24	57-24	UD8075	49-26	59-24
UD8053	17-22	1-22	UD9119	7-30	3-22
UDA062	3-20	5-22	WAC061	7-24	9-22
UDA089	11-28	13-22	UDA063	5-20	15-22
WAC065	19- 8	17-22	UDA086	19-22	21-22
UDA081	29-26	23-22	WAC063	25-22	25-22
WAC149	27-22	27-22	UDA126	25-20	29-22
UDA136	35-20	31-22	WAC138	33-22	33-22
WAC078	35-22	35-22	UDA093	31-26	37-22
UDA138	41-22	39-22	WAC076	41- 8	43-22
UDA074	55-20	45-22	UDA103	49-28	47-22
WAC074	53-24	51-22	UDA116	57-20	55-22
UD9055	53-30	57-22	UD8042	43-22	59-22
UD7007	3-26	1-20	UDA065	15-16	3-20
WAC009	3-28	5-20	WAC130	17-20	7-20
UD9005	15-30	11-20	WQD020	13-20	13-20
UD9061	19-24	15-20	UDA112	27-24	17-20
UD8097	21-22	19-20	UD9073	17-18	23-20
UD7076	3-22	27-20	UD7012	57-22	33-20
UD9146	43-18	37-20	UD8089	39-22	41-20
UDA075	33-24	43-20	UD9038	41-24	45-20
WQD012	47-20	47-20	UD9019	45-30	49-20
WQD054	43-20	53-20	WAC021	57-28	55-20

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UDA118	45-16	57-20	UD7039	57-26	59-20
UD7053	1-18	1-18	UD9029	21-30	3-18
UD9126	9-26	5-18	UD9002	13-22	9-18
WAC005	5-26	13-18	WAC059	11-12	17-18
UDA125	23-28	19-18	WAC058	7-20	21-18
WQD083	23-18	23-18	UDA133	23-22	25-18
WQD084	27-18	27-18	UD9041	23-16	29-18
UD9079	37-16	31-18	WAC136	33-18	33-18
UDA094	37-22	35-18	WQD034	37-18	37-18
WAC069	53-20	39-18	UDA104	37-28	41-18
WAC068	49-12	43-18	WAC014	55-26	47-18
UD9096	47-22	51-18	UD9141	51-26	55-18
UD9087	39-30	57-18	UD7057	59-18	59-18
UD8024	9-14	3-16	UD9057	5-16	5-16
WQD047	7-18	7-16	WQD022	9-16	9-16
WAC012	11-16	11-16	UDA088	11-14	13-16
UDA064	9-30	15-16	UD9069	23-20	19-16
UDA107	19- 6	21-16	UDA113	29-18	23-16
WAC003	15-26	27-16	UDA060	21- 8	29-16
UDA120	39- 8	31-16	WAC018	45-26	33-16
UDA071	31-18	37-16	UDA119	41- 6	39-16
UD9138	37-20	41-16	UDA115	51-30	45-16
UDA144	49-14	47-16	WAC067	49-16	49-16
WQD009	51-16	51-16	WQD071	53-18	53-16
UD9006	55-16	55-16	UD8076	51-14	57-16
UD7069	13-26	5-14	UD9034	7-14	7-14
UD9048	11-22	9-14	UDA132	29-10	13-14
UDA106	13-12	15-14	WAC002	25- 6	17-14
WQD046	19-14	19-14	UDA085	27-12	21-14
WAC056	23-12	23-14	UD8079	25-24	25-14
WAC152	27-14	27-14	UDA091	7-28	29-14
UDA135	53-28	31-14	WAC141	33-14	33-14
UD8095	35-24	35-14	WAC071	37-12	37-14
UDA097	33-12	39-14	WQD072	41-14	41-14
WAC015	35- 6	43-14	UDA124	47-12	45-14
UDA101	31-10	47-14	UD9084	49-22	51-14
UD9001	53-14	53-14	UD7104	47-26	55-14
UD7047	17- 6	5-12	UD7072	3-18	7-12
UD9032	5-30	9-12	WAC006	27-28	11-12
WAC060	15-12	15-12	UD9012	29-22	19-12
UD8047	29-20	23-12	UDA058	21-16	27-12
UDA078	39-16	33-12	UD8058	31-20	37-12
UD9009	31-22	41-12	WAC075	45-12	45-12
WAC016	33-28	49-12	UD9110	55-30	51-12
UD7016	57-18	53-12	UD7100	43- 6	55-12
UD8074	9-10	9-10	UD9049	29- 6	11-10

Table B.2

Full Core WNP-2 Cycle 14 Shuffled Fuel Information (Cont.)

Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14	Fuel Assembly Identification	Core Location Cycle 13	Core Location Cycle 14
UD9030	21-12	13-10	WQD051	15-10	15-10
UD9035	21-14	17-10	WAC053	23- 8	21-10
WQD049	23-10	23-10	WAC011	9-18	25-10
WAC151	27-10	27-10	UD9036	29-30	29-10
UD9025	31-30	31-10	WAC139	33-10	33-10
WAC023	51-18	35-10	WQD035	37-10	37-10
WAC026	37- 8	39-10	UD9121	39-14	43-10
WQD037	45-10	45-10	UD9042	39-12	47-10
UD9058	31- 6	49-10	UD8065	51-10	51-10
UD7083	17- 4	11- 8	UD9021	13- 8	13- 8
WQD023	17- 8	15- 8	WQD050	19-18	19- 8
UD9081	15-14	23- 8	UD9076	19-12	27- 8
UDA090	17-16	29- 8	UDA141	43-16	31- 8
UD9099	41-12	33- 8	UD9100	45-14	37- 8
WQD039	41-18	41- 8	WAC117	43- 8	45- 8
UD9056	47- 8	47- 8	UD7050	43- 4	49- 8
UD8070	25- 8	11- 6	UD7061	25-14	13- 6
UD9151	15- 6	15- 6	UD9124	25-10	17- 6
WAC010	27- 4	19- 6	UDA083	19- 4	21- 6
WQD048	23- 6	23- 6	WAC055	17-14	25- 6
UDA127	29- 4	29- 6	UDA137	31- 4	31- 6
WAC072	43-14	35- 6	WAC143	37- 6	37- 6
UDA102	41- 4	39- 6	WAC024	33- 4	41- 6
UD9111	35-10	43- 6	UD9120	45- 6	45- 6
UD7038	35-14	47- 6	UD8068	35- 8	49- 6
UD8009	13-10	15- 4	UD9074	29-16	17- 4
UDA134	13-14	19- 4	UD9128	29- 8	21- 4
UDA105	23-14	23- 4	WAC148	27- 6	25- 4
WAC013	23- 4	27- 4	WQD085	19-10	29- 4
WQD036	41-10	31- 4	WAC066	37- 4	33- 4
WAC137	33- 6	35- 4	UDA122	37-14	37- 4
UD9095	31- 8	39- 4	UDA100	47-14	41- 4
UD9022	31-16	43- 4	UD8046	47-10	45- 4
UD7045	5-22	17- 2	UD7014	25- 4	19- 2
UD8073	21-18	21- 2	UD8015	25-12	23- 2
UD8048	25-18	25- 2	UD8071	27-20	27- 2
UD7101	15-20	29- 2	UD7073	45-20	31- 2
UD8098	33-20	33- 2	UD8052	35-18	35- 2
UD8092	35-12	37- 2	UD8045	39-18	39- 2
UD7034	35- 4	41- 2	UD7036	55-22	43- 2

Appendix C

WNP-2 Cycle 14

Target Control Rod Patterns

(MICROBURN-B)

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 0000 MWD/MT

DATE 01/12/98 TIME 12:05:58
Cycle 14 Exposure 0.0 MWd/MTU
0.0 GWd
Core Average Exposure 18469.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTCT
0	0	0	1	0	3	1	0	0	8	0	1	1	0	0.00001

Delta E: MWd/MTU, (GWd)	0.0 (0.00)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50 (100.00 %)	

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	36	--	--	--	10	--	--	--	36	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	10	--	--	--	12	--	--	--	10	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	36	--	--	--	10	--	--	--	36	--	--		15
11			--	--	--	--	--	--	--	--	--	--				11
7				--	--	--	--	--	--	--	--					7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	4.82
k-effective:	1.00327
Void Fraction:	0.424
Core Delta-P: psia	21.194
Core Plate Delta-P: psia	16.742
Coolant Temp: Deg-F	547.3
In Channel Flow: Mlb/hr	92.19
Source Convergence	0.00006

Axial Profile

	N	Power	Exposure
Top	25	0.177	3.142
	24	0.417	6.290
	23	0.703	13.292
	22	0.854	16.338
	21	0.951	18.504
	20	1.007	19.797
	19	1.032	20.561
	18	1.049	21.009
	17	1.063	21.312
	16	1.076	21.482
	15	1.089	21.607
	14	1.102	21.715
	13	1.115	21.817
	12	1.129	21.918
	11	1.144	22.017
	10	1.161	22.109
	9	1.180	22.184
	8	1.203	22.224
	7	1.228	22.229*
	6	1.254	22.139
	5	1.286	21.849
	4	1.297*	21.046
	3	1.223	18.965
	2	0.975	14.537
Bottom	1	0.286	3.996
% AXIAL TILT		-11.922	-6.863
AVG BOT 8ft/12ft		1.0725	1.0518

Edit Radial Power

Zone	Avg.	Max.	Location
19	0.266	0.334	53 12
20	0.489	0.965	33 20
21	0.471	0.998	49 24
22	1.041	1.060	47 26
23	0.841	1.084	45 20
24	1.157	1.160	37 30
25	0.986	1.244	39 46
26	1.250	1.424	43 18
27	1.349	1.468	33 26
28	1.290	1.485	47 20
29	1.102	1.174	39 20
30	1.177	1.272	45 18

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.485	28	47 20	1.603	0.873	25	39 46	7.94	0.872	12.7	28	37 10 4	8.84	0.794	12.7	28	37 10 4
1.474	28	41 14	1.617	0.866	25	45 22	7.90	0.869	12.8	28	51 24 4	8.79	0.791	12.8	28	51 24 4
1.468	27	33 26	1.529	0.850	28	47 20	7.36	0.854	17.1	26	25 32 4	8.08	0.772	19.4	26	51 26 4
1.467	27	35 28	1.543	0.843	28	41 14	7.26	0.854	19.4	26	51 26 4	8.00	0.770	20.4	26	35 10 4
1.461	28	43 24	1.666	0.841	25	47 22	7.88	0.852	10.6	27	25 34 4	8.18	0.768	17.1	26	25 32 4
1.460	28	37 18	1.555	0.836	27	33 26	7.32	0.852	17.2	26	29 36 4	8.14	0.765	17.2	26	29 36 4
1.459	28	51 24	1.556	0.836	27	35 28	7.87	0.850	10.7	27	27 36 4	8.79	0.765	10.6	27	25 34 4
1.448	28	37 10	1.560	0.834	28	51 24	7.18	0.845	20.4	26	35 10 4	8.77	0.763	10.7	27	27 36 4
1.424	26	43 18	1.562	0.832	28	43 24	7.78	0.836	9.5	28	37 44 4	8.46	0.752	12.0	27	33 10 4
1.421	27	51 28	1.564	0.831	28	37 18	7.59	0.830	12.0	27	33 10 4	7.84	0.747	19.0	26	51 22 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 0200 MWD/MT

DATE 01/12/98 TIME 12:07:13
Cycle 14 Exposure 200.0 MWd/MTU
26.2 GWd
Core Average Exposure 18669.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	200.0	(26.18)
Power: MWt	3486.0	(100.00 %)
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50	(100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                -- -- -- -- -- -- --                59
55             -- -- -- -- -- -- -- -- -- --          55
51          -- -- -- -- -- -- -- -- -- -- --          51
47    -- -- 14 -- -- --  8 -- -- -- 14 -- --    47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- --  8 -- -- -- 12 -- -- --  8 -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15    -- -- 14 -- -- --  8 -- -- -- 14 -- --    15
11       -- -- -- -- -- -- -- -- -- -- --       11
 7          -- -- -- -- -- -- -- -- --          7
 3             -- -- -- -- -- -- --             3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	5.90
k-effective:	1.00364
Void Fraction:	0.423
Core Delta-P: psia	21.174
Core Plate Delta-P: psia	16.722
Coolant Temp: Deg-F	547.4
In Channel Flow: Mlb/hr	92.20
Source Convergence	0.00007

	N	Axial Profile Power	Axial Profile Exposure
Top	25	0.185	3.177
	24	0.436	6.373
	23	0.734	13.432
	22	0.889	16.509
	21	0.985	18.694
	20	1.033	19.998
	19	1.057	20.768
	18	1.064	21.219
	17	1.059	21.525
	16	1.058	21.698
	15	1.060	21.825
	14	1.064	21.935
	13	1.071	22.040
	12	1.081	22.144
	11	1.095	22.246
	10	1.113	22.341
	9	1.137	22.420
	8	1.169	22.465
	7	1.209	22.474*
	6	1.259	22.390
	5	1.310	22.106
	4	1.336*	21.305
	3	1.273	19.210
	2	1.022	14.733
Bottom	1	0.301	4.052
% AXIAL TILT		-11.199	-6.917
AVG BOT 8ft/12ft		1.0613	1.0520

Edit Zone	Radial Power Avg.	Max.	Location
19	0.257	0.318	53 12
20	0.498	0.987	33 20
21	0.477	1.011	49 24
22	1.052	1.076	47 26
23	0.843	1.118	33 30
24	1.192	1.196	37 30
25	0.971	1.242	39 46
26	1.248	1.449	35 30
27	1.377	1.513	33 26
28	1.290	1.479	51 24
29	1.080	1.182	39 20
30	1.181	1.310	33 28

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.513	27	33 26	1.606	0.872	25	39 46	8.15	0.898	13.1	28	37 10 4	9.06	0.820	13.1	28	37 10 4
1.512	27	35 28	1.497	0.869	27	33 26	7.66	0.895	17.5	26	25 32 4	9.01	0.816	13.2	28	51 24 4
1.479	28	51 24	1.497	0.868	27	35 28	8.10	0.894	13.2	28	51 24 4	8.68	0.804	15.2	26	25 32 3
1.478	28	43 24	1.619	0.865	25	45 22	7.62	0.891	17.6	26	29 36 4	9.15	0.802	11.1	27	25 34 4
1.477	28	37 18	1.534	0.847	28	51 24	8.22	0.891	11.1	27	25 34 4	9.13	0.800	11.1	27	27 36 4
1.466	28	37 10	1.539	0.845	28	43 24	8.20	0.889	11.1	27	27 36 4	8.63	0.799	15.3	26	29 36 3
1.455	28	47 20	1.540	0.844	28	37 18	7.47	0.879	19.8	26	51 26 4	8.31	0.796	19.8	26	51 26 4
1.449	26	35 30	1.667	0.840	25	47 22	7.40	0.870	20.7	26	35 10 4	8.23	0.795	20.7	26	35 10 4
1.448	27	51 28	1.550	0.839	28	37 10	8.02	0.862	9.9	28	37 44 4	8.73	0.781	12.4	27	33 10 4
1.447	26	31 26	1.674	0.836	24	37 30	7.84	0.860	12.4	27	33 10 4	8.66	0.775	12.5	27	51 28 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 0500 MWD/MT

DATE 01/12/98 TIME 12:08:23
Cycle 14 Exposure 500.0 MWd/MTU
65.4 GWd
Core Average Exposure 18969.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	300.0	(39.27)	
Power: MWt	3486.0	(100.00 %)	
Core Pressure: psia	1035.0		
Inlet Subcooling: Btu/lbm	-19.24		
Flow: Mlb/hr	108.50	(100.00 %)	

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	16	--	--	--	8	--	--	--	16	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	8	--	--	--	12	--	--	--	8	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	16	--	--	--	8	--	--	--	16	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	5.81
k-effective:	1.00310
Void Fraction:	0.418
Core Delta-P: psia	21.111
Core Plate Delta-P: psia	16.659
Coolant Temp: Deg-F	547.3
In Channel Flow: Mlb/hr	92.25
Source Convergence	0.00007

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.191	3.232	19	0.260	0.323	53 12
	24	0.449	6.503	20	0.497	0.979	33 20
	23	0.754	13.653	21	0.477	1.010	49 24
	22	0.913	16.776	22	1.047	1.071	47 26
	21	1.011	18.990	23	0.843	1.102	33 30
	20	1.061	20.308	24	1.175	1.179	37 30
	19	1.087	21.086	25	0.970	1.235	39 46
	18	1.098	21.539	26	1.245	1.427	35 30
	17	1.098	21.843	27	1.369	1.495	33 26
	16	1.089	22.016	28	1.291	1.476	51 24
	15	1.084	22.143	29	1.088	1.185	39 20
	14	1.083	22.255	30	1.189	1.305	33 28
	13	1.085	22.362				
	12	1.090	22.469				
	11	1.098	22.575				
	10	1.111	22.676				
	9	1.128	22.761				
	8	1.153	22.816				
	7	1.185	22.837*				
	6	1.224	22.768				
	5	1.263	22.500				
	4	1.277*	21.707				
	3	1.209	19.592				
	2	0.970	15.039				
Bottom	1	0.287	4.142				
		% AXIAL TILT		-8.677	-6.985		
		AVG BOT 8ft/12ft		1.0482	1.0522		

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR				APLHGR					LHGR				
Value	FT	Locat.		Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.495	27	33	26	1.611	0.869	25	39 46	7.80	0.864	13.7	28	37 10 4	8.67	0.793	13.7	28	37 10 4
1.495	27	35	28	1.622	0.863	25	45 22	7.75	0.860	13.8	28	51 24 4	8.62	0.790	13.8	28	51 24 4
1.476	28	51	24	1.517	0.857	27	33 26	7.22	0.850	18.1	26	25 32 4	8.67	0.767	11.7	27	25 34 4
1.470	28	43	24	1.517	0.857	27	35 28	7.78	0.849	11.7	27	25 34 4	8.65	0.766	11.7	27	27 36 4
1.469	28	37	18	1.536	0.846	28	51 24	7.76	0.847	11.7	27	27 36 4	7.95	0.766	20.4	26	51 26 4
1.464	28	37	10	1.666	0.840	25	47 22	7.18	0.845	18.2	26	29 36 4	7.88	0.764	21.3	26	35 10 4
1.457	28	47	20	1.547	0.840	28	43 24	7.14	0.840	20.4	26	51 26 4	8.03	0.760	18.1	26	25 32 4
1.446	28	41	14	1.549	0.839	28	37 18	7.08	0.832	21.3	26	35 10 4	7.99	0.757	18.2	26	29 36 4
1.442	27	51	28	1.551	0.838	28	37 10	7.47	0.824	13.1	27	33 10 4	8.32	0.752	13.1	27	33 10 4
1.434	27	43	28	1.565	0.830	28	47 20	7.63	0.824	10.6	28	37 44 4	8.25	0.746	13.1	27	51 28 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 1000 MWD/MT

DATE 01/12/98 TIME 12:10:00
Cycle 14 Exposure 1000.0 MWd/MTU
130.9 GWd
Core Average Exposure 19469.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0 (65.44)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50 (100.00 %)	

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	40	--	--	--	0	--	--	--	40	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	0	--	--	--	12	--	--	--	0	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	40	--	--	--	0	--	--	--	40	--	--		15
11			--	--	--	--	--	--	--	--	--	--				11
7				--	--	--	--	--	--	--	--					7
3					--	--	--	--	--	--						3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	5.09	
k-effective:	1.00340	
Void Fraction:	0.427	
Core Delta-P: psia	21.251	
Core Plate Delta-P: psia	16.800	
Coolant Temp: Deg-F	547.4	
In Channel Flow: Mlb/hr	92.14	
Source Convergence	0.00009	

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.167	3.327	19	0.271	0.341	53 12
	24	0.391	6.727	20	0.486	0.947	33 20
	23	0.655	14.030	21	0.471	0.999	49 24
	22	0.798	17.233	22	1.027	1.043	47 26
	21	0.895	19.497	23	0.839	1.083	45 20
	20	0.959	20.839	24	1.126	1.129	37 30
	19	1.003	21.630	25	0.970	1.227	39 46
	18	1.033	22.089	26	1.244	1.428	43 18
	17	1.058	22.392	27	1.328	1.444	33 26
	16	1.081	22.560	28	1.297	1.494	47 20
	15	1.100	22.686	29	1.133	1.199	39 20
	14	1.118	22.797	30	1.211	1.329	45 18
	13	1.135	22.905				
	12	1.152	23.014				
	11	1.169	23.124				
	10	1.187	23.231				
	9	1.207	23.326				
	8	1.231	23.393				
	7	1.260	23.430*				
	6	1.290	23.381				
	5	1.313*	23.132				
	4	1.305	22.346				
	3	1.223	20.197				
	2	0.981	15.525				
Bottom	1	0.290	4.284				
	% AXIAL TILT		-14.040	-7.029			
	AVG BOT 8ft/12ft		1.0898	1.0521			

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR				APLHGR					LHGR				
Value	FT	Locat.		Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.494	28	47	20	1.513	0.859	28	47 20	7.81	0.878	14.8	28	37 10 4	8.69	0.802	14.8	28	37 10 4
1.484	28	41	14	1.630	0.859	25	39 46	7.77	0.874	14.9	28	51 24 4	8.70	0.799	14.1	28	9 38 4
1.462	28	51	24	1.643	0.852	25	45 22	7.12	0.838	20.9	26	51 22 4	7.93	0.769	21.3	26	51 26 4
1.451	28	37	10	1.526	0.852	28	41 14	7.12	0.837	21.3	26	51 26 4	7.86	0.768	22.3	26	35 10 4
1.444	28	43	24	1.553	0.837	28	51 24	7.11	0.837	21.2	26	39 10 4	7.92	0.767	21.2	26	39 10 4
1.444	27	33	26	1.677	0.835	25	47 22	7.53	0.831	13.2	28	41 14 4	7.93	0.767	20.9	26	51 22 4
1.444	27	35	28	1.567	0.830	28	37 10	7.05	0.829	22.3	26	35 10 4	8.38	0.760	13.2	28	41 14 4
1.443	28	37	18	1.699	0.824	25	39 14	7.58	0.825	11.6	28	37 44 4	8.30	0.753	13.2	28	47 20 4
1.428	26	43	18	1.579	0.823	28	43 24	7.46	0.823	13.2	28	47 20 4	8.19	0.752	14.1	27	33 10 4
1.402	27	51	28	1.580	0.823	28	37 18	7.46	0.820	12.8	27	25 34 4	8.30	0.747	12.8	27	25 34 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 1500 MWD/MT

DATE 01/12/98 TIME 12:11:20
Cycle 14 Exposure 1500.0 MWd/MTU
196.3 GWd
Core Average Exposure 19969.6 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00013

Delta E: MWd/MTU, (GWd)	500.0	(65.44)	
Power: MWt	3486.0	(100.00 %)	
Core Pressure: psia	1035.0		
Inlet Subcooling: Btu/lbm	-19.24		
Flow: Mlb/hr	108.50	(100.00 %)	

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                -- -- -- -- -- -- --                59
55             -- -- -- -- -- -- -- -- --             55
51          -- -- -- -- -- -- -- -- -- -- --          51
47       -- -- 40 -- -- --  0 -- -- -- 40 -- --       47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- --  0 -- -- -- 12 -- -- --  0 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15       -- -- 40 -- -- --  0 -- -- -- 40 -- --       15
11          -- -- -- -- -- -- -- -- -- --             11
 7             -- -- -- -- -- -- -- -- --             7
 3                -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	5.09
k-effective:	1.00347
Void Fraction:	0.424
Core Delta-P: psia	21.223
Core Plate Delta-P: psia	16.771
Coolant Temp: Deg-F	547.3
In Channel Flow: Mlb/hr	92.16
Source Convergence	0.00005

	N	Axial Profile Power	Exposure
Top	25	0.171	3.409
	24	0.400	6.922
	23	0.667	14.358
	22	0.812	17.633
	21	0.909	19.944
	20	0.973	21.319
	19	1.015	22.132
	18	1.045	22.606
	17	1.069	22.922
	16	1.090	23.101
	15	1.109	23.237
	14	1.126	23.357
	13	1.142	23.473
	12	1.157	23.591
	11	1.172	23.709
	10	1.188	23.825
	9	1.206	23.930
	8	1.227	24.009
	7	1.250	24.061*
	6	1.275	24.027
	5	1.290*	23.789
	4	1.275	22.999
	3	1.191	20.810
	2	0.955	16.016
Bottom	1	0.284	4.428
% AXIAL TILT		-12.925	-7.205
AVG BOT 8ft/12ft		1.0837	1.0530

Edit Zone	Radial Power Avg.	Max.	Location
19	0.270	0.340	53 12
20	0.482	0.942	33 20
21	0.467	1.001	49 24
22	1.024	1.040	47 26
23	0.836	1.085	49 20
24	1.105	1.109	37 30
25	0.963	1.215	39 46
26	1.238	1.422	43 18
27	1.317	1.424	33 26
28	1.293	1.489	47 20
29	1.151	1.218	39 20
30	1.237	1.358	45 18

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.489	28	47 20	1.519	0.856	28	47 20	7.61	0.868	15.8	28	37 10 4	8.46	0.787	15.8	28	37 10 4
1.478	28	41 14	1.646	0.851	25	39 46	7.56	0.863	15.9	28	51 24 4	8.48	0.785	15.2	28	9 38 4
1.460	28	51 24	1.531	0.849	28	41 14	7.03	0.828	21.9	26	51 22 4	7.83	0.764	22.1	26	39 10 4
1.449	28	37 10	1.658	0.844	25	45 22	7.02	0.826	22.1	26	39 10 4	7.84	0.763	21.9	26	51 22 4
1.432	28	43 24	1.553	0.837	28	51 24	6.93	0.815	22.3	26	51 26 4	7.72	0.754	22.3	26	51 26 4
1.431	28	37 18	1.685	0.831	25	47 22	7.31	0.815	14.2	28	41 14 4	7.65	0.753	23.2	26	35 10 4
1.424	27	33 26	1.567	0.829	28	37 10	7.22	0.809	14.7	28	47 20 5	8.14	0.748	14.2	28	41 14 4
1.423	27	35 28	1.570	0.828	30	45 18	6.86	0.808	23.2	26	35 10 4	8.06	0.741	14.2	28	47 20 4
1.422	26	43 18	1.576	0.825	30	43 16	7.10	0.801	15.0	27	33 10 4	7.91	0.731	15.0	27	33 10 4
1.395	27	51 28	1.707	0.820	25	39 14	7.28	0.799	12.6	28	37 44 4	8.04	0.731	13.4	28	41 8 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 2000 MWD/MT

DATE 01/12/98 TIME 12:12:51
Cycle 14 Exposure 2000.0 MWd/MTU
261.8 GWd
Core Average Exposure 20469.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0 (65.44)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.66	
Flow: Mlb/hr	106.33 (98.00 %)	

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                  --  --  --  --  --  --  --              59
55                --  --  --  --  --  --  --  --  --        55
51              --  --  --  --  --  --  --  --  --  --      51
47        --  --  40  --  --  --   0  --  --  --  40  --  --  47
43 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  43
39 --  --  --  --  --  --   0  --  --  --   0  --  --  --  --  --  39
35 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  35
31 --  --  --   0  --  --  --  --  --  --  --   0  --  --  --  --  31
27 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  27
23 --  --  --  --  --  --   0  --  --  --   0  --  --  --  --  --  23
19 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  19
15        --  --  40  --  --  --   0  --  --  --  40  --  --  15
11              --  --  --  --  --  --  --  --  --  --  --  11
 7                --  --  --  --  --  --  --  --  --  --  --   7
 3                  --  --  --  --  --  --  --  --  --  --   3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	4.68
k-effective:	1.00343
Void Fraction:	0.426
Core Delta-P: psia	20.652
Core Plate Delta-P: psia	16.199
Coolant Temp: Deg-F	547.3
In Channel Flow: Mlb/hr	90.25
Source Convergence	0.00005

	N	Axial Profile Power	Exposure
Top	25	0.171	3.494
	24	0.400	7.121
	23	0.665	14.692
	22	0.807	18.040
	21	0.903	20.399
	20	0.966	21.806
	19	1.011	22.640
	18	1.044	23.129
	17	1.072	23.457
	16	1.095	23.647
	15	1.115	23.792
	14	1.133	23.920
	13	1.150	24.045
	12	1.165	24.170
	11	1.180	24.296
	10	1.194	24.420
	9	1.211	24.533
	8	1.229	24.623
	7	1.250	24.686*
	6	1.271	24.664
	5	1.284*	24.435
	4	1.267	23.637
	3	1.183	21.405
	2	0.951	16.493
Bottom	1	0.284	4.569
% AXIAL TILT		-12.929	-7.345
AVG BOT 8ft/12ft		1.0850	1.0538

Edit Zone	Radial Power Avg.	Max.	Location
19	0.266	0.336	53 12
20	0.477	0.943	33 20
21	0.460	0.993	49 24
22	1.013	1.029	47 26
23	0.836	1.130	33 30
24	1.120	1.123	37 30
25	0.962	1.194	39 46
26	1.229	1.404	43 18
27	1.312	1.464	33 26
28	1.278	1.469	47 20
29	1.161	1.231	39 20
30	1.261	1.399	33 28

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.469	28	47 20	1.522	0.854	30	33 28	7.37	0.853	16.9	28	37 10 4	8.20	0.769	16.9	28	37 10 4
1.464	27	33 26	1.528	0.851	28	47 20	7.34	0.850	16.9	28	51 24 4	8.24	0.768	16.2	28	9 38 4
1.464	27	35 28	1.535	0.847	27	33 26	7.45	0.836	14.7	27	25 34 4	8.29	0.764	14.7	27	25 34 4
1.459	28	41 14	1.536	0.846	27	35 28	7.43	0.834	14.7	27	27 36 4	8.27	0.763	14.7	27	27 36 4
1.444	28	51 24	1.540	0.844	28	41 14	6.91	0.813	22.8	26	51 22 4	7.69	0.756	23.0	26	39 10 4
1.433	28	37 10	1.666	0.840	25	39 46	6.90	0.812	23.0	26	39 10 4	7.71	0.756	22.8	26	51 22 4
1.412	28	43 24	1.551	0.838	30	45 18	6.88	0.809	20.9	26	25 32 4	7.66	0.740	20.9	26	25 32 4
1.411	28	37 18	1.557	0.835	30	43 16	6.85	0.805	21.0	26	29 36 4	7.50	0.738	23.2	26	51 26 4
1.404	26	43 18	1.679	0.834	25	45 22	7.06	0.803	15.6	28	41 14 5	7.62	0.737	21.0	26	29 36 4
1.399	30	33 28	1.559	0.834	28	51 24	7.03	0.799	15.6	28	47 20 5	7.43	0.736	24.1	26	35 10 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 2500 MWD/MT

DATE 01/12/98 TIME 12:14:02
Cycle 14 Exposure 2500.0 MWd/MTU
327.2 GWd
Core Average Exposure 20969.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0 (65.44)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50 (100.00 %)	

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	40	--	--	--	0	--	--	--	40	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	0	--	--	--	--	--	--	--	0	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	0	--	--	--	0	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	40	--	--	--	0	--	--	--	40	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	4.68
k-effective:	1.00362
Void Fraction:	0.419
Core Delta-P: psia	21.189
Core Plate Delta-P: psia	16.737
Coolant Temp: Deg-F	547.3
In Channel Flow: Mlb/hr	92.20
Source Convergence	0.00008

Axial Profile

	N	Power	Exposure
Top	25	0.176	3.579
	24	0.413	7.321
	23	0.683	15.025
	22	0.827	18.444
	21	0.922	20.851
	20	0.984	22.290
	19	1.028	23.146
	18	1.060	23.652
	17	1.086	23.993
	16	1.108	24.195
	15	1.126	24.350
	14	1.143	24.487
	13	1.158	24.620
	12	1.171	24.753
	11	1.183	24.886
	10	1.195	25.017
	9	1.208	25.139
	8	1.223	25.238
	7	1.238	25.312*
	6	1.253	25.300
	5	1.257*	25.077
	4	1.231	24.271
	3	1.140	21.997
	2	0.913	16.969
Bottom	1	0.274	4.710
% AXIAL TILT		-11.452	-7.479
AVG BOT 8ft/12ft		1.0769	1.0545

Edit Radial Power

Zone	Avg.	Max.	Location
19	0.264	0.335	53 12
20	0.473	0.938	33 20
21	0.457	0.996	49 24
22	1.009	1.027	47 26
23	0.833	1.108	33 30
24	1.100	1.103	37 30
25	0.957	1.184	39 46
26	1.225	1.401	43 18
27	1.302	1.443	33 26
28	1.276	1.465	47 20
29	1.179	1.248	39 20
30	1.285	1.405	33 28

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.465	28	47 20	1.544	0.842	30	45 18	7.17	0.842	17.8	28	37 10 4	7.98	0.753	17.8	28	37 10 4
1.455	28	41 14	1.544	0.842	30	33 28	7.14	0.839	17.9	28	51 24 4	8.02	0.753	17.2	28	9 38 4
1.443	28	51 24	1.545	0.841	28	47 20	6.82	0.803	23.7	26	51 22 4	7.61	0.752	23.7	26	51 22 4
1.443	27	33 26	1.549	0.839	30	43 16	6.81	0.801	24.0	26	39 10 4	7.59	0.752	24.0	26	39 10 4
1.442	27	35 28	1.552	0.838	30	49 22	7.01	0.797	15.7	27	25 34 4	7.88	0.726	14.6	28	7 42 4
1.433	28	37 10	1.558	0.834	28	41 14	6.91	0.796	16.5	28	41 14 5	7.87	0.725	14.6	27	7 20 4
1.405	30	33 28	1.689	0.829	25	39 46	7.03	0.796	15.3	28	41 8 4	7.83	0.725	15.3	28	41 8 4
1.401	30	45 18	1.570	0.828	30	39 12	6.99	0.795	15.7	27	27 36 4	7.80	0.725	15.7	27	25 34 4
1.401	26	43 18	1.572	0.827	28	51 24	7.03	0.795	15.3	28	53 20 4	7.30	0.723	24.1	26	51 26 4
1.400	28	43 24	1.576	0.825	27	33 26	6.88	0.792	16.6	28	47 20 5	7.78	0.723	15.7	27	27 36 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 3000 MWD/MT

DATE 01/12/98 TIME 12:15:16
Cycle 14 Exposure 3000.0 MWd/MTU
392.7 GWd
Core Average Exposure 21469.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHAIN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTCT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0	(65.44)
Power: MWt	3486.0	(100.00 %)
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50	(100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	40	--	--	--	0	--	--	--	40	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	4	--	--	--	4	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	0	--	--	--	--	--	--	--	0	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	4	--	--	--	4	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	40	--	--	--	0	--	--	--	40	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: % 4.50

k-effective:	1.00349
Void Fraction:	0.416
Core Delta-P: psia	21.153
Core Plate Delta-P: psia	16.701
Coolant Temp: Deg-F	547.2
In Channel Flow: Mlb/hr	92.22
Source Convergence	0.00005

	N	Axial Profile Power	Exposure
Top	25	0.187	3.666
	24	0.437	7.526
	23	0.717	15.367
	22	0.854	18.858
	21	0.943	21.313
	20	1.001	22.783
	19	1.040	23.660
	18	1.068	24.182
	17	1.091	24.536
	16	1.110	24.749
	15	1.127	24.913
	14	1.141	25.059
	13	1.154	25.199
	12	1.166	25.339
	11	1.177	25.478
	10	1.188	25.616
	9	1.199	25.744
	8	1.212	25.850
	7	1.226	25.931*
	6	1.239	25.928
	5	1.240*	25.707
	4	1.210	24.887
	3	1.115	22.568
	2	0.890	17.426
Bottom	1	0.268	4.845
% AXIAL TILT		-10.118	-7.571
AVG BOT 8ft/12ft		1.0677	1.0550

Edit Zone	Radial Power Avg.	Max.	Location
19	0.263	0.333	53 12
20	0.469	0.938	33 20
21	0.452	0.995	49 24
22	1.007	1.024	47 26
23	0.830	1.090	49 20
24	1.084	1.087	37 30
25	0.953	1.173	39 46
26	1.219	1.396	43 18
27	1.292	1.427	33 26
28	1.270	1.457	47 20
29	1.196	1.272	39 20
30	1.309	1.427	45 18

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.457	28	47 20	1.526	0.852	30	45 18	7.08	0.832	18.2	28	9 38 4	7.58	0.755	24.6	26	51 22 4
1.447	28	41 14	1.528	0.851	30	49 22	7.04	0.829	18.8	28	37 10 4	7.57	0.754	24.9	26	39 10 4
1.438	28	51 24	1.531	0.849	30	43 16	7.02	0.805	16.2	28	41 8 4	7.84	0.746	18.8	28	37 10 4
1.428	28	37 10	1.545	0.841	30	39 12	7.49	0.805	5.4	30	41 10 4	7.87	0.745	18.2	28	9 38 4
1.427	27	33 26	1.547	0.840	30	33 28	7.02	0.805	16.2	28	53 20 4	7.87	0.731	15.5	28	7 42 4
1.427	30	45 18	1.553	0.837	28	47 20	7.06	0.802	15.6	27	7 20 4	7.82	0.730	16.2	28	41 8 4
1.426	27	35 28	1.564	0.831	30	51 20	7.45	0.801	5.3	30	51 20 5	7.86	0.730	15.6	27	7 20 4
1.426	30	49 22	1.566	0.830	28	41 14	6.80	0.800	24.6	26	51 22 4	7.17	0.715	25.0	26	51 26 4
1.422	30	43 16	1.574	0.826	30	49 18	6.78	0.798	24.9	26	39 10 4	7.09	0.713	25.9	26	35 10 4
1.415	30	33 28	1.578	0.824	28	51 24	6.79	0.793	17.5	28	41 14 5	7.54	0.710	17.5	28	41 14 5

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 3500 MWD/MT

DATE 01/12/98 TIME 12:16:22
Cycle 14 Exposure 3500.0 MWd/MTU
458.1 GWd
Core Average Exposure 21969.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.0001

Delta E: MWd/MTU, (GWd)	500.0 (65.44)
Power: MWt	3486.0 (100.00 %)
Core Pressure: psia	1035.0
Inlet Subcooling: Btu/lbm	-19.24
Flow: Mlb/hr	108.50 (100.00 %)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	40	--	--	--	0	--	--	--	40	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	6	--	--	--	6	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	0	--	--	--	--	--	--	--	0	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	6	--	--	--	6	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	40	--	--	--	0	--	--	--	40	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	4.41
k-effective:	1.00333
Void Fraction:	0.413
Core Delta-P: psia	21.130
Core Plate Delta-P: psia	16.678
Coolant Temp: Deg-F	547.2
In Channel Flow: Mlb/hr	92.24
Source Convergence	0.00008

	N	Axial Profile Power	Exposure	Edit Zone	Radial Power Avg.	Max.	Location
Top	25	0.194	3.759	19	0.261	0.331	53 12
	24	0.453	7.744	20	0.466	0.938	33 20
	23	0.740	15.726	21	0.448	0.995	49 24
	22	0.881	19.285	22	1.004	1.021	47 26
	21	0.962	21.785	23	0.827	1.093	49 20
	20	1.014	23.284	24	1.069	1.073	37 30
	19	1.048	24.181	25	0.948	1.163	39 46
	18	1.072	24.717	26	1.213	1.391	43 18
	17	1.091	25.082	27	1.281	1.411	33 26
	16	1.108	25.305	28	1.263	1.449	47 20
	15	1.122	25.477	29	1.214	1.297	39 20
	14	1.134	25.630	30	1.334	1.456	49 22
	13	1.146	25.777				
	12	1.156	25.922				
	11	1.167	26.067				
	10	1.178	26.210				
	9	1.190	26.344				
	8	1.203	26.456				
	7	1.218	26.545				
	6	1.232	26.547*				
	5	1.234*	26.327				
	4	1.203	25.492				
	3	1.107	23.126				
	2	0.881	17.871				
Bottom	1	0.265	4.978				
% AXIAL TILT		-9.284	-7.630				
AVG BOT 8ft/12ft		1.0609	1.0553				

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR				LHGR			
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp. FT	Location	Value	Margin	Exp. FT	Location
1.456	30	49 22	1.504	0.864	30	49 22	7.86	0.845	6.4 30	41 10 4	7.64	0.766	25.5 26	51 22 4
1.452	30	45 18	1.508	0.862	30	45 18	7.82	0.841	6.3 30	51 20 4	7.62	0.765	25.8 26	39 10 4
1.449	28	47 20	1.513	0.859	30	43 16	7.02	0.826	19.1 28	9 38 4	7.78	0.745	19.8 28	37 10 4
1.448	30	43 16	1.521	0.855	30	39 12	7.67	0.824	6.4 30	39 8 4	7.81	0.745	19.1 28	9 38 4
1.442	30	39 12	1.534	0.848	30	51 20	7.09	0.824	17.2 28	41 8 4	7.94	0.742	16.4 28	7 42 4
1.440	28	41 14	1.548	0.840	30	49 18	7.08	0.823	17.2 28	53 20 4	7.89	0.741	17.2 28	41 8 4
1.431	28	51 24	1.550	0.839	30	33 28	7.65	0.822	6.4 30	53 22 4	7.93	0.741	16.5 27	7 20 4
1.429	30	51 20	1.550	0.839	30	41 10	6.99	0.822	19.8 28	37 10 4	9.08	0.741	6.4 30	41 10 4
1.425	30	33 28	1.560	0.834	30	43 12	7.12	0.820	16.5 27	7 20 4	9.04	0.737	6.3 30	51 20 4
1.422	28	37 10	1.562	0.832	28	47 20	7.58	0.815	6.4 30	39 22 4	8.85	0.722	6.4 30	39 8 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 3501 MWD/MT - D/S Swap

DATE 01/12/98 TIME 12:17:51
Cycle 14 Exposure 3501.0 MWd/MTU
458.2 GWd
Core Average Exposure 21970.4 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	1.0	(0.13)
Power: MWt	3486.0	(100.00 %)
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.66	
Flow: Mlb/hr	106.33	(98.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --                59
55           -- -- -- -- -- -- -- -- -- --          55
51        -- -- -- -- -- -- -- -- -- -- -- --       51
47     -- -- -- --  8 -- -- --  8 -- -- -- --       47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- --  8 -- -- -- -- -- -- --  8 -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- --  0 -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- --  8 -- -- -- -- -- -- --  8 -- -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15    -- -- -- --  8 -- -- --  8 -- -- -- --       15
11       -- -- -- -- -- -- -- -- -- --             11
 7          -- -- -- -- -- -- -- -- --             7
 3             -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	4.14
k-effective:	1.00322
Void Fraction:	0.413
Core Delta-P: psia	20.495
Core Plate Delta-P: psia	16.041
Coolant Temp: Deg-F	547.2
In Channel Flow: Mlb/hr	90.38
Source Convergence	0.00005

Axial Profile

	N	Power	Exposure
Top	25	0.214	3.759
	24	0.498	7.744
	23	0.811	15.727
	22	0.959	19.286
	21	1.037	21.786
	20	1.062	23.285
	19	1.077	24.182
	18	1.085	24.718
	17	1.091	25.083
	16	1.096	25.306
	15	1.100	25.478
	14	1.104	25.632
	13	1.109	25.778
	12	1.114	25.923
	11	1.121	26.068
	10	1.129	26.211
	9	1.140	26.345
	8	1.156	26.457
	7	1.176	26.546
	6	1.199	26.549*
	5	1.217*	26.328
	4	1.207	25.493
	3	1.124	23.127
	2	0.902	17.872
Bottom	1	0.273	4.978
% AXIAL TILT		-6.799	-7.630
AVG BOT 8ft/12ft		1.0389	1.0553

Edit Radial Power

Zone	Avg.	Max.	Location
19	0.251	0.318	53 12
20	0.480	1.021	33 20
21	0.433	0.917	49 24
22	0.991	1.016	41 20
23	0.834	1.079	35 26
24	1.118	1.121	37 30
25	0.967	1.179	47 30
26	1.177	1.349	39 26
27	1.342	1.452	33 22
28	1.221	1.443	39 34
29	1.226	1.372	39 20
30	1.332	1.418	35 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.452	27	33 22	1.533	0.848	30	35 24	7.41	0.797	6.4	30	41 10 4	7.09	0.711	25.5	26	51 22 4
1.449	27	39 28	1.533	0.848	30	37 26	7.38	0.794	6.3	30	51 20 4	7.07	0.710	25.8	26	39 10 4
1.448	27	33 26	1.535	0.847	30	35 20	6.76	0.786	17.2	28	41 8 4	7.58	0.708	16.5	28	7 42 4
1.447	27	35 28	1.537	0.846	30	41 26	6.76	0.786	17.2	28	53 20 4	7.53	0.707	17.2	28	41 8 4
1.445	27	33 18	1.540	0.844	30	31 20	7.27	0.782	6.4	30	39 8 4	7.56	0.707	16.5	27	7 20 4
1.443	27	43 28	1.542	0.843	30	41 30	6.79	0.782	16.5	27	7 20 4	8.56	0.699	6.4	30	41 10 4
1.443	28	39 34	1.548	0.840	27	33 22	7.26	0.780	6.4	30	53 22 4	7.28	0.697	19.8	28	37 10 4
1.438	27	47 28	1.551	0.838	27	39 28	6.56	0.772	19.1	28	9 38 4	7.31	0.697	19.1	28	9 38 4
1.437	28	43 34	1.551	0.838	27	33 26	6.53	0.769	19.8	28	37 10 4	8.53	0.696	6.3	30	51 20 4
1.435	28	27 18	1.552	0.838	27	35 28	6.66	0.769	16.7	27	13 34 4	7.41	0.694	16.7	27	13 34 4

```
TAPE  1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT  31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED
```

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 4000 MWD/MT

DATE 01/12/98 TIME 12:18:50
Cycle 14 Exposure 4000.0 MWd/MTU
523.6 GWd
Core Average Exposure 22469.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	499.0	(65.31)
Power: MWt	3486.0	(100.00 %)
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50	(100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                  --  --  --  --  --  --  --                  59
55                --  --  --  --  --  --  --  --  --            55
51              --  --  --  --  --  --  --  --  --  --  --      51
47          --  --  --  --  8   --  --  --  8   --  --  --  --  47
43 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  43
39 --  --  --  8   --  --  --  --  --  --  --  8   --  --  --  39
35 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  35
31 --  --  --  --  --  --  --  0   --  --  --  --  --  --  --  31
27 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  27
23 --  --  --  8   --  --  --  --  --  --  --  8   --  --  --  23
19 --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  19
15     --  --  --  --  8   --  --  --  8   --  --  --  --      15
11       --  --  --  --  --  --  --  --  --  --  --          11
 7         --  --  --  --  --  --  --  --  --  --            7
 3               --  --  --  --  --  --  --                  3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	4.14
k-effective:	1.00327
Void Fraction:	0.408
Core Delta-P: psia	21.062
Core Plate Delta-P: psia	16.609
Coolant Temp: Deg-F	547.2
In Channel Flow: Mlb/hr	92.30
Source Convergence	0.00005

Axial Profile			Edit	Radial Power		
	N	Power	Exposure	Zone	Avg.	Max. Location
Top	25	0.217	3.865	19	0.249	0.316 53 12
	24	0.504	7.992	20	0.476	1.016 33 20
	23	0.818	16.132	21	0.429	0.919 49 24
	22	0.965	19.765	22	0.988	1.012 41 20
	21	1.041	22.304	23	0.830	1.071 35 26
	20	1.065	23.815	24	1.099	1.102 37 30
	19	1.078	24.720	25	0.961	1.170 47 30
	18	1.086	25.260	26	1.173	1.341 39 26
	17	1.091	25.628	27	1.331	1.437 33 22
	16	1.095	25.853	28	1.218	1.428 39 34
	15	1.099	26.028	29	1.244	1.391 39 20
	14	1.103	26.183	30	1.358	1.441 35 20
	13	1.107	26.332			
	12	1.112	26.480			
	11	1.119	26.628			
	10	1.128	26.775			
	9	1.139	26.915			
	8	1.155	27.035			
	7	1.176	27.133			
	6	1.198	27.147*			
	5	1.215*	26.936			
	4	1.205	26.096			
	3	1.119	23.688			
	2	0.894	18.322			
Bottom	1	0.271	5.113			
% AXIAL TILT		-6.576	-7.611			
AVG BOT 8ft/12ft		1.0371	1.0550			

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR				LHGR			
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT Location	Value	Margin	Exp.	FT Location
1.441	30	35 20	1.533	0.848	30	35 20	7.73	0.831	7.4	30 41 10 4	8.79	0.727	7.4	30 41 10 4
1.439	30	41 26	1.535	0.847	30	41 26	7.70	0.828	7.3	30 51 20 4	8.76	0.725	7.3	30 51 20 4
1.437	27	33 22	1.536	0.846	30	35 24	7.52	0.809	7.4	30 39 8 4	7.14	0.721	26.4	26 51 22 4
1.436	30	35 24	1.536	0.846	30	37 26	7.51	0.807	7.4	30 53 22 4	7.65	0.720	17.4	28 7 42 4
1.435	30	37 26	1.539	0.845	30	31 20	6.82	0.802	18.1	28 53 20 4	7.11	0.720	26.6	26 39 10 4
1.435	30	31 20	1.540	0.844	30	41 30	6.82	0.802	18.1	28 41 8 4	7.63	0.719	17.4	27 7 20 4
1.434	30	41 30	1.545	0.841	30	49 30	6.86	0.800	17.4	27 7 20 4	7.59	0.718	18.1	28 41 8 4
1.434	27	39 28	1.555	0.836	30	31 12	7.33	0.788	6.8	30 43 12 4	8.55	0.708	7.4	30 39 8 4
1.432	27	33 18	1.579	0.823	30	49 26	7.28	0.783	6.8	30 49 18 4	8.54	0.707	7.4	30 53 22 4
1.430	27	43 28	1.701	0.823	25	47 30	7.21	0.775	7.3	30 35 8 4	7.27	0.698	20.0	28 9 38 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 4500 MWD/MT

DATE 01/12/98 TIME 12:20:01
Cycle 14 Exposure 4500.0 MWd/MTU
589.0 GWd
Core Average Exposure 22969.4 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0 (65.44)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50 (100.00 %)	

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                -- -- -- -- -- -- --                59
55             -- -- -- -- -- -- -- -- -- --          55
51          -- -- -- -- -- -- -- -- -- -- --          51
47       -- -- -- -- 10 -- -- -- 10 -- -- -- --       47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- -- 10 -- -- -- -- -- -- -- 10 -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- 0 -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 10 -- -- -- -- -- -- -- 10 -- -- -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15       -- -- -- -- 10 -- -- -- 10 -- -- -- --       15
11          -- -- -- -- -- -- -- -- -- --             11
 7             -- -- -- -- -- -- -- -- --             7
 3                -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	3.96
k-effective:	1.00366
Void Fraction:	0.403
Core Delta-P: psia	21.005
Core Plate Delta-P: psia	16.552
Coolant Temp: Deg-F	547.2
In Channel Flow: Mlb/hr	92.35
Source Convergence	0.00006

Axial Profile

	N	Power	Exposure
Top	25	0.225	3.972
	24	0.523	8.244
	23	0.845	16.541
	22	0.998	20.248
	21	1.082	22.825
	20	1.117	24.349
	19	1.114	25.259
	18	1.111	25.804
	17	1.108	26.174
	16	1.105	26.401
	15	1.104	26.578
	14	1.103	26.735
	13	1.104	26.886
	12	1.106	27.036
	11	1.110	27.188
	10	1.115	27.339
	9	1.124	27.485
	8	1.136	27.613
	7	1.152	27.722
	6	1.169	27.747*
	5	1.180*	27.544
	4	1.166	26.699
	3	1.081	24.248
	2	0.861	18.770
Bottom	1	0.262	5.248
% AXIAL TILT		-4.309	-7.589
AVG BOT 8ft/12ft		1.0220	1.0546

Edit Radial Power

Zone	Avg.	Max.	Location
19	0.247	0.315	53 12
20	0.471	1.010	33 20
21	0.426	0.926	49 24
22	0.990	1.012	41 20
23	0.826	1.057	35 26
24	1.076	1.080	37 30
25	0.959	1.160	47 30
26	1.170	1.329	39 26
27	1.315	1.417	33 18
28	1.214	1.409	43 34
29	1.260	1.413	39 20
30	1.379	1.460	35 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.460	30	35 20	1.521	0.855	30	35 20	7.68	0.826	8.4	30	41 10 4	8.64	0.727	8.4	30	41 10 4
1.458	30	41 26	1.523	0.854	30	41 26	7.67	0.824	8.3	30	51 20 4	8.63	0.725	8.3	30	51 20 4
1.452	30	31 20	1.528	0.851	30	49 30	7.42	0.798	8.4	30	39 8 4	7.47	0.708	18.3	28	7 42 4
1.451	30	41 30	1.529	0.850	30	31 20	7.42	0.798	8.3	30	7 40 4	7.46	0.707	18.3	27	7 20 4
1.449	30	49 30	1.530	0.850	30	41 30	6.71	0.790	18.3	28	7 42 4	7.40	0.705	19.0	28	41 8 4
1.448	30	35 24	1.532	0.849	30	35 24	7.33	0.789	7.8	30	43 12 4	6.91	0.704	27.6	26	51 22 5
1.448	30	37 26	1.532	0.849	30	37 26	6.70	0.788	18.3	27	7 20 4	6.90	0.702	27.5	26	39 10 4
1.441	30	31 12	1.538	0.845	30	31 12	7.30	0.785	7.7	30	49 18 4	8.35	0.702	8.4	30	39 8 4
1.432	30	49 26	1.560	0.833	30	49 26	6.64	0.781	18.2	28	19 54 4	8.36	0.702	8.3	30	7 40 4
1.421	30	35 12	1.573	0.826	30	35 12	7.07	0.760	8.2	30	35 8 4	8.30	0.691	7.8	30	43 12 4

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 5000 MWD/MT

DATE 01/12/98 TIME 12:21:06
Cycle 14 Exposure 5000.0 MWd/MTU
654.4 GWd
Core Average Exposure 23469.3 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0	(65.44)
Power: MWt	3486.0	(100.00 %)
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50	(100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                  --  --  --  --  --  --  --                  59
55              --  --  --  --  --  --  --  --  --  --          55
51          --  --  --  --  --  --  --  --  --  --  --          51
47      --  --  --  --  10  --  --  --  10  --  --  --  --      47
43  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  43
39  --  --  --  10  --  --  --  --  --  --  --  10  --  --  --  39
35  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  35
31  --  --  --  --  --  --  --   8  --  --  --  --  --  --  --  31
27  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  27
23  --  --  --  10  --  --  --  --  --  --  --  10  --  --  --  23
19  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  19
15      --  --  --  --  10  --  --  --  10  --  --  --  --      15
11          --  --  --  --  --  --  --  --  --  --  --          11
 7              --  --  --  --  --  --  --  --  --              7
 3                  --  --  --  --  --  --  --                  3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	3.87
k-effective:	1.00310
Void Fraction:	0.398
Core Delta-P: psia	20.951
Core Plate Delta-P: psia	16.498
Coolant Temp: Deg-F	547.1
In Channel Flow: Mlb/hr	92.39
Source Convergence	0.00006

	N	Power	Exposure
Top	25	0.234	4.084
	24	0.542	8.504
	23	0.872	16.964
	22	1.026	20.748
	21	1.109	23.367
	20	1.140*	24.908
	19	1.135	25.817
	18	1.130	26.360
	17	1.125	26.728
	16	1.122	26.954
	15	1.118	27.130
	14	1.116	27.287
	13	1.115	27.439
	12	1.114	27.590
	11	1.114	27.743
	10	1.115	27.898
	9	1.118	28.047
	8	1.123	28.182
	7	1.129	28.298
	6	1.135	28.332*
	5	1.137	28.135
	4	1.117	27.283
	3	1.036	24.789
	2	0.827	19.201
Bottom	1	0.252	5.378
% AXIAL TILT		-2.291	-7.519
AVG BOT 8ft/12ft		1.0107	1.0539

Edit Zone	Radial Power Avg.	Max.	Location
19	0.247	0.314	53 12
20	0.468	1.009	33 20
21	0.422	0.924	49 24
22	0.986	1.008	41 20
23	0.825	1.061	35 26
24	1.072	1.075	37 30
25	0.956	1.149	47 30
26	1.166	1.326	39 26
27	1.307	1.408	33 22
28	1.208	1.400	39 34
29	1.275	1.430	39 20
30	1.397	1.478	35 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	FT	Locat.	MCPR Value	Margin	FT	Locat.	APLHGR Value	Margin	Exp.	FT	Location	LHGR Value	Margin	Exp.	FT	Location
1.478	30	35 20	1.510	0.881	30	35 20	7.42	0.798	9.3	30	9 42 4	8.32	0.710	9.3	30	9 42 4
1.476	30	41 26	1.512	0.879	30	41 26	7.39	0.794	9.4	30	41 10 4	8.29	0.708	9.4	30	41 10 4
1.473	30	31 20	1.515	0.878	30	31 20	7.14	0.768	9.3	30	7 40 4	7.19	0.686	19.2	28	7 42 4
1.472	30	41 30	1.515	0.878	30	35 24	7.14	0.768	8.8	30	43 12 4	7.18	0.686	19.2	27	7 20 4
1.471	30	35 24	1.515	0.878	30	37 26	7.13	0.767	8.7	30	49 18 4	8.02	0.684	9.3	30	7 40 4
1.471	30	37 26	1.516	0.877	30	41 30	7.10	0.763	9.4	30	39 8 4	6.63	0.680	28.4	26	51 22 5
1.467	30	49 30	1.518	0.876	30	49 30	6.46	0.760	19.2	28	7 42 4	7.97	0.680	9.4	30	39 8 4
1.459	30	31 12	1.527	0.871	30	31 12	6.45	0.758	19.2	27	7 20 4	7.13	0.680	19.1	28	19 54 4
1.444	30	49 26	1.557	0.854	30	49 26	6.40	0.753	19.1	28	19 54 4	8.02	0.678	8.8	30	43 12 4
1.434	30	35 12	1.569	0.848	30	35 12	6.87	0.739	8.1	30	31 12 5	8.01	0.677	8.7	30	49 18 4

```
TAPE  1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT  31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED
```

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 5500 MWD/MT

DATE 01/12/98 TIME 12:22:14
Cycle 14 Exposure 5500.0 MWd/MTU
719.9 GWd
Core Average Exposure 23969.4 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd) 500.0 (65.44)
Power: MWt 3486.0 (100.00 %)
Core Pressure: psia 1035.0
Inlet Subcooling: Btu/lbm -19.24
Flow: Mlb/hr 108.50 (100.00 %)

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58.
59              -- -- -- -- -- -- -- --              59
55           -- -- -- -- -- -- -- -- -- --           55
51        -- -- -- -- -- -- -- -- -- -- -- --        51
47     -- -- -- -- 12 -- -- -- 12 -- -- -- --     47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- -- 12 -- -- -- -- -- -- -- 12 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- 12 -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 12 -- -- -- -- -- -- -- 12 -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15     -- -- -- -- 12 -- -- -- 12 -- -- -- --     15
11        -- -- -- -- -- -- -- -- -- -- --        11
 7           -- -- -- -- -- -- -- -- --           7
 3              -- -- -- -- -- -- --              3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

	N	Axial Power	Axial Exposure	Edit Zone	Radial Power Avg.	Radial Power Max.	Radial Power Location
Top	25	0.246	4.200	19	0.246	0.312	53 12
	24	0.572	8.774	20	0.465	1.003	33 20
	23	0.917	17.400	21	0.420	0.928	49 24
	22	1.081	21.261	22	0.988	1.008	41 20
	21	1.174	23.922	23	0.823	1.054	35 26
	20	1.218	25.478	24	1.059	1.062	37 30
	19	1.225*	26.385	25	0.957	1.139	47 30
	18	1.200	26.925	26	1.164	1.316	39 26
	17	1.182	27.291	27	1.295	1.392	33 22
	16	1.168	27.515	28	1.204	1.384	39 34
	15	1.155	27.690	29	1.288	1.445	39 20
	14	1.144	27.846	30	1.409	1.486	35 20
	13	1.134	27.996				
	12	1.124	28.147				
	11	1.115	28.300				
	10	1.105	28.456				
	9	1.094	28.607				
	8	1.083	28.743				
	7	1.070	28.863				
	6	1.056	28.900*				
	5	1.038	28.704				
	4	1.006	27.842				
	3	0.927	25.308				
	2	0.739	19.614				
Bottom	1	0.226	5.503				

Control Rod Density: % 3.65

k-effective: 1.00317
Void Fraction: 0.386
Core Delta-P: psia 20.822
Core Plate Delta-P: psia 16.368
Coolant Temp: Deg-F 547.0
In Channel Flow: Mlb/hr 92.49
Source Convergence 0.00005

% AXIAL TILT 2.932 -7.410
AVG BOT 8ft/12ft 0.9807 1.0530

Top Ten Thermal Limits Summary - Sorted by Margin

Power Value	Power FT	Power Locat.	MCPR Value	MCPR Margin	MCPR FT	MCPR Locat.	APLHGR Value	APLHGR Margin	APLHGR Exp.	APLHGR FT	APLHGR Location	LHGR Value	LHGR Margin	LHGR Exp.	LHGR FT	LHGR Location
1.486	30	35 20	1.512	0.879	30	35 20	6.24	0.734	25.1	26	47 24 20	7.96	0.726	31.9	25	45 24 20
1.484	30	41 26	1.514	0.878	30	41 26	6.76	0.729	10.3	30	9 42 4	7.89	0.720	31.9	25	37 16 20
1.479	30	31 20	1.517	0.877	30	35 24	6.17	0.726	25.2	26	37 14 20	8.34	0.711	26.0	25	45 22 20
1.478	30	35 24	1.518	0.876	30	37 26	6.73	0.725	10.2	30	19 52 4	8.04	0.711	29.2	25	47 22 20
1.478	30	41 30	1.518	0.876	30	31 20	6.16	0.724	18.5	27	33 26 19	8.33	0.709	25.8	25	39 46 20
1.478	30	37 26	1.519	0.876	30	49 30	6.16	0.724	18.5	27	35 28 19	7.83	0.699	30.1	25	39 14 20
1.476	30	49 30	1.520	0.875	30	41 30	6.16	0.722	17.7	28	43 24 20	7.71	0.691	30.4	25	31 30 20
1.469	30	31 12	1.526	0.871	30	31 12	6.13	0.721	18.4	27	43 28 19	6.88	0.685	39.0	23	37 24 18
1.453	30	49 26	1.557	0.854	30	49 26	6.12	0.720	18.3	27	33 18 19	6.86	0.685	25.1	26	47 24 20
1.445	29	39 20	1.566	0.849	29	39 20	6.15	0.720	17.7	28	37 18 20	6.70	0.679	40.3	23	35 36 18

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 6000 MWD/MT

DATE 01/12/98 TIME 12:23:47
Cycle 14 Exposure 6000.0 MWd/MTU
785.3 GWd
Core Average Exposure 24469.5 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0	(65.44)	
Power: MWt	3486.0	(100.00 %)	
Core Pressure: psia	1035.0		
Inlet Subcooling: Btu/lbm	-19.24		
Flow: Mlb/hr	108.50	(100.00 %)	

```
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59                -- -- -- -- -- -- --                59
55             -- -- -- -- -- -- -- -- -- --          55
51          -- -- -- -- -- -- -- -- -- --             51
47       -- -- -- -- 16 -- -- -- 16 -- -- -- --       47
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43
39 -- -- -- 16 -- -- -- -- -- -- -- 16 -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 16 -- -- -- -- -- -- -- 16 -- -- -- -- -- 23
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19
15       -- -- -- -- 16 -- -- -- 16 -- -- -- --       15
11          -- -- -- -- -- -- -- -- -- --             11
 7             -- -- -- -- -- -- -- -- --             7
 3                -- -- -- -- -- -- --                3
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
```

Control Rod Density: %	2.88
k-effective:	1.00355
Void Fraction:	0.373
Core Delta-P: psia	20.704
Core Plate Delta-P: psia	16.249
Coolant Temp: Deg-F	546.8
In Channel Flow: Mlb/hr	92.58
Source Convergence	0.00007

	N	Axial Profile Power	Exposure
Top	25	0.253	4.322
	24	0.587	9.060
	23	0.939	17.859
	22	1.110	21.802
	21	1.212	24.509
	20	1.270	26.088
	19	1.297	26.998
	18	1.303*	27.526
	17	1.286	27.883
	16	1.246	28.100
	15	1.216	28.268
	14	1.190	28.418
	13	1.167	28.564
	12	1.143	28.710
	11	1.119	28.858
	10	1.093	29.008
	9	1.066	29.154
	8	1.036	29.285
	7	1.004	29.399
	6	0.971	29.429*
	5	0.935	29.223
	4	0.891	28.345
	3	0.815	25.771
	2	0.651	19.984
Bottom	1	0.199	5.615
% AXIAL TILT		8.332	-7.198
AVG BOT 8ft/12ft		0.9543	1.0515

Edit Zone	Radial Power Avg.	Max.	Location
19	0.243	0.309	53 12
20	0.459	0.994	33 20
21	0.416	0.932	49 24
22	0.990	1.006	41 20
23	0.821	1.053	35 26
24	1.054	1.056	37 30
25	0.964	1.123	47 30
26	1.163	1.304	43 18
27	1.283	1.396	33 26
28	1.197	1.367	39 34
29	1.293	1.454	39 20
30	1.415	1.485	35 20

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.485	30	35 20	1.519	0.875	30	35 20	6.75	0.795	26.3	26	47 24 18	8.60	0.800	33.6	25	37 16 18
1.484	30	33 28	1.520	0.875	30	35 24	6.67	0.785	26.6	26	37 14 18	9.19	0.797	27.5	25	39 46 18
1.483	30	41 26	1.520	0.875	30	37 26	6.59	0.775	19.0	28	43 24 19	8.51	0.792	33.6	25	45 24 18
1.481	30	35 24	1.522	0.874	30	41 26	6.58	0.774	19.0	28	37 18 19	8.68	0.785	31.2	25	47 22 18
1.481	30	37 26	1.524	0.873	30	33 28	8.06	0.765	33.6	25	45 24 18	8.50	0.776	31.9	25	39 14 18
1.475	30	31 20	1.530	0.869	30	31 20	6.47	0.762	19.3	27	47 28 18	8.86	0.772	27.9	25	45 22 18
1.473	30	41 30	1.532	0.868	30	41 30	7.99	0.759	33.6	25	37 16 18	7.43	0.750	26.3	26	47 24 18
1.470	30	49 30	1.533	0.867	30	49 30	6.45	0.759	19.1	27	33 14 18	7.39	0.747	26.6	26	37 14 18
1.465	30	31 12	1.539	0.864	30	31 12	7.04	0.757	8.4	30	45 26 18	7.11	0.725	40.8	22	47 26 18
1.454	30	49 26	1.558	0.854	29	39 20	6.43	0.756	18.6	28	47 20 19	7.04	0.719	40.9	22	35 14 18

```
TAPE  1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT  31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED
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MICROBURN-B (DMAY95C) RUN: RODSTEP

WNP-2 - Rod Pattern at 6500 MWD/MT

DATE 01/12/98 TIME 12:25:23
Cycle 14 Exposure 6500.0 MWd/MTU
850.8 GWd
Core Average Exposure 24969.4 MWd/MTU

IDPFRZ	IPARM	IVDFRZ	KSRS	KSYM	LOPCPR	MAPLEX	MXHALN	NBURN	NCTL	NOPDR	NPFLAT	NPTXE	NSHUFL	TESTOT
0	0	0	1	0	3	1	0	1	8	0	0	1	0	0.00010

Delta E: MWd/MTU, (GWd)	500.0 (65.44)	
Power: MWt	3486.0 (100.00 %)	
Core Pressure: psia	1035.0	
Inlet Subcooling: Btu/lbm	-19.24	
Flow: Mlb/hr	108.50 (100.00 %)	

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	
59					--	--	--	--	--	--	--					59
55				--	--	--	--	--	--	--	--	--				55
51			--	--	--	--	--	--	--	--	--	--	--			51
47		--	--	--	--	--	--	--	--	--	--	--	--	--		47
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	43
39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	39
35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35
31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	31
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27
23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	23
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	19
15		--	--	--	--	--	--	--	--	--	--	--	--	--		15
11			--	--	--	--	--	--	--	--	--	--	--			11
7				--	--	--	--	--	--	--	--	--				7
3					--	--	--	--	--	--	--					3
	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58	

Control Rod Density: %	0.00
k-effective:	1.00344
Void Fraction:	0.384
Core Delta-P: psia	20.864
Core Plate Delta-P: psia	16.410
Coolant Temp: Deg-F	546.9
In Channel Flow: Mlb/hr	92.46
Source Convergence	0.00009

	Axial Profile			Edit	Radial Power		
	N	Power	Exposure	Zone	Avg.	Max.	Location
Top	25	0.232	4.447	19	0.237	0.301	53 12
	24	0.536	9.352	20	0.445	0.968	33 20
	23	0.853	18.329	21	0.410	0.961	49 24
	22	1.005	22.358	22	1.013	1.022	47 26
	21	1.097	25.116	23	0.807	1.044	49 20
	20	1.151	26.724	24	1.002	1.004	23 32
	19	1.184	27.648	25	0.986	1.124	39 46
	18	1.205	28.178	26	1.171	1.318	43 18
	17	1.217	28.526	27	1.252	1.368	13 34
	16	1.225	28.723	28	1.196	1.366	37 18
	15	1.227*	28.877	29	1.298	1.479	39 20
	14	1.223	29.014	30	1.420	1.491	45 26
	13	1.215	29.148				
	12	1.201	29.282				
	11	1.181	29.418				
	10	1.157	29.556				
	9	1.128	29.688				
	8	1.095	29.804				
	7	1.060	29.901				
	6	1.025	29.914*				
	5	0.992	29.691				
	4	0.956	28.791				
	3	0.888	26.179				
	2	0.723	20.310				
Bottom	1	0.224	5.713				
% AXIAL TILT		2.206	-6.888				
AVG BOT 8ft/12ft		1.0004	1.0495				

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	Locat.	Value	Margin	FT	Locat.	Value	Margin	Exp.	FT	Location	Value	Margin	Exp.	FT	Location
1.491	30	45 26	1.520	0.875	30	45 26	6.08	0.715	20.6	27	47 28 15	7.37	0.696	34.7	25	37 16 16
1.490	30	35 16	1.522	0.874	30	35 16	6.08	0.715	20.4	27	33 14 15	7.48	0.688	32.7	25	47 22 16
1.483	30	49 22	1.529	0.870	30	49 22	6.05	0.712	20.2	28	37 18 15	7.35	0.681	33.2	25	39 14 16
1.479	29	39 20	1.536	0.866	29	39 20	6.05	0.712	20.3	28	43 24 15	6.51	0.677	42.2	22	47 26 15
1.478	29	41 22	1.538	0.865	30	49 26	6.61	0.711	9.6	30	45 26 14	7.10	0.674	35.2	25	35 18 15
1.475	30	49 26	1.538	0.865	29	41 22	6.61	0.710	9.5	30	35 16 14	6.47	0.674	42.3	22	35 14 15
1.475	30	39 12	1.539	0.864	30	39 12	6.01	0.707	20.6	27	33 18 15	7.10	0.674	35.1	25	43 26 15
1.475	30	35 20	1.541	0.863	30	35 20	5.99	0.704	20.7	27	43 28 15	6.56	0.672	41.2	23	37 24 16
1.472	30	41 26	1.543	0.862	30	35 12	5.99	0.704	20.6	28	47 20 14	6.38	0.672	43.2	23	37 20 16
1.471	30	35 12	1.544	0.861	30	41 26	6.55	0.704	9.4	29	41 22 15	6.30	0.670	43.8	23	41 24 16

TAPE 1:DKA100:[HOANG.CYC14.JAN98]RST_TO14.DAT 31-DEC-1997 11:47:50.66
TAPE 20:
DECKPL :NO HISTORIAN PL USED

Attachment 2

April 15, 1998
ABBWP-98-021

Mr. R. A. Vopalensky
Mail Drop PE10
Washington Public Power Supply System
P.O. Box 968
Richland, WA 99352

Subject: Clarification of WNP-2 Cycle 14 SLMCPR Evaluation

Reference: 1. ABBWP-97-104, Rev. 1, WNP-2 Cycle 14 Safety Limit Minimum Critical Power Ratio for SVEA-96 Fuel Based on Reference Core, dated November 5, 1997.

2. WNP2-FTS-148, WNP-2 Cycle 14 Reload Design Report, January 1998.

Dear Mr. Vopalensky:

Reference 1 provided the results of the ABB analyses determining the WNP-2 Cycle 14 SVEA-96 SLMCPR based on the Cycle 14 Reference Core. The Attachment to this letter provides further clarification of this analysis as well as confirmation that the conclusions based on the Cycle 14 Reference Core apply to the Cycle 14 As-Loaded core established in Reference 2.

Please contact me at (860) 687-8017 or Bill Harris at (860) 687-8014 with any questions.

Best Regards,

Richard Matheny
Project Manager

cc: W. Wolkenhauer
R. Torres
S. Bian
Attachment

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Post Office Box 500
2000 Day Hill Road
Windsor, Connecticut 06095-0500
Telephone (860) 687-8001
Fax (860) 687-8002

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