ATTACHMENT 17

ANP-3342NP, Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design (Non-Proprietary)

AREVA

Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design

ANP-3342NP
Revision 1

August 2015

AREVA Inc.

Nature of Changes

Item	Page	Description and Justification
1.	2-1	Correction of typographical error, Regulation changed to Regulatory.
2.	Various	Minor changes/removal of proprietary markings/words.

Contents

Tables

Figures

Nomenclature

ACE	AREVA's advanced critical power correlation
BLEU	blended low enriched uranium
BOC	beginning of cycle
BOL	beginning of life
BWR	boiling water reactor
CGU	commercial grade uranium
CSDM	cold shutdown margin
EOC	end of cycle
EOFP	end of full power capability
EPU	extended power uprate
FFTR	final feedwater temperature reduction
GWd/MTU	gigawatt days per metric ton of initial uranium
HEXR	hot excess reactivity
LHGR	linear heat generation rate
MCPR	minimum critical power ratio
MICROBURN-B2	AREVA Inc. advanced BWR core simulator methodology with PPR capability
MWd/MTU	megawatt days per metric ton of initial uranium
NRC	Nuclear Regulatory Commission, U. S.
PLFR	part length fuel rod
PPR	Pin Power Reconstruction. The PPR methodology accounts for variation in local rod power distributions due to neighboring assemblies and control state. The local rod power distributions are reconstructed based on the actual flux solution for each statepoint.
R Value	the larger of zero or the shutdown margin at BOC minus the minimum calculated shutdown margin in the cycle
SLC	standby liquid control

1.0 **Introduction**

AREVA Inc. (AREVA) has performed an equilibrium fuel cycle design and fuel management calculations for the Browns Ferry BWRs with ATRIUM™* 10XM fuel at EPU (120% OLTP) conditions. These analyses have been performed with the approved AREVA neutronics methodology (Reference 1). The CASMO-4 lattice depletion code was used to generate nuclear data including cross sections and local power peaking factors. The MICROBURN-B2 three dimensional core simulator code, utilizes the pin power reconstruction (PPR) model to determine the thermal margins presented in this report. The ACE critical power correlation (References 2 and 5) was utilized for all assemblies in the core. The following MICROBURN-B2 modeling features are included in this analysis:

- Control blade B-10 depletion
- Explicit neutronic treatment of the spacer grids
- Explicit modeling of the PLFR plenums
- Explicit modeling of the water rod flow

Design results for the equilibrium cycle reactor core loading including projected control rod patterns and evaluations of thermal and reactivity margins are presented. The equilibrium cycle results are summarized in Table 2.1.

* ATRIUM is a trademark of AREVA Inc.

2.0 **Summary**

The equilibrium cycle fresh batch size (332 assemblies) and batch average enrichment **[ ]** were determined to meet the energy requirements provided by Tennessee Valley Authority (TVA) (Reference 4). For a complete description of the fresh reload assemblies, see Reference 3. The loading of the equilibrium cycle fuel as described in this report results in a projected equilibrium cycle full power energy capability of 2,544±42 GWd (18,392±300 MWd/MTU). Beyond the full power capability, the cycle has been designed to achieve 196 GWd additional energy via FFTR and power coastdown operation.

In order to obtain optimum operating flexibility, the projected control rod patterns for the equilibrium cycle were developed to be consistent with a conservative margin to thermal limits. The cycle design calculations also demonstrate adequate hot excess reactivity and cold shutdown margin throughout the cycle. The hot and cold target k-effs used in the design are provided in Table 3.2 and 3.3. Key results from the design analysis are summarized in Table 2.1. Figures 2.1 and 2.2 provide a summary of the equilibrium cycle design step-through projection.

The peak rod average power was verified to not exceed 6.3 kW/ft at exposures of > 54 GWd/MTU (Regulatory Guide 1.183 requirement).

Table 2.1 Browns Ferry Equilibrium Cycle Energy and Key Results Summary

Cycle Energy, GWd (Cycle Exposure, MWd/MTU)	
Cycle N-1	
• Best estimate depletion to Nominal EOC N-1	2,741 (19,811)
• Short window EOC N-1	2,658 (19,211)
• Long window EOC N-1	2,796 (20,211)
Cycle N	
• EOFP Energy	2,544±42 (18,392±300)
• FFTR and coast Energy	196 (1,419)
• EOC Energy	2,741±42 (19,811±300)

Key Results	
BOC CSDM, %Δk/k (based on short EOC N-1)	1.09
Minimum CSDM, %Δk/k (based on short EOC N-1)	1.09
Cycle Exposure of Minimum CSDM, MWd/MTU (short basis)	0
Moderator Temperature of Minimum CSDM, °F (short basis)	68
Cycle R Value, %Δk/k (short basis)	0.00
BOC CSDM, %Δk/k (based on nominal EOC N-1)	1.40
Minimum CSDM, %Δk/k (based on nominal EOC N-1)	1.40
Cycle Exposure of Minimum CSDM, MWd/MTU (nominal basis)	0
Moderator Temperature of Minimum CSDM, °F (nominal basis)	68
Cycle R Value, %Δk/k (nominal basis)	0.00
BOC CSDM, %Δk/k (based on long EOC N-1)	1.68
Minimum CSDM, %Δk/k (based on long EOC N-1)	1.68
Cycle Exposure of Minimum CSDM, MWd/MTU (long basis)	0
Moderator Temperature of Minimum CSDM, °F (long basis)	68
Cycle R Value, %Δk/k (long basis)	0.00
Minimum SLC SDM, %Δk/k (based on short EOC N-1)	3.03
Cycle Exposure of Minimum SLC SDM, MWd/MTU (short basis)	0
Minimum SLC SDM, %Δk/k (based on nominal EOC N-1)	3.41
Cycle Exposure of Minimum SLC SDM, MWd/MTU (nominal basis)	0

Key Results	
Minimum SLC SDM, %Δk/k (based on long EOC N-1)	3.62
Cycle Exposure of Minimum SLC SDM, MWd/MTU (long basis)	0
BOC HEXR, %Δk/k (based on short EOC N-1)	1.74
Maximum HEXR, %Δk/k (based on short EOC N-1)	1.74
Cycle Exposure of Maximum HEXR, MWd/MTU (short basis)	0
BOC HEXR, %Δk/k (based on nominal EOC N-1)	1.42
Maximum HEXR, %Δk/k (based on nominal EOC N-1)	1.42
Cycle Exposure of Maximum HEXR, MWd/MTU (nominal basis)	0
BOC HEXR, %Δk/k (based on long EOC N-1)	1.19
Maximum HEXR, %Δk/k (based on long EOC N-1)	1.19
Cycle Exposure of Maximum HEXR, MWd/MTU (long basis)	0
Minimum MAPLHGR Margin, %	12.1
Exposure of Minimum MAPLHGR Margin, MWd/MTU	18,150
Minimum LHGR Margin, %	12.1
Exposure of Minimum LHGR Margin, MWd/MTU	18,150
Minimum CPR Margin, %	7.2
Exposure of Minimum CPR Margin, MWd/MTU	17,701

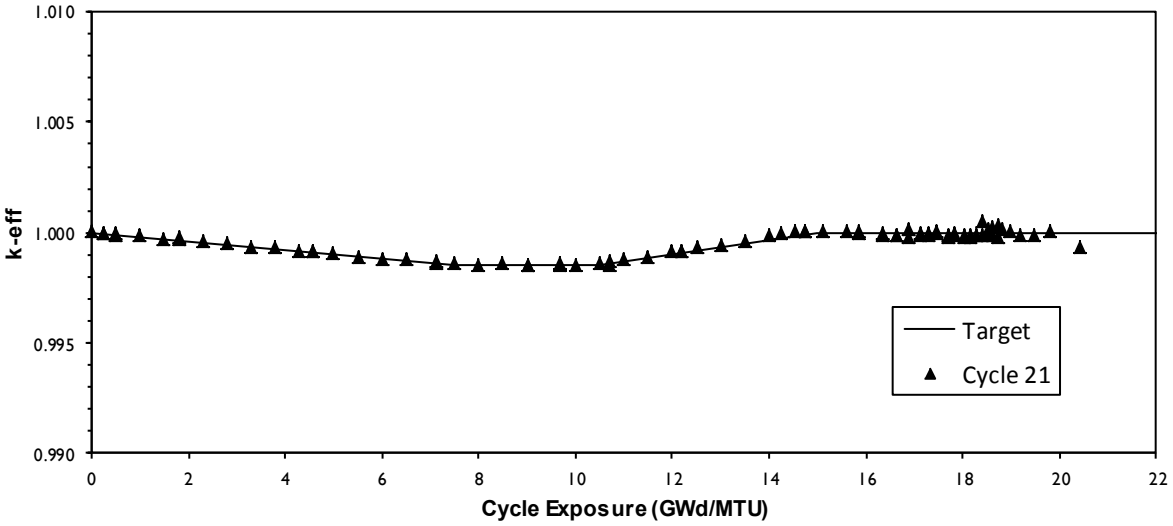

Figure 2.1 Browns Ferry Equilibrium Cycle Design Step-Through k-eff versus Cycle Exposure

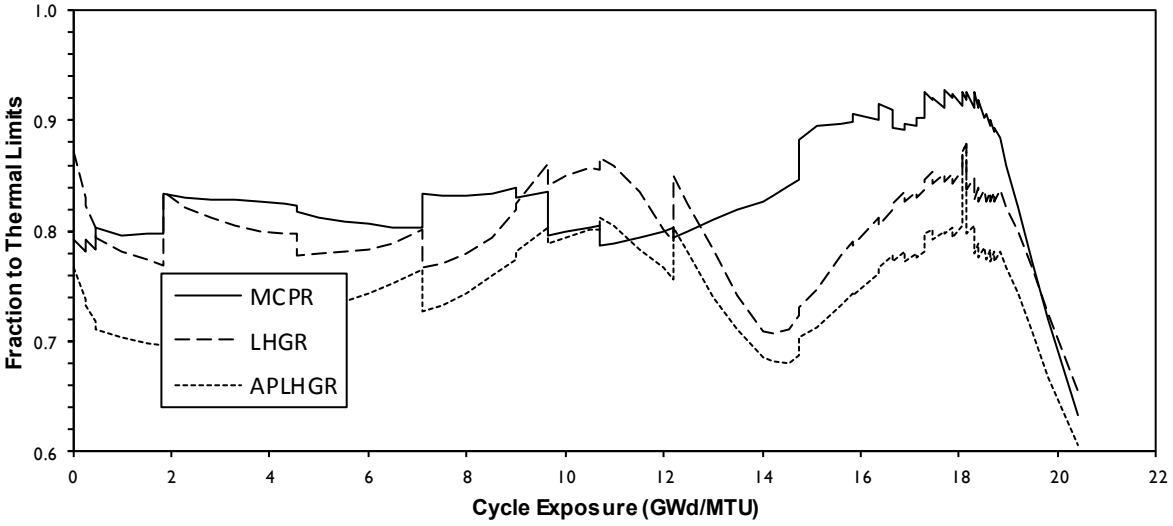

Figure 2.2 Browns Ferry Equilibrium Cycle Design Margin to Thermal Limits versus Cycle Exposure

3.0 Equilibrium Fuel Cycle Design

3.1 *General Description*

The assembly design for the equilibrium cycle fresh reload fuel for Browns Ferry is described in detail in Reference 3. Elevation views of the fresh reload fuel design axial enrichment and gadolinia distributions are shown in Appendix B, Figures B.1 through B.3. The loading pattern maintains full core symmetry within a scatter load fuel management scheme. This loading in conjunction with the control rod patterns presented in Appendix A shows acceptable power peaking and associated margins to limits for projected equilibrium cycle operation. The analyses supporting this fuel cycle design were based on the core parameters shown in Table 3.1. Figures 3.1 through 3.4, along with Table 3.1 define the reference loading pattern used in the fuel cycle design. The specific core location of the fresh assemblies in the equilibrium cycle is provided in Appendix C. Key results for the cycle are summarized in Table 2.1. The equilibrium cycle assumes the use of BLEU material for one fuel type to account for about 30% of the fresh reload assemblies. This was done to account for the possibility that limited supplies of BLEU material may become available after the current inventory is exhausted.

3.2 *Control Rod Patterns and Thermal Limits*

Projected control rod patterns for the equilibrium cycle and resultant key operating parameters including thermal margins are shown in Appendix A. The thermal margins presented in this report were determined using the MICROBURN-B2 3D core simulator PPR model and meet the required design margin to thermal limits from Reference 4. A detailed summary of the core parameters resulting from the step-through projection analysis is provided in Tables A.1 and A.2. Limiting results from the step-through are summarized in Table 2.1 and in Figure 2.2. The hot operating target k-eff versus cycle exposure which was determined to be appropriate for the equilibrium cycle is shown in Table 3.2. The k-eff and margin to limits results from the design cycle depletion are presented graphically in Figures 2.1 and 2.2. The k-eff values presented in Figure 2.1 and in Appendix A are not bias corrected. Selected exposure and radial power distributions from the equilibrium design step-through are presented in Appendix D.

3.3 *Hot Excess Reactivity and Cold Shutdown Margin*

The equilibrium cycle design calculations demonstrate adequate hot excess reactivity, SLC shutdown margin, and cold shutdown margin throughout the cycle. Key shutdown margin and

R-Value results are presented in Table 2.1. The shutdown margin for the equilibrium cycle is in conformance with the Technical Specification limit of R + 0.38 %Δk/k at BOC. The cold target k-eff versus exposure determined to be appropriate for calculation of cold shutdown margin for the equilibrium cycle is shown in Table 3.3. The core hot excess reactivity was calculated at full power with all rods out, 102.5 Mlb/hr core flow, with equilibrium xenon. Tables 3.4 through 3.6 summarize the equilibrium cycle reactivity margins versus cycle exposure, including the SLC shutdown margin.

Table 3.1 Equilibrium Cycle Core Composition and Design Parameters

Fuel Description	Cycle Loaded	Nuclear Fuel Type	Number of Assemblies
ATRIUM 10XM **[ ]**	N-2	13	16
ATRIUM 10XM **[ ]**	N-2	14	76
ATRIUM 10XM **[ ]**	N-2	15	8
ATRIUM 10XM **[ ]**	N-1	16	208
ATRIUM 10XM **[ ]**	N-1	17	92
ATRIUM 10XM **[ ]**	N-1	18	32
ATRIUM 10XM **[ ]**	N	19	208
ATRIUM 10XM **[ ]**	N	20	92
ATRIUM 10XM **[ ]**	N	21	32

Number of Fuel Assemblies in Core	764
Total Number of Fresh Assemblies	332
Total Core Mass, MTU	138.35
Rated Thermal Power Level, MW_t	3,952
Rated Core Flow, Mlb/hr	102.5
Reference Pressure, psia	1,050*
Reference Inlet Subcooling, Btu/lbm	26.94†

* Value is representative of MICROBURN-B2 input for dome pressure at rated conditions and varies depending on core state point.

† Value is typically determined by MICROBURN-B2 using a heat balance method based on nominal feedwater temperature and other parameters identified in the cycle specific plant parameters document.

Table 3.2 Browns Ferry Equilibrium Cycle Hot Operating Target k-eff versus Cycle Exposure

Cycle Exposure (MWd/MTU)	Hot Operating k-eff*
0.0	1.0000
7,500.0	0.9985
10,500.0	0.9985
15,000.0	1.0000
25,000.0	1.0000

Table 3.3 Browns Ferry Equilibrium Cycle Cold Critical Target k-eff versus Cycle Exposure

Cycle Exposure (MWd/MTU)	Cold Critical k-eff*
0.0	0.9940
25,000.0	0.9940

* Values are linearly interpolated between cycle exposure points.

Table 3.4 Browns Ferry Equilibrium Cycle Reactivity Margin Summary (Short EOC N-1)

Cycle Exposure (MWd/MTU)	Cold Shutdown Margin* (% Δk/k)	SLC Cold Shutdown Margin† (% Δk/k)	Hot Excess Reactivity (% Δk/k)
0	1.09	3.03	1.74
250	1.18	3.30	1.65
1,000	1.60	3.69	1.51
2,300	2.02	4.01	1.48
3,300	2.33	4.25	1.44
4,300	2.64	4.48	1.40
5,500	3.03	4.73	1.37
6,500	3.20	4.88	1.37
7,500	3.31	5.01	1.40
8,500	3.39	5.08	1.43
10,000	3.49	5.08	1.53
11,000	3.46	5.03	1.61
12,000	**3.31**	4.98	1.67
13,000	**3.06**	4.96	1.72
14,000	**2.83**	5.01	1.73
15,100	**2.57**	5.20	1.66
15,850	**2.43**	5.40	1.52
16,900	**2.30**	5.68	1.12
18,392	**2.19**	6.22	0.12
19,211	**2.30**	6.62	--
19,811	**2.48**	7.01	--

* Values in **BOLD** are limiting values at elevated moderator temperatures.

† Calculated at 366.0 °F ARO conditions.

Table 3.5 Browns Ferry Equilibrium Cycle Reactivity Margin Summary (Nominal EOC N-1)

Cycle Exposure (MWd/MTU)	Cold Shutdown Margin* (% Δk/k)	SLC Cold Shutdown Margin† (% Δk/k)	Hot Excess Reactivity (% Δk/k)
0	1.40	3.41	1.42
250	1.53	3.66	1.32
1,000	1.99	4.05	1.16
2,300	2.45	4.34	1.13
3,300	2.76	4.57	1.11
4,300	3.08	4.79	1.07
5,500	3.37	5.03	1.04
6,500	3.50	5.17	1.04
7,500	3.60	5.27	1.07
8,500	3.69	5.34	1.11
10,000	3.81	5.32	1.22
11,000	3.73	5.26	1.29
12,000	3.54	5.22	1.34
13,000	**3.34**	5.21	1.39
14,000	**3.08**	5.26	1.41
15,100	**2.82**	5.44	1.36
15,850	**2.67**	5.64	1.26
16,900	**2.52**	5.92	0.88
18,392	**2.36**	6.42	-0.06
19,211	**2.45**	6.81	--
19,811	**2.63**	7.18	--

* Values in **BOLD** are limiting values at elevated moderator temperatures.

† Calculated at 366.0 °F ARO conditions.

Table 3.6 Browns Ferry Equilibrium Cycle Reactivity Margin Summary (Long EOC N-1)

Cycle Exposure (MWd/MTU)	Cold Shutdown Margin* (% Δk/k)	SLC Cold Shutdown Margin† (% Δk/k)	Hot Excess Reactivity (% Δk/k)
0	1.68	3.62	1.19
250	1.80	3.91	1.08
1,000	2.29	4.29	0.92
2,300	2.77	4.57	0.90
3,300	3.07	4.79	0.87
4,300	3.39	5.02	0.84
5,500	3.57	5.22	0.81
6,500	3.70	5.35	0.82
7,500	3.81	5.45	0.85
8,500	3.89	5.49	0.89
10,000	4.03	5.46	1.00
11,000	3.92	5.41	1.07
12,000	3.75	5.37	1.11
13,000	**3.55**	5.37	1.15
14,000	**3.30**	5.43	1.18
15,100	**3.01**	5.61	1.15
15,850	**2.85**	5.81	1.07
16,900	**2.68**	6.11	0.74
18,392	**2.50**	6.55	-0.17
19,211	**2.55**	6.93	--
19,811	**2.71**	7.29	--

* Values in **BOLD** are limiting values at elevated moderator temperatures.

† Calculated at 366.0 °F ARO conditions.

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
60									14	14	14	14	14	13	14
									40.8	36.8	36.7	36.9	36.8	36.2	36.0
58	Nuclear Fuel Type							14	15	17	16	17	17	17	18
	BOC Exposure (GWd/MTU)							38.2	34.5	23.8	22.9	20.9	21.5	21.3	19.1
56						14	13	16	17	20	17	20	16	20	16
						38.7	37.3	23.3	22.1	0.0	22.2	0.0	24.1	0.0	23.0
54						14	17	17	20	21	16	20	20	21	19
						37.9	24.1	19.1	0.0	0.0	23.5	0.0	0.0	0.0	0.0
52					14	17	21	20	19	20	20	21	17	19	16
					41.4	24.7	0.0	0.0	0.0	0.0	0.0	0.0	25.2	0.0	24.7
50			14	14	17	17	20	16	20	16	19	16	19	16	19
			38.4	37.9	24.3	23.9	0.0	23.8	0.0	24.8	0.0	24.0	0.0	23.9	0.0
48			13	17	21	20	20	19	16	19	17	19	16	19	16
			36.9	24.0	0.0	0.0	0.0	0.0	24.7	0.0	25.0	0.0	24.5	0.0	23.6
46		14	16	17	20	16	19	16	19	16	19	16	19	16	19
		38.0	23.0	18.9	0.0	24.2	0.0	23.6	0.0	23.8	0.0	25.4	0.0	22.9	0.0
44	14	15	17	20	19	20	16	19	18	19	16	19	16	19	16
	40.5	34.5	22.0	0.0	0.0	0.0	24.6	0.0	22.1	0.0	24.8	0.0	24.6	0.0	25.1
42	14	17	20	21	20	16	19	16	19	18	19	16	19	16	19
	36.4	23.5	0.0	0.0	0.0	25.0	0.0	24.2	0.0	22.1	0.0	24.6	0.0	24.7	0.0
40	14	16	17	16	20	19	17	19	16	19	16	19	18	19	16
	36.9	23.4	22.1	23.8	0.0	0.0	24.8	0.0	24.2	0.0	23.5	0.0	23.7	0.0	24.6
38	14	17	20	20	21	16	19	16	19	16	19	16	19	18	19
	36.6	20.7	0.0	0.0	0.0	24.0	0.0	25.4	0.0	24.5	0.0	23.1	0.0	25.0	0.0
36	14	17	16	20	17	19	16	19	16	19	18	19	16	19	16
	37.0	21.5	24.1	0.0	24.1	0.0	24.7	0.0	25.0	0.0	23.9	0.0	25.0	0.0	24.5
34	13	17	20	21	19	16	19	16	19	16	19	18	19	16	19
	36.1	21.1	0.0	0.0	0.0	23.9	0.0	23.4	0.0	25.0	0.0	24.0	0.0	25.1	0.0
32	14	18	16	19	16	19	16	19	16	19	16	19	16	19	16
	35.8	19.1	23.1	0.0	25.0	0.0	25.2	0.0	25.1	0.0	24.1	0.0	25.4	0.0	25.2

Fuel Type	Description	Cycle Loaded	No. Per Quarter core
13	[ ]	N-2	4
14	[ ]	N-2	19
15	[ ]	N-2	2
16	[ ]	N-1	52
17	[ ]	N-1	23
18	[ ]	N-1	8
19	[ ]	N	52
20	[ ]	N	23
21	[ ]	N	8

Figure 3.1 Browns Ferry Equilibrium Cycle Upper Left Quarter Core Layout by Fuel Type

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60	14	13	14	14	14	14	14								
	36.1	36.2	37.1	36.9	36.9	36.9	40.8								
58	18	17	17	17	16	17	15	14			Nuclear Fuel Type				
	19.1	21.3	21.5	21.0	22.8	23.9	34.5	38.2			BOC Exposure (GWd/MTU)				
56	16	20	16	20	17	20	17	16	13	14					
	23.1	0.0	23.1	0.0	22.2	0.0	22.1	23.3	36.9	38.7					
54	19	21	20	20	16	21	20	17	17	14					
	0.0	0.0	0.0	0.0	23.5	0.0	0.0	19.2	24.1	37.9					
52	16	19	17	21	20	20	19	20	21	17	14				
	24.6	0.0	25.2	0.0	0.0	0.0	0.0	0.0	0.0	24.7	41.4				
50	19	16	19	16	19	16	20	16	20	17	17	14	14		
	0.0	23.9	0.0	24.0	0.0	24.8	0.0	23.8	0.0	23.9	24.3	37.9	38.4		
48	16	19	16	19	17	19	16	19	20	20	21	17	13		
	23.6	0.0	24.5	0.0	25.0	0.0	24.6	0.0	0.0	0.0	0.0	24.1	37.3		
46	19	16	19	16	19	16	19	16	19	16	20	17	16	14	
	0.0	22.8	0.0	25.3	0.0	23.8	0.0	23.9	0.0	24.2	0.0	19.0	23.0	38.1	
44	16	19	16	19	16	19	18	19	16	20	19	20	17	15	14
	25.1	0.0	24.6	0.0	24.7	0.0	22.4	0.0	24.6	0.0	0.0	0.0	22.0	34.5	40.5
42	19	16	19	16	19	18	19	16	19	16	20	21	20	17	14
	0.0	24.6	0.0	24.6	0.0	22.4	0.0	24.2	0.0	25.1	0.0	0.0	0.0	23.5	36.5
40	16	19	18	19	16	19	16	19	17	19	20	16	17	16	14
	24.5	0.0	23.8	0.0	23.9	0.0	25.2	0.0	24.8	0.0	0.0	23.9	22.1	23.3	36.9
38	19	18	19	16	19	16	19	16	19	16	21	20	20	17	14
	0.0	25.0	0.0	23.1	0.0	24.5	0.0	25.3	0.0	24.0	0.0	0.0	0.0	20.8	36.6
36	16	19	16	19	18	19	16	19	16	19	17	20	16	17	14
	24.5	0.0	24.2	0.0	23.9	0.0	25.0	0.0	24.7	0.0	24.1	0.0	23.1	21.6	36.8
34	19	16	19	18	19	16	19	16	19	16	19	21	20	17	13
	0.0	25.0	0.0	24.0	0.0	24.9	0.0	23.4	0.0	23.9	0.0	0.0	0.0	21.1	36.2
32	16	19	16	19	16	19	16	19	16	19	16	19	16	18	14
	25.1	0.0	25.5	0.0	24.1	0.0	25.1	0.0	25.1	0.0	24.9	0.0	23.0	19.1	35.9

Fuel Type	Description	Cycle Loaded	No. Per Quarter core
13	[ ]	N-2	4
14	[ ]	N-2	19
15	[ ]	N-2	2
16	[ ]	N-1	52
17	[ ]	N-1	23
18	[ ]	N-1	8
19	[ ]	N	52
20	[ ]	N	23
21	[ ]	N	8

Figure 3.2 Browns Ferry Equilibrium Cycle Upper Right Quarter Core Layout by Fuel Type

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
30	14	18	16	19	16	19	16	19	16	19	16	19	16	19	16
	35.8	19.1	23.0	0.0	24.9	0.0	25.1	0.0	25.1	0.0	24.1	0.0	25.4	0.0	25.1
28	13	17	20	21	19	16	19	16	19	16	19	18	19	16	19
	36.4	21.1	0.0	0.0	0.0	23.9	0.0	23.4	0.0	24.9	0.0	24.0	0.0	25.0	0.0
26	14	17	16	20	17	19	16	19	16	19	18	19	16	19	16
	36.9	21.6	24.1	0.0	24.1	0.0	24.7	0.0	25.0	0.0	23.9	0.0	24.2	0.0	24.5
24	14	17	20	20	21	16	19	16	19	16	19	16	19	18	19
	36.6	20.7	0.0	0.0	0.0	24.0	0.0	25.4	0.0	24.6	0.0	23.1	0.0	25.0	0.0
22	14	16	17	16	20	19	17	19	16	19	16	19	18	19	16
	36.8	23.4	22.1	23.8	0.0	0.0	24.8	0.0	24.8	0.0	23.6	0.0	23.7	0.0	24.6
20	14	17	20	21	20	16	19	16	19	18	19	16	19	16	19
	36.5	23.5	0.0	0.0	0.0	25.0	0.0	24.2	0.0	22.1	0.0	24.6	0.0	24.7	0.0
18	14	15	17	20	19	20	16	19	18	19	16	19	16	19	16
	40.5	34.5	22.0	0.0	0.0	0.0	24.6	0.0	22.1	0.0	25.2	0.0	24.6	0.0	25.1
16		14	16	17	20	16	19	16	19	16	19	16	19	16	19
		38.0	23.0	19.0	0.0	24.2	0.0	23.5	0.0	23.8	0.0	25.4	0.0	22.8	0.0
14			13	17	21	20	20	19	16	19	17	19	16	19	16
			37.3	24.0	0.0	0.0	0.0	0.0	24.7	0.0	25.0	0.0	24.5	0.0	23.6
12			14	14	17	17	20	16	20	16	19	16	19	16	19
			38.4	38.1	24.3	23.9	0.0	23.8	0.0	24.8	0.0	24.0	0.0	23.9	0.0
10					14	17	21	20	19	20	20	21	17	19	16
					41.4	24.7	0.0	0.0	0.0	0.0	0.0	0.0	25.2	0.0	24.6
8						14	17	17	20	21	16	20	20	21	19
						38.1	24.1	19.2	0.0	0.0	23.5	0.0	0.0	0.0	0.0
6						14	13	16	17	20	17	20	16	20	16
						38.7	37.0	23.3	22.1	0.0	22.2	0.0	24.1	0.0	23.1
4	Nuclear Fuel Type							14	15	17	16	17	17	17	18
	BOC Exposure (GWd/MTU)							38.2	34.5	23.8	22.8	20.9	21.5	21.3	19.1
2									14	14	14	14	14	13	14
									40.8	36.9	36.9	36.9	37.0	36.4	36.0

Fuel Type	Description	Cycle Loaded	No. Per Quarter core
13	[ ]	N-2	4
14	[ ]	N-2	19
15	[ ]	N-2	2
16	[ ]	N-1	52
17	[ ]	N-1	23
18	[ ]	N-1	8
19	[ ]	N	52
20	[ ]	N	23
21	[ ]	N	8

Figure 3.3 Browns Ferry Equilibrium Cycle Lower Left Quarter Core Layout by Fuel Type

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
30	16	19	16	19	16	19	16	19	16	19	16	19	16	18	14
	25.2	0.0	25.5	0.0	24.1	0.0	25.1	0.0	25.1	0.0	24.9	0.0	23.1	19.0	35.9
28	19	16	19	18	19	16	19	16	19	16	19	21	20	17	13
	0.0	25.1	0.0	24.0	0.0	24.9	0.0	23.4	0.0	23.9	0.0	0.0	0.0	21.1	36.4
26	16	19	16	19	18	19	16	19	16	19	17	20	16	17	14
	24.5	0.0	25.0	0.0	23.9	0.0	25.0	0.0	24.8	0.0	24.1	0.0	23.1	21.6	37.0
24	19	18	19	16	19	16	19	16	19	16	21	20	20	17	14
	0.0	25.0	0.0	23.1	0.0	24.5	0.0	25.4	0.0	24.0	0.0	0.0	0.0	20.8	36.6
22	16	19	18	19	16	19	16	19	17	19	20	16	17	16	14
	24.6	0.0	23.8	0.0	24.8	0.0	24.2	0.0	24.8	0.0	0.0	23.8	22.1	23.3	36.9
20	19	16	19	16	19	18	19	16	19	16	20	21	20	17	14
	0.0	24.6	0.0	24.6	0.0	22.4	0.0	24.2	0.0	25.1	0.0	0.0	0.0	23.5	36.5
18	16	19	16	19	16	19	18	19	16	20	19	20	17	15	14
	25.1	0.0	24.6	0.0	23.8	0.0	22.4	0.0	24.6	0.0	0.0	0.0	21.9	34.5	40.5
16	19	16	19	16	19	16	19	16	19	16	20	17	16	14	
	0.0	22.9	0.0	25.3	0.0	23.8	0.0	23.8	0.0	24.2	0.0	18.9	23.0	38.1	
14	16	19	16	19	17	19	16	19	20	20	21	17	13		
	23.6	0.0	24.5	0.0	25.0	0.0	24.6	0.0	0.0	0.0	0.0	24.1	37.0		
12	19	16	19	16	19	16	20	16	20	17	17	14	14		
	0.0	23.9	0.0	24.0	0.0	24.8	0.0	23.8	0.0	23.9	24.3	38.1	38.4		
10	16	19	17	21	20	20	19	20	21	17	14				
	24.6	0.0	25.2	0.0	0.0	0.0	0.0	0.0	0.0	24.7	41.4				
8	19	21	20	20	16	21	20	17	17	14					
	0.0	0.0	0.0	0.0	23.5	0.0	0.0	19.2	24.2	38.1					
6	16	20	16	20	17	20	17	16	13	14					
	23.0	0.0	23.1	0.0	22.2	0.0	22.1	23.2	37.3	38.7					
4	18	17	17	17	16	17	15	14							
	19.1	21.3	21.6	21.0	22.9	23.9	34.5	38.2							
2	14	13	14	14	14	14	14								
	36.1	36.4	37.0	36.9	36.9	36.9	40.7								

Nuclear Fuel Type
BOC Exposure (GWd/MTU)

Fuel Type	Description	Cycle Loaded	No. Per Quarter core
13	[ ]	N-2	4
14	[ ]	N-2	19
15	[ ]	N-2	2
16	[ ]	N-1	52
17	[ ]	N-1	23
18	[ ]	N-1	8
19	[ ]	N	52
20	[ ]	N	23
21	[ ]	N	8

Figure 3.4 Browns Ferry Equilibrium Cycle Lower Right Quarter Core Layout by Fuel Type

4.0 References

1. EMF-2158(P)(A) Revision 0, *Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2,* Siemens Power Corporation, October 1999.

2. ANP-10298PA Revision 0, *ACE/ATRIUM 10XM Critical Power Correlation*, AREVA NP, March 2010.

3. ANP-3343P Revision 0, *Nuclear Fuel Design Report Browns Ferry EPU (120% OLTP) Equilibrium Cycle ATRIUM 10XM Fuel,* AREVA Inc., October 2014.

4. BFE-3706 Revision 0, *Browns Ferry Unit 3 EPU Transition Energy Plan,* TVA, June 2014. (38-9226272-000)

5. ANP-3140(P) Revision 0, *Browns Ferry Units 1, 2, and 3 Improved K-factor Model for ACE/ATRIUM 10XM Critical Power Correlation,* AREVA NP, August 2012.

Appendix A Browns Ferry Equilibrium Cycle Step-Through Depletion Summary, Control Rod Patterns and Core Average Axial Power and Exposure Distributions

Table A.1 Browns Ferry Equilibrium Cycle Design Depletion Summary

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	1.00008	5.59	3952.0	102.50	1050.04	26.94	0.488	1.792	12.30	9.17
0.250	0.99995	5.59	3952.0	106.60	1050.04	25.82	0.475	1.817	11.70	8.76
0.251	1.00002	5.41	3952.0	102.50	1050.04	26.94	0.479	1.793	11.60	8.68
0.475	0.99987	5.41	3952.0	106.60	1050.04	25.82	0.469	1.814	11.32	8.50
0.475	0.99996	5.14	3952.0	102.50	1050.04	26.94	0.472	1.769	11.20	8.41
1.000	0.99985	5.14	3952.0	105.27	1050.04	26.17	0.465	1.783	11.03	8.35
1.500	0.99975	5.14	3952.0	105.27	1050.04	26.17	0.463	1.781	10.92	8.32
1.820	0.99972	5.14	3952.0	105.27	1050.04	26.17	0.461	1.779	10.83	8.30
1.820	0.99981	4.82	3952.0	102.50	1050.04	26.94	0.479	1.703	11.78	9.00
2.300	0.99962	4.82	3952.0	102.50	1050.04	26.94	0.477	1.708	11.58	8.93
2.800	0.99952	4.82	3952.0	103.01	1050.04	26.79	0.474	1.712	11.45	8.89
3.300	0.99938	4.82	3952.0	103.53	1050.04	26.65	0.471	1.714	11.36	8.89
3.800	0.99934	4.82	3952.0	104.55	1050.04	26.37	0.467	1.720	11.27	8.92
4.300	0.99920	4.82	3952.0	105.06	1050.04	26.23	0.465	1.724	11.25	8.97
4.563	0.99914	4.82	3952.0	105.27	1050.04	26.17	0.464	1.726	11.24	9.01
4.564	0.99915	4.19	3952.0	102.50	1050.04	26.94	0.475	1.737	10.97	8.80
5.000	0.99903	4.19	3952.0	103.01	1050.04	26.79	0.473	1.748	10.99	8.87
5.500	0.99892	4.19	3952.0	103.22	1050.04	26.73	0.471	1.756	11.01	8.96
6.000	0.99884	4.19	3952.0	103.22	1050.04	26.73	0.471	1.762	11.05	9.07
6.500	0.99876	4.19	3952.0	103.01	1050.04	26.79	0.471	1.767	11.13	9.23
7.110	0.99867	4.19	3952.0	102.50	1050.04	26.94	0.472	1.769	11.31	9.49
7.111	0.99862	4.95	3952.0	106.09	1050.04	25.95	0.455	1.702	10.81	8.86
7.500	0.99859	4.95	3952.0	105.58	1050.04	26.09	0.456	1.706	10.85	8.95
8.000	0.99852	4.95	3952.0	104.75	1050.04	26.31	0.458	1.706	11.00	9.14
8.500	0.99858	4.95	3952.0	104.04	1050.04	26.51	0.461	1.702	11.16	9.41
9.000	0.99855	4.95	3952.0	102.50	1050.04	26.94	0.464	1.693	11.41	9.71
9.001	0.99854	5.05	3952.0	104.55	1050.04	26.37	0.463	1.710	11.48	9.76
9.658	0.99854	5.05	3952.0	102.50	1050.04	26.94	0.468	1.699	11.83	10.14
9.659	0.99859	5.41	3952.0	106.60	1050.04	25.82	0.454	1.784	11.53	9.95
10.000	0.99855	5.41	3952.0	104.81	1050.04	26.30	0.458	1.775	11.58	10.05
10.500	0.99865	5.41	3952.0	103.53	1050.04	26.65	0.461	1.767	11.54	10.06
10.700	0.99872	5.41	3952.0	103.01	1050.04	26.79	0.462	1.764	11.47	10.03
10.700	0.99854	5.59	3952.0	106.60	1050.04	25.82	0.459	1.803	11.62	10.16
11.000	0.99880	5.59	3952.0	106.60	1050.04	25.82	0.458	1.802	11.43	10.03
11.500	0.99891	5.59	3952.0	105.06	1050.04	26.23	0.458	1.789	11.11	9.78
12.000	0.99913	5.59	3952.0	104.04	1050.04	26.51	0.455	1.777	10.70	9.47
12.205	0.99915	5.59	3952.0	103.27	1050.04	26.72	0.455	1.769	10.50	9.32
12.206	0.99919	5.72	3952.0	105.06	1050.04	26.23	0.455	1.787	11.20	9.89
12.500	0.99930	5.72	3952.0	104.55	1050.04	26.37	0.452	1.774	10.85	9.59
13.000	0.99946	5.72	3952.0	103.53	1050.04	26.65	0.446	1.753	10.17	8.99
13.500	0.99958	5.72	3952.0	102.50	1050.04	26.94	0.439	1.731	9.58	8.45
14.000	0.99985	5.72	3952.0	102.50	1050.04	26.94	0.430	1.718	9.12	8.00
14.230	0.99998	5.72	3952.0	102.50	1050.04	26.94	0.425	1.706	9.01	7.90
14.550	1.00003	5.72	3952.0	102.50	1050.04	26.94	0.419	1.689	8.98	8.10
14.753	1.00006	5.72	3952.0	102.50	1050.04	26.94	0.415	1.678	8.97	8.23
14.754	1.00005	5.68	3952.0	102.50	1050.04	26.94	0.416	1.608	9.17	8.35
15.100	1.00004	5.68	3952.0	103.01	1050.04	26.79	0.408	1.598	9.29	8.47
15.600	1.00008	5.68	3952.0	105.06	1050.04	26.23	0.394	1.592	9.51	8.65
15.850	1.00005	5.68	3952.0	106.34	1050.04	25.88	0.387	1.591	9.62	8.74
15.851	1.00002	5.54	3952.0	102.50	1050.04	26.94	0.391	1.577	9.72	8.72
16.350	0.99987	5.54	3952.0	106.60	1050.04	25.82	0.375	1.587	10.16	8.98
16.351	0.99999	5.41	3952.0	103.01	1050.04	26.79	0.378	1.561	10.27	9.07
16.650	0.99991	5.41	3952.0	106.60	1050.04	25.82	0.367	1.572	10.54	9.34
16.651	0.99993	4.05	3952.0	102.50	1050.04	26.94	0.388	1.602	9.89	9.04
16.900	0.99981	4.05	3952.0	106.60	1050.04	25.82	0.377	1.605	10.00	9.14
16.901	1.00013	3.78	3952.0	102.50	1050.04	26.94	0.379	1.593	9.86	9.03
17.150	0.99998	3.78	3952.0	106.34	1050.04	25.88	0.369	1.596	9.95	9.11
17.151	0.99993	3.69	3952.0	103.53	1050.04	26.65	0.371	1.583	10.00	9.05
17.300	0.99993	3.69	3952.0	106.50	1050.04	25.84	0.364	1.586	10.15	9.12
17.301	0.99994	2.97	3952.0	102.50	1050.04	26.94	0.378	1.544	9.94	9.22
17.450	0.99995	2.97	3952.0	106.09	1050.04	25.95	0.370	1.556	10.01	9.24
17.451	1.00008	2.79	3952.0	102.50	1050.04	26.94	0.372	1.553	9.95	9.15
17.700	0.99977	2.79	3952.0	107.11	1050.04	25.68	0.361	1.567	10.15	9.24

17.701	0.99988	2.03	3952.0	103.01	1050.04	26.79	0.373	1.540	10.03	9.29
17.850	0.99986	2.03	3952.0	107.11	1050.04	25.68	0.365	1.554	10.09	9.35
17.851	0.99998	1.80	3952.0	102.50	1050.04	26.94	0.368	1.545	10.03	9.26
18.050	0.99990	1.80	3952.0	107.62	1050.04	25.55	0.357	1.564	10.19	9.34
18.051	0.99982	1.67	3952.0	103.53	1050.04	26.65	0.361	1.545	11.33	10.28
18.150	0.99986	1.67	3952.0	106.60	1050.04	25.82	0.355	1.556	11.42	10.35
18.151	0.99982	0.86	3952.0	102.50	1050.04	26.94	0.367	1.545	10.58	9.53
18.300	0.99988	0.86	3952.0	107.62	1050.04	25.55	0.357	1.568	10.68	9.61
18.301	0.99988	0.00	3952.0	101.99	1050.04	27.08	0.370	1.545	9.76	9.08
18.392	1.00049	0.00	3952.0	107.62	1050.04	25.55	0.359	1.570	9.85	9.14
18.395	0.99986	0.00	3952.0	101.47	1048.48	29.16	0.363	1.558	9.67	8.99
18.526	1.00018	0.00	3952.0	107.11	1048.48	27.51	0.352	1.583	9.78	9.06
18.533	0.99988	0.00	3952.0	102.50	1046.99	30.67	0.354	1.576	9.63	8.94
18.627	1.00023	0.00	3952.0	107.11	1046.99	29.25	0.345	1.595	9.75	9.00
18.634	0.99991	0.00	3952.0	102.50	1045.56	32.41	0.347	1.589	9.60	8.87
18.721	1.00030	0.00	3952.0	107.11	1045.56	30.92	0.338	1.607	9.71	8.93
18.728	0.99981	0.00	3952.0	103.01	1044.65	33.36	0.341	1.599	9.59	8.84
18.822	1.00012	0.00	3952.0	107.62	1044.65	31.83	0.333	1.617	9.71	8.91
18.974	1.00007	0.00	3833.4	107.62	1042.35	30.76	0.326	1.664	9.53	8.72
19.211	0.99989	0.00	3651.6	107.62	1038.83	29.11	0.315	1.743	9.23	8.43
19.494	0.99987	0.00	3418.5	107.62	1034.32	27.02	0.301	1.849	8.82	8.05
19.811	1.00004	0.00	3141.8	107.62	1028.97	24.54	0.284	1.986	8.42	7.65
20.411	0.99933	0.00	2647.8	107.62	1019.43	20.17	0.252	2.259	7.69	6.90

Table A.2 Browns Ferry Equilibrium Cycle Design Depletion Thermal Margin Summary

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	1.00008	5.586	1.792	0.792	12.30	0.872	9.12	0.767
0.250	0.99995	5.586	1.817	0.781	11.70	0.830	8.75	0.739
0.251	1.00002	5.405	1.793	0.792	11.60	0.823	8.68	0.732
0.475	0.99987	5.405	1.814	0.783	11.32	0.803	8.49	0.719
0.475	0.99996	5.135	1.769	0.803	11.20	0.795	8.40	0.711
1.000	0.99985	5.135	1.783	0.796	11.03	0.782	8.23	0.703
1.500	0.99975	5.135	1.781	0.797	10.92	0.774	8.02	0.699
1.820	0.99972	5.135	1.779	0.798	10.83	0.768	7.95	0.696
1.820	0.99981	4.820	1.703	0.834	11.78	0.835	8.73	0.752
2.300	0.99962	4.820	1.708	0.831	11.58	0.821	8.58	0.745
2.800	0.99952	4.820	1.712	0.829	11.45	0.812	8.03	0.741
3.300	0.99938	4.820	1.714	0.828	11.36	0.805	7.97	0.742
3.800	0.99934	4.820	1.720	0.826	11.27	0.800	7.92	0.743
4.300	0.99920	4.820	1.724	0.824	11.25	0.798	7.89	0.747
4.563	0.99914	4.820	1.726	0.823	11.24	0.797	7.88	0.749
4.564	0.99915	4.189	1.737	0.817	10.97	0.778	7.64	0.726
5.000	0.99903	4.189	1.748	0.812	10.99	0.779	7.63	0.731
5.500	0.99892	4.189	1.756	0.809	11.01	0.781	7.63	0.736
6.000	0.99884	4.189	1.762	0.806	11.05	0.784	7.63	0.743
6.500	0.99876	4.189	1.767	0.803	11.13	0.789	7.66	0.752
7.110	0.99867	4.189	1.769	0.803	11.31	0.802	7.72	0.765
7.111	0.99862	4.955	1.702	0.834	10.81	0.767	7.49	0.727
7.500	0.99859	4.955	1.706	0.832	10.85	0.770	7.49	0.732
8.000	0.99852	4.955	1.706	0.832	11.00	0.780	7.45	0.744
8.500	0.99858	4.955	1.702	0.834	11.15	0.794	7.54	0.759
9.000	0.99855	4.955	1.693	0.839	11.41	0.819	7.64	0.775
9.001	0.99854	5.045	1.710	0.831	11.48	0.824	7.69	0.781
9.658	0.99854	5.045	1.699	0.836	11.83	0.861	7.82	0.804
9.659	0.99859	5.405	1.784	0.796	11.53	0.841	7.76	0.788
10.000	0.99855	5.405	1.775	0.800	11.58	0.851	10.05	0.795
10.500	0.99865	5.405	1.767	0.803	11.54	0.857	10.05	0.802
10.700	0.99872	5.405	1.764	0.805	11.47	0.856	10.03	0.801
10.700	0.99854	5.586	1.803	0.787	11.62	0.867	10.16	0.812
11.000	0.99880	5.586	1.802	0.788	11.43	0.859	10.03	0.805
11.500	0.99891	5.586	1.789	0.794	11.00	0.835	9.78	0.784
12.000	0.99913	5.586	1.777	0.799	10.64	0.802	9.47	0.767
12.205	0.99915	5.586	1.769	0.803	10.44	0.791	9.32	0.756
12.206	0.99919	5.721	1.787	0.794	11.16	0.851	9.89	0.803
12.500	0.99930	5.721	1.774	0.800	10.76	0.825	9.58	0.782
13.000	0.99946	5.721	1.753	0.810	10.07	0.783	8.99	0.740
13.500	0.99958	5.721	1.731	0.820	9.45	0.742	6.56	0.711
14.000	0.99985	5.721	1.718	0.827	7.02	0.709	6.48	0.685
14.230	0.99998	5.721	1.706	0.832	6.97	0.707	6.44	0.683
14.550	1.00003	5.721	1.689	0.841	7.17	0.711	6.47	0.681
14.753	1.00006	5.721	1.678	0.846	7.26	0.723	6.71	0.688
14.754	1.00005	5.676	1.608	0.883	7.26	0.731	6.77	0.703
15.100	1.00004	5.676	1.598	0.895	7.48	0.747	6.98	0.713
15.600	1.00008	5.676	1.592	0.898	7.72	0.778	7.06	0.733
15.850	1.00005	5.676	1.591	0.899	7.81	0.791	7.14	0.744
15.851	1.00002	5.541	1.577	0.907	7.74	0.786	7.24	0.742
16.350	0.99987	5.541	1.587	0.901	7.93	0.813	7.25	0.762
16.351	0.99999	5.405	1.561	0.916	7.86	0.805	7.43	0.767
16.650	0.99991	5.405	1.572	0.910	7.95	0.820	7.69	0.777
16.651	0.99993	4.054	1.602	0.893	7.97	0.824	7.38	0.772
16.900	0.99981	4.054	1.605	0.891	8.04	0.835	7.44	0.781
16.901	1.00013	3.784	1.593	0.898	7.94	0.826	7.35	0.772
17.150	0.99998	3.784	1.596	0.896	8.00	0.836	7.39	0.780
17.151	0.99993	3.694	1.583	0.903	7.95	0.830	7.35	0.776
17.300	0.99993	3.694	1.586	0.902	7.98	0.837	7.38	0.781
17.301	0.99994	2.973	1.544	0.926	8.08	0.847	7.53	0.797
17.450	0.99995	2.973	1.556	0.919	8.12	0.854	7.56	0.801
17.451	1.00008	2.793	1.553	0.921	8.02	0.843	7.47	0.792
17.700	0.99977	2.793	1.567	0.912	8.06	0.852	7.70	0.799

17.701	0.99988	2.027	1.540	0.928	8.05	0.845	7.68	0.797
17.850	0.99986	2.027	1.554	0.920	8.35	0.852	7.73	0.804
17.851	0.99998	1.802	1.545	0.925	8.27	0.843	7.64	0.795
18.050	0.99990	1.802	1.564	0.914	8.36	0.856	7.70	0.805
18.051	0.99982	1.667	1.545	0.926	8.76	0.872	8.60	0.872
18.150	0.99986	1.667	1.556	0.919	8.82	0.879	8.65	0.879
18.151	0.99982	0.856	1.545	0.926	8.12	0.838	8.03	0.797
18.300	0.99988	0.856	1.568	0.912	8.19	0.848	8.08	0.805
18.301	0.99988	0.000	1.545	0.926	8.01	0.829	7.43	0.780
18.392	1.00049	0.000	1.570	0.911	8.10	0.840	7.50	0.788
18.395	0.99986	0.000	1.558	0.918	7.97	0.826	7.38	0.776
18.526	1.00018	0.000	1.583	0.903	8.05	0.838	7.52	0.785
18.533	0.99988	0.000	1.576	0.907	7.95	0.827	7.36	0.775
18.627	1.00023	0.000	1.595	0.896	8.03	0.836	7.49	0.783
18.634	0.99991	0.000	1.589	0.900	7.93	0.826	7.33	0.773
18.721	1.00030	0.000	1.607	0.890	8.05	0.836	7.46	0.781
18.728	0.99981	0.000	1.599	0.894	7.92	0.827	7.38	0.773
18.822	1.00012	0.000	1.617	0.885	8.04	0.837	7.45	0.782
18.974	1.00007	0.000	1.664	0.860	7.98	0.822	7.29	0.767
19.211	0.99989	0.000	1.743	0.821	7.71	0.799	7.03	0.743
19.494	0.99987	0.000	1.849	0.773	7.35	0.767	6.69	0.710
19.811	1.00004	0.000	1.986	0.720	6.90	0.725	6.25	0.668
20.411	0.99933	0.000	2.259	0.633	6.48	0.655	5.82	0.607

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    15148.8
Exposure: MWd/MTU (GWd)            0.0 (   0.00 )
Delta E: MWd/MTU, (GWd)            0.0 (   0.00 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.156   3.317    13  0.498 0.522  59 34
Inlet Subcooling: Btu/lbm       -26.94                        24  0.451   9.366    14  0.436 0.538  59 30
Flow: Mlb/hr                    102.50 (100.00 %)             23  0.586  12.094    15  0.544 0.547   3 18
                                                              22  0.678  13.468    16  1.108 1.275  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.747  14.507    17  0.886 1.178  51 36
59              -- -- -- -- -- -- --             59           20  0.798  15.348    18  1.109 1.209  19 42
55          -- -- -- -- -- -- -- -- --           55           19  0.818  15.788    19  1.144 1.260  29 16
51       -- -- -- -- -- -- -- -- -- -- --        51           18  0.849  16.312    20  1.076 1.168  35  8
47    -- -- -- -- 10 -- -- -- 10 -- -- -- --     47           17  0.877  16.651    21  1.069 1.170  33  8
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43              16  0.908  16.931
39 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 39           15  0.956  17.422
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  0.986  17.320
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31          13  1.127  16.343
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.189  16.833
23 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 23          11  1.223  17.070
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.252  17.400
15    -- -- -- -- 10 -- -- -- 10 -- -- -- --    15           9  1.295  17.779
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.340  17.973
 7          -- -- -- -- -- -- -- -- --           7           7  1.397  18.150
 3             -- -- -- -- -- -- --              3           6  1.479  18.566*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.533* 18.515
                                                              4  1.528  17.762
Control Rod Density: %             5.59                       3  1.433  16.166
                                                              2  1.101  12.076
k-effective:                    1.00008                Bottom  1  0.292   3.493
Void Fraction:                    0.488
Core Delta-P: psia               25.162            % AXIAL TILT -26.179  -6.694
Core Plate Delta-P: psia         20.600         AVG BOT 8ft/12ft  1.1495  1.0409
Coolant Temp: Deg-F              548.7
In Channel Flow: Mlb/hr           90.02   Active Channel Flow: Mlb/hr        86.73
Total Bypass Flow (%):            12.2   (of total core flow)
Total Water Rod Flow (%):          3.2   (of total core flow)
Source Convergence              0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.275	16	31	14	1.792	0.792	19	31	12	9.12	0.767	25.7	16	31	48	4	12.30	0.872	0.0	19	31	50	4
1.260	19	29	16	1.804	0.787	19	29	46	8.84	0.758	27.9	16	31	10	4	12.17	0.863	0.0	19	49	32	4
1.257	19	31	12	1.809	0.785	19	29	28	8.73	0.751	28.3	16	51	32	4	12.15	0.862	0.0	19	31	16	4
1.251	16	23	24	1.812	0.784	19	27	30	8.85	0.743	25.6	16	33	50	4	12.14	0.861	0.0	19	33	10	4
1.249	19	23	22	1.815	0.782	19	33	14	8.61	0.740	28.1	16	47	32	4	12.04	0.854	0.0	19	51	34	4
1.249	19	21	38	1.816	0.782	19	49	30	8.77	0.736	25.3	16	49	34	4	11.98	0.850	0.0	19	31	8	4
1.248	16	21	40	1.818	0.781	19	21	38	8.26	0.723	30.2	17	51	36	4	11.98	0.850	0.0	19	33	48	4
1.247	19	49	32	1.820	0.780	19	23	22	8.11	0.721	31.9	17	35	10	4	11.96	0.848	0.0	20	25	8	4
1.247	16	29	32	1.829	0.776	19	45	30	8.57	0.719	25.3	16	33	16	4	11.94	0.847	0.0	20	7	26	4
1.246	16	27	16	1.834	0.774	19	23	36	8.41	0.706	25.5	16	21	40	4	11.85	0.840	0.0	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.1 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 0.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    15397.8
Exposure: MWd/MTU (GWd)         250.0 (  34.59 )
Delta E: MWd/MTU, (GWd)         250.0 (  34.59 )                 Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.163   3.359    13  0.499 0.524  59 34
Inlet Subcooling: Btu/lbm      -25.82                        24  0.472   9.490    14  0.438 0.540  59 30
Flow: Mlb/hr                   106.60 (104.00 %)             23  0.614  12.255    15  0.546 0.548   3 18
                                                             22  0.709  13.655    16  1.109 1.276  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  0.779  14.713    17  0.889 1.179  51 36
59             -- -- -- -- -- -- --             59          20  0.830  15.567    18  1.111 1.211  19 42
55          -- -- -- -- -- -- -- -- --          55          19  0.848  16.013    19  1.142 1.257  29 16
51       -- -- -- -- -- -- -- -- -- -- --       51          18  0.878  16.545    20  1.073 1.165  35  8
47    -- -- -- -- 10 -- -- -- 10 -- -- -- --    47          17  0.904  16.891    21  1.066 1.168  33  8
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43             16  0.932  17.179
39 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 39          15  0.978  17.683
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.005  17.588
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31          13  1.146  16.608
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.206  17.112
23 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 23          11  1.235  17.358
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.259  17.694
15    -- -- -- -- 10 -- -- -- 10 -- -- -- --    15           9  1.296  18.082
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.332  18.285
 7          -- -- -- -- -- -- -- -- --           7           7  1.377  18.474
 3             -- -- -- -- -- -- --              3           6  1.444  18.908*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  1.479* 18.867
                                                             4  1.455  18.111
Control Rod Density: %             5.59                      3  1.350  16.491
                                                             2  1.034  12.326
k-effective:                   0.99995                Bottom  1  0.274   3.563
Void Fraction:                   0.475
Core Delta-P: psia              26.558             % AXIAL TILT -23.587  -6.883
Core Plate Delta-P: psia        21.994          AVG BOT 8ft/12ft  1.1355  1.0419
Coolant Temp: Deg-F              548.7
In Channel Flow: Mlb/hr          93.77   Active Channel Flow: Mlb/hr        90.40
Total Bypass Flow (%):           12.0   (of total core flow)
Total Water Rod Flow (%):         3.2   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.276	16	31	14	1.817	0.781	19	31	12	8.75	0.739	26.1	16	31	48	4	11.70	0.830	0.6	19	31	50	4
1.257	19	29	16	1.825	0.778	19	29	46	8.48	0.730	28.4	16	31	10	4	11.57	0.821	0.6	19	49	32	4
1.254	19	31	12	1.826	0.777	19	29	28	8.37	0.723	28.7	16	51	32	4	11.55	0.819	0.6	19	31	16	4
1.251	16	23	24	1.829	0.776	19	27	30	8.48	0.715	26.0	16	33	50	4	11.54	0.819	0.6	19	33	10	4
1.250	16	21	40	1.835	0.774	19	21	38	8.25	0.712	28.6	16	47	32	4	11.44	0.812	0.6	19	51	34	4
1.247	16	29	32	1.837	0.773	19	23	22	8.40	0.708	25.8	16	49	34	4	11.42	0.810	0.6	19	31	8	4
1.247	16	27	16	1.838	0.772	19	33	14	7.78	0.700	33.1	17	35	10	5	11.41	0.809	0.6	19	33	48	4
1.246	19	23	22	1.840	0.772	19	49	30	7.88	0.699	31.6	17	51	36	5	11.36	0.806	0.6	20	25	8	4
1.246	19	21	38	1.846	0.769	19	45	30	8.12	0.691	27.1	16	33	16	5	11.34	0.804	0.6	20	7	26	4
1.244	19	49	32	1.852	0.767	19	23	36	7.97	0.681	27.5	16	21	40	5	11.28	0.800	0.6	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.2 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 250.0 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    15398.8
Exposure: MWd/MTU (GWd)         251.0 (  34.73 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                      Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)            N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                      Top 25  0.166   3.360    13  0.498 0.523  59 34
Inlet Subcooling: Btu/lbm      -26.94                          24  0.479   9.490    14  0.438 0.538  59 30
Flow: Mlb/hr                   102.50 (100.00 %)               23  0.623  12.255    15  0.546 0.548   3 18
                                                               22  0.722  13.656    16  1.110 1.274  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58                21  0.797  14.714    17  0.889 1.178  51 36
59             -- -- -- -- -- -- --             59             20  0.855  15.568    18  1.109 1.215  19 42
55          -- -- -- -- -- -- -- -- --          55             19  0.883  16.014    19  1.143 1.255  29 16
51       -- -- -- -- -- -- -- -- -- -- --       51             18  0.902  16.546    20  1.071 1.161  35  8
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --    47             17  0.919  16.892    21  1.064 1.163  33  8
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43                16  0.940  17.180
39 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 39             15  0.980  17.684
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35             14  1.003  17.589
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31             13  1.138  16.609
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27             12  1.194  17.113
23 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 23             11  1.221  17.359
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19             10  1.243  17.695
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15              9  1.279  18.083
11       -- -- -- -- -- -- -- -- -- -- --       11              8  1.314  18.287
 7          -- -- -- -- -- -- -- -- --           7              7  1.360  18.476
 3             -- -- -- -- -- -- --              3              6  1.428  18.909*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58                 5  1.466* 18.869
                                                               4  1.445  18.112
Control Rod Density: %             5.41                        3  1.343  16.492
                                                               2  1.029  12.327
k-effective:                   1.00002                 Bottom  1  0.272   3.563
Void Fraction:                   0.479
Core Delta-P: psia              25.011             % AXIAL TILT -22.314  -6.883
Core Plate Delta-P: psia        20.450          AVG BOT 8ft/12ft  1.1267  1.0419
Coolant Temp: Deg-F              548.6
In Channel Flow: Mlb/hr          90.10   Active Channel Flow: Mlb/hr        86.83
Total Bypass Flow (%):           12.1   (of total core flow)
Total Water Rod Flow (%):         3.2   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.274	16	31	14	1.793	0.792	19	31	12	8.68	0.732	26.1	16	31	48	4	11.60	0.823	0.6	19	31	50	4
1.255	19	29	16	1.794	0.792	19	29	46	8.40	0.724	28.4	16	31	10	4	11.47	0.814	0.6	19	49	32	4
1.251	19	31	12	1.805	0.787	19	21	38	8.30	0.717	28.7	16	51	32	4	11.45	0.812	0.6	19	31	16	4
1.250	16	21	40	1.807	0.786	19	23	22	8.40	0.709	26.0	16	33	50	4	11.44	0.812	0.6	19	33	10	4
1.248	16	23	24	1.809	0.785	19	49	30	8.17	0.705	28.6	16	47	32	4	11.35	0.805	0.6	19	51	34	4
1.247	16	27	16	1.813	0.783	19	19	40	8.33	0.702	25.8	16	49	34	4	11.32	0.803	0.6	19	31	8	4
1.245	19	23	22	1.813	0.783	19	21	42	7.70	0.692	33.1	17	35	10	5	11.31	0.802	0.6	19	33	48	4
1.245	19	21	38	1.814	0.783	19	29	28	7.80	0.692	31.6	17	51	36	5	11.27	0.799	0.6	20	25	8	4
1.241	19	49	32	1.815	0.782	19	45	30	8.14	0.685	25.8	16	33	16	4	11.25	0.798	0.6	20	7	26	4
1.240	19	45	30	1.816	0.782	19	33	14	8.05	0.675	25.2	16	31	6	4	11.18	0.793	0.6	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.3 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 251.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    15622.7
Exposure: MWd/MTU (GWd)         475.0 (  65.72 )
Delta E: MWd/MTU, (GWd)         224.0 (  30.99 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.170   3.399    13  0.497 0.521  59 34
Inlet Subcooling: Btu/lbm      -25.82                        24  0.491   9.606    14  0.436 0.536  59 30
Flow: Mlb/hr                   106.60 (104.00 %)             23  0.639  12.407    15  0.544 0.547   3 18
                                                             22  0.739  13.833    16  1.111 1.275  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  0.814  14.908    17  0.889 1.180  51 36
59             -- -- -- -- -- -- --             59           20  0.872  15.777    18  1.109 1.216  19 42
55          -- -- -- -- -- -- -- -- --          55           19  0.898  16.229    19  1.143 1.255  29 16
51       -- -- -- -- -- -- -- -- -- -- --       51           18  0.916  16.765    20  1.071 1.161  35  8
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --    47           17  0.932  17.116    21  1.064 1.164  33  8
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43              16  0.951  17.408
39 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 39           15  0.990  17.922
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35           14  1.011  17.833
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31           13  1.147  16.848
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27           12  1.203  17.364
23 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 23           11  1.228  17.615
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19           10  1.249  17.956
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15            9  1.281  18.352
11       -- -- -- -- -- -- -- -- -- -- --       11            8  1.312  18.562
 7          -- -- -- -- -- -- -- -- --          7            7  1.351  18.760
 3             -- -- -- -- -- -- --             3            6  1.411  19.207*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  1.438* 19.173
                                                             4  1.404  18.411
Control Rod Density: %             5.41                      3  1.296  16.769
                                                             2  0.991  12.539
k-effective:                   0.99987                Bottom  1  0.264   3.622
Void Fraction:                   0.469
Core Delta-P: psia              26.457            % AXIAL TILT -20.984  -7.000
Core Plate Delta-P: psia        21.894         AVG BOT 8ft/12ft  1.1194  1.0425
Coolant Temp: Deg-F              548.6
In Channel Flow: Mlb/hr          93.82   Active Channel Flow: Mlb/hr        90.47
Total Bypass Flow (%):           12.0   (of total core flow)
Total Water Rod Flow (%):         3.1   (of total core flow)
Source Convergence            0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.275	16	31	14	1.814	0.783	19	31	12	8.49	0.719	26.5	16	31	48	4	11.32	0.803	1.2	19	31	50	4
1.255	19	29	16	1.816	0.782	19	29	46	8.22	0.711	28.8	16	31	10	4	11.19	0.793	1.2	19	49	32	4
1.252	19	31	12	1.827	0.777	19	21	38	8.03	0.704	30.3	16	51	30	5	11.16	0.791	1.2	19	33	10	4
1.251	16	21	40	1.830	0.776	19	23	22	8.22	0.696	26.4	16	33	50	4	11.16	0.791	1.2	19	31	16	4
1.249	16	27	16	1.830	0.776	19	49	30	7.93	0.694	30.2	16	47	32	5	11.06	0.784	1.2	19	51	34	4
1.249	16	23	24	1.832	0.775	19	19	40	8.03	0.688	27.9	16	49	34	5	11.05	0.784	1.2	19	31	8	4
1.244	19	23	22	1.832	0.775	19	21	42	7.59	0.685	33.5	17	35	10	5	11.04	0.783	1.2	19	33	48	4
1.244	19	21	38	1.837	0.773	19	45	30	7.69	0.684	32.0	17	51	36	5	11.02	0.782	1.2	20	25	8	5
1.242	19	49	32	1.837	0.773	19	33	14	7.90	0.676	27.5	16	33	16	5	10.99	0.779	1.2	20	7	26	5
1.241	16	47	32	1.838	0.773	19	29	28	7.75	0.665	27.9	16	21	40	5	10.91	0.774	1.2	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.4 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 475.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)         475.2 (  65.74 )
Delta E: MWd/MTU, (GWd)           0.2 (   0.03 )
Power: MWt                     3952.0 (100.00 %)
Core Pressure: psia            1050.0
Inlet Subcooling: Btu/lbm      -26.94
Flow: Mlb/hr                   102.50 (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 -- -- --  6 -- -- -- 12 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 12 -- -- --  6 -- -- -- 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

Control Rod Density: %          5.14

k-effective:                 0.99996
Void Fraction:                0.472
Core Delta-P: psia           24.898
Core Plate Delta-P: psia     20.338
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr       90.16
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.2
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    15622.9

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.182   3.399    13  0.493 0.517  59 34
    24  0.525   9.607    14  0.433 0.532  59 30
    23  0.679  12.407    15  0.541 0.543   3 18
    22  0.778  13.833    16  1.114 1.272  31 14
    21  0.843  14.908    17  0.882 1.172  51 36
    20  0.893  15.777    18  1.118 1.216  19 42
    19  0.912  16.229    19  1.148 1.257  29 16
    18  0.924  16.766    20  1.061 1.151  35  8
    17  0.934  17.116    21  1.055 1.154  33  8
    16  0.949  17.409
    15  0.984  17.922
    14  1.002  17.833
    13  1.134  16.848
    12  1.187  17.364
    11  1.211  17.615
    10  1.231  17.957
     9  1.263  18.352
     8  1.294  18.562
     7  1.334  18.760
     6  1.394  19.207*
     5  1.422* 19.173
     4  1.392  18.411
     3  1.286  16.769
     2  0.984  12.539
Bottom  1  0.262   3.622

% AXIAL TILT -19.489  -7.000
AVG BOT 8ft/12ft  1.1078  1.0425

Active Channel Flow: Mlb/hr       86.91
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.272	16	31	14	1.769	0.803	19	21	38	8.40	0.711	26.5	16	31	48	4	11.20	0.795	1.2	19	31	50	4
1.266	16	29	32	1.770	0.802	19	29	28	8.14	0.704	28.8	16	31	10	4	11.07	0.785	1.2	19	49	32	4
1.263	16	23	24	1.773	0.801	19	27	30	8.03	0.697	29.1	16	51	32	4	11.05	0.784	1.2	19	33	10	4
1.257	19	29	16	1.774	0.801	19	23	22	8.14	0.689	26.4	16	33	50	4	11.04	0.783	1.2	19	31	16	4
1.256	16	21	40	1.781	0.797	19	29	16	7.83	0.685	30.2	16	47	32	5	10.95	0.777	1.2	19	51	34	4
1.253	19	23	22	1.787	0.794	19	19	40	8.06	0.681	26.2	16	49	34	4	10.94	0.776	1.2	19	31	8	4
1.253	19	21	38	1.788	0.794	19	21	42	7.50	0.677	33.5	17	35	10	5	10.92	0.775	1.2	19	33	48	4
1.250	16	27	16	1.794	0.792	19	45	30	7.60	0.677	32.0	17	51	36	5	10.90	0.773	1.2	20	25	8	5
1.245	19	31	12	1.796	0.791	19	23	36	7.81	0.667	27.5	16	33	16	5	10.86	0.770	1.2	20	7	26	5
1.242	19	45	30	1.796	0.791	19	25	38	7.66	0.657	27.9	16	21	40	5	10.80	0.766	1.2	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.5 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 475.2 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)         1000.0 ( 138.35 )
Delta E: MWd/MTU, (GWd)          524.8 (  72.61 )
Power: MWt                      3952.0 (100.00 %)
Core Pressure: psia             1050.0
Inlet Subcooling: Btu/lbm       -26.17
Flow: Mlb/hr                    105.27 (102.70 %)

    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 -- -- --  6 -- -- -- 12 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 12 -- -- --  6 -- -- -- 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

Control Rod Density: %             5.14

k-effective:                    0.99985
Void Fraction:                    0.465
Core Delta-P: psia               25.867
Core Plate Delta-P: psia         21.306
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          92.67
Total Bypass Flow (%):           12.0
Total Water Rod Flow (%):         3.1
Source Convergence              0.00009
```

```
Core Average Exposure: MWd/MTU    16147.7

                  Axial Profile    Edit   Radial Power
          N(PRA)  Power Exposure   Zone   Avg.  Max.   IR JR
Top 25    0.188    3.502    13   0.488 0.511  59 34
    24    0.538    9.905    14   0.428 0.526  59 30
    23    0.695   12.793    15   0.536 0.538   3 18
    22    0.794   14.278    16   1.112 1.270  31 14
    21    0.858   15.390    17   0.880 1.173  51 36
    20    0.905   16.286    18   1.114 1.214  19 42
    19    0.923   16.749    19   1.152 1.262  29 16
    18    0.933   17.291    20   1.064 1.155  35  8
    17    0.941   17.647    21   1.059 1.159  33  8
    16    0.955   17.948
    15    0.989   18.481
    14    1.006   18.402
    13    1.137   17.405
    12    1.189   17.947
    11    1.213   18.210
    10    1.232   18.561
     9    1.263   18.972
     8    1.291   19.197
     7    1.327   19.413
     6    1.382   19.889*
     5    1.402*  19.867
     4    1.364   19.087
     3    1.255   17.393
     2    0.962   13.016
Bottom   1    0.259    3.756

                % AXIAL TILT -18.499  -7.174
          AVG BOT 8ft/12ft  1.1018   1.0432

Active Channel Flow: Mlb/hr        89.37
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.270	16	31	14	1.783	0.796	19	21	38	8.23	0.703	27.5	16	31	48	4	11.03	0.782	2.4	19	31	50	4
1.262	19	29	16	1.788	0.794	19	29	28	7.94	0.699	30.8	16	31	10	5	10.89	0.773	2.4	19	49	32	4
1.260	16	23	24	1.788	0.794	19	23	22	7.84	0.693	31.2	16	51	30	5	10.88	0.771	2.4	19	33	10	5
1.259	16	29	32	1.790	0.793	19	27	30	7.90	0.684	28.9	16	33	50	5	10.85	0.770	2.4	19	31	16	5
1.257	19	23	22	1.795	0.791	19	29	16	7.73	0.682	31.1	16	47	32	5	10.79	0.765	2.4	19	31	8	4
1.257	19	21	38	1.800	0.789	19	19	40	7.83	0.676	28.8	16	49	34	5	10.79	0.765	2.4	20	25	8	5
1.253	16	21	40	1.800	0.789	19	21	42	7.41	0.674	34.3	17	35	10	5	10.78	0.765	2.4	19	51	34	5
1.251	19	31	12	1.807	0.786	19	45	30	7.51	0.674	32.9	17	51	36	5	10.76	0.763	2.4	19	33	48	4
1.248	16	27	16	1.810	0.784	19	19	36	7.69	0.662	28.4	16	33	16	5	10.75	0.762	2.4	20	7	26	5
1.247	19	45	30	1.811	0.784	19	23	36	7.53	0.651	28.8	16	21	40	5	10.64	0.755	2.4	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.6 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 1,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    16647.7
Exposure: MWd/MTU (GWd)         1500.0 ( 207.52 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.193   3.603    13  0.484 0.506  59 34
Inlet Subcooling: Btu/lbm       -26.17                        24  0.548  10.196    14  0.424 0.520  59 30
Flow: Mlb/hr                    105.27 (102.70 %)             23  0.707  13.168    15  0.532 0.535   3 18
                                                              22  0.805  14.709    16  1.110 1.267  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.868  15.856    17  0.877 1.172  51 36
59             -- -- -- -- -- -- --             59            20  0.914  16.777    18  1.110 1.210  19 42
55          -- -- -- -- -- -- -- -- --          55            19  0.930  17.249    19  1.157 1.266  29 16
51       -- -- -- -- -- -- -- -- -- -- --       51            18  0.939  17.796    20  1.067 1.159  53 36
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --    47            17  0.946  18.156    21  1.064 1.164  33  8
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43               16  0.959  18.464
39 -- -- -- 12 -- -- --  6 -- -- -- 12 -- -- -- 39            15  0.992  19.016
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35            14  1.007  18.945
31 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 31            13  1.136  17.936
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27            12  1.188  18.502
23 -- -- -- 12 -- -- --  6 -- -- -- 12 -- -- -- 23            11  1.211  18.776
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19            10  1.230  19.137
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15             9  1.260  19.562
11       -- -- -- -- -- -- -- -- -- -- --       11             8  1.287  19.800
 7          -- -- -- -- -- -- -- -- --          7             7  1.321  20.032
 3             -- -- -- -- -- -- --             3             6  1.373  20.533*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.390* 20.520
                                                              4  1.348  19.722
Control Rod Density: %              5.14                      3  1.240  17.977
                                                              2  0.953  13.464
k-effective:                    0.99975                Bottom  1  0.258   3.883
Void Fraction:                    0.463
Core Delta-P: psia               25.842            % AXIAL TILT -17.807  -7.304
Core Plate Delta-P: psia         21.281          AVG BOT 8ft/12ft  1.0975  1.0438
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          92.69   Active Channel Flow: Mlb/hr        89.39
Total Bypass Flow (%):           12.0    (of total core flow)
Total Water Rod Flow (%):         3.1    (of total core flow)
Source Convergence            0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.267	16	31	14	1.781	0.797	19	21	38	8.02	0.699	29.6	16	31	48	5	10.92	0.774	3.6	19	31	50	4
1.266	19	29	16	1.786	0.795	19	23	22	7.85	0.696	31.6	16	31	10	5	10.78	0.765	3.6	19	49	32	5
1.261	19	23	22	1.789	0.794	19	29	28	7.76	0.691	32.0	16	51	30	5	10.77	0.764	3.6	19	33	10	5
1.261	19	21	38	1.791	0.793	19	29	16	7.81	0.681	29.8	16	33	50	5	10.73	0.761	3.5	19	31	16	5
1.256	19	31	12	1.792	0.793	19	27	30	7.63	0.679	31.9	16	47	30	5	10.70	0.759	3.6	20	25	8	5
1.255	16	23	24	1.797	0.790	19	19	40	7.74	0.674	29.6	16	49	34	5	10.69	0.758	3.6	19	31	8	4
1.251	16	29	32	1.797	0.790	19	21	42	7.34	0.673	35.1	17	35	10	5	10.68	0.757	3.5	19	51	34	5
1.251	19	45	30	1.803	0.788	19	45	30	7.43	0.672	33.7	17	51	36	5	10.66	0.756	3.6	20	7	26	5
1.250	16	21	40	1.808	0.785	19	19	36	7.59	0.659	29.2	16	33	16	5	10.65	0.755	3.5	19	33	48	5
1.246	19	49	32	1.809	0.785	19	25	20	7.43	0.647	29.5	16	21	40	5	10.56	0.749	3.5	19	7	32	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.7 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 1,500.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)         1819.6 ( 251.74 )
Delta E: MWd/MTU, (GWd)          319.6 (  44.22 )
Power: MWt                      3952.0 (100.00 %)
Core Pressure: psia             1050.0
Inlet Subcooling: Btu/lbm       -26.17
Flow: Mlb/hr                    105.27 (102.70 %)

    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 -- -- --  6 -- -- -- 12 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 12 -- -- --  6 -- -- -- 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

Control Rod Density: %             5.14

k-effective:                    0.99972
Void Fraction:                    0.461
Core Delta-P: psia               25.823
Core Plate Delta-P: psia         21.262
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          92.70
Total Bypass Flow (%):           11.9
Total Water Rod Flow (%):         3.1
Source Convergence              0.00009
```

```
Core Average Exposure: MWd/MTU    16967.3

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.197   3.669    13  0.481 0.503  59 34
    24  0.555  10.384    14  0.422 0.516  59 30
    23  0.715  13.411    15  0.530 0.533   3 18
    22  0.814  14.989    16  1.108 1.264  31 14
    21  0.876  16.156    17  0.875 1.171  51 36
    20  0.921  17.094    18  1.107 1.208  19 42
    19  0.936  17.571    19  1.159 1.269  29 16
    18  0.944  18.121    20  1.070 1.161  53 36
    17  0.950  18.483    21  1.067 1.167  33  8
    16  0.962  18.795
    15  0.994  19.358
    14  1.008  19.292
    13  1.136  18.276
    12  1.186  18.856
    11  1.209  19.137
    10  1.228  19.504
     9  1.257  19.938
     8  1.284  20.184
     7  1.316  20.427
     6  1.366  20.942*
     5  1.380* 20.934
     4  1.337  20.123
     3  1.228  18.346
     2  0.945  13.748
Bottom  1  0.258   3.964

% AXIAL TILT -17.266  -7.371
AVG BOT 8ft/12ft  1.0941  1.0440

Active Channel Flow: Mlb/hr        89.41
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.269	19	29	16	1.779	0.798	19	21	38	7.95	0.696	30.2	16	31	48	5	10.83	0.768	4.4	19	31	50	4
1.264	16	31	14	1.784	0.796	19	23	22	7.79	0.694	32.2	16	31	10	5	10.70	0.759	4.3	19	49	32	5
1.263	19	23	22	1.788	0.794	19	29	16	7.69	0.688	32.6	16	51	30	5	10.69	0.758	4.3	19	33	10	5
1.263	19	21	38	1.789	0.794	19	29	28	7.74	0.679	30.3	16	33	50	5	10.64	0.754	4.3	19	31	16	5
1.259	19	31	12	1.792	0.793	19	27	32	7.57	0.676	32.4	16	47	30	5	10.63	0.754	4.3	20	25	8	5
1.254	19	45	30	1.795	0.791	19	21	42	7.68	0.671	30.1	16	49	34	5	10.61	0.753	4.3	19	31	8	5
1.252	16	23	24	1.795	0.791	19	19	40	7.28	0.671	35.6	17	35	10	5	10.59	0.751	4.3	20	7	26	5
1.249	19	49	32	1.800	0.789	19	45	30	7.38	0.670	34.2	17	51	36	5	10.59	0.751	4.3	19	51	34	5
1.249	19	27	14	1.805	0.787	19	19	36	7.53	0.656	29.7	16	33	16	5	10.58	0.750	4.2	19	33	48	5
1.247	16	21	40	1.806	0.786	19	25	20	7.34	0.644	30.3	16	45	28	5	10.50	0.744	4.2	19	7	32	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.8 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 1,819.6 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    16968.0
Exposure: MWd/MTU (GWd)        1820.3 ( 251.84 )
Delta E: MWd/MTU, (GWd)           0.7 (   0.10 )                 Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.161   3.670    13  0.487 0.512  59 34
Inlet Subcooling: Btu/lbm       -26.94                       24  0.454  10.385    14  0.428 0.526  59 30
Flow: Mlb/hr                   102.50 (100.00 %)            23  0.590  13.412    15  0.540 0.547   3 18
                                                            22  0.682  14.989    16  1.101 1.274  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  0.754  16.157    17  0.917 1.250  13 22
59             -- -- -- -- -- -- --             59          20  0.815  17.094    18  0.977 1.200  17 18
55          -- -- -- -- -- -- -- -- -- --       55          19  0.853  17.571    19  1.144 1.306  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --    51          18  0.891  18.122    20  1.105 1.230  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47          17  0.919  18.484    21  1.101 1.252  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43          16  0.949  18.796
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  0.996  19.359
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35          14  1.022  19.293
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.161  18.276
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27          12  1.219  18.857
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.247  19.138
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19          10  1.271  19.505
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.305  19.939
11       -- -- -- -- -- -- -- -- -- -- -- --       11           8  1.337  20.185
 7          -- -- -- -- -- -- -- -- -- --          7           7  1.376  20.428
 3             -- -- -- -- -- -- --              3           6  1.435  20.943*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.463* 20.935
                                                            4  1.436  20.124
Control Rod Density: %            4.82                      3  1.338  18.347
                                                            2  1.040  13.748
k-effective:                   0.99981                Bottom  1  0.285   3.965
Void Fraction:                   0.479
Core Delta-P: psia              25.073             % AXIAL TILT -23.760  -7.372
Core Plate Delta-P: psia        20.515          AVG BOT 8ft/12ft  1.1402  1.0440
Coolant Temp: Deg-F              548.6
In Channel Flow: Mlb/hr          90.07   Active Channel Flow: Mlb/hr        86.80
Total Bypass Flow (%):           12.1   (of total core flow)
Total Water Rod Flow (%):         3.2   (of total core flow)
Source Convergence            0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.306	19	47	34	1.703	0.834	20	51	40	8.73	0.752	28.4	16	49	28	4	11.78	0.835	4.3	19	49	32	4
1.297	19	49	32	1.735	0.819	19	49	30	8.43	0.747	31.5	16	51	30	4	11.74	0.832	4.3	19	51	34	4
1.292	19	49	36	1.737	0.818	19	47	28	8.28	0.745	33.2	17	51	26	4	11.72	0.831	4.1	19	49	26	4
1.287	19	13	24	1.749	0.812	19	49	36	8.41	0.743	31.2	16	47	32	4	11.68	0.829	3.9	21	51	24	4
1.280	19	45	32	1.755	0.809	19	13	38	8.49	0.740	29.7	16	49	24	4	11.68	0.829	4.1	19	47	34	4
1.279	19	15	26	1.785	0.795	19	15	32	8.31	0.736	31.4	16	47	26	4	11.67	0.827	4.3	20	7	26	4
1.274	16	49	34	1.789	0.794	19	45	36	7.96	0.720	33.8	17	13	22	5	11.49	0.815	3.9	20	51	40	4
1.270	16	47	32	1.792	0.792	20	39	52	8.18	0.717	30.4	16	45	28	5	11.45	0.812	3.0	19	47	24	4
1.269	16	47	36	1.798	0.790	20	9	20	7.70	0.709	35.6	17	35	10	5	11.44	0.811	4.2	19	15	32	4
1.267	16	45	34	1.798	0.790	19	15	22	7.94	0.708	32.2	16	31	10	5	11.43	0.811	3.4	19	49	40	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.9 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 1,820.3 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    17447.7
Exposure: MWd/MTU (GWd)         2300.0 ( 318.20 )
Delta E: MWd/MTU, (GWd)          479.7 (  66.36 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.166   3.753    13  0.483 0.507  59 34
Inlet Subcooling: Btu/lbm       -26.94                        24  0.464  10.621    14  0.424 0.520  59 30
Flow: Mlb/hr                    102.50 (100.00 %)             23  0.601  13.718    15  0.536 0.544   3 18
                                                              22  0.694  15.345    16  1.098 1.270  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.765  16.550    17  0.913 1.246  13 22
59              -- -- -- -- -- -- --              59          20  0.825  17.519    18  0.974 1.197  17 18
55          -- -- -- -- -- -- -- -- -- --         55          19  0.863  18.015    19  1.148 1.309  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.900  18.585    20  1.108 1.235  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  0.927  18.962    21  1.106 1.257  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43          16  0.956  19.289
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.001  19.876
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35          14  1.025  19.823
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.162  18.797
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27          12  1.218  19.403
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.246  19.697
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19          10  1.269  20.075
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15           9  1.302  20.524
11       -- -- -- -- -- -- -- -- -- -- -- --      11           8  1.332  20.784
 7          -- -- -- -- -- -- -- -- -- --         7           7  1.368  21.043
 3             -- -- -- -- -- -- -- --            3           6  1.424  21.585
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.448* 21.588*
                                                              4  1.417  20.764
Control Rod Density: %             4.82                       3  1.317  18.942
                                                              2  1.025  14.212
k-effective:                    0.99962                Bottom  1  0.283   4.098
Void Fraction:                    0.477
Core Delta-P: psia               25.043             % AXIAL TILT -22.925  -7.630
Core Plate Delta-P: psia         20.485          AVG BOT 8ft/12ft  1.1353  1.0455
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          90.09   Active Channel Flow: Mlb/hr        86.82
Total Bypass Flow (%):           12.1    (of total core flow)
Total Water Rod Flow (%):         3.2    (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.309	19	47	34	1.708	0.831	20	51	40	8.58	0.745	29.3	16	49	28	4	11.58	0.821	5.5	19	49	32	4
1.301	19	49	32	1.739	0.817	19	49	30	8.10	0.742	35.0	17	51	26	5	11.55	0.819	5.5	19	51	34	4
1.296	19	49	36	1.742	0.815	19	47	28	8.29	0.740	32.3	16	51	30	4	11.53	0.817	5.1	21	51	24	4
1.290	19	13	24	1.753	0.810	19	49	36	8.26	0.735	32.1	16	47	30	4	11.52	0.817	5.3	19	49	26	4
1.283	19	45	32	1.756	0.809	19	13	38	8.26	0.734	31.9	16	49	24	5	11.52	0.817	5.3	19	47	34	4
1.283	19	15	26	1.787	0.794	19	45	32	8.11	0.730	33.3	16	47	26	5	11.51	0.817	5.5	20	7	26	4
1.270	16	49	34	1.788	0.794	19	45	36	7.85	0.716	34.6	17	13	22	5	11.37	0.806	5.2	20	51	40	5
1.269	19	15	22	1.793	0.792	19	15	22	8.06	0.712	31.2	16	45	28	5	11.29	0.801	4.2	19	47	24	4
1.265	16	47	32	1.795	0.791	20	39	52	7.61	0.707	36.4	17	35	10	5	11.26	0.799	4.5	19	49	40	4
1.264	16	47	36	1.801	0.788	20	9	20	7.85	0.705	33.0	16	31	10	5	11.25	0.798	5.4	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.10 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 2,300.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    17947.6
Exposure: MWd/MTU (GWd)         2800.0 ( 387.38 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.170   3.841    13  0.479 0.502  59 34
Inlet Subcooling: Btu/lbm       -26.79                        24  0.474  10.872    14  0.421 0.514  59 30
Flow: Mlb/hr                    103.01 (100.50 %)             23  0.614  14.043    15  0.533 0.540   3 18
                                                              22  0.706  15.723    16  1.095 1.268  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.777  16.966    17  0.910 1.244  13 22
59             -- -- -- -- -- -- --             59           20  0.836  17.967    18  0.971 1.194  17 18
55          -- -- -- -- -- -- -- -- -- --       55           19  0.872  18.483    19  1.152 1.314  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --    51           18  0.908  19.073    20  1.112 1.242  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47           17  0.934  19.464    21  1.111 1.264  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43           16  0.961  19.806
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39           15  1.005  20.417
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35           14  1.028  20.377
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31           13  1.163  19.340
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27           12  1.217  19.972
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23           11  1.244  20.279
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19           10  1.267  20.668
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15            9  1.299  21.133
11       -- -- -- -- -- -- -- -- -- -- -- --       11            8  1.328  21.406
 7          -- -- -- -- -- -- -- -- -- --          7            7  1.362  21.682
 3             -- -- -- -- -- -- -- --             3            6  1.415  22.249
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.435* 22.262*
                                                              4  1.399  21.423
Control Rod Density: %             4.82                       3  1.297  19.554
                                                              2  1.010  14.688
k-effective:                    0.99952                Bottom  1  0.280   4.237
Void Fraction:                    0.474
Core Delta-P: psia               25.200             % AXIAL TILT -22.106  -7.861
Core Plate Delta-P: psia         20.641          AVG BOT 8ft/12ft  1.1303  1.0468
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          90.57   Active Channel Flow: Mlb/hr        87.29
Total Bypass Flow (%):            12.1   (of total core flow)
Total Water Rod Flow (%):          3.2   (of total core flow)
Source Convergence              0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.314	19	47	34	1.712	0.829	20	51	40	8.03	0.741	35.9	17	51	26	5	11.45	0.812	6.7	19	49	32	4
1.306	19	49	32	1.743	0.815	19	49	30	8.46	0.741	30.2	16	49	28	4	11.41	0.809	6.4	21	51	24	4
1.302	19	49	36	1.746	0.813	19	47	28	8.12	0.738	34.3	16	51	30	5	11.40	0.808	6.5	19	47	34	4
1.296	19	13	24	1.752	0.810	19	49	36	8.08	0.734	34.1	16	47	30	5	11.39	0.808	6.7	19	51	34	4
1.287	19	15	26	1.761	0.806	19	13	24	8.18	0.734	32.8	16	49	24	5	11.39	0.808	6.7	20	7	26	4
1.287	19	45	32	1.790	0.794	19	45	32	8.03	0.729	34.2	16	47	26	5	11.37	0.806	6.5	19	49	26	4
1.274	19	15	22	1.790	0.793	19	45	36	7.77	0.714	35.5	17	13	22	5	11.30	0.801	6.4	20	51	40	5
1.270	19	51	34	1.795	0.791	19	15	22	7.97	0.709	32.0	16	45	28	5	11.19	0.793	5.4	19	47	24	4
1.268	16	49	34	1.797	0.790	20	39	52	7.54	0.705	37.2	17	35	10	5	11.14	0.790	5.9	19	49	40	5
1.264	21	51	38	1.804	0.787	20	9	20	7.77	0.703	33.8	16	31	10	5	11.14	0.790	6.6	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.11 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 2,800.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    18447.7
Exposure: MWd/MTU (GWd)         3300.0 ( 456.55 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.174   3.933    13  0.475 0.497  59 34
Inlet Subcooling: Btu/lbm       -26.65                        24  0.484  11.128    14  0.417 0.509  59 30
Flow: Mlb/hr                    103.53 (101.00 %)             23  0.625  14.374    15  0.530 0.537   3 18
                                                              22  0.717  16.107    16  1.093 1.265  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.787  17.388    17  0.907 1.242  13 22
59             -- -- -- -- -- -- --             59            20  0.845  18.420    18  0.967 1.192  17 18
55          -- -- -- -- -- -- -- -- -- --       55            19  0.880  18.956    19  1.156 1.319  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --    51            18  0.915  19.565    20  1.116 1.248  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47            17  0.940  19.969    21  1.116 1.272  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43            16  0.966  20.326
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39            15  1.008  20.960
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35            14  1.029  20.931
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31            13  1.162  19.883
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27            12  1.215  20.540
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23            11  1.241  20.860
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19            10  1.264  21.260
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15             9  1.297  21.740
11       -- -- -- -- -- -- -- -- -- -- -- --       11             8  1.325  22.027
 7          -- -- -- -- -- -- -- -- -- --          7             7  1.357  22.318
 3             -- -- -- -- -- -- -- --             3             6  1.407  22.909
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.423* 22.931*
                                                              4  1.384  22.074
Control Rod Density: %             4.82                       3  1.281  20.157
                                                              2  0.996  15.157
k-effective:                    0.99938                Bottom  1  0.278   4.374
Void Fraction:                    0.471
Core Delta-P: psia               25.360            % AXIAL TILT -21.386  -8.058
Core Plate Delta-P: psia         20.802         AVG BOT 8ft/12ft  1.1258  1.0479
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          91.04   Active Channel Flow: Mlb/hr        87.76
Total Bypass Flow (%):            12.1   (of total core flow)
Total Water Rod Flow (%):          3.2   (of total core flow)
Source Convergence              0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.319	19	47	34	1.714	0.828	20	51	40	7.97	0.742	36.7	17	51	26	5	11.36	0.805	8.0	19	49	32	4
1.312	19	49	32	1.743	0.815	19	49	30	8.25	0.739	32.7	16	49	28	5	11.33	0.804	7.6	21	51	24	4
1.308	19	49	36	1.747	0.813	19	47	28	8.05	0.738	35.1	16	51	30	5	11.30	0.801	7.9	20	7	26	4
1.302	19	13	24	1.752	0.811	19	49	36	8.13	0.735	33.6	16	49	24	5	11.30	0.801	7.8	19	47	34	4
1.292	19	15	26	1.762	0.806	19	13	24	8.01	0.733	35.0	16	47	30	5	11.28	0.800	7.9	19	9	34	4
1.291	19	45	32	1.792	0.792	19	45	32	7.96	0.728	35.0	16	47	26	5	11.25	0.798	7.5	19	49	26	4
1.279	19	15	22	1.792	0.792	19	45	36	7.70	0.714	36.3	17	13	22	5	11.25	0.798	7.6	20	51	40	5
1.277	19	51	34	1.797	0.790	19	15	22	7.89	0.708	32.9	16	45	28	5	11.11	0.788	6.8	19	47	24	5
1.272	21	51	38	1.800	0.789	20	39	52	7.47	0.704	38.0	17	35	10	5	11.06	0.784	7.0	19	49	40	5
1.269	19	11	22	1.805	0.787	20	9	20	7.57	0.704	36.7	16	11	20	5	11.06	0.784	7.8	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.12 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 3,300.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)         3800.0 ( 525.73 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )
Power: MWt                      3952.0 (100.00 %)
Core Pressure: psia             1050.0
Inlet Subcooling: Btu/lbm       -26.37
Flow: Mlb/hr                    104.55 (102.00 %)

    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58
59              -- -- -- -- -- -- --              59
55          -- -- -- -- -- -- -- -- -- --         55
51       -- -- -- -- -- -- -- -- -- -- -- --      51
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 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: %           4.82

k-effective:                  0.99934
Void Fraction:                  0.467
Core Delta-P: psia             25.709
Core Plate Delta-P: psia       21.150
Coolant Temp: Deg-F             548.5
In Channel Flow: Mlb/hr          91.98
Total Bypass Flow (%):           12.0
Total Water Rod Flow (%):         3.2
Source Convergence            0.00008
```

```
Core Average Exposure: MWd/MTU    18947.5

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.178   4.026    13  0.471 0.492  59 34
    24  0.494  11.390    14  0.413 0.503  59 30
    23  0.637  14.712    15  0.526 0.533   3 18
    22  0.728  16.497    16  1.090 1.263  49 34
    21  0.797  17.816    17  0.904 1.240  13 22
    20  0.854  18.879    18  0.963 1.190  17 18
    19  0.888  19.433    19  1.160 1.324  47 34
    18  0.922  20.061    20  1.120 1.255  51 40
    17  0.945  20.478    21  1.121 1.279  51 38
    16  0.970  20.848
    15  1.011  21.505
    14  1.030  21.487
    13  1.161  20.426
    12  1.213  21.107
    11  1.239  21.439
    10  1.262  21.851
     9  1.294  22.346
     8  1.321  22.645
     7  1.352  22.952
     6  1.400  23.566
     5  1.413* 23.594*
     4  1.369  22.718
     3  1.263  20.752
     2  0.981  15.619
Bottom  1  0.275   4.510

% AXIAL TILT -20.665  -8.226
AVG BOT 8ft/12ft  1.1213  1.0488

Active Channel Flow: Mlb/hr       88.68
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.324	19	47	34	1.720	0.826	20	51	40	7.92	0.743	37.6	17	51	26	5	11.27	0.800	8.8	21	51	24	5
1.318	19	49	32	1.747	0.813	19	49	30	8.19	0.739	33.6	16	49	28	5	11.27	0.799	9.2	19	49	32	4
1.314	19	49	36	1.751	0.811	19	47	28	7.99	0.739	36.0	16	51	30	5	11.22	0.795	9.2	20	7	26	4
1.307	19	13	24	1.754	0.809	19	49	36	8.07	0.736	34.5	16	49	24	5	11.21	0.795	8.8	20	51	40	5
1.296	19	15	26	1.765	0.805	19	13	24	7.94	0.732	35.8	16	47	30	5	11.20	0.795	9.1	19	9	34	4
1.296	19	45	32	1.797	0.790	19	45	36	7.89	0.728	35.8	16	47	26	5	11.20	0.794	9.0	19	47	34	4
1.284	19	15	22	1.797	0.790	19	45	32	7.64	0.713	37.1	17	13	22	5	11.17	0.793	8.7	19	49	26	4
1.283	19	51	34	1.801	0.788	19	15	22	7.82	0.707	33.7	16	45	28	5	11.06	0.785	7.9	19	47	24	5
1.279	21	51	38	1.806	0.786	20	39	52	7.52	0.705	37.5	16	11	20	5	10.97	0.778	8.2	19	49	40	5
1.276	19	11	22	1.809	0.785	20	9	20	7.42	0.705	38.8	17	35	10	5	10.97	0.778	9.0	19	7	32	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.13 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 3,800.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    19447.5
Exposure: MWd/MTU (GWd)         4300.0 ( 594.90 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.182   4.121    13  0.467 0.487  59 34
Inlet Subcooling: Btu/lbm       -26.23                        24  0.502  11.656    14  0.409 0.498  59 30
Flow: Mlb/hr                    105.06 (102.50 %)             23  0.647  15.055    15  0.522 0.530   3 18
                                                              22  0.737  16.892    16  1.087 1.261  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.805  18.248    17  0.900 1.238  13 22
59              -- -- -- -- -- -- --              59          20  0.861  19.342    18  0.959 1.187  17 18
55          -- -- -- -- -- -- -- -- -- --         55          19  0.894  19.914    19  1.164 1.330  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.927  20.559    20  1.125 1.262  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  0.949  20.989    21  1.127 1.287  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43          16  0.973  21.373
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.013  22.051
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35          14  1.030  22.043
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.159  20.968
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27          12  1.209  21.673
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.235  22.017
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19          10  1.259  22.441
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15           9  1.291  22.950
11       -- -- -- -- -- -- -- -- -- -- -- --      11           8  1.318  23.263
 7          -- -- -- -- -- -- -- -- --           7           7  1.349  23.583
 3             -- -- -- -- -- -- --              3           6  1.396  24.220
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.407* 24.253*
                                                              4  1.361  23.356
Control Rod Density: %              4.82                      3  1.253  21.340
                                                              2  0.972  16.076
k-effective:                    0.99920                Bottom  1  0.274   4.645
Void Fraction:                    0.465
Core Delta-P: psia               25.880            % AXIAL TILT -20.152  -8.369
Core Plate Delta-P: psia         21.321          AVG BOT 8ft/12ft  1.1180  1.0496
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          92.45   Active Channel Flow: Mlb/hr        89.15
Total Bypass Flow (%):           12.0    (of total core flow)
Total Water Rod Flow (%):         3.1    (of total core flow)
Source Convergence              0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.330	19	47	34	1.724	0.824	20	51	40	7.89	0.747	38.4	17	51	26	5	11.25	0.798	10.0	21	51	24	5
1.324	19	49	32	1.748	0.812	19	49	30	8.14	0.741	34.4	16	49	28	5	11.22	0.796	10.4	19	49	32	4
1.321	19	49	36	1.753	0.810	19	47	28	7.95	0.741	36.8	16	51	30	5	11.20	0.794	10.0	20	51	40	5
1.313	19	13	24	1.755	0.809	19	49	36	8.04	0.739	35.4	16	49	24	5	11.18	0.793	10.3	20	7	26	5
1.301	19	15	26	1.766	0.804	19	13	24	7.88	0.733	36.7	16	47	30	5	11.17	0.792	10.3	19	9	34	4
1.300	19	45	32	1.800	0.789	19	45	36	7.84	0.729	36.7	16	47	26	5	11.15	0.791	10.2	19	47	34	4
1.290	19	51	34	1.801	0.789	19	45	32	7.59	0.715	37.9	17	13	22	5	11.14	0.790	9.9	19	49	26	4
1.289	19	15	22	1.804	0.787	19	15	22	7.50	0.709	38.3	16	11	20	5	11.04	0.783	9.1	19	47	24	5
1.287	21	51	38	1.806	0.786	20	39	52	7.76	0.707	34.5	16	45	28	5	10.95	0.776	10.1	19	7	32	5
1.284	19	11	22	1.810	0.784	19	11	22	7.38	0.706	39.6	17	35	10	5	10.92	0.774	9.4	19	49	40	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.14 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 4,300.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    19710.5
Exposure: MWd/MTU (GWd)         4563.0 ( 631.29 )
Delta E: MWd/MTU, (GWd)          263.0 (  36.39 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.184   4.172    13  0.465 0.484  59 34
Inlet Subcooling: Btu/lbm       -26.17                        24  0.506  11.798    14  0.407 0.495  59 30
Flow: Mlb/hr                    105.27 (102.70 %)             23  0.651  15.238    15  0.520 0.528   3 18
                                                              22  0.741  17.102    16  1.085 1.260  49 34
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.809  18.478    17  0.898 1.237  13 22
59             -- -- -- -- -- -- --             59            20  0.864  19.586    18  0.957 1.186  17 18
55          -- -- -- -- -- -- -- -- -- --       55            19  0.896  20.168    19  1.166 1.333  47 34
51       -- -- -- -- -- -- -- -- -- -- -- --    51            18  0.929  20.823    20  1.127 1.266  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47            17  0.951  21.259    21  1.130 1.291  51 38
43 -- -- -- -- -- 12 --  0 -- 14 -- -- -- -- -- 43            16  0.974  21.649
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39            15  1.013  22.338
35 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 35            14  1.029  22.335
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31            13  1.158  21.253
27 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 27            12  1.207  21.970
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23            11  1.232  22.320
19 -- -- -- -- -- 14 --  0 -- 12 -- -- -- -- -- 19            10  1.257  22.750
15    -- -- -- -- -- -- -- -- -- -- -- -- -- 15              9  1.289  23.268
11       -- -- -- -- -- -- -- -- -- -- -- 11                 8  1.317  23.587
 7          -- -- -- -- -- -- -- -- -- 7                    7  1.347  23.915
 3             -- -- -- -- -- -- -- 3                       6  1.394  24.563
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.404* 24.599*
                                                            4  1.358  23.691
Control Rod Density: %           4.82                       3  1.249  21.648
                                                            2  0.968  16.315
k-effective:                  0.99914                Bottom  1  0.273   4.716
Void Fraction:                  0.464
Core Delta-P: psia             25.948            % AXIAL TILT -19.918  -8.436
Core Plate Delta-P: psia       21.389         AVG BOT 8ft/12ft  1.1164  1.0500
Coolant Temp: Deg-F             548.5
In Channel Flow: Mlb/hr         92.64   Active Channel Flow: Mlb/hr        89.34
Total Bypass Flow (%):          12.0    (of total core flow)
Total Water Rod Flow (%):        3.1    (of total core flow)
Source Convergence            0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.333	19	47	34	1.726	0.823	20	51	40	7.88	0.749	38.9	17	51	26	5	11.24	0.797	10.6	21	51	24	5
1.327	19	49	32	1.748	0.812	19	49	30	8.12	0.743	34.9	16	49	28	5	11.20	0.794	11.0	19	49	32	4
1.325	19	49	36	1.753	0.810	19	47	28	7.94	0.743	37.3	16	51	30	5	11.19	0.794	10.6	20	51	40	5
1.316	19	13	24	1.755	0.809	19	49	36	8.03	0.740	35.8	16	49	24	5	11.17	0.792	11.0	20	7	26	5
1.304	19	15	26	1.767	0.804	19	13	24	7.86	0.734	37.1	16	47	30	5	11.16	0.792	10.9	19	9	34	4
1.303	19	45	32	1.801	0.788	19	45	36	7.82	0.730	37.1	16	47	26	5	11.13	0.790	10.5	19	49	26	5
1.294	19	51	34	1.802	0.788	19	45	32	7.57	0.716	38.3	17	13	22	5	11.13	0.789	10.7	19	47	34	5
1.292	19	15	22	1.805	0.787	19	15	22	7.49	0.711	38.7	16	11	20	5	11.03	0.782	9.8	19	47	24	5
1.291	21	51	38	1.806	0.786	20	39	52	7.36	0.708	40.0	17	35	10	5	10.94	0.776	10.7	19	7	32	5
1.288	19	11	22	1.810	0.785	19	11	22	7.73	0.707	35.0	16	45	28	5	10.89	0.772	10.0	19	49	40	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.15 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 4,563.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)        4563.7 ( 631.39 )
Delta E: MWd/MTU, (GWd)         0.7 (   0.10 )
Power: MWt                     3952.0 (100.00 %)
Core Pressure: psia            1050.0
Inlet Subcooling: Btu/lbm      -26.94
Flow: Mlb/hr                   102.50 (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 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- 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: %          4.19

k-effective:                 0.99915
Void Fraction:                0.475
Core Delta-P: psia           25.073
Core Plate Delta-P: psia     20.517
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr       90.08
Total Bypass Flow (%):         12.1
Total Water Rod Flow (%):       3.2
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    19711.2

                 Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.172   4.173    13  0.457 0.466  33  2
    24  0.472  11.798    14  0.400 0.476  59 30
    23  0.606  15.238    15  0.513 0.514   3 18
    22  0.690  17.102    16  1.077 1.256  29 32
    21  0.752  18.478    17  0.884 1.194  39 14
    20  0.807  19.587    18  1.066 1.209  17 44
    19  0.845  20.168    19  1.178 1.310  29 28
    18  0.890  20.823    20  1.111 1.227  39 10
    17  0.926  21.259    21  1.110 1.241  37 10
    16  0.961  21.650
    15  1.009  22.339
    14  1.033  22.336
    13  1.166  21.253
    12  1.219  21.971
    11  1.248  22.321
    10  1.275  22.751
     9  1.310  23.269
     8  1.341  23.588
     7  1.376  23.916
     6  1.430  24.564
     5  1.449* 24.600*
     4  1.411  23.692
     3  1.307  21.649
     2  1.017  16.316
Bottom  1  0.288   4.716

% AXIAL TILT -23.112  -8.437
AVG BOT 8ft/12ft  1.1382  1.0500

Active Channel Flow: Mlb/hr       86.81
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.310	19	29	28	1.737	0.817	19	29	34	7.64	0.726	38.9	17	51	26	5	10.97	0.778	10.3	20	39	52	5
1.307	19	27	30	1.738	0.817	19	27	32	7.52	0.723	40.0	17	35	10	5	10.97	0.778	10.6	20	51	40	5
1.273	19	27	36	1.781	0.797	20	21	52	7.79	0.718	35.8	16	49	24	5	10.94	0.776	10.6	21	51	24	5
1.273	19	19	44	1.785	0.795	20	51	22	7.79	0.717	35.6	16	37	12	5	10.93	0.775	10.3	21	37	10	5
1.271	19	25	34	1.817	0.781	19	27	36	7.69	0.715	36.7	16	31	10	5	10.87	0.771	11.0	20	7	26	5
1.271	19	17	46	1.819	0.781	16	31	32	7.64	0.715	37.3	16	51	30	5	10.86	0.771	10.7	20	25	8	5
1.270	19	17	42	1.822	0.780	19	25	34	7.75	0.708	34.8	16	33	50	5	10.86	0.770	10.3	20	17	50	5
1.268	19	15	44	1.831	0.776	19	17	46	7.45	0.707	38.7	16	11	20	5	10.82	0.767	10.2	20	19	52	5
1.258	19	19	48	1.834	0.774	19	15	44	7.72	0.706	34.9	16	49	28	5	10.81	0.767	10.5	20	49	18	5
1.256	16	29	32	1.834	0.774	19	29	38	7.47	0.706	38.3	16	41	12	5	10.81	0.766	10.4	20	9	20	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.16 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 4,563.7 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    20147.5
Exposure: MWd/MTU (GWd)        5000.0 ( 691.75 )
Delta E: MWd/MTU, (GWd)         436.3 (  60.36 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.175   4.253    13  0.453 0.462  33  2
Inlet Subcooling: Btu/lbm      -26.79                        24  0.478  12.020    14  0.397 0.472  59 30
Flow: Mlb/hr                   103.01 (100.50 %)             23  0.614  15.523    15  0.510 0.511   3 18
                                                             22  0.696  17.428    16  1.074 1.247  29 32
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  0.758  18.834    17  0.881 1.192  39 14
59              -- -- -- -- -- -- --              59         20  0.812  19.968    18  1.061 1.206  17 44
55          -- -- -- -- -- -- -- -- -- --         55         19  0.849  20.567    19  1.181 1.309  29 28
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  0.893  21.243    20  1.115 1.233  39 10
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  0.929  21.696    21  1.115 1.248  37 10
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- -- 43         16  0.963  22.103
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.010  22.814
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 35         14  1.032  22.822
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.164  21.728
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 27         12  1.216  22.467
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.244  22.829
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- -- 19         10  1.272  23.271
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  1.308  23.803
11       -- -- -- -- -- -- -- -- -- -- -- --       11          8  1.339  24.135
 7          -- -- -- -- -- -- -- -- -- --          7          7  1.374  24.477
 3             -- -- -- -- -- -- --              3          6  1.427  25.147
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  1.445* 25.191*
                                                             4  1.406  24.267
Control Rod Density: %          4.19                         3  1.299  22.181
                                                             2  1.010  16.729
k-effective:                 0.99903                Bottom  1  0.287   4.839
Void Fraction:                0.473
Core Delta-P: psia           25.247             % AXIAL TILT -22.724  -8.608
Core Plate Delta-P: psia     20.690          AVG BOT 8ft/12ft  1.1357  1.0510
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr       90.55   Active Channel Flow: Mlb/hr        87.27
Total Bypass Flow (%):         12.1   (of total core flow)
Total Water Rod Flow (%):       3.2   (of total core flow)
Source Convergence          0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.309	19	29	28	1.748	0.812	19	29	34	7.63	0.731	39.6	17	51	26	5	10.99	0.779	11.6	20	51	40	5
1.306	19	27	30	1.749	0.812	19	27	32	7.50	0.726	40.7	17	35	10	5	10.97	0.778	11.4	20	39	52	5
1.277	19	19	44	1.786	0.795	20	21	52	7.78	0.722	36.5	16	49	24	5	10.95	0.776	11.7	21	51	24	5
1.275	19	17	46	1.788	0.794	20	51	22	7.76	0.719	36.3	16	37	12	5	10.91	0.774	11.3	21	37	10	5
1.274	19	17	42	1.827	0.777	19	27	36	7.63	0.718	38.0	16	51	30	5	10.88	0.771	12.0	20	7	26	5
1.273	19	15	44	1.832	0.775	19	35	28	7.66	0.717	37.4	16	31	10	5	10.85	0.769	11.8	20	25	8	5
1.273	19	27	36	1.833	0.775	19	17	46	7.44	0.711	39.4	16	11	20	5	10.82	0.768	11.4	20	17	50	5
1.270	19	25	34	1.835	0.774	16	31	32	7.71	0.710	35.6	16	49	28	5	10.82	0.767	11.2	20	19	52	5
1.263	19	19	48	1.835	0.774	19	15	44	7.71	0.709	35.5	16	33	50	5	10.82	0.767	11.4	20	9	20	5
1.259	19	13	42	1.843	0.770	19	29	38	7.45	0.709	39.0	16	41	12	5	10.79	0.766	11.5	20	49	18	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.17 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 5,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    20647.4
Exposure: MWd/MTU (GWd)         5500.0 ( 760.92 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.177   4.346    13  0.449 0.457  33  2
Inlet Subcooling: Btu/lbm       -26.73                        24  0.484  12.277    14  0.394 0.466  59 30
Flow: Mlb/hr                    103.22 (100.70 %)             23  0.621  15.854    15  0.506 0.508   3 18
                                                              22  0.702  17.806    16  1.071 1.238  29 32
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.763  19.244    17  0.878 1.190  39 14
59              -- -- -- -- -- -- --              59          20  0.816  20.407    18  1.056 1.203  17 44
55          -- -- -- -- -- -- -- -- -- --         55          19  0.853  21.027    19  1.185 1.310  29 28
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.896  21.726    20  1.119 1.240  39 10
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  0.931  22.198    21  1.121 1.255  37 10
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- -- 43          16  0.964  22.623
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.010  23.359
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 35          14  1.030  23.378
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.159  22.271
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 27          12  1.210  23.033
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.239  23.409
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- -- 19          10  1.268  23.865
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.304  24.414
11       -- -- -- -- -- -- -- -- -- -- -- --       11           8  1.336  24.760
 7          -- -- -- -- -- -- -- -- -- --          7           7  1.372  25.120
 3             -- -- -- -- -- -- --              3            6  1.426  25.814
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.445* 25.867*
                                                              4  1.405  24.924
Control Rod Density: %             4.19                       3  1.297  22.788
                                                              2  1.007  17.201
k-effective:                    0.99892                Bottom  1  0.286   4.980
Void Fraction:                    0.471
Core Delta-P: psia               25.314            % AXIAL TILT -22.443  -8.787
Core Plate Delta-P: psia         20.758         AVG BOT 8ft/12ft  1.1336  1.0521
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          90.74   Active Channel Flow: Mlb/hr        87.46
Total Bypass Flow (%):           12.1    (of total core flow)
Total Water Rod Flow (%):         3.2    (of total core flow)
Source Convergence            0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.310	19	29	28	1.756	0.809	19	29	34	7.63	0.736	40.4	17	51	26	5	11.01	0.781	12.8	20	51	40	5
1.307	19	27	30	1.757	0.808	19	27	32	7.49	0.731	41.5	17	35	10	5	10.99	0.779	12.5	20	39	52	5
1.281	19	17	46	1.789	0.794	20	21	52	7.77	0.727	37.3	16	49	24	5	10.96	0.777	12.8	21	51	24	5
1.281	19	19	44	1.791	0.793	20	51	22	7.75	0.724	37.1	16	37	12	5	10.93	0.775	12.5	21	37	10	5
1.279	19	15	44	1.833	0.775	19	17	46	7.61	0.723	38.8	16	51	30	5	10.88	0.772	13.2	20	7	26	5
1.279	19	17	42	1.834	0.774	19	27	36	7.64	0.721	38.2	16	31	10	5	10.85	0.769	12.4	20	19	52	5
1.275	19	27	36	1.835	0.774	19	15	44	7.44	0.717	40.2	16	11	20	5	10.85	0.769	12.6	20	9	20	5
1.272	19	25	34	1.839	0.772	19	35	28	7.45	0.715	39.8	16	41	12	5	10.85	0.769	12.9	20	25	8	5
1.269	19	19	48	1.847	0.769	19	19	44	7.69	0.713	36.4	16	49	28	5	10.82	0.767	12.5	20	17	50	5
1.265	19	13	42	1.848	0.769	16	31	32	7.69	0.713	36.4	16	33	50	5	10.80	0.766	12.8	19	33	10	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.18 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 5,500.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    21147.3
Exposure: MWd/MTU (GWd)         6000.0 ( 830.10 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.180   4.440    13  0.445 0.452  33  2
Inlet Subcooling: Btu/lbm       -26.73                        24  0.489  12.538    14  0.390 0.461  59 30
Flow: Mlb/hr                    103.22 (100.70 %)             23  0.626  16.187    15  0.503 0.504   3 18
                                                              22  0.707  18.186    16  1.068 1.231  29 32
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.766  19.656    17  0.874 1.188  39 14
59              -- -- -- -- -- -- --              59          20  0.818  20.848    18  1.051 1.201  17 44
55          -- -- -- -- -- -- -- -- -- --         55          19  0.854  21.487    19  1.190 1.312  29 28
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.897  22.210    20  1.124 1.247  39 10
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  0.931  22.701    21  1.127 1.264  37 10
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- -- 43          16  0.964  23.143
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.008  23.904
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 35          14  1.027  23.933
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.154  22.811
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 27          12  1.204  23.597
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.232  23.987
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- -- 19          10  1.262  24.457
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.300  25.023
11       -- -- -- -- -- -- -- -- -- -- -- --       11           8  1.334  25.385
 7          -- -- -- -- -- -- -- -- -- --          7           7  1.372  25.761
 3             -- -- -- -- -- -- --              3           6  1.427  26.482
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.447* 26.543*
                                                              4  1.407  25.582
Control Rod Density: %             4.19                       3  1.298  23.395
                                                              2  1.006  17.672
k-effective:                    0.99884                Bottom  1  0.287   5.121
Void Fraction:                    0.471
Core Delta-P: psia               25.311            % AXIAL TILT -22.259  -8.952
Core Plate Delta-P: psia         20.755         AVG BOT 8ft/12ft  1.1320  1.0530
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          90.74   Active Channel Flow: Mlb/hr        87.47
Total Bypass Flow (%):           12.1    (of total core flow)
Total Water Rod Flow (%):         3.2    (of total core flow)
Source Convergence            0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.312	19	29	28	1.762	0.806	19	29	34	7.63	0.743	41.2	17	51	26	5	11.05	0.784	14.0	20	51	40	5
1.309	19	27	32	1.763	0.805	19	27	32	7.50	0.738	42.3	17	35	10	5	11.03	0.783	13.7	20	39	52	5
1.288	19	17	46	1.792	0.792	20	21	52	7.77	0.733	38.2	16	49	24	5	10.99	0.779	14.0	21	51	24	5
1.286	19	19	44	1.795	0.791	20	51	22	7.75	0.730	37.9	16	37	12	5	10.95	0.777	13.7	21	37	10	5
1.286	19	15	44	1.832	0.775	19	17	46	7.61	0.728	39.6	16	51	30	5	10.90	0.773	14.3	20	7	26	5
1.284	19	17	42	1.834	0.774	19	15	44	7.64	0.727	39.0	16	31	10	5	10.90	0.773	13.7	20	9	20	5
1.277	19	27	36	1.839	0.772	19	27	36	7.46	0.724	41.0	16	11	20	5	10.89	0.773	13.5	20	19	52	5
1.276	19	19	48	1.844	0.770	19	35	28	7.47	0.722	40.6	16	41	12	5	10.87	0.771	14.1	20	25	8	5
1.274	19	25	34	1.848	0.768	19	19	44	7.68	0.718	37.2	16	49	28	5	10.83	0.768	13.1	19	39	50	5
1.272	19	13	42	1.850	0.768	20	19	52	7.68	0.718	37.2	16	33	50	5	10.83	0.768	14.0	19	33	10	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.19 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 6,000.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    21647.3
Exposure: MWd/MTU (GWd)      6500.0 ( 899.27 )
Delta E: MWd/MTU, (GWd)       500.0 (  69.17 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                  Top 25  0.182   4.536    13  0.441 0.447  33  2
Inlet Subcooling: Btu/lbm    -26.79                      24  0.493  12.800    14  0.386 0.455  59 30
Flow: Mlb/hr                 103.01 (100.50 %)           23  0.630  16.524    15  0.499 0.501   3 18
                                                         22  0.709  18.568    16  1.065 1.223  29 32
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          21  0.768  20.070    17  0.871 1.186  39 14
59              -- -- -- -- -- -- --             59      20  0.819  21.290    18  1.046 1.197  17 44
55          -- -- -- -- -- -- -- -- -- --        55      19  0.854  21.948    19  1.194 1.314  29 28
51       -- -- -- -- -- -- -- -- -- -- -- --     51      18  0.896  22.694    20  1.128 1.254  39 10
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --  47      17  0.930  23.203    21  1.133 1.272  37 10
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- 43      16  0.962  23.662
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.006  24.447
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 35      14  1.023  24.486
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.148  23.349
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 27      12  1.196  24.158
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.225  24.561
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- 19      10  1.256  25.046
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15       9  1.296  25.630
11       -- -- -- -- -- -- -- -- -- -- --       11       8  1.331  26.008
 7          -- -- -- -- -- -- -- -- --          7       7  1.372  26.403
 3             -- -- -- -- -- -- --             3       6  1.431  27.150
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          5  1.453* 27.221*
                                                         4  1.415  26.242
Control Rod Density: %          4.19                     3  1.305  24.004
                                                         2  1.011  18.144
k-effective:                 0.99876              Bottom  1  0.289   5.263
Void Fraction:                0.471
Core Delta-P: psia           25.242          % AXIAL TILT -22.252  -9.107
Core Plate Delta-P: psia     20.685       AVG BOT 8ft/12ft  1.1313  1.0539
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr       90.56   Active Channel Flow: Mlb/hr        87.29
Total Bypass Flow (%):         12.1   (of total core flow)
Total Water Rod Flow (%):       3.2   (of total core flow)
Source Convergence          0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.314	19	29	28	1.767	0.803	19	29	34	7.66	0.752	42.0	17	51	26	5	11.13	0.789	15.2	20	51	40	5
1.311	19	27	30	1.769	0.803	19	27	32	7.52	0.746	43.1	17	35	10	5	11.10	0.787	14.9	20	39	52	5
1.294	19	17	46	1.795	0.791	20	21	52	7.79	0.741	39.0	16	49	24	5	11.05	0.784	15.2	21	51	24	5
1.292	19	15	44	1.798	0.790	20	51	22	7.78	0.738	38.8	16	37	12	5	11.01	0.781	14.9	21	37	10	5
1.291	19	19	44	1.831	0.776	19	17	46	7.62	0.736	40.4	16	51	30	5	10.97	0.778	14.9	20	9	20	5
1.289	19	17	42	1.833	0.775	19	15	44	7.65	0.734	39.8	16	31	10	5	10.97	0.778	14.7	20	19	52	5
1.282	19	19	48	1.839	0.772	19	27	36	7.49	0.733	41.8	16	11	20	5	10.95	0.777	15.5	20	7	26	4
1.280	19	27	36	1.849	0.768	19	19	44	7.50	0.731	41.4	16	41	12	5	10.92	0.774	14.5	19	49	40	5
1.278	19	13	42	1.849	0.768	19	35	28	7.69	0.725	38.1	16	49	28	5	10.91	0.774	15.1	19	33	10	4
1.276	19	25	34	1.852	0.767	20	19	52	7.69	0.724	38.0	16	33	50	5	10.91	0.774	14.3	19	39	50	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.20 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 6,500.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    22257.8
Exposure: MWd/MTU (GWd)         7110.5 ( 983.73 )
Delta E: MWd/MTU, (GWd)          610.5 (  84.46 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.184   4.654    13  0.436 0.441  33  2
Inlet Subcooling: Btu/lbm       -26.94                        24  0.496  13.123    14  0.382 0.449   9 52
Flow: Mlb/hr                    102.50 (100.00 %)             23  0.634  16.937    15  0.494 0.496   3 18
                                                              22  0.711  19.036    16  1.061 1.214  29 32
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.767  20.575    17  0.866 1.183  39 14
59              -- -- -- -- -- -- --              59          20  0.818  21.829    18  1.039 1.194  17 44
55          -- -- -- -- -- -- -- -- -- --         55          19  0.852  22.510    19  1.200 1.317  29 28
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.894  23.283    20  1.134 1.264  39 10
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  0.927  23.815    21  1.141 1.282  37 10
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- -- 43          16  0.958  24.295
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.000  25.108
35 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 35          14  1.016  25.158
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.137  24.001
27 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- -- 27          12  1.184  24.836
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.213  25.256
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- -- 19          10  1.247  25.760
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.289  26.369
11       -- -- -- -- -- -- -- -- -- -- -- --       11           8  1.329  26.767
 7          -- -- -- -- -- -- -- -- -- --          7           7  1.374  27.187
 3             -- -- -- -- -- -- -- --             3           6  1.438  27.969
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.466* 28.055*
                                                              4  1.431  27.055
Control Rod Density: %             4.19                       3  1.322  24.754
                                                              2  1.023  18.725
k-effective:                    0.99867                Bottom  1  0.293   5.438
Void Fraction:                    0.472
Core Delta-P: psia               25.071            % AXIAL TILT -22.440  -9.290
Core Plate Delta-P: psia         20.515         AVG BOT 8ft/12ft  1.1315  1.0549
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          90.09   Active Channel Flow: Mlb/hr        86.83
Total Bypass Flow (%):           12.1    (of total core flow)
Total Water Rod Flow (%):         3.2    (of total core flow)
Source Convergence            0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.317	19	29	28	1.769	0.803	19	29	34	7.72	0.765	43.0	17	51	26	5	11.31	0.802	16.5	20	51	40	4
1.313	19	27	30	1.771	0.802	19	27	32	7.58	0.760	44.1	17	35	10	5	11.27	0.799	16.2	20	39	52	4
1.302	19	17	46	1.796	0.790	20	21	52	7.84	0.754	40.0	16	49	24	5	11.21	0.795	16.6	21	51	24	4
1.300	19	15	44	1.801	0.788	20	51	22	7.82	0.750	39.8	16	37	12	5	11.16	0.791	16.2	21	37	10	4
1.298	19	19	44	1.829	0.777	19	17	46	7.67	0.748	41.4	16	51	30	5	11.10	0.787	17.0	20	7	26	4
1.295	19	17	42	1.831	0.776	19	15	44	7.55	0.746	42.8	16	11	20	5	11.10	0.787	16.3	20	9	20	5
1.291	19	19	48	1.840	0.772	19	27	36	7.69	0.746	40.8	16	31	10	5	11.09	0.786	16.1	20	19	52	5
1.286	19	13	42	1.849	0.768	19	19	44	7.56	0.744	42.4	16	41	12	5	11.07	0.785	16.6	19	33	10	4
1.285	19	39	12	1.851	0.767	19	25	34	7.72	0.736	39.1	16	49	28	5	11.05	0.784	15.5	19	39	50	4
1.285	19	35	12	1.853	0.766	19	39	12	7.76	0.735	38.6	16	15	46	5	11.04	0.783	15.8	19	49	40	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.21 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 7,110.5 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    22258.5
Exposure: MWd/MTU (GWd)         7111.2 ( 983.83 )
Delta E: MWd/MTU, (GWd)            0.7 (   0.10 )                    Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)           N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                     Top 25  0.200   4.654    13  0.419 0.437  33  2
Inlet Subcooling: Btu/lbm       -25.95                         24  0.540  13.124    14  0.364 0.443  31  2
Flow: Mlb/hr                    106.09 (103.50 %)              23  0.690  16.937    15  0.468 0.497  43 58
                                                               22  0.772  19.036    16  1.084 1.281  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58                21  0.831  20.576    17  0.825 1.179  39 14
59              -- -- -- -- -- -- --              59           20  0.877  21.829    18  1.114 1.254  19 42
55          -- -- -- -- -- -- -- -- -- --         55           19  0.897  22.511    19  1.243 1.384  21 38
51       -- -- -- -- -- -- -- -- -- -- -- --      51           18  0.928  23.284    20  1.056 1.250  17 12
47    -- -- -- -- -- 10 -- 10 -- -- -- -- --    47           17  0.951  23.815    21  1.035 1.249  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43           16  0.974  24.296
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39           15  1.010  25.109
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35           14  1.020  25.159
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31           13  1.138  24.001
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27           12  1.181  24.837
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23           11  1.206  25.257
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19           10  1.235  25.761
15    -- -- -- -- -- 10 -- 10 -- -- -- -- --    15            9  1.272  26.370
11       -- -- -- -- -- -- -- -- -- -- --       11            8  1.304  26.768
 7          -- -- -- -- -- -- -- -- -- --        7            7  1.340  27.188
 3             -- -- -- -- -- -- --              3            6  1.393  27.970
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58                 5  1.407* 28.056*
                                                               4  1.359  27.056
Control Rod Density: %             4.95                        3  1.243  24.755
                                                               2  0.956  18.726
k-effective:                    0.99862                Bottom  1  0.274   5.438
Void Fraction:                    0.455
Core Delta-P: psia               26.241             % AXIAL TILT -18.766  -9.290
Core Plate Delta-P: psia         21.681          AVG BOT 8ft/12ft  1.1076  1.0549
Coolant Temp: Deg-F              548.4
In Channel Flow: Mlb/hr           93.41   Active Channel Flow: Mlb/hr        90.09
Total Bypass Flow (%):            12.0   (of total core flow)
Total Water Rod Flow (%):          3.1   (of total core flow)
Source Convergence              0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.384	19	21	38	1.702	0.834	19	19	36	7.49	0.727	41.0	16	47	30	5	10.81	0.767	14.0	19	17	34	5
1.380	19	19	40	1.706	0.833	19	21	38	7.46	0.725	41.1	16	17	30	5	10.76	0.763	16.2	20	19	52	5
1.374	19	23	40	1.711	0.830	19	19	40	7.65	0.725	38.5	16	15	28	5	10.75	0.763	13.6	19	41	26	5
1.372	19	19	36	1.715	0.828	19	23	22	7.57	0.722	39.2	16	17	36	5	10.74	0.762	15.1	19	15	32	5
1.366	19	21	42	1.721	0.825	19	21	42	7.32	0.720	42.4	16	41	12	5	10.70	0.759	15.9	20	43	12	5
1.364	19	17	34	1.733	0.819	19	19	32	7.68	0.719	37.4	16	21	40	5	10.69	0.758	16.3	19	47	34	5
1.359	19	19	32	1.738	0.817	19	43	28	7.61	0.719	38.3	16	19	38	5	10.68	0.758	14.5	19	41	40	5
1.353	19	17	38	1.745	0.814	19	45	30	7.28	0.718	42.5	16	17	48	5	10.68	0.757	14.0	19	39	42	5
1.352	19	19	44	1.745	0.814	19	23	36	7.40	0.717	40.8	16	17	40	5	10.68	0.757	14.2	19	17	24	5
1.351	19	25	24	1.747	0.813	19	21	34	7.54	0.714	38.6	16	41	16	5	10.68	0.757	14.1	19	39	24	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.22 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 7,111.2 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    22647.2
Exposure: MWd/MTU (GWd)         7500.0 (1037.60 )
Delta E: MWd/MTU, (GWd)          388.8 (  53.79 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.201   4.737    13  0.416 0.433  33  2
Inlet Subcooling: Btu/lbm       -26.09                        24  0.543  13.349    14  0.362 0.440  31  2
Flow: Mlb/hr                    105.58 (103.00 %)             23  0.693  17.225    15  0.466 0.494  43 58
                                                              22  0.773  19.360    16  1.081 1.276  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.831  20.925    17  0.823 1.178  39 14
59              -- -- -- -- -- -- --              59          20  0.876  22.197    18  1.109 1.249  19 42
55          -- -- -- -- -- -- -- -- -- --         55          19  0.896  22.887    19  1.247 1.386  21 38
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.926  23.673    20  1.060 1.256  17 12
47    -- -- -- -- -- 10 -- 10 -- -- -- -- --    47          17  0.949  24.214    21  1.040 1.257  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  0.971  24.704
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39          15  1.007  25.532
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.015  25.586
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31          13  1.131  24.413
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.173  25.265
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23          11  1.198  25.694
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.228  26.209
15    -- -- -- -- -- 10 -- 10 -- -- -- -- --    15           9  1.267  26.831
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.302  27.242
 7          -- -- -- -- -- -- -- -- --           7           7  1.342  27.676
 3             -- -- -- -- -- -- --              3           6  1.398  28.478
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.416* 28.569*
                                                              4  1.370  27.552
Control Rod Density: %            4.95                        3  1.254  25.209
                                                              2  0.964  19.075
k-effective:                   0.99859                 Bottom  1  0.276   5.543
Void Fraction:                   0.456
Core Delta-P: psia              26.061             % AXIAL TILT -18.884  -9.340
Core Plate Delta-P: psia        21.501          AVG BOT 8ft/12ft  1.1077  1.0552
Coolant Temp: Deg-F              548.4
In Channel Flow: Mlb/hr          92.94   Active Channel Flow: Mlb/hr        89.64
Total Bypass Flow (%):           12.0   (of total core flow)
Total Water Rod Flow (%):         3.1   (of total core flow)
Source Convergence            0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.386	19	21	38	1.706	0.832	19	19	36	7.49	0.732	41.6	16	47	30	5	10.85	0.770	17.0	20	19	52	5
1.383	19	19	40	1.708	0.831	19	21	38	7.37	0.730	43.0	16	41	12	5	10.80	0.766	14.9	19	17	34	5
1.376	19	23	40	1.709	0.831	19	19	40	7.64	0.728	39.2	16	15	28	5	10.78	0.765	16.8	20	43	12	5
1.374	19	19	36	1.714	0.829	19	23	22	7.44	0.727	41.7	16	17	30	5	10.75	0.762	16.0	19	15	32	5
1.369	19	21	42	1.723	0.824	19	21	42	7.32	0.726	43.1	16	17	48	5	10.74	0.762	14.5	19	41	26	5
1.365	19	17	34	1.736	0.818	19	19	32	7.55	0.725	39.9	16	17	36	5	10.74	0.762	17.0	20	39	52	5
1.361	19	19	32	1.742	0.815	19	43	28	7.66	0.722	38.1	16	21	40	5	10.73	0.761	16.6	19	39	50	5
1.356	19	17	38	1.745	0.814	19	23	36	7.59	0.722	39.0	16	19	38	5	10.72	0.760	17.2	19	47	34	5
1.356	19	19	44	1.747	0.813	19	45	30	7.56	0.721	39.2	16	15	46	5	10.71	0.760	16.6	19	17	16	5
1.353	19	25	24	1.748	0.812	19	27	40	7.40	0.721	41.4	16	17	40	5	10.70	0.759	14.9	19	39	42	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.23 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 7,500.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    23147.3
Exposure: MWd/MTU (GWd)         8000.0 (1106.80 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.202   4.843    13  0.412 0.429  47 56
Inlet Subcooling: Btu/lbm       -26.31                        24  0.544  13.640    14  0.358 0.434  31  2
Flow: Mlb/hr                    104.75 (102.20 %)             23  0.693  17.596    15  0.462 0.490  43 58
                                                              22  0.772  19.777    16  1.078 1.271  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.829  21.373    17  0.819 1.176  39 14
59              -- -- -- -- -- -- --              59          20  0.872  22.669    18  1.103 1.245  19 42
55          -- -- -- -- -- -- -- -- -- --         55          19  0.891  23.369    19  1.252 1.390  21 38
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.921  24.171    20  1.064 1.263  17 50
47    -- -- -- -- -- 10 -- 10 -- -- -- -- --    47          17  0.944  24.725    21  1.046 1.266  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  0.965  25.226
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39          15  0.999  26.073
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.007  26.131
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31          13  1.119  24.939
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.160  25.809
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23          11  1.186  26.251
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.219  26.782
15    -- -- -- -- -- 10 -- 10 -- -- -- -- --    15           9  1.261  27.423
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.300  27.851
 7          -- -- -- -- -- -- -- -- --           7           7  1.345  28.304
 3             -- -- -- -- -- -- --              3           6  1.408  29.134
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.432* 29.236*
                                                              4  1.391  28.198
Control Rod Density: %            4.95                        3  1.275  25.801
                                                              2  0.980  19.529
k-effective:                   0.99852                 Bottom  1  0.281   5.680
Void Fraction:                   0.458
Core Delta-P: psia              25.781             % AXIAL TILT -19.266  -9.407
Core Plate Delta-P: psia        21.221          AVG BOT 8ft/12ft  1.1089  1.0555
Coolant Temp: Deg-F              548.4
In Channel Flow: Mlb/hr          92.19   Active Channel Flow: Mlb/hr        88.91
Total Bypass Flow (%):           12.0   (of total core flow)
Total Water Rod Flow (%):         3.1   (of total core flow)
Source Convergence            0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	IR JR	Value	Margin	FT	IR JR	Value	Margin	Exp. FT	IR JR	K	Value	Margin	Exp. FT	IR JR	K
1.390	19	21 38	1.706	0.832	19	19 40	7.45	0.744	43.8 16	41 12	5	11.00	0.780	18.2 20	19 52	5
1.388	19	19 40	1.706	0.832	19	19 36	7.53	0.742	42.4 16	47 30	5	10.92	0.774	18.0 20	43 12	5
1.380	19	23 40	1.709	0.831	19	21 38	7.38	0.739	43.9 16	17 48	5	10.88	0.772	18.1 20	39 52	5
1.377	19	19 36	1.712	0.829	19	23 22	7.67	0.737	40.0 16	15 28	5	10.88	0.771	17.8 19	39 50	5
1.373	19	21 42	1.724	0.824	19	21 42	7.46	0.735	42.5 16	17 30	5	10.87	0.771	16.4 19	17 34	5
1.369	19	17 34	1.737	0.818	19	19 32	7.63	0.733	40.0 16	15 46	5	10.82	0.767	17.2 19	15 32	5
1.365	19	19 32	1.743	0.815	19	43 28	7.57	0.732	40.7 16	17 36	5	10.80	0.766	15.6 19	41 26	5
1.362	19	19 44	1.744	0.814	19	23 36	7.60	0.731	40.0 16	41 16	5	10.80	0.766	17.7 19	17 16	5
1.361	19	17 38	1.747	0.813	19	45 30	7.43	0.730	42.2 16	17 40	5	10.80	0.766	18.3 19	47 34	5
1.357	19	25 24	1.747	0.813	19	27 40	7.61	0.730	39.8 16	19 38	5	10.78	0.765	18.6 19	49 32	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.24 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 8,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    23647.1
Exposure: MWd/MTU (GWd)         8500.0 (1176.00 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.203   4.951    13  0.408 0.426  47 56
Inlet Subcooling: Btu/lbm       -26.51                        24  0.545  13.931    14  0.354 0.430   9 52
Flow: Mlb/hr                    104.04 (101.50 %)             23  0.694  17.967    15  0.458 0.487  43 58
                                                              22  0.770  20.193    16  1.074 1.267  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.825  21.819    17  0.814 1.173  39 14
59              -- -- -- -- -- -- --              59          20  0.868  23.138    18  1.098 1.241  19 42
55          -- -- -- -- -- -- -- -- -- --         55          19  0.887  23.849    19  1.257 1.396  21 38
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.915  24.666    20  1.068 1.271  17 50
47    -- -- -- -- -- 10 -- 10 -- -- -- -- --    47          17  0.938  25.232    21  1.051 1.275  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  0.959  25.745
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39          15  0.992  26.610
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  0.998  26.672
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31          13  1.107  25.459
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.147  26.348
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23          11  1.174  26.803
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.210  27.350
15    -- -- -- -- -- 10 -- 10 -- -- -- -- --    15           9  1.255  28.011
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.299  28.459
 7          -- -- -- -- -- -- -- -- --           7           7  1.349  28.934
 3             -- -- -- -- -- -- --              3           6  1.419  29.795
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.450* 29.910*
                                                              4  1.414  28.854
Control Rod Density: %            4.95                        3  1.299  26.403
                                                              2  0.997  19.992
k-effective:                   0.99858                Bottom  1  0.286   5.820
Void Fraction:                   0.461
Core Delta-P: psia              25.542             % AXIAL TILT -19.695  -9.480
Core Plate Delta-P: psia        20.983          AVG BOT 8ft/12ft  1.1103  1.0558
Coolant Temp: Deg-F             548.4
In Channel Flow: Mlb/hr          91.54   Active Channel Flow: Mlb/hr        88.26
Total Bypass Flow (%):           12.0   (of total core flow)
Total Water Rod Flow (%):         3.1   (of total core flow)
Source Convergence            0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.396	19	21	38	1.702	0.834	19	19	40	7.54	0.759	44.6	16	41	12	5	11.15	0.794	19.4	20	19	52	5
1.393	19	19	40	1.704	0.833	19	19	36	7.58	0.752	43.2	16	47	30	5	11.10	0.790	19.4	20	39	52	4
1.386	19	23	40	1.706	0.832	19	21	38	7.46	0.752	44.7	16	17	48	5	11.06	0.786	19.1	20	43	12	5
1.383	19	19	36	1.709	0.831	19	23	22	7.71	0.747	40.8	16	15	28	5	11.07	0.785	18.7	19	39	50	4
1.379	19	21	42	1.723	0.824	19	21	42	7.70	0.746	40.9	16	15	46	5	10.91	0.780	19.8	19	49	32	4
1.374	19	17	34	1.736	0.818	19	19	32	7.50	0.745	43.3	16	17	30	5	8.13	0.777	49.1	16	41	50	5
1.370	19	19	32	1.742	0.815	19	23	36	7.66	0.742	40.8	16	41	16	5	10.90	0.777	19.5	19	47	34	5
1.368	19	19	44	1.744	0.814	19	43	28	7.60	0.742	41.5	16	17	36	5	10.95	0.776	17.2	19	17	34	5
1.367	19	17	38	1.746	0.813	19	27	40	7.47	0.740	43.0	16	17	40	5	10.91	0.774	18.9	19	17	16	5
1.362	19	25	24	1.746	0.813	19	45	30	7.65	0.739	40.6	16	19	38	5	10.91	0.773	18.8	19	41	48	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.25 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 8,500.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)         9000.0 (1245.10 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )
Power: MWt                      3952.0 (100.00 %)
Core Pressure: psia             1050.0
Inlet Subcooling: Btu/lbm       -26.94
Flow: Mlb/hr                    102.50 (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 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 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: %           4.95

k-effective:                  0.99855
Void Fraction:                  0.464
Core Delta-P: psia             25.015
Core Plate Delta-P: psia       20.456
Coolant Temp: Deg-F             548.4
In Channel Flow: Mlb/hr         90.14
Total Bypass Flow (%):           12.1
Total Water Rod Flow (%):         3.2
Source Convergence            0.00009
```

```
Core Average Exposure: MWd/MTU    24147.2

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.204   5.058    13  0.404 0.423  47 56
    24  0.544  14.223    14  0.351 0.427   9 52
    23  0.692  18.338    15  0.455 0.483  43 58
    22  0.766  20.607    16  1.071 1.263  21 40
    21  0.820  22.263    17  0.810 1.171  39 14
    20  0.862  23.605    18  1.093 1.237  19 42
    19  0.880  24.326    19  1.263 1.401  21 38
    18  0.908  25.158    20  1.072 1.278  39 10
    17  0.930  25.736    21  1.056 1.282  37 10
    16  0.951  26.261
    15  0.982  27.143
    14  0.987  27.208
    13  1.094  25.973
    12  1.132  26.881
    11  1.161  27.348
    10  1.199  27.913
     9  1.248  28.597
     8  1.297  29.066
     7  1.354  29.566
     6  1.431  30.462
     5  1.471* 30.593*
     4  1.443  29.522
     3  1.330  27.018
     2  1.021  20.464
Bottom  1  0.293   5.962

% AXIAL TILT -20.305  -9.561
AVG BOT 8ft/12ft  1.1127  1.0561

Active Channel Flow: Mlb/hr        86.90
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.401	19	21	38	1.693	0.839	19	19	40	7.64	0.775	45.4	16	41	12	5	11.41	0.819	20.3	20	19	52	4
1.400	19	19	40	1.696	0.837	19	19	36	7.54	0.767	45.5	16	17	48	5	11.33	0.815	20.5	20	39	52	4
1.391	19	23	40	1.697	0.837	19	21	38	7.64	0.765	44.0	16	47	30	5	11.33	0.811	19.9	19	39	50	4
1.388	19	19	36	1.701	0.835	19	23	22	7.78	0.761	41.7	16	15	46	5	11.28	0.808	20.0	20	43	12	4
1.384	19	21	42	1.715	0.828	19	21	42	7.77	0.759	41.6	16	45	28	5	11.10	0.801	21.0	19	49	32	4
1.380	19	17	34	1.727	0.822	19	19	32	7.55	0.756	44.1	16	17	30	5	11.12	0.797	20.0	19	15	48	4
1.375	19	19	32	1.735	0.819	19	23	36	7.73	0.755	41.7	16	41	16	5	11.07	0.796	20.5	19	47	34	4
1.374	19	19	44	1.739	0.817	19	27	40	9.71	0.755	16.3	20	39	10	4	11.10	0.795	20.0	19	17	16	4
1.372	19	17	38	1.739	0.816	19	43	28	7.65	0.753	42.3	16	17	36	5	11.12	0.794	19.7	19	41	48	4
1.368	19	15	32	1.740	0.816	19	45	30	7.53	0.752	43.8	16	17	40	5	8.22	0.794	49.9	16	41	50	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.26 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 9,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    24148.2
Exposure: MWd/MTU (GWd)         9001.0 (1245.30 )
Delta E: MWd/MTU, (GWd)            1.0 (   0.14 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.201   5.059    13  0.404 0.423  47 56
Inlet Subcooling: Btu/lbm       -26.37                        24  0.538  14.223    14  0.350 0.427   9 52
Flow: Mlb/hr                    104.55 (102.00 %)             23  0.684  18.339    15  0.455 0.482  43 58
                                                              22  0.755  20.608    16  1.070 1.264  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.806  22.264    17  0.811 1.166  39 14
59             -- -- -- -- -- -- --             59            20  0.843  23.606    18  1.094 1.238  19 42
55          -- -- -- -- -- -- -- -- --          55            19  0.867  24.327    19  1.262 1.405  21 38
51       -- -- -- -- -- -- -- -- -- -- --       51            18  0.900  25.159    20  1.073 1.280  17 50
47    -- -- -- -- --  8 --  8 -- -- -- -- --    47            17  0.925  25.737    21  1.058 1.278  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43            16  0.948  26.262
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39            15  0.983  27.144
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35            14  0.989  27.209
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31            13  1.098  25.974
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27            12  1.138  26.882
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23            11  1.168  27.349
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19            10  1.207  27.914
15    -- -- -- -- --  8 --  8 -- -- -- -- --    15             9  1.257  28.598
11       -- -- -- -- -- -- -- -- -- -- --       11             8  1.306  29.067
 7          -- -- -- -- -- -- -- -- --           7             7  1.363  29.568
 3             -- -- -- -- -- -- --              3             6  1.440  30.463
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.480* 30.595*
                                                              4  1.450  29.524
Control Rod Density: %             5.05                       3  1.336  27.019
                                                              2  1.026  20.465
k-effective:                    0.99854                Bottom  1  0.294   5.962
Void Fraction:                    0.463
Core Delta-P: psia               25.787             % AXIAL TILT -21.027  -9.561
Core Plate Delta-P: psia         21.227          AVG BOT 8ft/12ft  1.1179  1.0561
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          91.97   Active Channel Flow: Mlb/hr        88.68
Total Bypass Flow (%):           12.0    (of total core flow)
Total Water Rod Flow (%):         3.2    (of total core flow)
Source Convergence            0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	IR JR	Value	Margin	FT	IR JR	Value	Margin	Exp. FT	IR JR	K	Value	Margin	Exp. FT	IR JR	K
1.405	19	21 38	1.710	0.831	19	19 36	7.69	0.781	45.4 16	41 12	5	11.48	0.824	20.3 20	19 52	4
1.403	19	19 40	1.712	0.830	19	21 38	7.59	0.772	45.5 16	17 48	5	11.40	0.820	20.5 20	39 52	4
1.393	19	19 36	1.713	0.829	19	19 40	7.68	0.770	44.0 16	47 30	5	11.40	0.815	19.9 19	39 50	4
1.392	19	23 40	1.730	0.821	19	23 22	7.83	0.766	41.7 16	15 46	5	11.35	0.812	20.0 20	43 12	4
1.386	19	17 34	1.732	0.820	19	21 42	7.82	0.764	41.6 16	45 28	5	11.16	0.806	21.0 19	49 32	4
1.384	19	21 42	1.739	0.817	19	19 32	7.60	0.761	44.1 16	17 30	5	11.19	0.801	20.0 19	15 48	4
1.381	19	19 32	1.745	0.814	19	43 28	7.78	0.760	41.6 16	19 46	5	11.13	0.801	20.5 19	47 34	4
1.377	19	17 38	1.745	0.814	19	45 30	9.76	0.759	16.3 20	39 10	4	11.17	0.800	20.0 19	17 16	4
1.375	19	19 44	1.753	0.810	19	23 36	7.70	0.757	42.3 16	17 36	5	8.28	0.799	49.9 16	41 50	5
1.375	19	15 32	1.757	0.808	19	21 34	7.58	0.757	43.8 16	17 40	5	11.19	0.799	19.7 19	41 48	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.27 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 9,001.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    24805.1
Exposure: MWd/MTU (GWd)         9657.9 (1336.20 )
Delta E: MWd/MTU, (GWd)          656.9 (  90.89 )                 Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.201   5.198    13  0.399 0.419  47 56
Inlet Subcooling: Btu/lbm       -26.94                        24  0.536  14.601    14  0.346 0.423   9 52
Flow: Mlb/hr                    102.50 (100.00 %)             23  0.680  18.818    15  0.450 0.477  43 58
                                                              22  0.748  21.141    16  1.065 1.258  21 40
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.797  22.832    17  0.805 1.163  39 14
59              -- -- -- -- -- -- --              59          20  0.833  24.200    18  1.087 1.233  19 42
55          -- -- -- -- -- -- -- -- -- --         55          19  0.856  24.938    19  1.269 1.412  21 38
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  0.888  25.793    20  1.079 1.290  17 50
47    -- -- -- -- --  8 --  8 -- -- -- -- --    47          17  0.913  26.389    21  1.064 1.286  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  0.936  26.929
39 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 39          15  0.969  27.836
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  0.974  27.905
31 -- -- -- -- -- --  0 --  0 -- -- -- -- -- -- 31          13  1.079  26.642
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.119  27.575
23 -- --  0 -- -- -- -- -- -- -- -- --  0 -- -- 23          11  1.150  28.061
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.194  28.652
15    -- -- -- -- --  8 --  8 -- -- -- -- --    15           9  1.249  29.368
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.305  29.869
 7          -- -- -- -- -- -- -- -- --           7           7  1.371  30.408
 3             -- -- -- -- -- -- --              3           6  1.458  31.354
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.510* 31.513*
                                                              4  1.491  30.427
Control Rod Density: %             5.05                       3  1.381  27.854
                                                              2  1.061  21.106
k-effective:                    0.99854                Bottom  1  0.305   6.156
Void Fraction:                    0.468
Core Delta-P: psia               25.088             % AXIAL TILT -22.001  -9.704
Core Plate Delta-P: psia         20.529          AVG BOT 8ft/12ft  1.1220  1.0568
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr           90.11   Active Channel Flow: Mlb/hr        86.85
Total Bypass Flow (%):            12.1   (of total core flow)
Total Water Rod Flow (%):          3.2   (of total core flow)
Source Convergence             0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power			MCPR				APLHGR					LHGR				
Value	FT	IR JR	Value	Margin	FT	IR JR	Value	Margin	Exp.	FT	IR JR	K	Value	Margin	Exp.	FT	IR JR	K
1.412	19	21 38	1.699	0.836	19	19 36	7.82	0.804	46.5	16	41 12	5	11.83	0.861	21.9	20	19 52	4
1.411	19	19 40	1.701	0.835	19	19 40	10.14	0.797	17.7	20	39 10	4	11.71	0.852	21.9	20	39 52	4
1.400	19	19 36	1.701	0.835	19	21 38	7.72	0.794	46.6	16	17 48	5	11.74	0.852	21.5	19	39 50	4
1.399	19	23 40	1.719	0.826	19	23 22	10.09	0.790	17.3	20	41 10	4	11.69	0.849	21.6	20	43 12	4
1.393	19	17 34	1.725	0.823	19	21 42	7.96	0.787	42.8	16	15 46	5	11.52	0.837	21.6	19	15 48	4
1.392	19	21 42	1.728	0.822	19	19 32	7.76	0.787	45.1	16	47 30	5	11.39	0.833	22.5	19	49 32	4
1.389	19	19 32	1.737	0.817	19	45 30	9.98	0.782	17.3	20	17 50	4	11.48	0.833	21.6	19	17 16	4
1.385	19	17 38	1.738	0.817	19	43 28	7.91	0.782	42.7	16	15 28	5	11.51	0.833	21.2	19	41 48	4
1.384	19	19 44	1.744	0.814	19	23 36	9.92	0.781	17.8	21	37 10	4	11.37	0.829	22.1	19	47 34	4
1.383	19	15 32	1.750	0.812	19	25 38	7.89	0.780	42.7	16	19 46	5	8.41	0.823	51.1	16	41 50	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.28 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 9,657.9 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    24805.9
Exposure: MWd/MTU (GWd)         9658.7 (1336.30 )
Delta E: MWd/MTU, (GWd)            0.7 (   0.10 )                    Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.228   5.199    13  0.421 0.426  59 34
Inlet Subcooling: Btu/lbm       -25.82                        24  0.611  14.601    14  0.366 0.433  59 30
Flow: Mlb/hr                    106.60 (104.00 %)             23  0.776  18.819    15  0.477 0.479   3 18
                                                              22  0.852  21.142    16  1.056 1.210  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.904  22.833    17  0.826 1.160  51 26
59             -- -- -- -- -- -- --             59            20  0.940  24.200    18  1.021 1.152  19 42
55          -- -- -- -- -- -- -- -- --          55            19  0.947  24.938    19  1.223 1.352  31 12
51       -- -- -- -- -- -- -- -- -- -- --       51            18  0.946  25.794    20  1.147 1.265  39 10
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --    47            17  0.944  26.389    21  1.166 1.294  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43               16  0.944  26.930
39 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 39            15  0.960  27.837
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35            14  0.952  27.906
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31            13  1.045  26.643
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27            12  1.077  27.575
23 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 23            11  1.103  28.062
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19            10  1.144  28.653
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15             9  1.198  29.369
11       -- -- -- -- -- -- -- -- -- -- --       11             8  1.252  29.870
 7          -- -- -- -- -- -- -- -- --           7             7  1.318  30.409
 3             -- -- -- -- -- -- --              3             6  1.403  31.355
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.449* 31.514*
                                                              4  1.421  30.428
Control Rod Density: %             5.41                       3  1.306  27.855
                                                              2  0.996  21.107
k-effective:                    0.99859                Bottom  1  0.285   6.156
Void Fraction:                    0.454
Core Delta-P: psia               26.362             % AXIAL TILT -16.480  -9.704
Core Plate Delta-P: psia         21.800          AVG BOT 8ft/12ft  1.0810  1.0568
Coolant Temp: Deg-F               548.5
In Channel Flow: Mlb/hr           93.90   Active Channel Flow: Mlb/hr        90.59
Total Bypass Flow (%):            11.9   (of total core flow)
Total Water Rod Flow (%):          3.1   (of total core flow)
Source Convergence              0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.352	19	31	12	1.784	0.796	19	31	12	7.76	0.788	45.4	16	51	30	5	11.53	0.841	22.1	19	33	10	4
1.350	19	49	32	1.786	0.795	19	49	30	7.78	0.785	44.7	16	31	10	5	11.48	0.841	22.6	19	9	34	4
1.328	19	31	16	1.815	0.782	19	29	16	9.95	0.783	17.8	19	51	28	4	11.45	0.834	22.0	19	31	8	4
1.327	19	15	32	1.816	0.782	19	45	30	7.45	0.779	48.0	17	35	10	5	11.39	0.831	22.2	19	7	32	4
1.326	19	47	28	1.820	0.780	19	19	40	7.56	0.778	46.6	17	51	26	5	11.24	0.824	22.7	19	49	32	4
1.324	19	33	14	1.827	0.777	19	21	42	9.91	0.778	17.4	19	33	10	4	11.23	0.821	22.4	20	25	8	4
1.322	19	33	10	1.829	0.776	20	51	22	9.80	0.772	18.0	19	49	32	4	11.23	0.819	22.2	20	7	26	4
1.321	19	51	34	1.830	0.776	19	47	28	9.79	0.768	17.5	21	53	34	4	11.26	0.819	21.7	19	31	50	4
1.307	19	21	38	1.831	0.775	20	21	10	9.78	0.767	17.4	21	33	54	4	11.30	0.817	21.2	21	33	8	4
1.305	19	23	40	1.832	0.775	19	33	14	9.78	0.765	17.1	19	31	50	4	11.24	0.813	21.2	21	7	34	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.29 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 9,658.7 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    25147.1
Exposure: MWd/MTU (GWd)     10000.0 (1383.50 )
Delta E: MWd/MTU, (GWd)       341.3 (  47.23 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                  Top 25  0.228   5.281    13  0.418 0.421  59 34
Inlet Subcooling: Btu/lbm    -26.30                      24  0.609  14.824    14  0.364 0.430   9 52
Flow: Mlb/hr                 104.81 (102.25 %)           23  0.773  19.102    15  0.474 0.476   3 18
                                                         22  0.847  21.455    16  1.054 1.206  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          21  0.899  23.165    17  0.823 1.157  51 26
59              -- -- -- -- -- -- --             59      20  0.934  24.546    18  1.018 1.151  19 42
55          -- -- -- -- -- -- -- -- --           55      19  0.941  25.286    19  1.227 1.355  31 12
51       -- -- -- -- -- -- -- -- -- -- --        51      18  0.940  26.141    20  1.149 1.269  39 10
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --     47      17  0.938  26.736    21  1.168 1.296  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43      16  0.938  27.277
39 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 39      15  0.954  28.189
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35      14  0.944  28.255
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31      13  1.036  26.975
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27      12  1.068  27.917
23 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 23      11  1.095  28.412
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19      10  1.137  29.017
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15       9  1.193  29.751
11       -- -- -- -- -- -- -- -- -- -- --       11       8  1.252  30.270
 7          -- -- -- -- -- -- -- -- --           7       7  1.321  30.830
 3             -- -- -- -- -- -- --              3       6  1.412  31.804
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          5  1.463* 31.979*
                                                         4  1.442  30.885
Control Rod Density: %          5.41                     3  1.330  28.276
                                                         2  1.015  21.428
k-effective:                0.99855                Bottom  1  0.290   6.253
Void Fraction:                0.458
Core Delta-P: psia           25.727            % AXIAL TILT -16.995  -9.709
Core Plate Delta-P: psia     21.166         AVG BOT 8ft/12ft  1.0833  1.0566
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr        92.27   Active Channel Flow: Mlb/hr        89.00
Total Bypass Flow (%):         12.0   (of total core flow)
Total Water Rod Flow (%):       3.1   (of total core flow)
Source Convergence          0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.355	19	31	12	1.775	0.800	19	31	12	10.05	0.795	18.5	19	51	28	4	11.58	0.851	23.0	19	33	10	4
1.353	19	49	32	1.777	0.799	19	49	30	7.75	0.792	46.0	16	51	30	5	11.52	0.850	23.4	19	9	34	4
1.331	19	31	16	1.806	0.786	19	29	16	10.02	0.791	18.2	19	33	10	4	11.51	0.845	22.8	19	31	8	4
1.331	19	15	32	1.806	0.786	19	45	30	7.90	0.791	44.0	16	31	52	4	11.44	0.841	23.1	19	7	32	4
1.330	19	47	28	1.811	0.784	19	19	40	7.47	0.785	48.6	17	35	10	5	11.28	0.833	23.5	19	49	32	4
1.327	19	33	14	1.819	0.781	19	21	42	9.90	0.784	18.7	19	49	32	4	11.28	0.831	23.2	20	25	8	4
1.325	19	33	10	1.821	0.780	19	47	28	7.57	0.784	47.2	17	51	26	5	11.33	0.829	22.5	19	31	50	4
1.324	19	51	34	1.822	0.779	20	51	22	9.90	0.779	17.8	19	31	50	4	11.28	0.829	23.0	20	7	26	4
1.311	19	21	38	1.823	0.779	20	21	10	9.82	0.775	18.2	21	53	34	4	11.32	0.825	22.0	21	33	8	4
1.310	19	23	40	1.824	0.779	19	33	14	9.82	0.775	18.1	21	33	54	4	11.27	0.821	22.0	21	7	34	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.30 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 10,000.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      10500.0 (1452.70 )
Delta E: MWd/MTU, (GWd)        500.0 (  69.17 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -26.65
Flow: Mlb/hr                  103.53 (101.00 %)

    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 -- -- --  0 -- -- -- 12 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 12 -- -- --  0 -- -- -- 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

Control Rod Density: %          5.41

k-effective:                 0.99865
Void Fraction:                 0.461
Core Delta-P: psia            25.284
Core Plate Delta-P: psia      20.723
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr        91.11
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.1
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    25647.2

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.228   5.401    13  0.413 0.416  59 34
    24  0.609  15.150    14  0.360 0.428   9 52
    23  0.772  19.515    15  0.471 0.472  43 58
    22  0.844  21.911    16  1.051 1.202  31 14
    21  0.893  23.648    17  0.819 1.153  51 26
    20  0.928  25.048    18  1.014 1.147  19 42
    19  0.935  25.792    19  1.232 1.360  31 12
    18  0.934  26.647    20  1.153 1.275  39 10
    17  0.932  27.241    21  1.172 1.300  37 10
    16  0.932  27.782
    15  0.947  28.702
    14  0.938  28.763
    13  1.027  27.456
    12  1.058  28.414
    11  1.086  28.922
    10  1.132  29.548
     9  1.191  30.308
     8  1.252  30.856
     7  1.326  31.449
     6  1.420  32.466
     5  1.475* 32.667*
     4  1.460  31.564
     3  1.352  28.903
     2  1.033  21.907
Bottom  1  0.295   6.397

% AXIAL TILT -17.465  -9.726
AVG BOT 8ft/12ft  1.0854  1.0564

Active Channel Flow: Mlb/hr        87.86
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.360	19	31	12	1.767	0.803	19	31	12	10.05	0.802	19.6	19	51	34	4	11.54	0.857	24.2	19	33	10	4
1.356	19	49	32	1.772	0.801	19	49	30	10.06	0.801	19.2	19	33	10	4	11.44	0.853	24.7	19	9	34	4
1.337	19	31	16	1.799	0.789	19	29	16	7.86	0.794	44.8	16	31	52	4	11.45	0.849	24.0	19	31	8	4
1.336	19	15	32	1.800	0.789	19	45	30	7.69	0.793	46.8	16	51	30	5	11.36	0.845	24.3	19	7	32	4
1.334	19	47	28	1.806	0.786	19	19	40	9.98	0.792	18.8	19	31	50	4	11.31	0.837	23.7	19	31	50	4
1.332	19	33	14	1.814	0.783	19	21	42	9.89	0.791	19.7	19	49	32	4	11.20	0.836	24.7	19	49	32	4
1.330	19	33	10	1.815	0.782	19	47	28	7.43	0.788	49.4	17	35	10	5	11.22	0.835	24.4	20	25	8	4
1.327	19	51	34	1.817	0.782	19	33	14	7.54	0.787	48.0	17	51	26	5	11.22	0.834	24.2	20	7	26	4
1.318	19	21	38	1.817	0.781	20	21	10	9.81	0.783	19.5	20	39	52	4	11.25	0.828	23.2	21	33	8	4
1.316	19	23	40	1.818	0.781	20	51	22	9.82	0.780	19.0	20	41	52	4	11.16	0.827	23.9	20	19	52	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.31 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 10,500.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    25847.2
Exposure: MWd/MTU (GWd)     10700.0 (1480.30 )
Delta E: MWd/MTU, (GWd)       200.0 (  27.67 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.229   5.450    13  0.412 0.413  59 34
Inlet Subcooling: Btu/lbm    -26.79                       24  0.609  15.280    14  0.359 0.427   9 52
Flow: Mlb/hr                 103.01 (100.50 %)            23  0.773  19.681    15  0.469 0.471  43 58
                                                          22  0.843  22.093    16  1.050 1.201  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  0.893  23.841    17  0.817 1.151  51 26
59              -- -- -- -- -- -- --             59       20  0.928  25.249    18  1.012 1.146  19 42
55          -- -- -- -- -- -- -- -- --           55       19  0.934  25.994    19  1.234 1.362  31 12
51       -- -- -- -- -- -- -- -- -- -- --        51       18  0.933  26.849    20  1.155 1.276  39 10
47    -- -- -- -- 12 -- -- -- 12 -- -- -- --     47       17  0.931  27.442    21  1.173 1.300  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43       16  0.932  27.983
39 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 39       15  0.946  28.906
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35       14  0.936  28.965
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31       13  1.025  27.648
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27       12  1.056  28.611
23 -- -- -- 12 -- -- --  0 -- -- -- 12 -- -- -- 23       11  1.084  29.125
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19       10  1.130  29.760
15    -- -- -- -- 12 -- -- -- 12 -- -- -- --    15        9  1.190  30.531
11       -- -- -- -- -- -- -- -- -- -- --       11        8  1.253  31.090
 7          -- -- -- -- -- -- -- -- --           7        7  1.326  31.697
 3             -- -- -- -- -- -- --              3        6  1.420  32.732
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  1.476* 32.943*
                                                          4  1.462  31.837
Control Rod Density: %         5.41                       3  1.357  29.156
                                                          2  1.037  22.101
k-effective:                0.99872                Bottom  1  0.297   6.455
Void Fraction:                0.462
Core Delta-P: psia           25.102             % AXIAL TILT -17.526  -9.734
Core Plate Delta-P: psia     20.542          AVG BOT 8ft/12ft  1.0856  1.0563
Coolant Temp: Deg-F           548.5
In Channel Flow: Mlb/hr       90.65   Active Channel Flow: Mlb/hr        87.41
Total Bypass Flow (%):        12.0    (of total core flow)
Total Water Rod Flow (%):      3.1    (of total core flow)
Source Convergence          0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.362	19	31	12	1.764	0.805	19	31	12	10.03	0.801	19.6	19	33	10	4	11.47	0.856	24.7	19	33	10	4
1.356	19	49	32	1.770	0.802	19	49	30	10.00	0.801	20.0	19	51	34	4	11.35	0.851	25.2	19	9	34	4
1.340	19	31	16	1.795	0.791	19	29	16	9.97	0.794	19.3	19	31	50	4	11.39	0.848	24.5	19	31	8	4
1.338	19	15	32	1.797	0.790	19	45	30	7.81	0.792	45.2	16	31	10	4	11.28	0.842	24.7	19	7	32	4
1.335	19	47	28	1.803	0.788	19	19	40	7.64	0.790	47.1	16	51	30	5	11.27	0.837	24.2	19	31	50	4
1.335	19	33	14	1.811	0.784	19	21	42	9.83	0.789	20.1	19	49	32	4	11.15	0.833	24.9	20	25	8	4
1.331	19	33	10	1.813	0.783	19	47	28	7.40	0.787	49.7	17	35	10	5	11.12	0.833	25.2	19	49	32	4
1.328	19	51	34	1.813	0.783	19	33	14	7.50	0.786	48.3	17	51	36	5	11.16	0.833	24.7	20	7	26	4
1.320	19	21	38	1.814	0.783	20	21	10	9.80	0.785	19.9	20	39	52	4	11.15	0.830	24.4	20	19	52	4
1.319	19	23	40	1.815	0.782	20	51	22	9.84	0.784	19.4	20	41	52	4	11.16	0.825	23.7	21	33	8	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.32 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 10,700.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    25847.4
Exposure: MWd/MTU (GWd)     10700.2 (1480.40 )
Delta E: MWd/MTU, (GWd)         0.2 (   0.03 )                Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                    Top 25  0.226   5.450    13  0.412 0.414  59 34
Inlet Subcooling: Btu/lbm    -25.82                        24  0.604  15.281    14  0.358 0.426   9 52
Flow: Mlb/hr                 106.60 (104.00 %)             23  0.764  19.681    15  0.469 0.471  43 58
                                                           22  0.830  22.093    16  1.049 1.203  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  0.874  23.841    17  0.816 1.152  51 26
59              -- -- -- -- -- -- --              59       20  0.901  25.249    18  1.013 1.142  19 42
55          -- -- -- -- -- -- -- -- --            55       19  0.896  25.994    19  1.233 1.366  31 12
51       -- -- -- -- -- -- -- -- -- -- --         51       18  0.907  26.849    20  1.158 1.278  39 10
47    -- -- -- -- 10 -- -- -- 10 -- -- -- --     47       17  0.913  27.442    21  1.177 1.302  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43       16  0.921  27.983
39 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 39       15  0.941  28.907
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35       14  0.936  28.965
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31       13  1.029  27.648
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27       12  1.064  28.612
23 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 23       11  1.095  29.125
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19       10  1.144  29.760
15    -- -- -- -- 10 -- -- -- 10 -- -- -- --    15        9  1.206  30.531
11       -- -- -- -- -- -- -- -- -- -- --       11        8  1.270  31.090
 7          -- -- -- -- -- -- -- -- --           7        7  1.345  31.697
 3             -- -- -- -- -- -- --              3        6  1.440  32.732
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  1.495* 32.943*
                                                           4  1.479  31.838
Control Rod Density: %          5.59                       3  1.372  29.157
                                                           2  1.049  22.101
k-effective:                0.99854                Bottom  1  0.300   6.455
Void Fraction:                0.459
Core Delta-P: psia           26.468             % AXIAL TILT -18.959  -9.734
Core Plate Delta-P: psia     21.905          AVG BOT 8ft/12ft  1.0950  1.0563
Coolant Temp: Deg-F           548.6
In Channel Flow: Mlb/hr        93.86   Active Channel Flow: Mlb/hr        90.52
Total Bypass Flow (%):         12.0   (of total core flow)
Total Water Rod Flow (%):       3.1   (of total core flow)
Source Convergence          0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.366	19	31	12	1.803	0.787	19	31	12	10.16	0.812	19.7	19	33	10	4	11.62	0.867	24.7	19	33	10	4
1.360	19	49	32	1.809	0.785	19	49	30	10.12	0.811	20.0	19	51	34	4	11.50	0.862	25.2	19	9	34	4
1.342	19	31	16	1.835	0.774	19	29	16	10.10	0.804	19.3	19	31	50	4	11.53	0.859	24.5	19	31	8	4
1.340	19	15	32	1.838	0.773	19	45	30	7.82	0.803	46.4	16	31	10	5	11.42	0.853	24.7	19	7	32	4
1.336	19	47	28	1.850	0.768	19	19	40	7.74	0.801	47.1	16	51	30	5	11.41	0.848	24.2	19	31	50	4
1.336	19	33	10	1.853	0.766	19	47	28	9.96	0.799	20.1	19	49	32	4	11.26	0.844	25.2	19	49	32	4
1.335	19	27	14	1.853	0.766	19	33	14	7.50	0.798	49.7	17	35	10	5	11.29	0.844	24.9	20	25	8	4
1.332	19	51	34	1.856	0.765	19	21	38	7.60	0.797	48.3	17	51	36	5	11.30	0.843	24.7	20	7	26	4
1.322	19	21	38	1.859	0.764	19	21	42	9.93	0.795	19.9	20	39	52	4	11.29	0.840	24.4	20	19	52	4
1.321	19	23	40	1.863	0.762	19	23	22	9.96	0.794	19.4	20	41	52	4	11.31	0.836	23.7	21	33	8	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.33 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 10,700.2 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      11000.0 (1521.80 )
Delta E: MWd/MTU, (GWd)        299.8 (  41.48 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -25.82
Flow: Mlb/hr                  106.60 (104.00 %)

    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 -- -- --  0 -- -- -- 10 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 10 -- -- --  0 -- -- -- 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: %          5.59

k-effective:                 0.99880
Void Fraction:                 0.458
Core Delta-P: psia            26.460
Core Plate Delta-P: psia      21.897
Coolant Temp: Deg-F           548.6
In Channel Flow: Mlb/hr        93.86
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.1
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    26147.0

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.227   5.522    13  0.409 0.411   5 48
    24  0.607  15.475    14  0.356 0.424   9 52
    23  0.768  19.927    15  0.466 0.468  43 58
    22  0.833  22.362    16  1.047 1.201  31 14
    21  0.876  24.124    17  0.814 1.150  51 26
    20  0.903  25.541    18  1.010 1.140  19 42
    19  0.898  26.284    19  1.237 1.368  31 12
    18  0.909  27.142    20  1.160 1.280  39 52
    17  0.915  27.738    21  1.178 1.303  37 10
    16  0.923  28.281
    15  0.943  29.211
    14  0.937  29.268
    13  1.029  27.937
    12  1.063  28.909
    11  1.095  29.432
    10  1.144  30.081
     9  1.207  30.870
     8  1.271  31.447
     7  1.344  32.075
     6  1.437  33.136
     5  1.489* 33.361*
     4  1.472  32.252
     3  1.367  29.541
     2  1.044  22.395
Bottom  1  0.299   6.543

% AXIAL TILT -18.745  -9.763
AVG BOT 8ft/12ft  1.0938  1.0563

Active Channel Flow: Mlb/hr        90.53
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.368	19	31	12	1.802	0.788	19	31	12	10.03	0.805	20.3	19	33	10	4	11.43	0.859	25.4	19	33	10	4
1.361	19	49	32	1.810	0.784	19	49	30	9.96	0.802	20.6	19	51	34	4	11.28	0.851	25.9	19	9	34	4
1.347	19	31	16	1.833	0.775	19	29	16	10.00	0.800	19.9	19	31	50	4	11.34	0.850	25.2	19	31	8	4
1.343	19	15	32	1.838	0.773	19	45	30	7.72	0.797	46.9	16	31	10	5	11.21	0.842	25.5	19	7	32	4
1.339	19	27	14	1.849	0.768	19	19	40	9.91	0.795	20.1	20	41	52	4	11.26	0.842	24.9	19	31	50	4
1.337	19	33	10	1.850	0.767	19	33	14	7.62	0.793	47.6	16	51	30	5	11.18	0.837	25.1	20	19	52	4
1.337	19	47	28	1.852	0.767	19	47	28	7.41	0.792	50.2	17	35	10	5	11.12	0.835	25.4	20	7	26	4
1.333	19	51	34	1.855	0.766	19	21	38	9.84	0.792	20.5	20	39	52	4	11.10	0.835	25.6	20	25	8	4
1.326	19	21	38	1.857	0.765	19	21	42	7.51	0.791	48.8	17	51	36	5	11.23	0.835	24.3	20	13	48	4
1.325	19	23	40	1.862	0.763	19	23	22	9.78	0.789	20.8	19	49	32	4	11.21	0.833	24.2	20	9	20	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.34 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 11,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    26647.1
Exposure: MWd/MTU (GWd)        11500.0 (1591.00 )
Delta E: MWd/MTU, (GWd)          500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.230   5.643    13  0.406 0.409   5 48
Inlet Subcooling: Btu/lbm       -26.23                        24  0.612  15.801    14  0.353 0.422   9 52
Flow: Mlb/hr                    105.06 (102.50 %)             23  0.774  20.339    15  0.464 0.465   3 18
                                                              22  0.839  22.813    16  1.044 1.196  31 14
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.882  24.598    17  0.811 1.146  51 36
59              -- -- -- -- -- -- --              59          20  0.909  26.029    18  1.007 1.137  19 42
55          -- -- -- -- -- -- -- -- --            55          19  0.905  26.771    19  1.241 1.370  31 12
51       -- -- -- -- -- -- -- -- -- -- --         51          18  0.916  27.635    20  1.163 1.282  39 52
47    -- -- -- -- 10 -- -- -- 10 -- -- -- --     47          17  0.923  28.234    21  1.180 1.303  37 10
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  0.931  28.781
39 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 39          15  0.951  29.722
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  0.944  29.776
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31          13  1.034  28.418
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.068  29.407
23 -- -- -- 10 -- -- --  0 -- -- -- 10 -- -- -- 23          11  1.099  29.945
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.149  30.617
15    -- -- -- -- 10 -- -- -- 10 -- -- -- --    15           9  1.210  31.435
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.272  32.041
 7          -- -- -- -- -- -- -- -- --           7           7  1.340  32.702
 3             -- -- -- -- -- -- --              3           6  1.424  33.805
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.468* 34.053*
                                                              4  1.448  32.935
Control Rod Density: %             5.59                       3  1.347  30.175
                                                              2  1.031  22.880
k-effective:                    0.99891                Bottom  1  0.295   6.689
Void Fraction:                    0.458
Core Delta-P: psia               25.866            % AXIAL TILT -18.091  -9.801
Core Plate Delta-P: psia         21.304         AVG BOT 8ft/12ft  1.0907  1.0562
Coolant Temp: Deg-F              548.5
In Channel Flow: Mlb/hr          92.49   Active Channel Flow: Mlb/hr        89.20
Total Bypass Flow (%):           12.0    (of total core flow)
Total Water Rod Flow (%):         3.1    (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.370	19	31	12	1.789	0.794	19	31	12	9.78	0.784	20.2	20	9	20	4	11.00	0.835	26.6	19	33	10	4
1.359	19	49	32	1.800	0.789	19	49	30	9.68	0.784	21.3	19	33	10	4	11.00	0.826	25.4	20	9	20	4
1.353	19	29	16	1.816	0.782	19	29	16	9.70	0.784	21.1	20	41	52	4	10.97	0.826	25.7	19	31	50	4
1.345	19	15	32	1.826	0.778	19	45	30	9.70	0.784	20.9	19	31	50	4	10.99	0.825	25.4	20	13	48	4
1.345	19	27	14	1.832	0.775	19	33	14	7.49	0.780	47.7	16	31	10	5	10.89	0.825	26.4	19	31	8	4
1.338	19	33	10	1.836	0.773	19	19	40	9.57	0.777	21.7	19	51	34	4	10.79	0.822	27.0	19	9	34	4
1.338	19	47	28	1.839	0.772	19	47	28	7.19	0.776	50.9	17	35	10	5	10.86	0.822	26.3	20	19	52	4
1.333	19	51	34	1.840	0.772	19	21	38	9.56	0.776	21.6	20	39	10	4	10.90	0.817	25.2	19	15	48	4
1.333	19	21	38	1.841	0.771	19	21	42	7.30	0.775	49.6	17	51	36	5	10.88	0.815	25.2	20	17	12	4
1.332	19	23	40	1.846	0.769	19	23	22	9.71	0.774	19.4	20	51	40	4	10.93	0.815	24.6	20	11	18	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.35 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 11,500.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      12000.0 (1660.20 )
Delta E: MWd/MTU, (GWd)        500.0 (  69.17 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm      -26.51
Flow: Mlb/hr                  104.04 (101.50 %)

    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 -- -- --  0 -- -- -- 10 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 10 -- -- --  0 -- -- -- 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: %          5.59

k-effective:                 0.99913
Void Fraction:                0.455
Core Delta-P: psia           25.435
Core Plate Delta-P: psia     20.874
Coolant Temp: Deg-F          548.4
In Channel Flow: Mlb/hr       91.59
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.1
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    27147.0

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.234   5.765    13  0.403 0.407   5 48
    24  0.622  16.131    14  0.350 0.421   9 52
    23  0.786  20.757    15  0.461 0.463   3 18
    22  0.850  23.269    16  1.042 1.193  31 14
    21  0.894  25.077    17  0.808 1.142  51 36
    20  0.922  26.523    18  1.004 1.135  19 42
    19  0.919  27.263    19  1.246 1.371  31 12
    18  0.931  28.133    20  1.165 1.284  21 10
    17  0.939  28.736    21  1.182 1.303  37 10
    16  0.948  29.288
    15  0.968  30.240
    14  0.959  30.289
    13  1.049  28.905
    12  1.081  29.909
    11  1.111  30.461
    10  1.159  31.157
     9  1.218  32.003
     8  1.272  32.636
     7  1.330  33.327
     6  1.399  34.465
     5  1.428* 34.731*
     4  1.400  33.601
     3  1.301  30.795
     2  0.996  23.354
Bottom  1  0.285   6.832

% AXIAL TILT -16.732  -9.818
AVG BOT 8ft/12ft  1.0843  1.0561

Active Channel Flow: Mlb/hr        88.34
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.371	19	31	12	1.777	0.799	19	31	12	9.47	0.767	21.2	20	9	42	4	10.64	0.802	25.9	20	9	20	4
1.360	19	29	16	1.789	0.794	19	49	30	9.30	0.758	22.1	20	41	52	4	10.53	0.799	26.6	20	13	48	4
1.358	19	49	32	1.800	0.789	19	29	16	9.41	0.757	20.4	20	9	40	4	10.40	0.798	27.8	19	33	10	4
1.349	19	27	14	1.814	0.783	19	45	30	7.18	0.754	48.5	16	31	10	5	10.47	0.796	26.8	19	31	50	4
1.346	19	15	32	1.815	0.783	19	33	14	9.25	0.753	21.9	19	31	50	4	10.44	0.794	26.7	20	19	10	4
1.339	19	23	22	1.822	0.779	19	19	40	6.91	0.752	51.7	17	35	10	5	10.47	0.793	26.3	19	15	48	4
1.338	19	21	38	1.825	0.778	19	21	38	9.18	0.750	22.3	19	33	10	4	10.53	0.793	25.7	20	11	44	4
1.338	19	47	28	1.825	0.778	19	21	42	9.27	0.750	21.2	20	13	48	4	10.49	0.793	26.1	19	47	16	4
1.338	19	33	10	1.826	0.778	19	47	28	7.00	0.750	50.4	17	51	36	5	10.70	0.792	23.9	20	51	40	4
1.332	19	51	34	1.830	0.776	19	23	22	9.23	0.749	21.6	19	15	48	4	10.41	0.788	26.3	20	17	12	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.36 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 12,000.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)       12205.4 (1688.60 )
Delta E: MWd/MTU, (GWd)         205.4 (  28.41 )
Power: MWt                     3952.0 (100.00 %)
Core Pressure: psia            1050.0
Inlet Subcooling: Btu/lbm      -26.72
Flow: Mlb/hr                   103.27 (100.75 %)

    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 -- -- --  0 -- -- -- 10 -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- --  0 -- -- --  0 -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- 10 -- -- --  0 -- -- -- 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: %          5.59

k-effective:                 0.99915
Void Fraction:                 0.455
Core Delta-P: psia            25.130
Core Plate Delta-P: psia      20.569
Coolant Temp: Deg-F           548.4
In Channel Flow: Mlb/hr        90.92
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.1
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    27352.3

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.236   5.816    13  0.402 0.406   5 48
    24  0.626  16.269    14  0.350 0.420   9 52
    23  0.791  20.930    15  0.460 0.462   3 18
    22  0.855  23.458    16  1.041 1.191  31 14
    21  0.900  25.276    17  0.807 1.140  51 36
    20  0.928  26.728    18  1.003 1.134  19 42
    19  0.926  27.467    19  1.248 1.371  31 12
    18  0.938  28.340    20  1.166 1.284  21 10
    17  0.947  28.945    21  1.182 1.302  37 10
    16  0.956  29.499
    15  0.976  30.456
    14  0.967  30.503
    13  1.056  29.107
    12  1.087  30.117
    11  1.117  30.675
    10  1.165  31.380
     9  1.221  32.237
     8  1.272  32.881
     7  1.324  33.582
     6  1.387  34.733
     5  1.408* 35.003*
     4  1.377  33.867
     3  1.279  31.042
     2  0.980  23.544
Bottom  1  0.280   6.889

% AXIAL TILT -16.084  -9.818
AVG BOT 8ft/12ft  1.0814  1.0560

Active Channel Flow: Mlb/hr        87.68
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.371	19	31	12	1.769	0.803	19	31	12	9.32	0.756	21.6	20	9	42	4	10.44	0.791	26.4	20	9	20	4
1.362	19	29	16	1.781	0.797	19	49	30	9.26	0.747	20.8	20	9	40	4	10.31	0.786	27.0	20	13	48	4
1.357	19	49	32	1.791	0.793	19	29	16	9.12	0.746	22.5	20	41	52	4	10.20	0.785	28.1	19	33	10	5
1.351	19	27	14	1.804	0.787	19	33	14	7.05	0.743	48.8	16	31	10	5	10.26	0.784	27.2	19	31	50	5
1.347	19	15	32	1.807	0.786	19	45	30	9.06	0.741	22.4	19	31	50	5	10.33	0.782	26.2	20	11	44	4
1.341	19	23	22	1.814	0.783	19	19	40	6.78	0.741	52.0	17	35	10	5	10.29	0.781	26.6	19	47	16	4
1.340	19	21	38	1.815	0.782	19	21	42	9.11	0.740	21.6	20	13	48	4	10.27	0.781	26.8	19	15	48	4
1.338	19	47	28	1.816	0.782	19	21	38	7.23	0.740	46.1	16	31	48	5	10.50	0.781	24.3	20	9	22	4
1.338	19	33	10	1.818	0.781	19	47	28	9.19	0.740	20.5	19	9	18	4	10.23	0.780	27.1	20	19	10	4
1.331	19	51	34	1.821	0.780	19	23	22	6.87	0.739	50.7	17	51	36	5	10.30	0.778	26.0	19	33	48	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.37 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 12,205.4 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      12206.1 (1688.70 )
Delta E: MWd/MTU, (GWd)          0.7 (   0.10 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -26.23
Flow: Mlb/hr                  105.06 (102.50 %)

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

Control Rod Density: %          5.72

k-effective:                 0.99919
Void Fraction:                 0.455
Core Delta-P: psia            25.848
Core Plate Delta-P: psia      21.285
Coolant Temp: Deg-F           548.4
In Channel Flow: Mlb/hr        92.50
Total Bypass Flow (%):         12.0
Total Water Rod Flow (%):       3.1
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    27353.0

                    Axial Profile    Edit   Radial Power
          N(PRA)  Power Exposure  Zone  Avg.  Max.   IR JR
Top 25    0.233   5.817    13  0.396 0.415   5 48
    24    0.619  16.269    14  0.347 0.429   9 52
    23    0.779  20.931    15  0.465 0.469   3 18
    22    0.833  23.459    16  1.026 1.198  21 30
    21    0.860  25.277    17  0.828 1.157  13 40
    20    0.880  26.729    18  1.016 1.156  23 28
    19    0.891  27.468    19  1.247 1.365  15 44
    18    0.914  28.341    20  1.178 1.329  11 44
    17    0.932  28.946    21  1.177 1.314  51 38
    16    0.948  29.500
    15    0.974  30.456
    14    0.970  30.503
    13    1.064  29.108
    12    1.099  30.118
    11    1.131  30.676
    10    1.181  31.381
     9    1.239  32.238
     8    1.291  32.882
     7    1.344  33.583
     6    1.407  34.734
     5   1.430*  35.004*
     4    1.399  33.868
     3    1.300  31.043
     2    0.997  23.545
Bottom   1  0.285   6.889

          % AXIAL TILT -17.847  -9.818
AVG BOT 8ft/12ft  1.0938  1.0560

Active Channel Flow: Mlb/hr        89.22
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.365	19	15	44	1.787	0.794	19	21	34	9.89	0.803	21.6	20	9	20	4	11.16	0.851	27.0	20	9	20	4
1.359	19	21	28	1.800	0.789	20	51	40	9.73	0.793	22.0	20	11	18	4	11.16	0.840	25.7	19	49	40	4
1.358	19	13	42	1.808	0.785	19	23	30	9.68	0.792	22.5	20	19	10	4	11.00	0.836	26.7	20	11	44	4
1.351	19	17	16	1.809	0.785	19	19	32	9.80	0.790	20.8	20	9	22	4	10.89	0.836	27.8	20	19	52	4
1.347	19	21	12	1.826	0.778	20	21	10	7.39	0.790	50.0	16	11	20	5	11.03	0.831	25.8	20	9	40	4
1.345	19	23	26	1.826	0.777	19	19	36	9.61	0.786	22.4	20	17	12	4	10.91	0.831	27.0	20	13	48	4
1.342	19	23	30	1.829	0.777	19	21	38	9.65	0.785	21.8	19	13	16	4	10.90	0.827	26.6	19	47	16	4
1.342	19	17	42	1.831	0.776	19	15	44	7.32	0.784	50.3	16	41	50	5	10.84	0.827	27.1	19	39	50	4
1.341	19	19	14	1.833	0.775	19	23	36	9.61	0.783	21.9	19	15	14	4	10.80	0.826	27.3	20	43	12	4
1.340	19	11	40	1.833	0.775	20	49	18	9.71	0.781	20.5	19	9	18	4	10.85	0.825	26.8	19	15	48	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.38 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 12,206.1 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    27647.0
Exposure: MWd/MTU (GWd)        12500.0 (1729.40 )
Delta E: MWd/MTU, (GWd)          293.9 (  40.66 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.236   5.889    13  0.394 0.414   5 48
Inlet Subcooling: Btu/lbm       -26.37                        24  0.627  16.465    14  0.346 0.428   9 52
Flow: Mlb/hr                    104.55 (102.00 %)             23  0.788  21.177    15  0.463 0.467   3 18
                                                              22  0.843  23.724    16  1.025 1.198  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  0.870  25.551    17  0.826 1.156  13 40
59              -- -- -- -- -- -- --              59          20  0.891  27.010    18  1.015 1.156  23 28
55          -- -- -- -- -- -- -- -- -- --         55          19  0.903  27.752    19  1.249 1.365  15 44
51       -- -- -- -- --  6 -- -- -- -- --        51          18  0.928  28.633    20  1.179 1.329  11 44
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47          17  0.946  29.244    21  1.177 1.314  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43          16  0.963  29.803
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  0.989  30.768
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35          14  0.984  30.813
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.078  29.402
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27          12  1.111  30.421
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.142  30.988
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19          10  1.190  31.707
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.244  32.579
11       -- -- -- -- --  6 -- -- -- -- --       11           8  1.290  33.236
 7          -- -- -- -- -- -- -- -- --          7           7  1.334  33.951
 3             -- -- -- -- -- -- --             3           6  1.385  35.118
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  1.396* 35.392*
                                                              4  1.358  34.247
Control Rod Density: %             5.72                       3  1.260  31.395
                                                              2  0.967  23.815
k-effective:                    0.99930                Bottom  1  0.277   6.970
Void Fraction:                    0.452
Core Delta-P: psia               25.611            % AXIAL TILT -16.657  -9.826
Core Plate Delta-P: psia         21.049         AVG BOT 8ft/12ft  1.0883  1.0560
Coolant Temp: Deg-F              548.4
In Channel Flow: Mlb/hr           92.07   Active Channel Flow: Mlb/hr        88.80
Total Bypass Flow (%):            11.9   (of total core flow)
Total Water Rod Flow (%):          3.1   (of total core flow)
Source Convergence              0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.365	19	15	44	1.774	0.800	19	21	34	9.58	0.782	22.2	20	9	20	4	10.76	0.825	27.7	20	9	20	4
1.364	19	21	28	1.789	0.794	20	51	40	7.19	0.772	50.5	16	11	20	5	10.79	0.817	26.3	19	49	40	4
1.359	19	13	42	1.796	0.791	19	23	30	9.41	0.771	22.6	20	11	18	4	10.61	0.811	27.4	20	11	44	4
1.351	19	17	16	1.798	0.790	19	19	32	9.50	0.771	21.4	20	9	40	4	10.46	0.810	28.7	20	41	52	5
1.350	19	23	26	1.815	0.782	19	19	36	9.34	0.768	23.1	20	19	10	4	10.68	0.809	26.4	20	9	40	4
1.348	19	23	30	1.817	0.781	20	21	10	7.11	0.765	50.7	16	41	50	5	10.50	0.805	27.6	20	13	48	4
1.347	19	21	12	1.819	0.781	19	21	38	9.42	0.762	21.1	19	9	18	4	10.52	0.803	27.2	19	47	16	4
1.344	19	19	32	1.821	0.780	20	49	18	9.27	0.762	23.0	20	17	12	4	10.44	0.802	27.9	19	39	50	5
1.342	19	11	40	1.822	0.780	19	23	36	9.31	0.762	22.4	19	13	16	4	10.39	0.801	28.2	20	43	12	5
1.342	19	17	42	1.822	0.779	19	15	44	9.27	0.759	22.5	19	15	14	4	10.46	0.801	27.5	19	15	48	4

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.39 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 12,500.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    28146.9
Exposure: MWd/MTU (GWd)      13000.0 (1798.50 )
Delta E: MWd/MTU, (GWd)        500.0 (  69.17 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.242   6.016    13  0.392 0.412   5 48
Inlet Subcooling: Btu/lbm     -26.65                        24  0.642  16.805    14  0.344 0.426   9 52
Flow: Mlb/hr                  103.53 (101.00 %)             23  0.807  21.604    15  0.461 0.465   3 18
                                                            22  0.863  24.184    16  1.023 1.195  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  0.892  26.027    17  0.824 1.153  13 40
59              -- -- -- -- -- -- --              59        20  0.915  27.498    18  1.012 1.154  23 28
55          -- -- -- -- -- -- -- -- -- --         55        19  0.929  28.247    19  1.253 1.371  21 28
51       -- -- -- -- --  6 -- -- -- -- --        51        18  0.956  29.141    20  1.180 1.330  11 44
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47        17  0.976  29.762    21  1.179 1.316  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43        16  0.993  30.330
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.020  31.310
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35        14  1.013  31.352
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.106  29.912
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27        12  1.137  30.946
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.164  31.527
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19        10  1.207  32.268
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.253  33.164
11       -- -- -- -- --  6 -- -- -- -- --       11         8  1.286  33.839
 7          -- -- -- -- -- -- -- -- -- --        7         7  1.310  34.569
 3             -- -- -- -- -- -- --              3         6  1.338* 35.755
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.327  36.029*
                                                            4  1.276  34.863
Control Rod Density: %            5.72                      3  1.179  31.966
                                                            2  0.906  24.253
k-effective:                  0.99946                Bottom  1  0.259   7.102
Void Fraction:                  0.446
Core Delta-P: psia             25.139            % AXIAL TILT -14.209  -9.807
Core Plate Delta-P: psia       20.578         AVG BOT 8ft/12ft  1.0770  1.0558
Coolant Temp: Deg-F            548.2
In Channel Flow: Mlb/hr         91.19   Active Channel Flow: Mlb/hr        87.97
Total Bypass Flow (%):          11.9   (of total core flow)
Total Water Rod Flow (%):        3.1   (of total core flow)
Source Convergence           0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.371	19	21	28	1.753	0.810	19	21	34	8.99	0.740	23.2	20	9	42	4	10.07	0.783	29.2	20	51	42	5
1.364	19	15	44	1.767	0.804	20	51	40	6.81	0.738	51.3	16	11	20	5	10.12	0.777	27.9	19	49	40	5
1.361	19	13	42	1.772	0.801	19	23	32	6.80	0.733	50.8	16	41	50	6	9.95	0.772	28.8	20	11	44	5
1.356	19	23	30	1.779	0.798	19	19	32	8.83	0.731	23.8	20	11	18	5	9.86	0.771	29.8	20	41	52	5
1.355	19	23	26	1.795	0.791	19	19	36	8.91	0.730	22.6	20	9	40	5	10.17	0.768	26.0	20	51	22	5
1.351	19	17	16	1.796	0.791	20	49	18	8.76	0.727	24.1	20	19	10	5	9.87	0.766	29.0	19	39	50	5
1.349	19	21	12	1.797	0.790	20	21	10	8.72	0.724	24.1	20	17	12	5	9.87	0.763	28.5	19	47	16	5
1.349	19	19	32	1.798	0.790	19	23	26	6.70	0.722	50.8	16	13	18	6	9.79	0.762	29.3	20	43	12	5
1.346	19	11	40	1.801	0.789	19	21	38	8.74	0.722	23.6	19	13	16	5	9.81	0.761	28.9	20	13	48	5
1.343	19	17	42	1.803	0.788	19	15	44	8.85	0.721	22.1	19	9	18	4	9.82	0.760	28.7	19	15	48	5

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.40 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 13,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    28646.9
Exposure: MWd/MTU (GWd)      13500.0 (1867.70 )
Delta E: MWd/MTU, (GWd)        500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.249   6.146    13  0.390 0.410   5 48
Inlet Subcooling: Btu/lbm     -26.94                        24  0.659  17.153    14  0.342 0.425   9 52
Flow: Mlb/hr                  102.50 (100.00 %)             23  0.828  22.042    15  0.459 0.464   3 18
                                                            22  0.886  24.656    16  1.021 1.193  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  0.918  26.515    17  0.822 1.152  13 40
59              -- -- -- -- -- -- --              59        20  0.943  27.999    18  1.010 1.153  23 28
55          -- -- -- -- -- -- -- -- -- --         55        19  0.959  28.756    19  1.256 1.376  21 28
51       -- -- -- -- --  6 -- -- -- -- --        51        18  0.989  29.666    20  1.182 1.332  11 44
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47        17  1.010  30.298    21  1.180 1.317  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43        16  1.029  30.876
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.056  31.870
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35        14  1.045  31.907
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.138  30.436
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27        12  1.166  31.484
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.189  32.076
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19        10  1.225  32.837
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.260  33.751
11       -- -- -- -- --  6 -- -- -- -- --       11         8  1.277  34.438
 7          -- -- -- -- -- -- -- -- --          7         7  1.280  35.175
 3             -- -- -- -- -- -- --             3         6  1.283* 36.368
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.251  36.632*
                                                            4  1.188  35.440
Control Rod Density: %          5.72                        3  1.092  32.497
                                                            2  0.841  24.662
k-effective:                 0.99958                Bottom  1  0.241   7.225
Void Fraction:                0.439
Core Delta-P: psia           24.662             % AXIAL TILT -11.405  -9.741
Core Plate Delta-P: psia     20.102          AVG BOT 8ft/12ft  1.0641  1.0554
Coolant Temp: Deg-F          548.1
In Channel Flow: Mlb/hr       90.32   Active Channel Flow: Mlb/hr        87.15
Total Bypass Flow (%):        11.9    (of total core flow)
Total Water Rod Flow (%):      3.1    (of total core flow)
Source Convergence          0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.376	19	21	28	1.731	0.820	19	21	34	6.56	0.711	51.4	16	49	42	6	9.45	0.742	30.2	20	51	42	5
1.365	19	15	44	1.743	0.815	20	51	40	6.52	0.707	51.5	16	41	50	6	9.52	0.738	28.9	19	49	40	5
1.363	19	23	30	1.747	0.813	19	23	32	8.45	0.702	24.4	20	9	42	5	9.37	0.731	29.6	20	41	52	6
1.362	19	13	42	1.760	0.807	19	19	32	6.41	0.696	51.5	16	13	18	6	7.02	0.731	56.2	16	49	42	6
1.359	19	23	26	1.763	0.806	19	23	26	8.42	0.695	23.6	20	9	40	5	9.34	0.731	29.9	20	11	44	5
1.352	19	19	32	1.768	0.803	20	49	18	8.31	0.693	24.7	20	11	18	5	9.58	0.730	27.0	20	51	22	5
1.351	19	17	16	1.775	0.800	19	19	36	6.37	0.692	51.6	16	17	48	6	6.98	0.728	56.3	16	41	50	6
1.350	19	21	12	1.775	0.800	20	39	52	6.58	0.691	48.5	16	15	16	6	9.38	0.727	28.8	19	39	50	6
1.349	19	11	40	1.780	0.798	19	15	18	8.26	0.691	25.0	20	19	10	5	9.29	0.724	29.5	19	47	16	5
1.344	19	19	36	1.780	0.798	19	11	40	8.21	0.686	25.0	20	17	12	5	9.30	0.724	29.2	20	43	12	6

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.41 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 13,500.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    29146.8
Exposure: MWd/MTU (GWd)      14000.0 (1936.90 )
Delta E: MWd/MTU, (GWd)        500.0 (  69.17 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.256   6.279    13  0.388 0.409   5 48
Inlet Subcooling: Btu/lbm     -26.94                        24  0.679  17.511    14  0.340 0.424   9 52
Flow: Mlb/hr                  102.50 (100.00 %)             23  0.853  22.492    15  0.457 0.462   3 18
                                                            22  0.914  25.142    16  1.020 1.189  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  0.949  27.019    17  0.820 1.151  13 40
59              -- -- -- -- -- -- --              59        20  0.977  28.517    18  1.007 1.150  23 28
55          -- -- -- -- -- -- -- -- -- --         55        19  0.995  29.284    19  1.258 1.379  21 28
51       -- -- -- -- --  6 -- -- -- -- --        51        18  1.027  30.210    20  1.184 1.335  11 44
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47        17  1.050  30.854    21  1.182 1.320  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43        16  1.069  31.442
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.095  32.451
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35        14  1.081  32.481
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.173  30.976
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27        12  1.197  32.036
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.213  32.637
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19        10  1.241  33.413
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.263* 34.342
11       -- -- -- -- --  6 -- -- -- -- --       11         8  1.262  35.032
 7          -- -- -- -- -- -- -- -- -- --        7         7  1.243  35.765
 3             -- -- -- -- -- -- --              3         6  1.221  36.953
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.168  37.198*
                                                            4  1.091  35.973
Control Rod Density: %            5.72                      3  0.995  32.985
                                                            2  0.768  25.038
k-effective:                  0.99985                Bottom  1  0.220   7.338
Void Fraction:                  0.430
Core Delta-P: psia             24.540            % AXIAL TILT  -8.119  -9.625
Core Plate Delta-P: psia       19.980         AVG BOT 8ft/12ft  1.0487  1.0547
Coolant Temp: Deg-F            547.9
In Channel Flow: Mlb/hr         90.39   Active Channel Flow: Mlb/hr        87.24
Total Bypass Flow (%):          11.8   (of total core flow)
Total Water Rod Flow (%):        3.1   (of total core flow)
Source Convergence           0.00004
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.379	19	21	28	1.718	0.827	19	21	34	6.48	0.685	49.1	16	41	12	8	7.02	0.709	53.6	16	41	50	8
1.368	19	23	30	1.724	0.824	20	51	40	6.25	0.683	52.1	16	49	42	6	9.03	0.708	30.1	20	51	42	6
1.366	19	15	44	1.729	0.821	19	23	32	6.40	0.678	49.2	16	13	44	8	6.98	0.705	53.6	16	49	42	8
1.365	19	13	42	1.735	0.819	19	23	26	6.39	0.677	49.3	16	17	48	8	6.78	0.704	56.0	16	17	48	8
1.361	19	23	26	1.745	0.814	19	41	32	6.52	0.674	47.1	16	15	46	8	9.08	0.704	28.8	19	49	40	6
1.354	19	11	40	1.745	0.814	20	49	18	6.42	0.666	47.3	16	37	12	8	6.78	0.704	55.9	16	47	18	8
1.354	19	19	32	1.749	0.812	19	15	18	7.93	0.664	25.2	20	9	42	5	8.91	0.702	30.6	20	41	52	6
1.353	19	21	12	1.752	0.810	19	47	42	6.40	0.660	46.8	16	15	42	9	8.94	0.699	29.8	20	11	44	6
1.353	19	17	16	1.758	0.808	20	39	52	7.92	0.660	24.6	20	11	18	6	8.94	0.699	29.7	19	39	50	6
1.347	19	15	40	1.760	0.807	19	11	40	6.30	0.660	48.2	17	39	14	8	6.86	0.697	54.2	16	15	16	8

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.42 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 14,000.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    29376.7
Exposure: MWd/MTU (GWd)      14230.0 (1968.70 )
Delta E: MWd/MTU, (GWd)        230.0 (  31.82 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.260   6.342    13  0.387 0.408   5 48
Inlet Subcooling: Btu/lbm     -26.94                        24  0.688  17.680    14  0.339 0.424   9 52
Flow: Mlb/hr                  102.50 (100.00 %)             23  0.864  22.703    15  0.456 0.461   3 18
                                                            22  0.927  25.370    16  1.019 1.187  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  0.963  27.256    17  0.820 1.151  13 40
59              -- -- -- -- -- -- --              59        20  0.993  28.762    18  1.005 1.148  23 28
55           -- -- -- -- -- -- -- -- --           55        19  1.012  29.533    19  1.259 1.380  21 28
51        -- -- -- -- --  6 -- -- -- -- --        51        18  1.045  30.467    20  1.186 1.337  11 44
47     -- -- -- -- -- -- -- -- -- -- -- -- --     47        17  1.069  31.117    21  1.183 1.321  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43        16  1.087  31.709
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.113  32.725
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35        14  1.097  32.751
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.188  31.229
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27        12  1.210  32.295
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.222  32.899
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19        10  1.246  33.681
15     -- -- -- -- -- -- -- -- -- -- -- -- --     15         9  1.262* 34.613
11        -- -- -- -- --  6 -- -- -- -- --        11         8  1.253  35.303
 7           -- -- -- -- -- -- -- -- --           7         7  1.224  36.031
 3              -- -- -- -- -- -- --              3         6  1.192  37.213
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  1.131  37.446*
                                                            4  1.050  36.203
Control Rod Density: %            5.72                      3  0.954  33.195
                                                            2  0.736  25.200
k-effective:                  0.99998                Bottom  1  0.211   7.387
Void Fraction:                  0.425
Core Delta-P: psia             24.485            % AXIAL TILT  -6.604  -9.554
Core Plate Delta-P: psia       19.925         AVG BOT 8ft/12ft  1.0414  1.0544
Coolant Temp: Deg-F            547.8
In Channel Flow: Mlb/hr         90.42   Active Channel Flow: Mlb/hr        87.27
Total Bypass Flow (%):          11.8   (of total core flow)
Total Water Rod Flow (%):        3.1   (of total core flow)
Source Convergence           0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.380	19	21	28	1.706	0.832	19	39	34	6.44	0.683	49.4	16	41	12	8	6.97	0.707	54.0	16	41	50	8
1.370	19	23	30	1.715	0.828	20	51	40	6.42	0.680	49.4	16	49	20	8	6.94	0.703	54.0	16	49	42	8
1.367	19	15	44	1.722	0.825	19	23	32	6.45	0.677	48.4	16	13	44	9	6.84	0.702	55.0	16	47	18	9
1.366	19	13	42	1.722	0.824	19	23	26	6.34	0.674	49.6	16	17	48	8	6.72	0.702	56.4	16	17	48	8
1.361	19	23	26	1.733	0.819	19	41	32	6.54	0.673	46.6	16	15	46	9	6.91	0.698	53.7	16	15	16	9
1.356	19	11	40	1.734	0.819	20	49	18	6.45	0.665	46.7	16	37	12	9	8.82	0.695	30.6	20	51	42	6
1.354	19	21	12	1.734	0.819	19	15	18	6.49	0.660	45.5	16	15	42	15	8.89	0.692	29.3	19	49	40	6
1.354	19	19	32	1.737	0.817	19	47	42	6.53	0.659	44.8	16	21	30	15	7.01	0.691	51.7	17	47	40	15
1.353	19	17	16	1.750	0.811	19	11	40	6.26	0.657	48.5	17	39	14	8	9.01	0.691	27.7	20	41	52	8
1.348	19	15	40	1.751	0.811	20	39	52	6.23	0.654	48.4	17	13	40	8	7.00	0.688	51.4	17	39	48	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.43 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 14,230.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      14550.0 (2013.00 )
Delta E: MWd/MTU, (GWd)        320.0 (  44.27 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -26.94
Flow: Mlb/hr                  102.50 (100.00 %)

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

Control Rod Density: %          5.72

k-effective:                 1.00003
Void Fraction:                 0.419
Core Delta-P: psia            24.404
Core Plate Delta-P: psia      19.844
Coolant Temp: Deg-F           547.7
In Channel Flow: Mlb/hr        90.46
Total Bypass Flow (%):         11.7
Total Water Rod Flow (%):       3.1
Source Convergence          0.00008
```

```
Core Average Exposure: MWd/MTU    29696.9

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.265   6.431    13  0.386 0.407   5 48
    24  0.703  17.918    14  0.339 0.423   9 52
    23  0.882  23.002    15  0.456 0.460   3 18
    22  0.948  25.694    16  1.017 1.183  21 30
    21  0.987  27.593    17  0.819 1.150  13 40
    20  1.018  29.109    18  1.003 1.145  23 28
    19  1.039  29.887    19  1.260 1.380  21 28
    18  1.073  30.832    20  1.188 1.339  11 44
    17  1.097  31.491    21  1.185 1.323  51 38
    16  1.114  32.089
    15  1.139  33.113
    14  1.120  33.134
    13  1.210  31.588
    12  1.228  32.659
    11  1.236  33.267
    10  1.252  34.055
     9  1.258* 34.991
     8  1.238  35.675
     7  1.195  36.393
     6  1.149  37.563
     5  1.077  37.776*
     4  0.989  36.508
     3  0.895  33.472
     2  0.691  25.413
Bottom  1  0.198   7.451

% AXIAL TILT  -4.289  -9.436
AVG BOT 8ft/12ft  1.0302  1.0538

Active Channel Flow: Mlb/hr        87.33
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.380	19	21	28	1.689	0.841	19	39	34	6.47	0.681	48.7	16	41	12	9	7.17	0.711	52.1	17	47	40	15
1.371	19	23	30	1.702	0.834	20	51	40	6.63	0.678	46.0	16	15	42	15	7.16	0.707	51.9	17	39	48	15
1.368	19	13	42	1.705	0.833	19	23	26	6.43	0.677	48.7	16	49	20	9	7.09	0.706	52.6	16	15	42	15
1.367	19	15	44	1.709	0.831	19	23	32	6.41	0.676	48.9	16	13	44	9	6.93	0.705	54.4	16	41	50	9
1.360	19	23	26	1.714	0.829	19	15	18	6.39	0.675	48.9	16	17	48	9	6.80	0.703	55.5	16	17	48	9
1.359	19	11	40	1.715	0.828	19	41	32	6.63	0.673	45.2	16	21	30	15	6.80	0.702	55.4	16	47	18	9
1.356	19	21	12	1.716	0.828	19	47	42	6.50	0.672	47.1	16	15	46	9	7.10	0.701	51.8	16	15	16	15
1.354	19	17	16	1.718	0.827	20	49	18	6.58	0.665	45.0	17	13	40	15	6.97	0.700	53.2	16	49	42	9
1.354	19	19	32	1.735	0.818	19	17	42	6.42	0.664	47.2	16	37	12	9	7.05	0.700	52.4	16	17	40	15
1.349	19	15	40	1.736	0.818	19	15	40	6.49	0.664	46.0	16	17	40	15	7.02	0.695	52.0	16	39	32	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.44 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 14,550.0 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    29899.8
Exposure: MWd/MTU (GWd)       14752.8 (2041.00 )
Delta E: MWd/MTU, (GWd)         202.8 (  28.06 )                    Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.269   6.488    13  0.385 0.407   5 48
Inlet Subcooling: Btu/lbm      -26.94                        24  0.712  18.071    14  0.338 0.423   9 52
Flow: Mlb/hr                   102.50 (100.00 %)             23  0.894  23.195    15  0.455 0.460   3 18
                                                             22  0.962  25.903    16  1.016 1.181  21 30
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.002  27.811    17  0.819 1.150  13 40
59              -- -- -- -- -- -- --              59         20  1.034  29.334    18  1.001 1.143  23 28
55          -- -- -- -- -- -- -- -- -- --         55         19  1.056  30.116    19  1.261 1.379  21 28
51       -- -- -- -- --  6 -- -- -- -- --       51          18  1.090  31.069    20  1.190 1.341  11 44
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.114  31.733    21  1.187 1.324  51 38
43 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 43          16  1.130  32.335
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.154  33.364
35 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 35          14  1.133  33.381
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.223  31.819
27 -- -- --  8 -- -- --  0 -- -- --  8 -- -- -- 27          12  1.238  32.893
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.242  33.502
19 -- -- -- -- --  6 -- -- --  6 -- -- -- -- -- 19          10  1.255  34.293
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.255* 35.229
11       -- -- -- -- --  6 -- -- -- -- --       11           8  1.227  35.909
 7          -- -- -- -- -- -- -- -- --           7           7  1.176  36.618
 3             -- -- -- -- -- -- --              3           6  1.123  37.779
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  1.044  37.977*
                                                             4  0.953  36.693
Control Rod Density: %           5.72                        3  0.859  33.638
                                                             2  0.665  25.542
k-effective:                  1.00006                Bottom  1  0.190   7.490
Void Fraction:                  0.415
Core Delta-P: psia             24.354             % AXIAL TILT  -2.853  -9.350
Core Plate Delta-P: psia       19.794          AVG BOT 8ft/12ft  1.0231  1.0534
Coolant Temp: Deg-F            547.6
In Channel Flow: Mlb/hr         90.49   Active Channel Flow: Mlb/hr        87.37
Total Bypass Flow (%):          11.7   (of total core flow)
Total Water Rod Flow (%):        3.0   (of total core flow)
Source Convergence           0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.379	19	21	28	1.678	0.846	19	39	34	6.71	0.688	46.3	16	15	42	15	7.26	0.723	52.5	17	47	40	15
1.371	19	23	30	1.694	0.838	20	51	40	6.46	0.682	49.0	16	41	12	9	7.25	0.719	52.2	17	39	48	15
1.369	19	13	42	1.695	0.838	19	23	26	6.68	0.682	45.9	16	13	44	15	7.17	0.717	52.9	16	15	42	15
1.368	19	15	44	1.697	0.837	19	23	32	6.68	0.681	45.8	16	15	46	15	7.20	0.713	52.1	16	15	16	15
1.362	19	11	40	1.701	0.835	19	15	18	6.69	0.681	45.5	16	21	30	15	7.12	0.710	52.7	16	17	40	15
1.358	19	23	26	1.702	0.834	19	47	42	6.43	0.678	49.0	16	49	20	9	7.20	0.709	51.7	16	47	18	15
1.357	19	21	12	1.704	0.833	19	41	32	6.63	0.678	46.0	16	17	14	15	7.22	0.709	51.4	16	41	50	15
1.354	19	17	16	1.708	0.832	20	49	18	6.66	0.676	45.3	17	13	40	15	7.18	0.709	51.8	16	17	48	15
1.353	19	19	32	1.722	0.824	19	15	40	6.63	0.673	45.3	17	21	48	15	7.15	0.708	52.0	16	49	42	15
1.350	19	15	40	1.723	0.824	19	17	42	6.56	0.673	46.3	16	17	40	15	7.09	0.704	52.3	16	39	32	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.45 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 14,752.8 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    29900.5
Exposure: MWd/MTU (GWd)       14753.6 (2041.10 )
Delta E: MWd/MTU, (GWd)           0.7 (   0.10 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.274   6.488    13  0.392 0.399   5 48
Inlet Subcooling: Btu/lbm     -26.94                         24  0.726  18.072    14  0.342 0.411  51 52
Flow: Mlb/hr                   102.50 (100.00 %)             23  0.907  23.196    15  0.455 0.457   3 18
                                                             22  0.968  25.904    16  1.027 1.193  29 26
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  0.994  27.811    17  0.826 1.156  51 26
59              -- -- -- -- -- -- --              59         20  1.027  29.335    18  0.919 1.126  23 28
55          -- -- -- -- -- -- -- -- -- --         55         19  1.048  30.117    19  1.253 1.423  31 34
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.083  31.070    20  1.194 1.347  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.106  31.734    21  1.212 1.357  51 38
43 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 43         16  1.123  32.336
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.147  33.365
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35         14  1.128  33.382
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.218  31.819
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27         12  1.234  32.894
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.239  33.503
19 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 19         10  1.253  34.294
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15          9  1.254* 35.230
11       -- -- -- -- -- -- -- -- -- -- -- --      11          8  1.227  35.910
 7          -- -- -- -- -- -- -- -- -- --         7          7  1.178  36.619
 3             -- -- -- -- -- -- -- --            3          6  1.126  37.780
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  1.049  37.978*
                                                             4  0.959  36.693
Control Rod Density: %            5.68                       3  0.867  33.639
                                                             2  0.672  25.542
k-effective:                   1.00005                Bottom  1  0.193   7.490
Void Fraction:                   0.416
Core Delta-P: psia              24.351             % AXIAL TILT  -3.026  -9.349
Core Plate Delta-P: psia        19.791          AVG BOT 8ft/12ft  1.0232  1.0533
Coolant Temp: Deg-F             547.7
In Channel Flow: Mlb/hr          90.49   Active Channel Flow: Mlb/hr        87.37
Total Bypass Flow (%):           11.7   (of total core flow)
Total Water Rod Flow (%):         3.0   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.423	19	31	34	1.608	0.883	19	33	32	6.77	0.703	47.5	16	29	32	15	7.26	0.731	53.3	16	33	34	15
1.422	19	27	30	1.610	0.882	19	31	34	6.71	0.697	47.4	16	27	28	15	7.25	0.729	53.3	16	31	32	15
1.393	19	25	28	1.636	0.868	19	33	26	6.78	0.693	45.9	16	31	36	15	7.31	0.726	52.2	17	25	10	15
1.392	19	27	26	1.637	0.868	19	25	34	6.70	0.691	46.9	16	25	30	15	7.36	0.723	51.4	17	9	26	15
1.368	19	31	50	1.687	0.842	20	51	40	6.45	0.687	49.8	17	35	10	9	7.17	0.715	52.6	16	31	26	15
1.365	19	25	12	1.698	0.836	19	23	30	6.76	0.686	45.3	17	51	36	15	7.12	0.715	53.2	16	25	32	15
1.361	19	49	26	1.702	0.834	19	29	24	6.64	0.683	46.6	16	51	30	15	7.12	0.713	53.0	16	49	34	15
1.361	19	49	40	1.710	0.830	20	21	10	6.64	0.683	46.5	16	49	28	15	7.14	0.712	52.6	16	9	32	15
1.359	19	23	30	1.718	0.826	19	25	50	6.72	0.681	45.2	16	37	12	15	6.92	0.709	54.9	16	31	10	9
1.359	19	33	10	1.719	0.826	19	49	26	6.73	0.679	44.7	16	49	38	15	7.18	0.709	51.7	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.46 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 14,753.6 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    30246.9
Exposure: MWd/MTU (GWd)     15100.0 (2089.10 )
Delta E: MWd/MTU, (GWd)       346.4 (  47.93 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.280   6.590    13  0.391 0.399   5 48
Inlet Subcooling: Btu/lbm    -26.79                       24  0.744  18.345    14  0.341 0.411  51 52
Flow: Mlb/hr                 103.01 (100.50 %)            23  0.930  23.536    15  0.454 0.457   3 18
                                                          22  0.994  26.271    16  1.025 1.188  29 26
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.023  28.188    17  0.826 1.155  51 26
59              -- -- -- -- -- -- --              59      20  1.057  29.724    18  0.917 1.122  23 28
55          -- -- -- -- -- -- -- -- -- --         55      19  1.079  30.515    19  1.253 1.419  31 34
51       -- -- -- -- -- -- -- -- -- -- -- --      51      18  1.114  31.481    20  1.197 1.350  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47      17  1.137  32.154    21  1.213 1.358  51 38
43 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 43      16  1.152  32.761
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.174  33.799
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35      14  1.150  33.807
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.240  32.217
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27      12  1.251  33.296
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.249  33.905
19 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 19      10  1.255* 34.700
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15       9  1.247  35.635
11       -- -- -- -- -- -- -- -- -- -- --       11       8  1.207  36.305
 7          -- -- -- -- -- -- -- -- --           7       7  1.143  36.995
 3             -- -- -- -- -- -- --              3       6  1.078  38.137
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.990  38.309*
                                                          4  0.896  36.994
Control Rod Density: %         5.68                       3  0.805  33.910
                                                          2  0.625  25.753
k-effective:                1.00004                Bottom  1  0.179   7.553
Void Fraction:                0.408
Core Delta-P: psia           24.442            % AXIAL TILT  -0.382  -9.183
Core Plate Delta-P: psia     19.882         AVG BOT 8ft/12ft  1.0098  1.0525
Coolant Temp: Deg-F           547.5
In Channel Flow: Mlb/hr       91.00   Active Channel Flow: Mlb/hr        87.88
Total Bypass Flow (%):         11.7   (of total core flow)
Total Water Rod Flow (%):       3.0   (of total core flow)
Source Convergence          0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.419	19	31	34	1.598	0.895	19	33	32	6.98	0.713	45.9	16	29	32	17	7.48	0.747	52.8	17	25	10	15
1.418	19	27	30	1.598	0.895	19	31	34	6.78	0.707	47.9	16	27	28	15	7.52	0.744	51.9	17	9	26	15
1.389	19	25	28	1.626	0.879	19	25	34	6.85	0.706	46.7	17	35	10	15	7.34	0.743	53.9	16	33	34	15
1.388	19	27	26	1.626	0.879	19	33	26	6.86	0.705	46.4	16	31	36	15	7.33	0.741	53.8	16	31	32	15
1.369	19	31	50	1.676	0.853	20	51	40	6.91	0.705	45.8	17	51	36	15	7.26	0.732	53.5	16	49	34	15
1.365	19	25	12	1.694	0.844	19	23	32	6.77	0.703	47.4	16	25	30	15	7.29	0.732	53.1	16	9	32	15
1.364	19	49	40	1.698	0.842	20	39	10	6.77	0.701	47.1	16	51	30	15	7.31	0.730	52.7	17	39	48	15
1.362	19	49	26	1.699	0.842	19	31	24	6.87	0.700	45.7	16	37	12	15	7.35	0.730	52.2	16	23	50	15
1.360	19	21	12	1.699	0.841	19	25	50	6.78	0.700	47.0	16	49	28	15	7.26	0.728	53.1	16	31	26	15
1.359	19	33	10	1.700	0.841	19	49	26	6.89	0.698	45.2	16	49	38	15	7.20	0.728	53.7	16	25	32	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.47 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 15,100.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    30746.7
Exposure: MWd/MTU (GWd)     15600.0 (2158.30 )
Delta E: MWd/MTU, (GWd)       500.0 (  69.17 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.291   6.741    13  0.389 0.399   5 48
Inlet Subcooling: Btu/lbm    -26.23                       24  0.773  18.750    14  0.340 0.412  51 52
Flow: Mlb/hr                 105.06 (102.50 %)            23  0.967  24.044    15  0.453 0.456   3 18
                                                          22  1.038  26.819    16  1.023 1.177  29 26
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.069  28.753    17  0.826 1.155  51 26
59              -- -- -- -- -- -- --              59      20  1.106  30.308    18  0.913 1.114  23 28
55          -- -- -- -- -- -- -- -- --            55      19  1.128  31.110    19  1.254 1.409  31 34
51       -- -- -- -- -- -- -- -- -- -- --         51      18  1.162  32.095    20  1.203 1.357  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47      17  1.182  32.779    21  1.217 1.361  51 38
43 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 43      16  1.192  33.394
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.210  34.442
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35      14  1.180  34.436
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.267  32.803
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27      12  1.272* 33.885
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.260  34.492
19 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 19      10  1.253  35.287
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15       9  1.230  36.214
11       -- -- -- -- -- -- -- -- -- -- --       11       8  1.172  36.861
 7          -- -- -- -- -- -- -- -- --           7       7  1.089  37.517
 3             -- -- -- -- -- -- --              3       6  1.007  38.625
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.906  38.752*
                                                          4  0.806  37.392
Control Rod Density: %          5.68                      3  0.719  34.266
                                                          2  0.559  26.030
k-effective:                 1.00008                Bottom  1  0.161   7.637
Void Fraction:                0.394
Core Delta-P: psia           25.037             % AXIAL TILT   3.642  -8.895
Core Plate Delta-P: psia     20.476          AVG BOT 8ft/12ft  0.9885  1.0511
Coolant Temp: Deg-F           547.4
In Channel Flow: Mlb/hr       92.92   Active Channel Flow: Mlb/hr        89.78
Total Bypass Flow (%):         11.6   (of total core flow)
Total Water Rod Flow (%):       3.0   (of total core flow)
Source Convergence          0.00005
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.409	19	31	34	1.592	0.898	19	33	32	7.06	0.733	47.5	17	35	10	15	7.72	0.778	53.6	17	25	10	15
1.408	19	27	30	1.592	0.898	19	31	34	7.12	0.733	46.7	16	29	32	17	7.76	0.775	52.8	17	9	26	15
1.380	19	25	28	1.621	0.882	19	25	34	7.11	0.731	46.5	17	51	36	15	7.68	0.764	52.4	16	33	34	17
1.378	19	27	26	1.622	0.882	19	33	26	7.08	0.727	46.5	16	37	12	15	7.67	0.763	52.5	16	31	32	17
1.370	19	49	40	1.665	0.859	20	51	40	7.06	0.727	46.6	16	27	28	17	7.55	0.760	53.5	17	39	48	15
1.370	19	31	50	1.675	0.854	20	39	10	7.10	0.725	45.9	16	49	24	15	7.50	0.760	53.9	16	9	32	15
1.366	19	35	50	1.678	0.852	19	25	50	6.95	0.725	47.8	16	51	30	15	7.58	0.760	53.0	16	23	50	15
1.364	19	21	12	1.678	0.852	19	49	26	6.95	0.724	47.8	16	49	28	15	7.46	0.759	54.3	16	49	34	15
1.363	19	49	26	1.681	0.851	19	23	32	6.97	0.723	47.4	16	33	12	15	7.54	0.758	53.3	17	47	40	15
1.361	21	51	38	1.683	0.850	19	39	50	7.05	0.723	46.3	16	31	10	15	7.47	0.756	53.8	16	33	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.48 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 15,600.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    30996.7
Exposure: MWd/MTU (GWd)     15850.0 (2192.80 )
Delta E: MWd/MTU, (GWd)       250.0 (  34.59 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.297   6.819    13  0.388 0.399   5 48
Inlet Subcooling: Btu/lbm    -25.88                       24  0.789  18.960    14  0.339 0.412  51 52
Flow: Mlb/hr                 106.34 (103.75 %)            23  0.986  24.305    15  0.453 0.456   3 18
                                                          22  1.061  27.102    16  1.021 1.171  29 26
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.093  29.044    17  0.826 1.155  51 26
59              -- -- -- -- -- -- --              59      20  1.131  30.610    18  0.910 1.110  23 28
55          -- -- -- -- -- -- -- -- -- --         55      19  1.152  31.418    19  1.254 1.404  31 34
51       -- -- -- -- -- -- -- -- -- -- -- --      51      18  1.185  32.412    20  1.207 1.361  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47      17  1.203  33.101    21  1.220 1.362  51 38
43 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 43      16  1.209  33.718
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.223  34.770
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35      14  1.190  34.756
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.276  33.100
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27      12  1.277* 34.183
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.261  34.786
19 -- -- -- --  6 --  6 --  6 --  6 -- -- -- -- 19      10  1.249  35.579
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15       9  1.218  36.501
11       -- -- -- -- -- -- -- -- -- -- -- --      11       8  1.153  37.133
 7          -- -- -- -- -- -- -- -- -- --         7       7  1.063  37.768
 3             -- -- -- -- -- -- -- --            3       6  0.975  38.856
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.870  38.960*
                                                          4  0.768  37.576
Control Rod Density: %          5.68                      3  0.684  34.430
                                                          2  0.533  26.157
k-effective:                 1.00005              Bottom  1  0.153   7.675
Void Fraction:                0.387
Core Delta-P: psia           25.434          % AXIAL TILT   5.548  -8.730
Core Plate Delta-P: psia     20.873       AVG BOT 8ft/12ft  0.9778  1.0503
Coolant Temp: Deg-F          547.3
In Channel Flow: Mlb/hr       94.11   Active Channel Flow: Mlb/hr        90.96
Total Bypass Flow (%):        11.5    (of total core flow)
Total Water Rod Flow (%):      3.0    (of total core flow)
Source Convergence          0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.404	19	31	34	1.591	0.899	19	33	32	7.14	0.744	47.8	17	35	10	15	7.81	0.791	54.0	17	25	10	15
1.403	19	27	30	1.591	0.899	19	31	34	7.26	0.743	46.1	16	29	32	18	7.85	0.788	53.2	17	9	26	15
1.374	19	25	28	1.621	0.882	19	25	34	7.19	0.742	46.9	17	51	36	15	7.84	0.774	51.8	16	33	34	18
1.373	19	49	40	1.622	0.882	19	33	26	7.16	0.739	46.9	16	37	12	15	7.82	0.773	51.9	16	31	32	18
1.372	19	27	26	1.661	0.861	20	51	40	7.19	0.736	46.1	16	27	28	18	7.64	0.773	53.9	17	39	48	15
1.371	19	31	50	1.665	0.859	20	39	10	7.18	0.736	46.3	16	49	24	15	7.67	0.772	53.4	16	23	50	15
1.367	19	35	50	1.668	0.857	19	49	26	7.13	0.734	46.7	16	31	10	15	7.63	0.771	53.7	17	47	40	15
1.366	19	39	50	1.669	0.857	19	25	50	7.01	0.734	48.2	16	51	30	15	7.57	0.771	54.3	16	9	32	15
1.363	19	49	26	1.671	0.856	19	39	50	7.04	0.734	47.7	16	33	12	15	7.52	0.769	54.7	16	49	34	15
1.362	21	51	38	1.676	0.853	19	33	10	7.01	0.733	48.1	16	49	28	15	7.66	0.769	53.2	16	49	24	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.49 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 15,850.0 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    30997.7
Exposure: MWd/MTU (GWd)       15851.0 (2193.00 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                      Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)           N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                     Top 25  0.301   6.819    13  0.388 0.401   5 48
Inlet Subcooling: Btu/lbm     -26.94                          24  0.798  18.960    14  0.339 0.415   9 52
Flow: Mlb/hr                   102.50 (100.00 %)              23  0.999  24.306    15  0.453 0.455   3 18
                                                              22  1.079  27.103    16  1.021 1.167  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.120  29.046    17  0.824 1.151  51 26
59              -- -- -- -- -- -- --              59          20  1.154  30.611    18  0.919 1.107  23 34
55          -- -- -- -- -- -- -- -- --            55          19  1.166  31.419    19  1.256 1.397  31 34
51       -- -- -- -- -- -- -- -- -- -- --         51          18  1.192  32.413    20  1.203 1.359  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47          17  1.204  33.102    21  1.214 1.359  51 24
43 -- -- -- -- 10 --  6 --  6 --  8 -- -- -- -- 43          16  1.207  33.719
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.217  34.772
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35          14  1.182  34.757
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.265* 33.101
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27          12  1.264  34.184
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.247  34.787
19 -- -- -- --  8 --  6 --  6 -- 10 -- -- -- -- 19          10  1.235  35.581
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.206  36.502
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.142  37.134
 7          -- -- -- -- -- -- -- -- --           7           7  1.054  37.769
 3             -- -- -- -- -- -- --              3           6  0.968  38.857
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.866  38.961*
                                                              4  0.766  37.577
Control Rod Density: %            5.54                        3  0.682  34.431
                                                              2  0.532  26.158
k-effective:                   1.00002                Bottom  1  0.153   7.675
Void Fraction:                   0.391
Core Delta-P: psia              24.041             % AXIAL TILT   6.322  -8.730
Core Plate Delta-P: psia        19.482          AVG BOT 8ft/12ft  0.9709  1.0502
Coolant Temp: Deg-F             547.2
In Channel Flow: Mlb/hr          90.65   Active Channel Flow: Mlb/hr        87.59
Total Bypass Flow (%):           11.6   (of total core flow)
Total Water Rod Flow (%):         3.0   (of total core flow)
Source Convergence            0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.397	19	31	34	1.577	0.907	19	33	32	7.24	0.742	46.1	16	29	32	18	7.74	0.786	54.1	17	35	10	15
1.396	19	27	30	1.577	0.907	19	31	34	7.10	0.740	47.8	17	35	10	15	7.78	0.781	53.2	17	51	26	15
1.376	19	11	40	1.603	0.892	19	25	34	7.15	0.738	46.9	17	51	26	15	7.82	0.772	51.8	16	33	34	18
1.368	19	25	34	1.605	0.891	19	33	26	7.13	0.736	46.9	16	37	12	15	7.80	0.771	51.9	16	31	32	18
1.368	19	39	12	1.633	0.876	20	51	22	7.18	0.735	46.1	16	27	34	18	7.60	0.770	53.9	17	21	48	15
1.366	19	27	26	1.636	0.874	20	39	10	7.15	0.734	46.3	16	49	24	15	7.63	0.769	53.4	16	23	50	15
1.364	19	35	12	1.646	0.869	19	25	50	7.26	0.731	44.6	16	29	36	18	7.60	0.768	53.7	17	47	22	15
1.364	19	31	12	1.646	0.869	19	49	26	7.18	0.730	45.4	16	25	32	18	7.62	0.765	53.2	16	49	24	15
1.360	19	49	26	1.648	0.868	19	39	12	7.00	0.729	47.7	16	33	12	15	7.51	0.764	54.3	16	9	32	15
1.359	20	51	22	1.653	0.865	19	23	32	6.97	0.729	48.1	16	49	28	15	7.46	0.762	54.7	16	49	34	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.50 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 15,851.0 MWd/MTU

```
Cycle:                          21                  Core Average Exposure: MWd/MTU    31496.7
Exposure: MWd/MTU (GWd)     16350.0 (2262.00 )
Delta E: MWd/MTU, (GWd)       499.0 (  69.04 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)           N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                    Top 25  0.314   6.982    13  0.387 0.401   5 48
Inlet Subcooling: Btu/lbm    -25.82                        24  0.834  19.396    14  0.338 0.416   9 52
Flow: Mlb/hr                 106.60 (104.00 %)             23  1.044  24.852    15  0.452 0.454   3 18
                                                           22  1.132  27.699    16  1.018 1.168  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  1.176  29.664    17  0.825 1.152  51 26
59           -- -- -- -- -- -- -- --           59          20  1.210  31.247    18  0.914 1.097  23 34
55        -- -- -- -- -- -- -- -- -- --        55          19  1.218  32.061    19  1.255 1.383  31 34
51     -- -- -- -- -- -- -- -- -- -- -- --     51          18  1.239  33.068    20  1.211 1.368  51 22
47  -- -- -- -- -- -- -- -- -- -- -- -- -- --  47          17  1.245  33.762    21  1.220 1.363  51 24
43 -- -- -- -- 10 --  6 --  6 --  8 -- -- -- -- 43         16  1.239  34.377
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.243  35.434
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35         14  1.201  35.399
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.282* 33.695
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27         12  1.274  34.776
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.247  35.369
19 -- -- -- --  8 --  6 --  6 -- 10 -- -- -- -- 19         10  1.224  36.155
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  1.181  37.059
11       -- -- -- -- -- -- -- -- -- -- --       11          8  1.102  37.658
 7          -- -- -- -- -- -- -- -- --           7          7  0.999  38.249
 3             -- -- -- -- -- -- --              3          6  0.899  39.293
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.789  39.347*
                                                            4  0.687  37.916
Control Rod Density: %          5.54                        3  0.609  34.732
                                                            2  0.476  26.393
k-effective:                 0.99987                Bottom  1  0.137   7.747
Void Fraction:                 0.375
Core Delta-P: psia            25.363                % AXIAL TILT  10.409  -8.349
Core Plate Delta-P: psia      20.803            AVG BOT 8ft/12ft  0.9472  1.0483
Coolant Temp: Deg-F            547.1
In Channel Flow: Mlb/hr        94.42   Active Channel Flow: Mlb/hr        91.30
Total Bypass Flow (%):          11.4   (of total core flow)
Total Water Rod Flow (%):        2.9   (of total core flow)
Source Convergence           0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.383	19	31	34	1.587	0.901	19	33	32	7.25	0.762	48.6	17	35	10	15	7.93	0.813	54.9	17	35	10	15
1.383	19	11	40	1.587	0.901	19	31	34	7.37	0.761	46.9	16	29	32	18	7.97	0.808	54.0	17	51	26	15
1.383	19	27	30	1.615	0.886	19	25	34	7.30	0.760	47.7	17	51	26	15	7.99	0.797	52.7	16	33	34	18
1.373	19	39	12	1.616	0.885	19	33	26	7.28	0.758	47.6	16	37	12	15	7.79	0.796	54.7	17	21	48	15
1.368	20	51	22	1.620	0.883	20	9	40	7.33	0.757	46.9	16	27	34	18	7.96	0.795	52.7	16	31	32	18
1.365	19	29	50	1.624	0.881	20	39	10	7.31	0.756	47.1	16	49	24	15	7.78	0.794	54.5	17	47	22	15
1.364	19	35	12	1.633	0.876	19	39	12	7.41	0.753	45.3	16	29	36	18	7.81	0.794	54.2	16	23	50	15
1.363	21	51	24	1.635	0.874	19	49	26	7.34	0.752	46.2	16	25	32	18	7.80	0.790	54.0	16	49	24	15
1.362	19	49	26	1.636	0.874	19	25	50	7.22	0.750	47.4	16	31	10	15	7.79	0.789	53.9	16	41	12	15
1.357	19	33	10	1.637	0.873	19	11	40	7.13	0.749	48.5	16	33	12	15	7.66	0.787	55.1	16	9	32	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.51 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,350.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    31497.6
Exposure: MWd/MTU (GWd)       16351.0 (2262.20 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.318   6.982    13  0.385 0.398   5 48
Inlet Subcooling: Btu/lbm     -26.79                         24  0.842  19.397    14  0.337 0.413  51 52
Flow: Mlb/hr                   103.01 (100.50 %)              23  1.056  24.853    15  0.451 0.454   3 18
                                                              22  1.150  27.700    16  1.020 1.162  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.203  29.665    17  0.822 1.146  51 26
59              -- -- -- -- -- -- --              59          20  1.233  31.249    18  0.921 1.102  23 34
55          -- -- -- -- -- -- -- -- --            55          19  1.232  32.062    19  1.258 1.385  31 34
51       -- -- -- -- -- -- -- -- -- -- --         51          18  1.246  33.069    20  1.204 1.358  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- --     47          17  1.246  33.763    21  1.213 1.354  51 24
43 -- -- -- -- 10 --  6 --  8 -- 10 -- -- -- -- 43          16  1.235  34.379
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.235  35.435
35 -- -- -- --  8 -- -- -- -- --  6 -- -- -- -- 35          14  1.191  35.400
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.269* 33.696
27 -- -- -- --  6 -- -- -- -- --  8 -- -- -- -- 27          12  1.261  34.777
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.234  35.370
19 -- -- -- -- 10 --  8 --  6 -- 10 -- -- -- -- 19          10  1.211  36.156
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.169  37.060
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.092  37.659
 7          -- -- -- -- -- -- -- -- --           7           7  0.991  38.249
 3             -- -- -- -- -- -- --              3           6  0.894  39.294
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.786  39.348*
                                                              4  0.686  37.917
Control Rod Density: %            5.41                        3  0.608  34.733
                                                              2  0.475  26.393
k-effective:                  0.99999                 Bottom  1  0.137   7.747
Void Fraction:                 0.378
Core Delta-P: psia            24.066              % AXIAL TILT  11.146  -8.348
Core Plate Delta-P: psia      19.507          AVG BOT 8ft/12ft  0.9404  1.0483
Coolant Temp: Deg-F            547.0
In Channel Flow: Mlb/hr         91.19   Active Channel Flow: Mlb/hr        88.15
Total Bypass Flow (%):          11.5    (of total core flow)
Total Water Rod Flow (%):        3.0    (of total core flow)
Source Convergence           0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.385	19	31	34	1.561	0.916	19	33	32	7.43	0.767	46.9	16	29	32	18	7.86	0.805	54.8	17	25	10	15
1.384	19	27	30	1.563	0.915	19	31	34	7.39	0.763	46.9	16	27	28	18	8.05	0.803	52.7	16	33	34	18
1.374	19	11	40	1.582	0.904	19	25	34	7.48	0.760	45.4	16	31	36	18	8.01	0.800	52.8	16	31	32	18
1.365	19	39	50	1.587	0.901	19	33	26	7.41	0.759	46.2	16	25	30	18	7.89	0.800	54.0	17	9	26	15
1.360	19	31	50	1.610	0.888	20	9	40	7.18	0.755	48.6	17	35	52	15	8.40	0.792	47.8	16	19	34	21
1.360	19	35	50	1.612	0.887	19	39	50	7.99	0.753	38.0	18	19	20	21	7.95	0.790	52.3	16	25	32	18
1.359	19	25	28	1.613	0.886	19	23	32	7.23	0.752	47.7	17	51	26	15	7.72	0.790	54.7	17	39	48	15
1.358	20	51	22	1.619	0.883	20	39	10	7.21	0.750	47.6	16	37	50	15	7.99	0.788	51.8	16	31	26	18
1.357	19	27	26	1.619	0.883	19	49	26	7.24	0.749	47.1	16	49	24	15	7.71	0.787	54.5	17	47	40	15
1.357	19	49	26	1.622	0.882	19	49	40	7.51	0.747	43.4	16	25	26	20	7.72	0.785	54.2	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.52 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,351.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    31796.8
Exposure: MWd/MTU (GWd)     16650.0 (2303.50 )
Delta E: MWd/MTU, (GWd)       299.0 (  41.37 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.326   7.084    13  0.385 0.398   5 48
Inlet Subcooling: Btu/lbm    -25.82                       24  0.866  19.670    14  0.337 0.413   7 50
Flow: Mlb/hr                 106.60 (104.00 %)            23  1.087  25.196    15  0.450 0.454   3 18
                                                          22  1.186  28.077    16  1.018 1.163  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.240  30.059    17  0.823 1.147  51 26
59             -- -- -- -- -- -- --             59        20  1.269  31.652    18  0.918 1.095  23 34
55          -- -- -- -- -- -- -- -- --          55        19  1.263  32.465    19  1.257 1.379  11 40
51       -- -- -- -- -- -- -- -- -- -- --       51        18  1.273  33.475    20  1.210 1.365  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47        17  1.268  34.169    21  1.217 1.357  51 24
43 -- -- -- -- 10 --  6 --  8 -- 10 -- -- -- -- 43        16  1.252  34.780
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.247  35.836
35 -- -- -- --  8 -- -- -- -- --  6 -- -- -- -- 35        14  1.199  35.786
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.276* 34.051
27 -- -- -- --  6 -- -- -- -- --  8 -- -- -- -- 27        12  1.264  35.130
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.231  35.715
19 -- -- -- -- 10 --  8 --  6 -- 10 -- -- -- -- 19        10  1.202  36.493
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.152  37.385
11       -- -- -- -- -- -- -- -- -- -- --       11         8  1.066  37.961
 7          -- -- -- -- -- -- -- -- --           7         7  0.957  38.522
 3             -- -- -- -- -- -- --              3         6  0.854  39.539
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.742  39.561*
                                                          4  0.642  38.102
Control Rod Density: %          5.41                      3  0.568  34.897
                                                          2  0.444  26.522
k-effective:                0.99991                Bottom  1  0.128   7.786
Void Fraction:                0.367
Core Delta-P: psia           25.258            % AXIAL TILT  13.595  -8.087
Core Plate Delta-P: psia     20.698          AVG BOT 8ft/12ft  0.9254  1.0469
Coolant Temp: Deg-F           547.0
In Channel Flow: Mlb/hr        94.48   Active Channel Flow: Mlb/hr        91.37
Total Bypass Flow (%):         11.4    (of total core flow)
Total Water Rod Flow (%):       2.9    (of total core flow)
Source Convergence          0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.379	19	11	40	1.572	0.910	19	33	32	7.69	0.777	44.8	16	29	32	20	7.95	0.820	55.3	17	25	10	15
1.375	19	31	34	1.574	0.908	19	31	34	7.67	0.775	44.8	16	27	28	20	8.13	0.816	53.2	16	33	34	18
1.374	19	27	30	1.594	0.897	19	25	34	8.17	0.774	38.5	18	19	20	21	8.61	0.816	48.3	16	19	34	21
1.368	19	39	50	1.598	0.895	19	33	26	7.72	0.773	44.0	16	25	32	20	7.99	0.815	54.5	17	9	26	15
1.365	20	51	22	1.605	0.891	20	9	40	7.77	0.772	43.3	16	31	36	20	8.09	0.813	53.3	16	31	32	18
1.361	19	31	50	1.609	0.889	19	39	50	7.25	0.766	49.1	17	35	52	15	8.53	0.809	48.3	16	17	36	21
1.360	19	35	50	1.616	0.885	19	49	40	7.65	0.765	43.9	16	25	26	20	8.34	0.805	49.9	16	25	32	20
1.357	19	49	26	1.618	0.884	20	39	10	7.30	0.764	48.2	17	51	26	15	7.81	0.804	55.2	17	39	48	15
1.357	21	51	24	1.619	0.883	19	49	26	7.89	0.762	40.5	16	19	34	22	8.08	0.802	52.3	16	31	26	18
1.352	20	39	52	1.619	0.883	19	23	32	7.28	0.761	48.1	16	37	50	15	7.81	0.801	55.0	17	47	40	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.53 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,650.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)       16651.0 (2303.70 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )
Power: MWt                     3952.0 (100.00 %)
Core Pressure: psia            1050.0
Inlet Subcooling: Btu/lbm      -26.94
Flow: Mlb/hr                   102.50 (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 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- 43
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39
35 -- -- -- --  0 -- -- -- -- --  6 -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- --  6 -- -- -- -- --  0 -- -- -- -- 27
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- 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: %          4.05

k-effective:                 0.99993
Void Fraction:                0.388
Core Delta-P: psia           24.047
Core Plate Delta-P: psia     19.493
Coolant Temp: Deg-F           547.1
In Channel Flow: Mlb/hr       90.64
Total Bypass Flow (%):         11.6
Total Water Rod Flow (%):       3.0
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    31797.7

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.279   7.084    13  0.381 0.398   5 48
    24  0.738  19.671    14  0.334 0.416  51 52
    23  0.929  25.197    15  0.448 0.452   3 18
    22  1.027  28.078    16  1.011 1.157  49 38
    21  1.097  30.060    17  0.820 1.153  47 40
    20  1.159  31.654    18  0.965 1.148  17 18
    19  1.197  32.466    19  1.263 1.387  49 40
    18  1.238  33.477    20  1.208 1.361  51 40
    17  1.258  34.170    21  1.208 1.345  51 38
    16  1.262  34.781
    15  1.271  35.837
    14  1.233  35.787
    13  1.318* 34.053
    12  1.309  35.131
    11  1.278  35.716
    10  1.250  36.494
     9  1.205  37.386
     8  1.126  37.962
     7  1.025  38.523
     6  0.931  39.539
     5  0.826  39.562*
     4  0.729  38.103
     3  0.652  34.898
     2  0.514  26.522
Bottom  1  0.149   7.786

% AXIAL TILT   7.150  -8.087
AVG BOT 8ft/12ft  0.9756  1.0469

Active Channel Flow: Mlb/hr       87.59
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.387	19	49	40	1.602	0.893	19	15	18	7.38	0.772	48.1	17	39	14	15	7.97	0.824	55.6	17	39	48	15
1.375	19	39	12	1.603	0.892	19	49	40	7.35	0.768	48.0	17	47	40	15	7.96	0.821	55.4	17	47	40	15
1.371	19	17	46	1.603	0.892	19	47	42	7.31	0.768	48.5	16	41	12	15	7.97	0.812	54.4	16	41	50	15
1.371	19	19	48	1.604	0.891	19	17	16	7.29	0.767	48.6	16	17	48	15	7.95	0.810	54.5	16	49	42	15
1.370	19	13	20	1.605	0.891	19	41	18	7.29	0.765	48.4	16	15	46	15	7.85	0.810	55.4	17	35	10	15
1.370	19	15	18	1.610	0.888	19	41	48	7.32	0.765	48.1	16	37	12	15	7.90	0.806	54.5	17	9	26	15
1.365	19	19	44	1.612	0.887	19	39	12	7.27	0.765	48.6	16	49	42	15	7.85	0.805	54.9	16	17	48	15
1.362	19	39	16	1.613	0.886	19	17	42	7.27	0.764	48.6	16	13	18	15	7.86	0.805	54.8	16	15	16	15
1.361	20	51	40	1.618	0.884	19	39	16	7.24	0.763	48.8	16	15	42	15	7.86	0.802	54.5	16	47	18	15
1.358	19	37	14	1.619	0.883	20	39	10	7.35	0.763	47.5	16	49	38	15	7.84	0.801	54.6	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.54 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,651.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    32046.6
Exposure: MWd/MTU (GWd)     16900.0 (2338.10 )
Delta E: MWd/MTU, (GWd)       249.0 (  34.45 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.287   7.159    13  0.381 0.398   5 48
Inlet Subcooling: Btu/lbm    -25.82                       24  0.759  19.871    14  0.334 0.416  51 52
Flow: Mlb/hr                 106.60 (104.00 %)            23  0.956  25.448    15  0.448 0.452   3 18
                                                          22  1.057  28.358    16  1.009 1.158  49 38
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.128  30.359    17  0.821 1.153  47 40
59              -- -- -- -- -- -- --              59      20  1.190  31.969    18  0.961 1.146  17 18
55          -- -- -- -- -- -- -- -- -- --         55      19  1.224  32.791    19  1.262 1.391  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --      51      18  1.262  33.813    20  1.213 1.367  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47      17  1.277  34.511    21  1.212 1.348  51 38
43 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- -- 43      16  1.276  35.122
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.281  36.180
35 -- -- -- --  0 -- -- -- -- --  6 -- -- -- -- -- 35      14  1.239  36.119
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.323* 34.360
27 -- -- -- --  6 -- -- -- -- --  0 -- -- -- -- -- 27      12  1.311  35.436
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.276  36.013
19 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- -- 19      10  1.243  36.785
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15       9  1.191  37.665
11       -- -- -- -- -- -- -- -- -- -- -- --       11       8  1.104  38.222
 7          -- -- -- -- -- -- -- -- -- --          7       7  0.997  38.758
 3             -- -- -- -- -- -- --              3        6  0.897  39.752*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.788  39.750
                                                          4  0.691  38.268
Control Rod Density: %          4.05                      3  0.617  35.046
                                                          2  0.487  26.639
k-effective:                 0.99981                Bottom  1  0.141   7.821
Void Fraction:                0.377
Core Delta-P: psia           25.435              % AXIAL TILT   9.262  -7.907
Core Plate Delta-P: psia     20.879          AVG BOT 8ft/12ft  0.9627  1.0460
Coolant Temp: Deg-F           547.1
In Channel Flow: Mlb/hr       94.38   Active Channel Flow: Mlb/hr        91.25
Total Bypass Flow (%):        11.5    (of total core flow)
Total Water Rod Flow (%):      2.9    (of total core flow)
Source Convergence          0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.391	19	49	40	1.605	0.891	19	49	40	7.44	0.781	48.5	17	39	14	15	8.04	0.835	56.0	17	39	48	15
1.378	19	39	12	1.609	0.889	19	15	18	7.38	0.779	48.9	16	41	12	15	8.03	0.833	55.8	17	47	40	15
1.372	19	19	48	1.609	0.889	19	47	42	7.41	0.777	48.4	17	47	40	15	8.06	0.825	54.8	16	41	50	15
1.372	19	17	46	1.612	0.887	19	17	16	7.35	0.777	49.0	16	17	48	15	8.04	0.824	54.9	16	49	42	15
1.372	19	13	20	1.614	0.886	19	41	18	7.35	0.777	49.0	16	49	42	15	7.94	0.823	55.8	17	35	10	15
1.370	19	15	18	1.616	0.885	19	39	12	7.36	0.775	48.8	16	15	46	15	7.99	0.819	54.9	17	9	26	15
1.367	20	51	40	1.617	0.885	19	41	48	7.38	0.775	48.5	16	37	12	15	7.93	0.818	55.3	16	17	48	15
1.364	19	19	44	1.622	0.882	20	39	10	7.34	0.774	48.9	16	13	44	15	7.93	0.816	55.2	16	15	16	15
1.362	19	39	16	1.622	0.881	20	51	40	7.41	0.773	47.9	16	49	38	15	7.94	0.815	54.9	16	47	18	15
1.359	19	37	14	1.623	0.881	19	17	42	7.35	0.771	48.3	16	41	16	15	7.91	0.812	55.1	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.55 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,900.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    32047.6
Exposure: MWd/MTU (GWd)       16901.0 (2338.20 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.303   7.159    13  0.378 0.395   5 48
Inlet Subcooling: Btu/lbm      -26.94                        24  0.802  19.872    14  0.331 0.413  51 52
Flow: Mlb/hr                   102.50 (100.00 %)             23  1.006  25.449    15  0.444 0.448   3 18
                                                             22  1.103  28.359    16  1.013 1.149  49 38
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.158  30.360    17  0.814 1.145  47 22
59              -- -- -- -- -- -- --              59         20  1.209  31.970    18  0.968 1.142  17 44
55          -- -- -- -- -- -- -- -- -- --         55         19  1.233  32.792    19  1.267 1.377  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.264  33.814    20  1.202 1.352  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.273  34.512    21  1.201 1.335  51 38
43 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- -- 43         16  1.267  35.124
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.268  36.182
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- -- 35         14  1.224  36.120
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.305* 34.361
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- -- 27         12  1.291  35.437
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.256  36.014
19 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- -- 19         10  1.224  36.786
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  1.173  37.666
11       -- -- -- -- -- -- -- -- -- -- -- --       11          8  1.088  38.223
 7          -- -- -- -- -- -- -- -- -- --          7          7  0.983  38.759
 3             -- -- -- -- -- -- --              3          6  0.885  39.753*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.778  39.751
                                                             4  0.681  38.269
Control Rod Density: %            3.78                       3  0.608  35.046
                                                             2  0.480  26.640
k-effective:                  1.00013                 Bottom  1  0.139   7.821
Void Fraction:                 0.379
Core Delta-P: psia            23.928              % AXIAL TILT  10.648  -7.906
Core Plate Delta-P: psia      19.375          AVG BOT 8ft/12ft  0.9505  1.0460
Coolant Temp: Deg-F           546.9
In Channel Flow: Mlb/hr        90.71   Active Channel Flow: Mlb/hr        87.67
Total Bypass Flow (%):         11.5   (of total core flow)
Total Water Rod Flow (%):       3.0   (of total core flow)
Source Convergence           0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.377	19	49	40	1.593	0.898	19	41	18	7.35	0.772	48.5	17	39	14	15	7.94	0.826	56.0	17	39	48	15
1.365	19	39	50	1.596	0.896	19	17	16	7.32	0.769	48.5	17	13	40	15	7.93	0.823	55.8	17	47	40	15
1.362	19	17	46	1.596	0.896	19	49	40	7.28	0.769	48.9	16	41	12	15	7.96	0.815	54.8	16	41	50	15
1.360	19	13	42	1.597	0.896	19	15	18	7.26	0.767	49.0	16	17	48	15	7.93	0.813	54.9	16	49	42	15
1.360	19	19	48	1.599	0.895	19	17	42	7.26	0.767	49.0	16	49	20	15	7.84	0.813	55.7	17	25	10	15
1.360	19	15	44	1.599	0.894	19	39	50	7.27	0.766	48.8	16	15	46	15	7.88	0.809	54.9	17	9	26	15
1.359	19	19	44	1.599	0.894	19	41	48	7.29	0.765	48.5	16	37	12	15	7.83	0.807	55.3	16	17	48	15
1.354	19	39	16	1.599	0.894	19	47	42	7.25	0.765	48.9	16	13	44	15	7.83	0.806	55.2	16	15	16	15
1.352	20	51	40	1.606	0.890	20	9	40	7.32	0.764	47.9	16	49	24	15	7.84	0.804	54.9	16	47	18	15
1.352	19	17	42	1.611	0.888	19	39	16	7.21	0.763	49.2	16	15	42	15	7.81	0.802	55.1	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.56 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 16,901.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    32296.6
Exposure: MWd/MTU (GWd)        17150.0 (2372.70 )
Delta E: MWd/MTU, (GWd)          249.0 (  34.45 )                Axial Profile    Edit   Radial Power
Power: MWt                      3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1050.0                    Top 25  0.312   7.240    13  0.377 0.395   5 48
Inlet Subcooling: Btu/lbm       -25.88                        24  0.827  20.089    14  0.331 0.413  51 52
Flow: Mlb/hr                    106.34 (103.75 %)             23  1.037  25.722    15  0.444 0.448   3 18
                                                              22  1.138  28.660    16  1.012 1.150  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.193  30.676    17  0.815 1.145  47 22
59              -- -- -- -- -- -- --              59          20  1.242  32.300    18  0.965 1.139  17 44
55          -- -- -- -- -- -- -- -- --            55          19  1.262  33.128    19  1.266 1.381  49 22
51       -- -- -- -- -- -- -- -- -- -- --         51          18  1.288  34.157    20  1.207 1.358  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --      47          17  1.291  34.857    21  1.205 1.338  51 24
43 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 43          16  1.279  35.466
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.275  36.523
35 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 35          14  1.228  36.450
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.307* 34.665
27 -- -- -- --  6 -- -- -- -- --  6 -- -- -- -- 27          12  1.291  35.737
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.251  36.306
19 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 19          10  1.214  37.070
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.157  37.937
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.066  38.474
 7          -- -- -- -- -- -- -- -- --           7           7  0.954  38.985
 3             -- -- -- -- -- -- --              3           6  0.850  39.955*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.739  39.928
                                                              4  0.643  38.423
Control Rod Density: %              3.78                      3  0.572  35.184
                                                              2  0.452  26.748
k-effective:                    0.99998                Bottom  1  0.131   7.854
Void Fraction:                    0.369
Core Delta-P: psia               25.214            % AXIAL TILT  12.869  -7.701
Core Plate Delta-P: psia         20.660         AVG BOT 8ft/12ft  0.9363  1.0450
Coolant Temp: Deg-F              547.0
In Channel Flow: Mlb/hr           94.22   Active Channel Flow: Mlb/hr        91.11
Total Bypass Flow (%):            11.4   (of total core flow)
Total Water Rod Flow (%):          2.9   (of total core flow)
Source Convergence              0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.381	19	49	22	1.596	0.896	19	49	40	7.39	0.780	48.9	17	39	14	15	8.00	0.836	56.4	17	39	48	15
1.367	19	39	50	1.601	0.893	19	39	50	7.35	0.779	49.3	16	41	12	15	8.04	0.833	55.8	17	47	40	15
1.361	19	13	42	1.602	0.892	19	17	16	7.33	0.777	49.4	16	49	20	15	8.03	0.827	55.2	16	41	50	15
1.361	19	17	46	1.603	0.892	19	41	18	7.37	0.777	48.8	17	47	22	15	8.01	0.825	55.3	16	49	42	15
1.360	19	41	48	1.603	0.892	19	15	18	7.31	0.776	49.4	16	17	48	15	7.91	0.824	56.1	17	25	10	15
1.360	19	15	44	1.603	0.892	19	47	42	7.32	0.774	49.2	16	15	46	15	7.96	0.820	55.3	17	9	26	15
1.358	20	51	40	1.604	0.891	19	41	48	7.30	0.774	49.3	16	13	44	15	7.90	0.819	55.8	16	17	48	15
1.356	19	19	44	1.606	0.891	20	9	40	7.33	0.773	48.9	16	37	12	15	7.89	0.816	55.6	16	47	18	15
1.353	19	39	16	1.608	0.889	19	17	42	7.37	0.772	48.3	16	49	24	15	7.89	0.816	55.6	16	15	16	15
1.350	19	37	48	1.618	0.884	20	39	10	7.39	0.769	47.7	16	15	42	17	7.86	0.812	55.5	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.57 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,150.0 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    32297.6
Exposure: MWd/MTU (GWd)       17151.0 (2372.80 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                      Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.315   7.240    13  0.377 0.394   5 48
Inlet Subcooling: Btu/lbm      -26.65                        24  0.834  20.090    14  0.330 0.411  51 52
Flow: Mlb/hr                   103.53 (101.00 %)             23  1.046  25.723    15  0.443 0.447   3 18
                                                             22  1.152  28.661    16  1.014 1.148  49 38
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.214  30.678    17  0.813 1.144  47 40
59              -- -- -- -- -- -- --              59         20  1.255  32.301    18  0.968 1.137  17 44
55          -- -- -- -- -- -- -- -- -- --         55         19  1.269  33.129    19  1.269 1.377  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.290  34.158    20  1.201 1.353  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.290  34.858    21  1.199 1.334  51 38
43 -- -- -- -- -- --  8 --  6 -- -- -- -- -- -- 43         16  1.275  35.467
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.270  36.525
35 -- -- -- --  6 -- -- -- -- --  8 -- -- -- -- 35         14  1.220  36.451
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.299* 34.666
27 -- -- -- --  8 -- -- -- -- --  6 -- -- -- -- 27         12  1.281  35.738
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.242  36.307
19 -- -- -- -- -- --  6 --  8 -- -- -- -- -- -- 19         10  1.205  37.071
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15          9  1.149  37.939
11       -- -- -- -- -- -- -- -- -- -- -- --      11          8  1.059  38.475
 7          -- -- -- -- -- -- -- -- -- --         7          7  0.949  38.986
 3             -- -- -- -- -- -- --              3          6  0.847  39.956*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.738  39.928
                                                             4  0.643  38.424
Control Rod Density: %            3.69                       3  0.573  35.184
                                                             2  0.453  26.749
k-effective:                  0.99993                 Bottom  1  0.131   7.854
Void Fraction:                  0.371
Core Delta-P: psia             24.200             % AXIAL TILT  13.325  -7.700
Core Plate Delta-P: psia       19.646          AVG BOT 8ft/12ft  0.9319  1.0450
Coolant Temp: Deg-F            546.8
In Channel Flow: Mlb/hr         91.68   Active Channel Flow: Mlb/hr        88.64
Total Bypass Flow (%):          11.4    (of total core flow)
Total Water Rod Flow (%):        2.9    (of total core flow)
Source Convergence           0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.377	19	49	40	1.583	0.903	19	49	40	7.35	0.776	48.9	17	39	14	15	7.95	0.830	56.4	17	39	48	15
1.363	19	39	12	1.586	0.902	19	41	18	7.30	0.774	49.3	16	41	12	15	7.99	0.829	55.8	17	47	40	15
1.358	19	13	20	1.590	0.899	19	47	42	7.32	0.772	48.8	17	47	40	15	7.97	0.821	55.2	16	41	50	15
1.357	19	17	46	1.591	0.899	19	15	18	7.28	0.772	49.4	16	49	42	15	7.96	0.820	55.3	16	49	42	15
1.357	19	41	14	1.593	0.898	19	17	16	7.27	0.771	49.4	16	17	48	15	7.85	0.818	56.2	17	35	10	15
1.356	19	19	44	1.594	0.897	19	17	42	7.27	0.770	49.2	16	15	46	15	7.91	0.815	55.4	17	9	26	15
1.356	19	15	18	1.594	0.897	19	39	50	7.29	0.769	48.9	16	37	12	15	7.85	0.813	55.8	16	17	48	15
1.354	19	39	16	1.596	0.896	19	41	48	7.25	0.769	49.3	16	13	44	15	7.84	0.811	55.6	16	15	16	15
1.353	20	51	40	1.597	0.896	19	39	16	7.33	0.768	48.3	16	49	38	15	7.83	0.810	55.6	16	47	18	15
1.351	19	37	14	1.600	0.894	20	9	40	7.37	0.767	47.7	16	15	42	17	7.82	0.807	55.5	16	23	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.58 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,151.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    32446.9
Exposure: MWd/MTU (GWd)       17300.3 (2393.50 )
Delta E: MWd/MTU, (GWd)         149.3 (  20.65 )                Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.320   7.290    13  0.376 0.394   5 48
Inlet Subcooling: Btu/lbm      -25.84                        24  0.848  20.224    14  0.329 0.411  53 50
Flow: Mlb/hr                   106.50 (103.90 %)             23  1.065  25.891    15  0.443 0.447   3 18
                                                             22  1.173  28.849    16  1.013 1.149  49 38
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.234  30.875    17  0.813 1.144  47 40
59              -- -- -- -- -- -- --              59         20  1.274  32.505    18  0.966 1.136  17 18
55          -- -- -- -- -- -- -- -- -- --         55         19  1.285  33.335    19  1.268 1.380  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.304* 34.367    20  1.204 1.357  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.300  35.067    21  1.202 1.336  51 38
43 -- -- -- -- -- --  8 --  6 -- -- -- -- -- -- -- 43         16  1.282  35.673
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.274  36.730
35 -- -- -- --  6 -- -- -- -- --  8 -- -- -- -- 35         14  1.223  36.648
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.301  34.847
27 -- -- -- --  8 -- -- -- -- --  6 -- -- -- -- 27         12  1.282  35.917
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.240  36.480
19 -- -- -- -- -- --  6 --  8 -- -- -- -- -- -- 19         10  1.201  37.239
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15          9  1.141  38.098
11       -- -- -- -- -- -- -- -- -- -- -- --      11          8  1.047  38.622
 7          -- -- -- -- -- -- -- -- -- --         7          7  0.932  39.117
 3             -- -- -- -- -- -- --              3          6  0.826  40.073*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.716  40.030
                                                             4  0.620  38.512
Control Rod Density: %           3.69                        3  0.552  35.263
                                                             2  0.436  26.811
k-effective:                  0.99993                Bottom  1  0.126   7.873
Void Fraction:                  0.364
Core Delta-P: psia             25.211            % AXIAL TILT  14.603  -7.568
Core Plate Delta-P: psia       20.657         AVG BOT 8ft/12ft  0.9237  1.0443
Coolant Temp: Deg-F             546.9
In Channel Flow: Mlb/hr         94.39   Active Channel Flow: Mlb/hr        91.29
Total Bypass Flow (%):          11.4    (of total core flow)
Total Water Rod Flow (%):        2.9    (of total core flow)
Source Convergence            0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.380	19	49	40	1.586	0.902	19	49	40	7.38	0.781	49.2	17	39	14	15	7.98	0.837	56.7	17	39	48	15
1.365	19	39	12	1.595	0.897	19	41	18	7.34	0.780	49.5	16	41	12	15	8.03	0.835	56.1	17	47	40	15
1.359	19	47	42	1.596	0.896	19	47	42	7.56	0.780	46.8	17	47	40	17	8.02	0.828	55.5	16	41	50	15
1.358	19	41	14	1.597	0.895	19	15	18	7.32	0.778	49.6	16	49	42	15	8.01	0.828	55.5	16	49	42	15
1.358	19	17	46	1.599	0.894	19	39	50	7.30	0.776	49.6	16	17	48	15	7.89	0.825	56.5	17	35	10	15
1.357	20	51	40	1.599	0.894	19	17	16	7.54	0.775	46.5	16	49	38	17	7.95	0.822	55.6	17	9	26	15
1.356	19	15	18	1.602	0.893	19	41	48	7.30	0.775	49.4	16	15	46	15	7.90	0.821	56.0	16	17	48	15
1.354	19	41	18	1.602	0.892	19	17	42	7.42	0.774	47.9	16	15	42	17	7.88	0.818	55.9	16	47	18	15
1.354	19	39	16	1.602	0.892	20	9	40	7.29	0.774	49.6	16	13	44	15	7.87	0.817	55.9	16	15	16	15
1.351	19	37	14	1.604	0.891	19	39	16	7.32	0.774	49.1	16	37	12	15	8.51	0.815	49.2	16	41	34	21

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.59 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,300.3 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    32447.7
Exposure: MWd/MTU (GWd)       17301.0 (2393.60 )
Delta E: MWd/MTU, (GWd)           0.7 (   0.10 )                      Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)           N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                     Top 25  0.295   7.291    13  0.374 0.391   5 48
Inlet Subcooling: Btu/lbm     -26.94                          24  0.781  20.225    14  0.328 0.409  51 52
Flow: Mlb/hr                   102.50 (100.00 %)              23  0.983  25.892    15  0.441 0.443   3 18
                                                              22  1.090  28.849    16  1.024 1.157  35 48
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.162  30.876    17  0.811 1.163  39 48
59             -- -- -- -- -- -- --             59            20  1.222  32.506    18  0.897 1.145  17 44
55          -- -- -- -- -- -- -- -- --          55            19  1.252  33.336    19  1.272 1.395  37 48
51       -- -- -- -- -- -- -- -- -- -- --       51            18  1.284  34.368    20  1.200 1.346  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47            17  1.292  35.068    21  1.199 1.327  37 52
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43            16  1.284  35.674
39 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 39            15  1.282  36.731
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35            14  1.235  36.649
31 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 31            13  1.316* 34.848
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27            12  1.298  35.918
23 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 23            11  1.258  36.481
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19            10  1.219  37.240
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15             9  1.163  38.099
11       -- -- -- -- -- -- -- -- -- -- --       11             8  1.075  38.622
 7          -- -- -- -- -- -- -- -- --           7             7  0.969  39.118
 3             -- -- -- -- -- -- --              3             6  0.872  40.073*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.767  40.030
                                                              4  0.675  38.512
Control Rod Density: %            2.97                        3  0.605  35.263
                                                              2  0.481  26.811
k-effective:                   0.99994                Bottom  1  0.140   7.873
Void Fraction:                   0.378
Core Delta-P: psia              23.927             % AXIAL TILT  11.145  -7.568
Core Plate Delta-P: psia        19.377          AVG BOT 8ft/12ft  0.9495  1.0443
Coolant Temp: Deg-F              546.9
In Channel Flow: Mlb/hr          90.71   Active Channel Flow: Mlb/hr        87.67
Total Bypass Flow (%):           11.5   (of total core flow)
Total Water Rod Flow (%):         3.0   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.395	19	37	48	1.544	0.926	19	23	48	7.53	0.797	49.2	17	39	14	15	8.08	0.847	56.7	17	39	48	15
1.391	19	39	16	1.546	0.925	19	39	16	7.46	0.788	49.1	16	37	12	15	8.01	0.838	56.5	17	47	40	15
1.382	19	33	48	1.560	0.917	19	33	48	7.44	0.786	49.1	17	47	22	15	7.97	0.832	56.4	17	25	10	15
1.380	19	35	46	1.561	0.916	19	41	18	7.36	0.782	49.5	16	41	12	15	8.05	0.831	55.5	16	41	50	15
1.378	19	39	50	1.561	0.916	19	25	16	7.39	0.780	49.0	16	41	16	15	8.02	0.830	55.7	16	23	50	15
1.376	19	49	22	1.566	0.913	19	39	50	7.40	0.780	48.8	16	35	14	15	7.98	0.824	55.6	16	49	42	15
1.376	19	41	18	1.570	0.911	19	17	42	7.29	0.779	50.1	17	35	10	15	7.93	0.820	55.6	16	25	48	15
1.370	19	31	50	1.574	0.909	19	41	48	7.31	0.778	49.6	16	17	48	15	7.94	0.820	55.5	16	41	16	15
1.369	19	41	14	1.575	0.908	19	15	40	7.30	0.778	49.8	16	15	42	15	7.82	0.819	56.6	16	33	50	15
1.368	19	35	50	1.578	0.906	19	17	16	7.27	0.776	49.9	16	33	12	15	7.88	0.819	56.0	16	17	48	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.60 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,301.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    32596.6
Exposure: MWd/MTU (GWd)      17450.0 (2414.20 )
Delta E: MWd/MTU, (GWd)        149.0 (  20.61 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.300   7.338    13  0.374 0.390   5 48
Inlet Subcooling: Btu/lbm     -25.95                        24  0.795  20.350    14  0.327 0.409  51 52
Flow: Mlb/hr                  106.09 (103.50 %)             23  1.001  26.050    15  0.440 0.442   3 18
                                                            22  1.110  29.026    16  1.023 1.156  35 48
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.182  31.064    17  0.812 1.163  39 48
59              -- -- -- -- -- -- --              59        20  1.241  32.704    18  0.895 1.144  17 44
55          -- -- -- -- -- -- -- -- -- --         55        19  1.268  33.538    19  1.271 1.395  37 48
51       -- -- -- -- -- -- -- -- -- -- -- --      51        18  1.298  34.576    20  1.203 1.350  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47        17  1.302  35.276    21  1.201 1.329  37 52
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43        16  1.290  35.881
39 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 39        15  1.286  36.937
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35        14  1.238  36.848
31 -- -- -- --  0 -- -- -- -- --  0 -- -- -- -- 31        13  1.318* 35.032
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27        12  1.299  36.099
23 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 23        11  1.256  36.656
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19        10  1.215  37.410
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15         9  1.155  38.261
11       -- -- -- -- -- -- -- -- -- -- -- --      11         8  1.063  38.772
 7          -- -- -- -- -- -- -- -- -- --         7         7  0.952  39.252
 3             -- -- -- -- -- -- --              3         6  0.851  40.194*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.745  40.136
                                                            4  0.652  38.605
Control Rod Density: %            2.97                      3  0.584  35.346
                                                            2  0.464  26.877
k-effective:                  0.99995                Bottom  1  0.135   7.894
Void Fraction:                0.370
Core Delta-P: psia           25.154              % AXIAL TILT  12.411  -7.447
Core Plate Delta-P: psia     20.603          AVG BOT 8ft/12ft  0.9415  1.0437
Coolant Temp: Deg-F          547.0
In Channel Flow: Mlb/hr       93.97   Active Channel Flow: Mlb/hr        90.86
Total Bypass Flow (%):        11.4    (of total core flow)
Total Water Rod Flow (%):      2.9    (of total core flow)
Source Convergence          0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.395	19	37	48	1.556	0.919	19	23	48	7.56	0.801	49.4	17	39	14	15	8.12	0.854	56.9	17	39	48	15
1.391	19	39	16	1.559	0.917	19	39	16	7.48	0.793	49.3	16	37	12	15	8.05	0.845	56.8	17	47	40	15
1.381	19	33	48	1.572	0.909	19	33	48	7.46	0.791	49.3	17	47	22	15	8.01	0.839	56.7	17	25	10	15
1.379	19	35	46	1.573	0.909	19	25	16	7.40	0.788	49.8	16	41	12	15	8.10	0.839	55.7	16	41	50	15
1.379	19	39	50	1.574	0.909	19	41	18	7.41	0.784	49.2	16	41	16	15	8.05	0.837	56.0	16	23	50	15
1.378	19	49	22	1.574	0.908	19	39	50	7.42	0.784	49.1	16	35	14	15	8.03	0.833	55.8	16	49	42	15
1.374	19	41	18	1.583	0.904	19	17	42	7.32	0.784	50.3	17	35	10	15	7.93	0.826	56.2	16	17	48	15
1.370	19	31	50	1.584	0.903	19	41	48	7.35	0.783	49.9	16	17	48	15	7.96	0.826	55.9	16	25	48	15
1.370	19	41	48	1.587	0.901	19	15	40	7.34	0.782	49.8	16	49	20	15	7.97	0.825	55.7	16	41	16	15
1.368	19	35	50	1.589	0.900	19	17	16	7.48	0.782	48.1	16	15	42	17	7.85	0.825	56.9	16	33	50	15

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.61 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,450.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    32597.6
Exposure: MWd/MTU (GWd)      17451.0 (2414.30 )
Delta E: MWd/MTU, (GWd)          1.0 (   0.14 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.310   7.338    13  0.372 0.389   5 48
Inlet Subcooling: Btu/lbm     -26.94                        24  0.820  20.351    14  0.326 0.406   7 50
Flow: Mlb/hr                  102.50 (100.00 %)             23  1.030  26.051    15  0.438 0.441   3 18
                                                            22  1.140  29.028    16  1.026 1.149  49 24
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.208  31.065    17  0.807 1.153  39 48
59              -- -- -- -- -- -- --              59        20  1.257  32.705    18  0.900 1.138  17 44
55          -- -- -- -- -- -- -- -- -- --         55        19  1.276  33.540    19  1.276 1.382  37 48
51       -- -- -- -- -- -- -- -- -- -- -- --      51        18  1.300  34.577    20  1.194 1.345  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47        17  1.299  35.278    21  1.192 1.326  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43        16  1.284  35.882
39 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 39        15  1.276  36.938
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35        14  1.226  36.849
31 -- -- -- --  8 -- -- -- -- --  8 -- -- -- -- 31        13  1.304* 35.033
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27        12  1.284  36.100
23 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 23        11  1.241  36.657
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19        10  1.201  37.411
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.142  38.262
11       -- -- -- -- -- -- -- -- -- -- --       11         8  1.052  38.772
 7          -- -- -- -- -- -- -- -- --           7         7  0.943  39.253
 3             -- -- -- -- -- -- --              3         6  0.844  40.194*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.739  40.137
                                                            4  0.647  38.606
Control Rod Density: %            2.79                      3  0.580  35.347
                                                            2  0.461  26.877
k-effective:                  1.00008                Bottom  1  0.134   7.894
Void Fraction:                 0.372
Core Delta-P: psia            23.854            % AXIAL TILT  13.328  -7.447
Core Plate Delta-P: psia      19.304          AVG BOT 8ft/12ft  0.9331  1.0437
Coolant Temp: Deg-F           546.8
In Channel Flow: Mlb/hr        90.75   Active Channel Flow: Mlb/hr        87.73
Total Bypass Flow (%):         11.5   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.382	19	37	48	1.553	0.921	19	23	48	7.47	0.792	49.4	17	39	14	15	8.02	0.843	56.9	17	39	48	15
1.380	19	39	16	1.553	0.921	19	39	16	7.62	0.787	47.0	17	47	22	17	7.99	0.839	56.8	17	47	40	15
1.375	19	49	22	1.561	0.916	19	41	18	7.39	0.783	49.4	16	37	12	15	8.00	0.829	55.7	16	41	50	15
1.368	19	47	24	1.561	0.916	19	47	24	7.46	0.781	48.1	16	15	42	17	7.90	0.828	56.7	17	25	10	15
1.368	19	35	46	1.561	0.916	19	15	40	7.31	0.778	49.8	16	41	12	15	7.95	0.826	56.0	16	23	50	15
1.367	19	33	48	1.567	0.913	19	17	42	7.55	0.778	46.7	16	49	24	17	7.96	0.826	55.8	16	49	42	15
1.367	19	41	18	1.569	0.911	19	25	16	7.49	0.777	47.4	16	41	16	17	8.03	0.821	54.7	16	15	42	17
1.366	19	15	40	1.570	0.911	19	49	40	7.28	0.776	49.8	16	49	20	15	7.89	0.819	55.9	17	9	26	15
1.365	19	39	50	1.570	0.911	19	33	48	7.33	0.775	49.1	16	35	14	15	7.89	0.817	55.7	16	41	16	15
1.360	19	17	42	1.574	0.908	19	39	50	7.26	0.774	49.9	16	17	48	15	8.10	0.817	53.5	16	49	24	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.62 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,451.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      17700.0 (2448.80 )
Delta E: MWd/MTU, (GWd)        249.0 (  34.45 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -25.68
Flow: Mlb/hr                  107.11 (104.50 %)

    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 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- --  8 -- -- -- -- --  8 -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- -- --  6 --  6 -- -- -- -- -- -- 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: %          2.79

k-effective:                 0.99977
Void Fraction:                 0.361
Core Delta-P: psia            25.419
Core Plate Delta-P: psia      20.868
Coolant Temp: Deg-F           546.9
In Channel Flow: Mlb/hr        94.95
Total Bypass Flow (%):         11.4
Total Water Rod Flow (%):       2.9
Source Convergence          0.00006
```

```
Core Average Exposure: MWd/MTU    32846.6

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.319   7.421    13  0.371 0.389   5 48
    24  0.845  20.573    14  0.325 0.407   7 50
    23  1.062  26.330    15  0.438 0.441   3 18
    22  1.176  29.339    16  1.025 1.149  49 24
    21  1.242  31.395    17  0.808 1.151  39 48
    20  1.288  33.047    18  0.897 1.137  17 44
    19  1.302  33.886    19  1.274 1.380  37 48
    18  1.320* 34.929    20  1.199 1.351  51 40
    17  1.314  35.629    21  1.196 1.329  51 24
    16  1.292  36.229
    15  1.281  37.282
    14  1.228  37.179
    13  1.305  35.336
    12  1.282  36.398
    11  1.236  36.945
    10  1.191  37.689
     9  1.127  38.526
     8  1.031  39.015
     7  0.916  39.469
     6  0.812  40.387*
     5  0.705  40.305
     4  0.613  38.752
     3  0.548  35.478
     2  0.437  26.982
Bottom  1  0.127   7.926

% AXIAL TILT  15.378  -7.229
AVG BOT 8ft/12ft  0.9196  1.0425

Active Channel Flow: Mlb/hr        91.84
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.380	19	37	48	1.567	0.912	19	23	48	7.70	0.799	47.4	17	47	22	17	8.06	0.852	57.3	17	39	48	15
1.378	19	49	40	1.568	0.912	19	39	16	7.68	0.799	47.6	17	39	14	17	8.32	0.850	54.6	17	47	40	17
1.377	19	39	16	1.573	0.909	19	47	24	7.53	0.791	48.5	16	15	42	17	8.05	0.838	56.1	16	41	50	15
1.368	19	47	24	1.574	0.908	19	49	40	7.64	0.791	47.1	16	49	24	17	7.95	0.837	57.1	17	25	10	15
1.366	19	39	50	1.575	0.908	19	15	40	7.58	0.790	47.8	16	37	12	17	8.03	0.836	56.2	16	49	42	15
1.364	19	41	18	1.576	0.907	19	41	18	7.55	0.788	47.8	16	41	16	17	7.99	0.834	56.4	16	23	50	15
1.364	19	35	46	1.581	0.904	19	17	42	7.35	0.786	50.2	16	41	12	15	8.11	0.834	55.1	16	15	42	17
1.364	19	33	48	1.582	0.904	19	39	50	7.33	0.785	50.2	16	49	20	15	8.20	0.831	53.9	16	49	24	17
1.363	19	15	40	1.585	0.902	19	25	16	7.54	0.784	47.6	16	35	14	17	7.94	0.828	56.3	17	9	26	15
1.357	19	17	42	1.586	0.902	19	33	48	7.30	0.781	50.2	16	17	48	15	8.14	0.828	54.2	16	41	16	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.63 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,700.0 MWd/MTU

```
Cycle:                              21                          Core Average Exposure: MWd/MTU    32847.6
Exposure: MWd/MTU (GWd)       17701.0 (2448.90 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                      Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)           N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                     Top 25  0.298   7.421    13  0.367 0.385   5 48
Inlet Subcooling: Btu/lbm       -26.79                         24  0.788  20.574    14  0.321 0.402   7 50
Flow: Mlb/hr                   103.01 (100.50 %)              23  0.993  26.331    15  0.433 0.438   3 18
                                                              22  1.109  29.340    16  1.031 1.156  45 28
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.189  31.396    17  0.799 1.153  47 22
59             -- -- -- -- -- -- --             59           20  1.252  33.048    18  0.892 1.128  17 44
55          -- -- -- -- -- -- -- -- --          55           19  1.280  33.888    19  1.283 1.385  47 24
51       -- -- -- -- -- -- -- -- -- -- --       51           18  1.308  34.931    20  1.184 1.345  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47           17  1.311  35.630    21  1.183 1.329  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43           16  1.295  36.230
39 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- 39           15  1.288  37.283
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35           14  1.238  37.180
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31           13  1.316* 35.338
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27           12  1.294  36.400
23 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- 23           11  1.248  36.947
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19           10  1.205  37.690
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15            9  1.144  38.527
11       -- -- -- -- -- -- -- -- -- -- --       11            8  1.053  39.016
 7          -- -- -- -- -- -- -- -- --          7            7  0.945  39.470
 3             -- -- -- -- -- -- --             3            6  0.847  40.388*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.745  40.305
                                                              4  0.655  38.753
Control Rod Density: %            2.03                        3  0.590  35.479
                                                              2  0.471  26.982
k-effective:                   0.99988                Bottom  1  0.137   7.926
Void Fraction:                   0.373
Core Delta-P: psia              24.068             % AXIAL TILT  12.730  -7.228
Core Plate Delta-P: psia        19.520          AVG BOT 8ft/12ft  0.9395  1.0425
Coolant Temp: Deg-F             546.8
In Channel Flow: Mlb/hr          91.19   Active Channel Flow: Mlb/hr        88.15
Total Bypass Flow (%):           11.5   (of total core flow)
Total Water Rod Flow (%):         2.9   (of total core flow)
Source Convergence            0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.385	19	47	24	1.540	0.928	19	47	24	7.68	0.797	47.4	17	47	22	17	8.05	0.845	56.8	17	47	40	15
1.384	19	43	28	1.545	0.926	19	45	26	7.61	0.795	48.0	16	47	26	17	7.90	0.836	57.4	17	21	48	15
1.382	19	45	26	1.551	0.922	19	15	40	7.64	0.790	47.1	16	49	24	17	8.17	0.834	54.6	16	47	26	17
1.377	19	49	22	1.552	0.921	19	17	34	7.54	0.790	48.3	16	15	38	17	8.21	0.831	53.9	16	49	24	17
1.372	19	15	40	1.559	0.917	19	47	34	7.63	0.788	47.0	16	45	28	17	7.96	0.830	56.2	16	49	42	15
1.367	19	47	28	1.560	0.917	19	15	32	7.39	0.786	49.7	16	47	30	17	7.94	0.828	56.3	17	9	26	15
1.359	19	45	30	1.567	0.913	19	49	40	7.47	0.785	48.5	16	15	42	17	8.01	0.828	55.6	16	49	34	17
1.359	19	19	36	1.572	0.910	19	41	32	7.37	0.785	49.8	17	39	14	15	8.05	0.828	55.1	16	15	42	17
1.358	19	39	16	1.574	0.909	19	17	42	7.40	0.782	49.1	16	49	28	17	8.00	0.827	55.6	16	47	32	17
1.357	19	37	14	1.578	0.906	19	41	26	7.49	0.781	47.8	16	17	36	17	8.06	0.825	54.8	16	15	38	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.64 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,701.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      17850.0 (2469.50 )
Delta E: MWd/MTU, (GWd)        149.0 (  20.61 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm      -25.68
Flow: Mlb/hr                  107.11 (104.50 %)

    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 -- -- -- -- -- --  6 --  0 -- -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- -- --  0 --  6 -- -- -- -- -- -- 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: %          2.03

k-effective:                 0.99986
Void Fraction:                0.365
Core Delta-P: psia           25.482
Core Plate Delta-P: psia     20.934
Coolant Temp: Deg-F           546.9
In Channel Flow: Mlb/hr       94.92
Total Bypass Flow (%):         11.4
Total Water Rod Flow (%):       2.9
Source Convergence          0.00009
```

```
Core Average Exposure: MWd/MTU    32996.6

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.303   7.469    13  0.366 0.385   5 48
    24  0.803  20.701    14  0.321 0.402   7 50
    23  1.013  26.491    15  0.432 0.437   3 18
    22  1.130  29.520    16  1.030 1.155  49 24
    21  1.210  31.589    17  0.800 1.153  47 22
    20  1.271  33.251    18  0.890 1.127  17 44
    19  1.296  34.095    19  1.282 1.384  47 24
    18  1.321* 35.142    20  1.188 1.350  51 22
    17  1.320  35.842    21  1.186 1.331  51 24
    16  1.301  36.439
    15  1.291  37.491
    14  1.239  37.379
    13  1.318  35.521
    12  1.295  36.580
    11  1.247  37.120
    10  1.200  37.858
     9  1.136  38.686
     8  1.041  39.162
     7  0.928  39.601
     6  0.827  40.505*
     5  0.722  40.408
     4  0.633  38.843
     3  0.568  35.559
     2  0.454  27.047
Bottom  1  0.133   7.946

% AXIAL TILT  14.003  -7.104
AVG BOT 8ft/12ft  0.9313  1.0419

Active Channel Flow: Mlb/hr        91.80
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.384	19	47	24	1.554	0.920	19	47	24	7.73	0.804	47.7	17	47	22	17	8.35	0.852	54.5	17	47	22	17
1.381	19	43	28	1.561	0.916	19	45	26	7.65	0.801	48.2	16	47	26	17	7.94	0.843	57.6	17	21	48	15
1.380	19	45	26	1.565	0.914	19	15	40	7.69	0.798	47.4	16	49	24	17	8.22	0.842	54.8	16	47	26	17
1.379	19	49	22	1.568	0.912	19	17	34	7.57	0.795	48.5	16	15	38	17	8.27	0.840	54.2	16	49	24	17
1.371	19	15	40	1.573	0.909	19	47	34	7.73	0.794	46.5	16	45	28	18	8.01	0.837	56.5	16	49	42	15
1.365	19	47	28	1.575	0.908	19	49	40	7.49	0.793	49.2	16	47	30	18	8.10	0.836	55.4	16	15	42	17
1.358	19	39	16	1.576	0.908	19	15	32	7.51	0.792	48.8	16	15	42	17	8.05	0.836	55.9	16	49	34	17
1.357	19	37	14	1.587	0.901	19	41	32	7.58	0.790	47.8	17	39	14	17	7.98	0.835	56.5	17	9	26	15
1.357	19	45	30	1.588	0.900	19	17	42	7.44	0.788	49.3	16	49	28	17	8.04	0.834	55.8	16	47	32	17
1.356	19	19	36	1.592	0.898	19	41	18	7.52	0.787	48.1	16	43	30	18	8.10	0.832	55.0	16	15	38	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.65 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,850.0 MWd/MTU

```
Cycle:                          21
Exposure: MWd/MTU (GWd)    17851.0 (2469.70 )
Delta E: MWd/MTU, (GWd)        1.0 (   0.14 )
Power: MWt                  3952.0 (100.00 %)
Core Pressure: psia         1050.0
Inlet Subcooling: Btu/lbm   -26.94
Flow: Mlb/hr                102.50 (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 -- -- -- -- -- --  8 --  8 -- -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- -- --  8 --  8 -- -- -- -- -- -- 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: %          1.80

k-effective:                 0.99998
Void Fraction:                 0.368
Core Delta-P: psia            23.811
Core Plate Delta-P: psia      19.264
Coolant Temp: Deg-F            546.7
In Channel Flow: Mlb/hr        90.77   Active Channel Flow: Mlb/hr       87.76
Total Bypass Flow (%):          11.4   (of total core flow)
Total Water Rod Flow (%):        2.9   (of total core flow)
Source Convergence           0.00006
```

Core Average Exposure: MWd/MTU 32997.7

	Axial Profile	
N(PRA)	Power	Exposure
Top 25	0.314	7.469
24	0.830	20.702
23	1.045	26.493
22	1.165	29.521
21	1.244	31.590
20	1.292	33.253
19	1.306	34.096
18	1.324*	35.143
17	1.316	35.843
16	1.293	36.440
15	1.279	37.492
14	1.225	37.380
13	1.301	35.522
12	1.277	36.581
11	1.229	37.121
10	1.183	37.859
9	1.121	38.687
8	1.028	39.163
7	0.918	39.602
6	0.819	40.505*
5	0.716	40.408
4	0.628	38.843
3	0.565	35.560
2	0.451	27.047
Bottom 1	0.132	7.946
% AXIAL TILT	15.059	-7.103
AVG BOT 8ft/12ft	0.9214	1.0419

Edit	Radial Power			
Zone	Avg.	Max.	IR	JR
13	0.363	0.381	5	48
14	0.318	0.398	7	50
15	0.429	0.433	3	18
16	1.032	1.146	45	28
17	0.793	1.141	47	22
18	0.911	1.118	17	18
19	1.289	1.376	43	28
20	1.175	1.331	51	40
21	1.173	1.314	51	24

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.376	19	43	28	1.545	0.925	19	15	26	7.64	0.795	47.7	17	47	22	17	8.27	0.843	54.4	17	47	40	17
1.370	19	47	24	1.547	0.924	19	17	34	7.58	0.793	48.2	16	47	26	17	7.86	0.834	57.6	17	39	48	15
1.369	19	45	26	1.548	0.924	19	47	24	7.70	0.792	46.5	16	45	28	18	8.13	0.833	54.8	16	47	26	17
1.362	19	49	40	1.558	0.918	19	15	40	7.52	0.789	48.5	16	15	38	17	8.17	0.830	54.2	16	49	24	17
1.359	19	15	40	1.558	0.918	19	41	32	7.55	0.789	48.1	16	43	30	18	8.23	0.829	53.5	16	15	34	18
1.355	19	19	36	1.562	0.915	19	47	34	7.60	0.788	47.4	16	49	24	17	8.07	0.829	55.0	16	47	32	18
1.355	19	41	32	1.563	0.915	19	15	32	7.45	0.788	49.2	16	47	30	18	8.06	0.829	55.1	16	15	24	17
1.353	19	47	28	1.569	0.911	19	41	26	7.59	0.787	47.3	16	17	36	18	8.03	0.828	55.4	16	15	42	17
1.351	19	39	16	1.569	0.911	19	49	40	7.52	0.785	47.8	17	39	14	17	7.98	0.828	55.9	16	49	34	17
1.349	19	37	48	1.577	0.907	19	17	42	7.44	0.784	48.8	16	15	42	17	8.16	0.827	54.0	16	17	32	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.66 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 17,851.0 MWd/MTU

```
Cycle:                              21
Exposure: MWd/MTU (GWd)      18050.0 (2497.20 )
Delta E: MWd/MTU, (GWd)        199.0 (  27.53 )
Power: MWt                    3952.0 (100.00 %)
Core Pressure: psia           1050.0
Inlet Subcooling: Btu/lbm     -25.55
Flow: Mlb/hr                  107.62 (105.00 %)

    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 -- -- -- -- -- --  8 --  8 -- -- -- -- -- 39
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27
23 -- -- -- -- -- --  8 --  8 -- -- -- -- -- 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: %          1.80

k-effective:                 0.99990
Void Fraction:                0.357
Core Delta-P: psia           25.569
Core Plate Delta-P: psia     21.021
Coolant Temp: Deg-F          546.8
In Channel Flow: Mlb/hr       95.43
Total Bypass Flow (%):        11.3
Total Water Rod Flow (%):      2.9
Source Convergence          0.00006
```

```
Core Average Exposure: MWd/MTU    33196.6

                  Axial Profile    Edit   Radial Power
N(PRA)  Power Exposure  Zone  Avg.  Max.  IR JR
Top 25  0.322   7.536    13  0.363 0.380   5 48
    24  0.852  20.881    14  0.318 0.398  53 50
    23  1.073  26.718    15  0.428 0.433   3 18
    22  1.196  29.775    16  1.031 1.142  45 28
    21  1.273  31.860    17  0.793 1.140  47 40
    20  1.318  33.533    18  0.909 1.117  17 18
    19  1.328  34.379    19  1.288 1.371  43 28
    18  1.340* 35.430    20  1.180 1.336  51 40
    17  1.328  36.127    21  1.177 1.316  51 38
    16  1.300  36.719
    15  1.283  37.767
    14  1.226  37.644
    13  1.302  35.764
    12  1.276  36.818
    11  1.226  37.350
    10  1.177  38.079
     9  1.109  38.895
     8  1.011  39.353
     7  0.895  39.770
     6  0.791  40.655*
     5  0.686  40.539
     4  0.598  38.957
     3  0.536  35.662
     2  0.429  27.129
Bottom  1  0.125   7.971

% AXIAL TILT  16.796  -6.923
AVG BOT 8ft/12ft  0.9099  1.0409

Active Channel Flow: Mlb/hr        92.32
(of total core flow)
(of total core flow)
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.371	19	43	28	1.564	0.914	19	15	26	7.70	0.805	48.0	17	47	22	17	8.36	0.856	54.8	17	47	40	17
1.368	19	47	24	1.566	0.913	19	47	24	7.71	0.803	47.7	16	47	26	18	8.20	0.846	55.5	17	39	48	17
1.366	19	45	26	1.567	0.912	19	17	34	7.76	0.801	46.9	16	45	28	18	8.30	0.844	54.2	16	47	26	18
1.365	19	49	40	1.576	0.908	19	15	40	7.63	0.799	48.2	16	15	38	18	8.24	0.842	54.5	16	49	24	17
1.356	19	15	40	1.579	0.906	19	49	40	7.66	0.798	47.7	16	49	24	17	8.16	0.841	55.3	16	47	32	18
1.350	19	19	36	1.580	0.905	19	47	34	7.51	0.798	49.5	16	47	30	18	8.16	0.841	55.3	16	49	34	18
1.350	19	37	48	1.580	0.905	19	41	32	7.60	0.797	48.4	16	43	30	18	8.22	0.840	54.7	16	15	24	18
1.350	19	47	34	1.584	0.903	19	15	32	7.65	0.796	47.6	16	17	36	18	8.30	0.840	53.9	16	15	34	18
1.349	19	39	16	1.588	0.900	19	41	26	7.59	0.794	48.1	17	39	14	17	8.16	0.838	55.1	16	15	42	18
1.349	19	41	32	1.593	0.897	19	39	16	7.55	0.793	48.5	16	15	42	18	8.23	0.838	54.3	16	17	26	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.67 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,050.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33197.6
Exposure: MWd/MTU (GWd)      18051.0 (2497.30 )
Delta E: MWd/MTU, (GWd)          1.0 (   0.14 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1050.0                    Top 25  0.323   7.536    13  0.361 0.378   5 48
Inlet Subcooling: Btu/lbm     -26.65                        24  0.852  20.882    14  0.316 0.396   7 50
Flow: Mlb/hr                  103.53 (101.00 %)             23  1.074  26.719    15  0.426 0.430   3 18
                                                            22  1.202  29.776    16  1.033 1.138  45 28
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.286  31.862    17  0.788 1.133  47 22
59              -- -- -- -- -- -- --              59        20  1.342  33.534    18  0.924 1.114  17 44
55          -- -- -- -- -- -- -- -- -- --         55        19  1.348  34.380    19  1.293 1.370  43 28
51       -- -- -- -- -- -- -- -- -- -- -- --      51        18  1.351* 35.431    20  1.170 1.324  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47        17  1.331  36.128    21  1.167 1.305  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43        16  1.298  36.720
39 -- -- -- -- -- -- 12 -- 10 -- -- -- -- -- -- 39        15  1.278  37.769
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35        14  1.219  37.645
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.292  35.765
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27        12  1.265  36.820
23 -- -- -- -- -- -- 10 -- 12 -- -- -- -- -- -- 23        11  1.214  37.351
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19        10  1.166  38.080
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15         9  1.100  38.896
11       -- -- -- -- -- -- -- -- -- -- -- --      11         8  1.004  39.354
 7          -- -- -- -- -- -- -- -- -- --         7         7  0.891  39.771
 3             -- -- -- -- -- -- --              3         6  0.789  40.656*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.685  40.539
                                                            4  0.598  38.958
Control Rod Density: %            1.67                      3  0.537  35.663
                                                            2  0.430  27.129
k-effective:                  0.99982                Bottom  1  0.126   7.971
Void Fraction:                  0.361
Core Delta-P: psia             24.099            % AXIAL TILT  17.295  -6.922
Core Plate Delta-P: psia       19.553         AVG BOT 8ft/12ft  0.9052  1.0409
Coolant Temp: Deg-F             546.6
In Channel Flow: Mlb/hr         91.73   Active Channel Flow: Mlb/hr        88.71
Total Bypass Flow (%):          11.4    (of total core flow)
Total Water Rod Flow (%):        2.9    (of total core flow)
Source Convergence           0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.370	19	43	28	1.545	0.926	19	17	34	8.60	0.872	45.2	18	27	38	20	8.76	0.872	52.4	16	25	36	20
1.361	19	45	26	1.554	0.920	19	15	26	8.54	0.853	43.9	18	25	40	20	8.75	0.864	51.8	16	31	26	20
1.360	19	47	24	1.555	0.919	19	47	24	10.28	0.845	23.1	19	25	38	20	11.33	0.863	27.0	19	25	38	20
1.356	19	19	36	1.557	0.919	19	41	32	10.26	0.838	22.4	19	27	40	20	8.62	0.862	52.9	16	23	38	20
1.354	19	49	22	1.559	0.917	19	41	26	7.98	0.825	47.0	16	25	36	20	8.67	0.861	52.2	16	29	40	20
1.351	19	41	30	1.563	0.915	19	15	40	8.05	0.818	45.4	16	29	36	20	8.84	0.855	50.1	18	27	38	20
1.351	19	15	40	1.569	0.911	19	39	16	7.99	0.818	46.1	16	29	40	20	11.30	0.854	26.0	19	27	40	20
1.350	19	39	16	1.572	0.910	19	47	34	7.93	0.815	46.5	16	23	38	20	8.53	0.848	52.4	16	27	42	20
1.348	19	37	14	1.572	0.910	19	15	32	7.81	0.807	47.1	16	27	34	20	8.49	0.848	52.8	16	27	34	20
1.344	19	35	16	1.572	0.909	19	41	18	7.88	0.805	45.9	16	27	42	20	8.23	0.848	55.3	17	47	22	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.68 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,051.0 MWd/MTU

```
Cycle:                          21                   Core Average Exposure: MWd/MTU    33296.6
Exposure: MWd/MTU (GWd)    18150.0 (2511.00 )
Delta E: MWd/MTU, (GWd)       99.0 (  13.70 )             Axial Profile    Edit   Radial Power
Power: MWt                  3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia         1050.0                   Top 25  0.326   7.570   13  0.360 0.378   5 48
Inlet Subcooling: Btu/lbm   -25.82                       24  0.863  20.972   14  0.315 0.396   7 50
Flow: Mlb/hr                106.60 (104.00 %)            23  1.088  26.834   15  0.425 0.430   3 18
                                                         22  1.217  29.905   16  1.032 1.137  45 28
   2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.301  32.000   17  0.789 1.134  47 22
59             -- -- -- -- -- -- -- --          59       20  1.355  33.678   18  0.923 1.114  17 44
55          -- -- -- -- -- -- -- -- -- --       55       19  1.358  34.525   19  1.292 1.368  43 28
51       -- -- -- -- -- -- -- -- -- -- -- --    51       18  1.359* 35.576   20  1.173 1.327  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47       17  1.337  36.271   21  1.169 1.306  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43       16  1.302  36.859
39 -- -- -- -- -- -- 12 -- 10 -- -- -- -- -- -- 39       15  1.280  37.905
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35       14  1.220  37.775
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31       13  1.293  35.885
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27       12  1.265  36.937
23 -- -- -- -- -- -- 10 -- 12 -- -- -- -- -- -- 23       11  1.213  37.463
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19       10  1.164  38.188
15    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 15        9  1.094  38.997
11       -- -- -- -- -- -- -- -- -- -- -- --    11        8  0.995  39.446
 7          -- -- -- -- -- -- -- -- -- --        7        7  0.879  39.853
 3             -- -- -- -- -- -- -- --           3        6  0.775  40.728*
   2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  0.670  40.602
                                                          4  0.583  39.013
Control Rod Density: %        1.67                        3  0.523  35.712
                                                          2  0.418  27.169
k-effective:               0.99986               Bottom  1  0.122   7.983
Void Fraction:               0.355
Core Delta-P: psia          25.158           % AXIAL TILT  18.167  -6.828
Core Plate Delta-P: psia    20.611       AVG BOT 8ft/12ft  0.8994  1.0404
Coolant Temp: Deg-F          546.7
In Channel Flow: Mlb/hr      94.53   Active Channel Flow: Mlb/hr       91.44
Total Bypass Flow (%):        11.3   (of total core flow)
Total Water Rod Flow (%):      2.9   (of total core flow)
Source Convergence         0.00008
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.368	19	43	28	1.556	0.919	19	17	34	8.65	0.879	45.4	18	27	38	20	8.82	0.879	52.6	16	25	36	20
1.360	19	47	24	1.565	0.914	19	15	26	8.59	0.860	44.0	18	25	40	20	11.42	0.872	27.2	19	25	38	20
1.359	19	45	26	1.565	0.913	19	47	24	10.35	0.853	23.3	19	25	38	20	8.81	0.871	52.0	16	31	26	20
1.356	19	49	22	1.569	0.911	19	41	32	10.34	0.846	22.6	19	27	40	20	8.68	0.870	53.0	16	23	38	20
1.353	19	19	36	1.570	0.911	19	41	26	8.03	0.831	47.1	16	25	36	20	8.74	0.869	52.4	16	29	40	20
1.350	19	15	40	1.573	0.909	19	15	40	8.04	0.825	46.3	16	29	40	20	11.40	0.863	26.2	19	27	40	20
1.350	19	39	16	1.579	0.905	19	39	16	8.09	0.824	45.6	16	29	36	20	8.89	0.862	50.3	18	27	38	20
1.349	19	41	30	1.583	0.904	19	47	34	7.98	0.821	46.7	16	23	38	20	8.60	0.857	52.5	16	27	42	20
1.348	19	37	14	1.583	0.904	19	23	48	7.85	0.813	47.2	16	27	34	20	8.54	0.855	52.9	16	27	34	20
1.343	19	35	16	1.583	0.903	19	41	18	7.94	0.813	46.1	16	27	42	20	8.28	0.854	55.4	17	47	22	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.69 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,150.0 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33297.6
Exposure: MWd/MTU (GWd)       18151.0 (2511.20 )
Delta E: MWd/MTU, (GWd)           1.0 (   0.14 )                 Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1050.0                    Top 25  0.314   7.571    13  0.356 0.374   5 48
Inlet Subcooling: Btu/lbm      -26.94                        24  0.827  20.973    14  0.312 0.391   7 50
Flow: Mlb/hr                   102.50 (100.00 %)             23  1.043  26.835    15  0.421 0.425   3 18
                                                             22  1.169  29.907    16  1.033 1.147  35 18
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.253  32.001    17  0.779 1.123  47 22
59              -- -- -- -- -- -- --              59         20  1.311  33.680    18  0.953 1.123  19 42
55          -- -- -- -- -- -- -- -- -- --         55         19  1.324  34.526    19  1.301 1.379  37 18
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.337* 35.577    20  1.158 1.310  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.325  36.272    21  1.154 1.289  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43         16  1.298  36.860
39 -- -- -- -- -- -- -- -- 10 -- -- -- -- -- -- 39         15  1.281  37.907
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35         14  1.225  37.777
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.300  35.886
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27         12  1.273  36.938
23 -- -- -- -- -- -- 10 -- -- -- -- -- -- -- -- 23         11  1.222  37.464
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19         10  1.174  38.189
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15          9  1.109  38.998
11       -- -- -- -- -- -- -- -- -- -- -- --      11          8  1.016  39.447
 7          -- -- -- -- -- -- -- -- -- --         7          7  0.906  39.854
 3             -- -- -- -- -- -- --              3          6  0.809  40.729*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.709  40.603
                                                             4  0.625  39.013
Control Rod Density: %            0.86                       3  0.565  35.712
                                                             2  0.453  27.169
k-effective:                   0.99982                Bottom  1  0.133   7.983
Void Fraction:                   0.367
Core Delta-P: psia              23.804             % AXIAL TILT  15.665  -6.827
Core Plate Delta-P: psia        19.260          AVG BOT 8ft/12ft  0.9173  1.0404
Coolant Temp: Deg-F             546.7
In Channel Flow: Mlb/hr          90.77   Active Channel Flow: Mlb/hr        87.76
Total Bypass Flow (%):           11.4   (of total core flow)
Total Water Rod Flow (%):         2.9   (of total core flow)
Source Convergence            0.00005
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.379	19	37	18	1.545	0.926	19	37	18	8.03	0.797	43.2	18	33	38	21	8.12	0.838	55.4	17	47	22	17
1.374	19	25	42	1.545	0.925	19	25	42	7.56	0.791	48.2	17	47	22	17	8.08	0.836	55.6	17	21	48	17
1.371	19	33	18	1.549	0.923	19	41	26	7.59	0.791	47.8	16	17	36	18	8.13	0.828	54.4	16	47	26	18
1.368	19	21	42	1.551	0.922	19	17	34	7.53	0.789	48.3	17	39	14	17	7.98	0.828	55.9	16	15	42	17
1.367	19	19	36	1.552	0.921	19	33	18	7.63	0.789	47.0	16	45	28	18	8.16	0.828	54.0	16	15	34	18
1.365	19	43	28	1.555	0.920	19	21	42	7.52	0.789	48.4	16	15	38	18	8.10	0.827	54.6	16	17	40	18
1.363	19	35	16	1.561	0.916	19	35	16	7.56	0.789	47.8	16	47	26	18	8.11	0.827	54.5	16	17	32	18
1.356	19	39	16	1.565	0.914	19	39	16	7.49	0.788	48.6	16	43	30	18	8.09	0.827	54.6	16	17	36	18
1.356	19	39	28	1.567	0.913	19	21	34	7.54	0.788	48.0	16	19	34	18	8.06	0.825	54.8	16	15	38	18
1.351	19	45	26	1.568	0.912	19	45	26	7.50	0.786	48.3	16	17	40	18	8.07	0.825	54.7	16	49	24	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.70 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,151.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    33446.6
Exposure: MWd/MTU (GWd)     18300.0 (2531.80 )
Delta E: MWd/MTU, (GWd)       149.0 (  20.61 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                  Top 25  0.319   7.620    13  0.355 0.373   5 48
Inlet Subcooling: Btu/lbm    -25.55                      24  0.844  21.107    14  0.311 0.391   7 50
Flow: Mlb/hr                 107.62 (105.00 %)           23  1.064  27.003    15  0.420 0.424   3 18
                                                         22  1.191  30.096    16  1.032 1.144  35 18
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          21  1.275  32.205    17  0.780 1.124  47 22
59              -- -- -- -- -- -- --              59     20  1.330  33.892    18  0.950 1.120  19 42
55          -- -- -- -- -- -- -- -- -- --         55     19  1.339  34.740    19  1.300 1.376  37 18
51       -- -- -- -- -- -- -- -- -- -- -- --      51     18  1.349* 35.793    20  1.162 1.315  51 22
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47     17  1.334  36.486    21  1.158 1.293  51 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43     16  1.303  37.069
39 -- -- -- -- -- -- -- -- 10 -- -- -- -- -- -- 39     15  1.284  38.113
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35     14  1.226  37.974
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31     13  1.301  36.067
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27     12  1.273  37.115
23 -- -- -- -- -- -- 10 -- -- -- -- -- -- -- -- 23     11  1.221  37.634
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19     10  1.171  38.352
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15      9  1.102  39.153
11       -- -- -- -- -- -- -- -- -- -- -- --       11      8  1.003  39.588
 7          -- -- -- -- -- -- -- -- -- --          7      7  0.889  39.979
 3             -- -- -- -- -- -- --                3      6  0.788  40.840*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          5  0.686  40.700
                                                         4  0.601  39.099
Control Rod Density: %         0.86                      3  0.542  35.790
                                                         2  0.436  27.231
k-effective:                0.99988                Bottom  1  0.128   8.002
Void Fraction:                0.357
Core Delta-P: psia           25.576            % AXIAL TILT  16.961  -6.693
Core Plate Delta-P: psia     21.032         AVG BOT 8ft/12ft  0.9088  1.0397
Coolant Temp: Deg-F           546.8
In Channel Flow: Mlb/hr       95.43   Active Channel Flow: Mlb/hr        92.31
Total Bypass Flow (%):         11.3   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.376	19	37	18	1.568	0.912	19	37	18	8.08	0.805	43.5	18	33	38	21	8.19	0.848	55.7	17	47	22	17
1.370	19	25	42	1.569	0.912	19	25	42	7.61	0.799	48.4	17	47	22	17	8.14	0.845	55.9	17	21	48	17
1.367	19	33	18	1.571	0.910	19	41	26	7.62	0.797	48.1	16	47	26	18	8.21	0.839	54.7	16	47	26	18
1.364	19	21	42	1.572	0.910	19	17	34	7.63	0.797	48.0	16	17	36	18	8.10	0.837	55.5	16	15	42	18
1.363	19	19	36	1.574	0.908	19	33	18	7.58	0.796	48.5	17	39	14	17	8.22	0.837	54.3	16	15	34	18
1.362	19	43	28	1.579	0.906	19	21	42	7.57	0.796	48.6	16	15	38	18	8.16	0.836	54.9	16	17	40	18
1.361	19	35	16	1.583	0.903	19	35	16	7.68	0.796	47.3	16	45	28	18	8.15	0.835	54.8	16	17	36	18
1.355	19	39	16	1.585	0.902	19	39	16	7.53	0.794	48.8	16	43	30	18	8.14	0.835	55.0	16	49	24	17
1.351	19	39	28	1.587	0.901	19	47	24	7.57	0.793	48.2	16	19	34	18	8.13	0.835	55.0	16	15	38	18
1.350	19	45	26	1.587	0.901	19	45	26	8.05	0.792	42.3	18	25	22	21	8.16	0.835	54.7	16	17	32	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.71 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,300.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    33447.6
Exposure: MWd/MTU (GWd)     18301.0 (2531.90 )
Delta E: MWd/MTU, (GWd)         1.0 (   0.14 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                    Top 25  0.306   7.621    13  0.350 0.367   5 48
Inlet Subcooling: Btu/lbm    -27.08                        24  0.807  21.107    14  0.307 0.385  53 50
Flow: Mlb/hr                 101.99 ( 99.50 %)             23  1.018  27.004    15  0.414 0.418   3 18
                                                           22  1.143  30.098    16  1.034 1.145  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  1.229  32.206    17  0.769 1.105  39 48
59           -- -- -- -- -- -- -- --           59          20  1.291  33.894    18  0.988 1.109  35 40
55        -- -- -- -- -- -- -- -- -- --        55          19  1.312  34.742    19  1.311 1.379  33 44
51     -- -- -- -- -- -- -- -- -- -- -- --     51          18  1.332* 35.795    20  1.143 1.290  51 40
47  -- -- -- -- -- -- -- -- -- -- -- -- -- --  47          17  1.324  36.488    21  1.139 1.269  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43         16  1.299  37.071
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.284  38.114
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35         14  1.229  37.975
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.306  36.068
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27         12  1.278  37.116
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.227  37.636
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19         10  1.178  38.354
15  -- -- -- -- -- -- -- -- -- -- -- -- -- --  15           9  1.113  39.154
11     -- -- -- -- -- -- -- -- -- -- -- --     11           8  1.021  39.589
 7        -- -- -- -- -- -- -- -- -- --         7           7  0.914  39.980
 3           -- -- -- -- -- -- -- --            3           6  0.820  40.841*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.725  40.701
                                                            4  0.645  39.099
Control Rod Density: %         0.00                         3  0.587  35.790
                                                            2  0.473  27.232
k-effective:                0.99988                 Bottom  1  0.139   8.002
Void Fraction:                0.370
Core Delta-P: psia           23.674              % AXIAL TILT  14.574  -6.692
Core Plate Delta-P: psia     19.133          AVG BOT 8ft/12ft  0.9256  1.0397
Coolant Temp: Deg-F           546.7
In Channel Flow: Mlb/hr       90.28   Active Channel Flow: Mlb/hr       87.28
Total Bypass Flow (%):         11.5   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00005
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.379	19	33	44	1.545	0.926	19	31	42	7.43	0.780	48.4	17	47	22	17	8.01	0.829	55.7	17	47	40	17
1.377	19	35	42	1.547	0.925	19	33	18	7.41	0.778	48.6	17	39	14	17	7.97	0.827	55.9	17	39	48	17
1.373	19	31	42	1.547	0.925	19	25	42	7.45	0.778	48.0	16	17	36	18	7.99	0.817	54.7	16	47	26	18
1.366	19	37	44	1.557	0.918	19	23	18	7.43	0.777	48.1	16	47	26	18	7.95	0.817	55.1	16	15	24	18
1.356	19	33	40	1.565	0.914	19	31	24	7.49	0.777	47.3	16	45	28	18	7.84	0.816	56.2	16	15	42	17
1.354	19	35	46	1.567	0.913	19	33	40	7.37	0.776	48.8	16	43	30	18	8.02	0.816	54.3	16	15	34	18
1.354	19	31	38	1.569	0.912	19	25	16	7.38	0.776	48.6	16	15	38	18	7.97	0.816	54.8	16	17	26	18
1.351	19	41	36	1.570	0.911	19	41	26	7.41	0.776	48.2	16	19	34	18	7.95	0.815	54.9	16	17	40	18
1.350	19	39	42	1.570	0.911	19	23	32	7.36	0.774	48.7	16	37	16	17	7.96	0.815	54.7	16	17	32	18
1.348	19	39	34	1.572	0.910	19	39	34	7.44	0.774	47.6	16	25	44	17	7.93	0.814	55.0	16	49	24	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.72 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,301.0 MWd/MTU

```
Cycle:                           21                   Core Average Exposure: MWd/MTU    33538.6
Exposure: MWd/MTU (GWd)     18392.1 (2544.50 )
Delta E: MWd/MTU, (GWd)        91.1 (  12.60 )              Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)         N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1050.0                   Top 25  0.311   7.651    13  0.349 0.366   5 48
Inlet Subcooling: Btu/lbm    -25.55                       24  0.822  21.187    14  0.305 0.384  53 50
Flow: Mlb/hr                 107.62 (105.00 %)            23  1.037  27.104    15  0.413 0.417   3 18
                                                          22  1.163  30.211    16  1.033 1.144  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           21  1.248  32.328    17  0.769 1.106  39 48
59             -- -- -- -- -- -- -- --            59      20  1.309  34.021    18  0.986 1.107  35 40
55          -- -- -- -- -- -- -- -- -- --         55      19  1.328  34.872    19  1.311 1.378  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51      18  1.345* 35.926    20  1.147 1.295  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47      17  1.334  36.618    21  1.143 1.273  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43      16  1.307  37.199
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.290  38.241
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35      14  1.233  38.096
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.310  36.180
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27      12  1.282  37.225
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.228  37.740
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19      10  1.177  38.454
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --   15       9  1.108  39.248
11       -- -- -- -- -- -- -- -- -- -- -- --      11       8  1.010  39.675
 7          -- -- -- -- -- -- -- -- -- --          7       7  0.898  40.057
 3             -- -- -- -- -- -- -- --             3       6  0.799  40.910*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  0.700  40.761
                                                           4  0.618  39.153
Control Rod Density: %         0.00                        3  0.560  35.839
                                                           2  0.451  27.271
k-effective:                1.00049             Bottom  1  0.133   8.015
Void Fraction:                0.359
Core Delta-P: psia           25.627            % AXIAL TILT  15.882  -6.614
Core Plate Delta-P: psia     21.086        AVG BOT 8ft/12ft  0.9176  1.0393
Coolant Temp: Deg-F           546.8
In Channel Flow: Mlb/hr       95.40   Active Channel Flow: Mlb/hr        92.28
Total Bypass Flow (%):         11.4   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.378	19	33	44	1.570	0.911	19	31	42	7.50	0.788	48.5	17	47	22	17	8.10	0.840	55.8	17	47	40	17
1.375	19	35	42	1.571	0.910	19	33	18	7.47	0.786	48.7	17	39	14	17	8.05	0.837	56.0	17	39	48	17
1.370	19	31	42	1.572	0.910	19	25	42	7.50	0.786	48.2	16	47	26	18	8.08	0.828	54.8	16	47	26	18
1.365	19	37	44	1.581	0.904	19	23	18	7.50	0.785	48.2	16	17	36	18	8.02	0.827	55.3	16	15	24	18
1.354	19	35	46	1.591	0.899	19	31	24	7.45	0.784	48.7	16	15	38	18	7.98	0.826	55.7	16	15	42	18
1.353	19	33	40	1.591	0.899	19	25	16	7.56	0.784	47.4	16	45	28	18	8.10	0.826	54.4	16	15	34	18
1.350	19	31	38	1.592	0.898	19	33	40	7.42	0.783	49.0	16	43	30	18	8.04	0.825	54.9	16	17	26	18
1.349	19	39	42	1.593	0.898	19	41	26	7.46	0.782	48.4	16	19	34	18	8.03	0.825	55.0	16	17	40	18
1.349	19	41	36	1.594	0.897	19	17	34	7.41	0.781	48.8	16	37	16	17	8.02	0.824	55.1	16	49	24	17
1.346	19	43	34	1.595	0.896	19	23	32	7.42	0.780	48.7	16	17	40	18	7.94	0.824	55.8	16	49	34	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.73 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,392.1 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33542.0
Exposure: MWd/MTU (GWd)       18395.4 (2545.00 )
Delta E: MWd/MTU, (GWd)           3.4 (   0.47 )                 Axial Profile    Edit   Radial Power
Power: MWt                     3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1048.5                    Top 25  0.305   7.652    13  0.351 0.369   5 48
Inlet Subcooling: Btu/lbm      -29.16                        24  0.806  21.190    14  0.307 0.386  53 50
Flow: Mlb/hr                   101.47 ( 99.00 %)             23  1.016  27.108    15  0.417 0.421   3 18
                                                             22  1.142  30.215    16  1.033 1.142  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.226  32.332    17  0.772 1.104  39 48
59              -- -- -- -- -- -- --              59         20  1.287  34.026    18  0.986 1.105  35 40
55          -- -- -- -- -- -- -- -- -- --         55         19  1.307  34.876    19  1.308 1.375  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51         18  1.325* 35.931    20  1.147 1.293  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47         17  1.317  36.623    21  1.143 1.270  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43         16  1.292  37.204
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.277  38.245
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35         14  1.225  38.100
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.305  36.184
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27         12  1.281  37.229
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.232  37.744
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19         10  1.186  38.458
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  1.123  39.252
11       -- -- -- -- -- -- -- -- -- -- --       11          8  1.030  39.679
 7          -- -- -- -- -- -- -- -- --           7          7  0.922  40.060
 3             -- -- -- -- -- -- --              3          6  0.825  40.913*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.727  40.764
                                                             4  0.645  39.155
Control Rod Density: %            0.00                       3  0.587  35.841
                                                             2  0.473  27.272
k-effective:                   0.99986                Bottom  1  0.139   8.015
Void Fraction:                   0.363
Core Delta-P: psia              23.361             % AXIAL TILT  14.161  -6.611
Core Plate Delta-P: psia        18.811          AVG BOT 8ft/12ft  0.9275  1.0393
Coolant Temp: Deg-F              546.0
In Channel Flow: Mlb/hr          89.88   Active Channel Flow: Mlb/hr        86.90
Total Bypass Flow (%):           11.4   (of total core flow)
Total Water Rod Flow (%):         2.9   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.375	19	33	44	1.558	0.918	19	31	42	7.38	0.776	48.6	17	47	22	17	7.97	0.826	55.8	17	47	40	17
1.372	19	35	42	1.558	0.918	19	33	18	7.36	0.775	48.7	17	39	14	17	7.92	0.824	56.0	17	39	48	17
1.367	19	31	42	1.560	0.917	19	25	42	7.38	0.773	48.2	16	47	26	18	7.95	0.814	54.8	16	47	26	18
1.362	19	37	44	1.569	0.911	19	23	18	7.38	0.773	48.2	16	17	36	18	7.79	0.813	56.3	16	15	42	17
1.351	19	35	46	1.580	0.905	19	25	16	7.33	0.772	48.7	16	15	38	18	7.89	0.813	55.3	16	15	24	18
1.350	19	33	40	1.580	0.905	19	31	24	7.43	0.772	47.4	16	45	28	18	7.96	0.812	54.5	16	15	34	18
1.348	19	31	38	1.581	0.905	19	33	40	7.30	0.771	49.0	16	43	30	18	7.89	0.811	55.1	16	49	24	17
1.346	19	39	42	1.582	0.904	19	41	26	7.34	0.770	48.4	16	19	34	18	7.91	0.811	54.9	16	17	26	18
1.346	19	41	36	1.584	0.903	19	17	34	7.30	0.769	48.8	16	37	16	17	7.89	0.811	55.0	16	17	40	18
1.343	19	43	34	1.585	0.902	19	39	42	7.30	0.768	48.7	16	17	40	18	7.81	0.810	55.9	16	49	34	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.74 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,395.4 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33672.1
Exposure: MWd/MTU (GWd)      18525.5 (2563.00 )
Delta E: MWd/MTU, (GWd)        130.1 (  18.00 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1048.5                    Top 25  0.311   7.694    13  0.350 0.368   5 48
Inlet Subcooling: Btu/lbm     -27.51                        24  0.824  21.303    14  0.306 0.386  53 50
Flow: Mlb/hr                  107.11 (104.50 %)             23  1.039  27.251    15  0.416 0.420   3 18
                                                            22  1.166  30.377    16  1.032 1.139  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.250  32.506    17  0.773 1.105  39 48
59              -- -- -- -- -- -- --              59        20  1.308  34.208    18  0.983 1.101  35 40
55          -- -- -- -- -- -- -- -- -- --         55        19  1.324  35.061    19  1.307 1.372  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51        18  1.340* 36.118    20  1.151 1.298  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47        17  1.327  36.809    21  1.146 1.274  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43        16  1.299  37.385
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39        15  1.283  38.425
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35        14  1.228  38.273
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31        13  1.308  36.343
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27        12  1.283  37.385
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23        11  1.233  37.894
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19        10  1.184  38.602
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.116  39.388
11       -- -- -- -- -- -- -- -- -- -- --       11         8  1.017  39.803
 7          -- -- -- -- -- -- -- -- --           7         7  0.903  40.171
 3             -- -- -- -- -- -- --              3         6  0.801  41.012*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.699  40.850
                                                            4  0.616  39.232
Control Rod Density: %            0.00                      3  0.559  35.910
                                                            2  0.450  27.329
k-effective:                  1.00018                Bottom  1  0.132   8.032
Void Fraction:                 0.352
Core Delta-P: psia            25.291             % AXIAL TILT  15.649  -6.501
Core Plate Delta-P: psia      20.741          AVG BOT 8ft/12ft  0.9180  1.0387
Coolant Temp: Deg-F            546.2
In Channel Flow: Mlb/hr         95.00   Active Channel Flow: Mlb/hr        91.91
Total Bypass Flow (%):          11.3   (of total core flow)
Total Water Rod Flow (%):        2.9   (of total core flow)
Source Convergence           0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.372	19	33	44	1.583	0.903	19	33	18	7.52	0.785	47.9	17	47	22	18	8.05	0.838	56.0	17	47	40	17
1.368	19	35	42	1.584	0.903	19	31	42	7.42	0.783	48.9	17	39	14	17	8.01	0.835	56.3	17	39	48	17
1.363	19	31	42	1.585	0.902	19	25	42	7.46	0.783	48.4	16	47	26	18	8.04	0.826	55.0	16	47	26	18
1.360	19	37	44	1.594	0.897	19	23	18	7.40	0.781	49.0	16	15	38	18	7.94	0.824	55.9	16	15	42	18
1.349	19	35	46	1.603	0.892	19	25	16	7.44	0.781	48.4	16	17	36	18	7.97	0.824	55.5	16	15	24	18
1.345	19	33	40	1.605	0.891	19	41	26	7.50	0.780	47.6	16	45	28	18	8.06	0.823	54.5	16	49	24	18
1.343	19	39	42	1.606	0.891	19	17	34	7.36	0.778	49.2	16	43	30	18	8.04	0.822	54.7	16	15	34	18
1.343	19	41	36	1.607	0.890	19	31	24	7.47	0.778	47.7	16	49	24	18	7.90	0.822	56.1	16	49	34	18
1.342	19	31	38	1.609	0.889	19	33	40	7.39	0.777	48.6	16	19	34	18	7.98	0.822	55.3	16	17	40	18
1.341	19	43	34	1.609	0.889	19	39	42	7.33	0.777	49.3	16	15	42	18	8.00	0.821	55.0	16	49	42	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.75 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,525.5 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33679.4
Exposure: MWd/MTU (GWd)      18532.8 (2564.00 )
Delta E: MWd/MTU, (GWd)          7.2 (   1.00 )                Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1047.0                    Top 25  0.307   7.696    13  0.351 0.370   5 48
Inlet Subcooling: Btu/lbm     -30.67                        24  0.811  21.310    14  0.308 0.387  53 50
Flow: Mlb/hr                  102.50 (100.00 %)             23  1.023  27.259    15  0.419 0.423   3 18
                                                            22  1.149  30.386    16  1.032 1.138  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.232  32.516    17  0.775 1.103  39 48
59             -- -- -- -- -- -- --             59          20  1.290  34.218    18  0.983 1.100  35 40
55          -- -- -- -- -- -- -- -- --          55          19  1.308  35.071    19  1.305 1.369  33 44
51       -- -- -- -- -- -- -- -- -- -- --       51          18  1.324* 36.129    20  1.152 1.297  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.314  36.819    21  1.147 1.273  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.288  37.396
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.273  38.435
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.222  38.282
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.306  36.351
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.284  37.394
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.238  37.902
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.193  38.610
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.130  39.396
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.035  39.810
 7          -- -- -- -- -- -- -- -- --          7           7  0.922  40.177
 3             -- -- -- -- -- -- --             3           6  0.820  41.017*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.718  40.855
                                                            4  0.634  39.236
Control Rod Density: %            0.00                      3  0.576  35.914
                                                            2  0.465  27.332
k-effective:                  0.99988                Bottom  1  0.136   8.033
Void Fraction:                  0.354
Core Delta-P: psia             23.568            % AXIAL TILT  14.303  -6.495
Core Plate Delta-P: psia       19.009         AVG BOT 8ft/12ft  0.9258  1.0387
Coolant Temp: Deg-F            545.4
In Channel Flow: Mlb/hr         90.87   Active Channel Flow: Mlb/hr        87.89
Total Bypass Flow (%):          11.4   (of total core flow)
Total Water Rod Flow (%):        2.9   (of total core flow)
Source Convergence           0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.369	19	33	44	1.576	0.907	19	33	18	7.36	0.775	48.8	17	47	22	17	7.95	0.827	56.1	17	47	40	17
1.365	19	35	42	1.578	0.906	19	31	42	7.33	0.774	48.9	17	39	14	17	7.91	0.825	56.3	17	39	48	17
1.360	19	31	42	1.579	0.906	19	25	42	7.36	0.772	48.5	16	47	26	18	7.93	0.815	55.1	16	47	26	18
1.357	19	37	44	1.588	0.901	19	23	18	7.30	0.771	49.0	16	15	38	18	7.83	0.813	55.9	16	15	42	18
1.346	19	35	46	1.597	0.895	19	25	16	7.34	0.770	48.4	16	17	36	18	7.87	0.813	55.5	16	15	24	18
1.342	19	33	40	1.600	0.894	19	41	26	7.40	0.770	47.6	16	45	28	18	7.88	0.812	55.4	16	49	24	17
1.340	19	39	42	1.601	0.893	19	17	34	7.26	0.769	49.2	16	43	30	18	7.80	0.811	56.1	16	49	34	18
1.340	19	41	36	1.602	0.893	19	31	24	7.37	0.768	47.8	16	49	24	18	7.90	0.811	55.0	16	49	42	17
1.339	19	31	38	1.604	0.892	19	33	40	7.24	0.767	49.3	16	15	42	18	7.93	0.811	54.7	16	15	34	18
1.338	19	43	34	1.604	0.892	19	39	42	7.29	0.767	48.6	16	19	34	18	7.87	0.811	55.3	16	17	40	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.76 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,532.8 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    33773.3
Exposure: MWd/MTU (GWd)     18626.7 (2577.00 )
Delta E: MWd/MTU, (GWd)        94.0 (  13.00 )                Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1047.0                    Top 25  0.311   7.727    13  0.350 0.369   5 48
Inlet Subcooling: Btu/lbm    -29.25                        24  0.825  21.392    14  0.307 0.387  53 50
Flow: Mlb/hr                 107.11 (104.50 %)             23  1.041  27.363    15  0.418 0.422   3 18
                                                           22  1.168  30.504    16  1.031 1.136  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  1.251  32.642    17  0.775 1.104  47 40
59              -- -- -- -- -- -- --              59       20  1.308  34.350    18  0.981 1.098  19 42
55          -- -- -- -- -- -- -- -- -- --         55       19  1.322  35.205    19  1.305 1.367  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51       18  1.336* 36.263    20  1.155 1.301  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47       17  1.323  36.953    21  1.149 1.276  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   43       16  1.294  37.526
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   39       15  1.278  38.564
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   35       14  1.226  38.406
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   31       13  1.309  36.466
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   27       12  1.287  37.506
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   23       11  1.239  38.011
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   19       10  1.192  38.715
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15        9  1.124  39.495
11       -- -- -- -- -- -- -- -- -- -- -- --       11        8  1.024  39.901
 7          -- -- -- -- -- -- -- -- -- --          7        7  0.906  40.258
 3             -- -- -- -- -- -- -- --             3        6  0.800  41.088*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  0.695  40.917
                                                           4  0.610  39.291
Control Rod Density: %          0.00                       3  0.553  35.964
                                                           2  0.446  27.372
k-effective:                 1.00023                Bottom  1  0.131   8.046
Void Fraction:                0.345
Core Delta-P: psia           25.147             % AXIAL TILT  15.516  -6.416
Core Plate Delta-P: psia     20.588          AVG BOT 8ft/12ft  0.9183  1.0383
Coolant Temp: Deg-F          545.5
In Channel Flow: Mlb/hr       95.05   Active Channel Flow: Mlb/hr        91.99
Total Bypass Flow (%):        11.3    (of total core flow)
Total Water Rod Flow (%):      2.9    (of total core flow)
Source Convergence         0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.367	19	33	44	1.595	0.896	19	33	18	7.49	0.783	48.1	17	47	22	18	8.03	0.836	56.2	17	47	40	17
1.363	19	35	42	1.598	0.895	19	31	42	7.39	0.781	49.1	17	39	14	17	7.98	0.834	56.4	17	39	48	17
1.358	19	31	42	1.598	0.895	19	25	42	7.42	0.780	48.6	16	47	26	18	8.01	0.824	55.2	16	47	26	18
1.356	19	37	44	1.607	0.890	19	23	18	7.36	0.778	49.1	16	15	38	18	7.91	0.823	56.1	16	15	42	18
1.346	19	35	46	1.615	0.885	19	25	16	7.39	0.777	48.5	16	17	36	18	8.04	0.822	54.7	16	49	24	18
1.339	19	33	40	1.617	0.884	19	41	26	7.45	0.777	47.8	16	45	28	18	7.94	0.821	55.7	16	15	24	18
1.339	19	21	42	1.618	0.884	19	17	34	7.44	0.777	47.9	16	49	24	18	7.99	0.821	55.1	16	49	42	17
1.338	19	41	36	1.622	0.881	19	31	24	7.30	0.775	49.4	16	15	42	18	7.87	0.821	56.2	16	49	34	18
1.337	19	43	28	1.622	0.881	19	39	42	7.31	0.775	49.3	16	43	30	18	7.85	0.819	56.3	16	47	32	18
1.336	19	31	38	1.624	0.880	19	23	32	7.32	0.773	49.0	16	17	40	18	8.00	0.819	54.8	16	15	34	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.77 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,626.7 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    33780.6
Exposure: MWd/MTU (GWd)     18634.0 (2578.00 )
Delta E: MWd/MTU, (GWd)         7.2 (   1.00 )                Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1045.6                    Top 25  0.307   7.730    13  0.352 0.371   5 48
Inlet Subcooling: Btu/lbm    -32.41                        24  0.813  21.398    14  0.308 0.388  53 50
Flow: Mlb/hr                 102.50 (100.00 %)             23  1.025  27.371    15  0.421 0.425   3 18
                                                           22  1.151  30.513    16  1.031 1.135  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  1.233  32.651    17  0.778 1.103  47 40
59             -- -- -- -- -- -- --             59         20  1.290  34.360    18  0.981 1.097  19 42
55          -- -- -- -- -- -- -- -- -- --       55         19  1.306  35.215    19  1.303 1.365  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --    51         18  1.321* 36.274    20  1.156 1.299  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47         17  1.309  36.963    21  1.150 1.274  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43         16  1.283  37.537
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.269  38.574
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35         14  1.220  38.416
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.307  36.475
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27         12  1.288  37.515
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.244  38.019
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19         10  1.202  38.723
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  1.138  39.502
11       -- -- -- -- -- -- -- -- -- -- --       11          8  1.041  39.908
 7          -- -- -- -- -- -- -- -- --          7          7  0.925  40.264
 3             -- -- -- -- -- -- --             3          6  0.819  41.094*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  0.714  40.922
                                                           4  0.629  39.295
Control Rod Density: %           0.00                      3  0.571  35.968
                                                           2  0.461  27.375
k-effective:                 0.99991                Bottom  1  0.135   8.047
Void Fraction:                 0.347
Core Delta-P: psia            23.438            % AXIAL TILT  14.177  -6.410
Core Plate Delta-P: psia      18.871         AVG BOT 8ft/12ft  0.9261  1.0382
Coolant Temp: Deg-F           544.7
In Channel Flow: Mlb/hr        90.92   Active Channel Flow: Mlb/hr        87.97
Total Bypass Flow (%):         11.3   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.365	19	33	44	1.589	0.900	19	33	18	7.33	0.773	48.9	17	47	22	17	7.93	0.826	56.2	17	47	40	17
1.360	19	35	42	1.592	0.899	19	25	42	7.30	0.771	49.1	17	39	14	17	7.88	0.823	56.4	17	39	48	17
1.355	19	31	42	1.592	0.898	19	31	42	7.32	0.770	48.6	16	47	26	18	7.90	0.814	55.2	16	47	26	18
1.353	19	37	44	1.601	0.893	19	23	18	7.26	0.768	49.1	16	15	38	18	7.80	0.812	56.1	16	15	42	18
1.343	19	35	46	1.609	0.889	19	25	16	7.30	0.767	48.5	16	17	36	18	7.89	0.811	55.2	16	49	42	17
1.337	19	33	40	1.612	0.887	19	41	26	7.36	0.767	47.8	16	45	28	18	7.93	0.811	54.7	16	49	24	18
1.336	19	21	42	1.613	0.887	19	17	34	7.35	0.767	47.9	16	49	24	18	7.83	0.811	55.7	16	15	24	18
1.336	19	41	36	1.617	0.884	19	39	42	7.21	0.765	49.4	16	15	42	18	7.77	0.810	56.2	16	49	34	18
1.335	19	43	28	1.617	0.884	19	31	24	7.22	0.765	49.3	16	43	30	18	7.62	0.809	57.7	16	41	50	15
1.333	19	31	38	1.619	0.883	19	33	40	7.21	0.763	49.2	16	37	16	17	7.75	0.809	56.3	16	47	32	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.78 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,634.0 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    33867.3
Exposure: MWd/MTU (GWd)     18720.7 (2590.00 )
Delta E: MWd/MTU, (GWd)        86.7 (  12.00 )                Axial Profile    Edit   Radial Power
Power: MWt                   3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1045.6                    Top 25  0.311   7.758    13  0.351 0.370   5 48
Inlet Subcooling: Btu/lbm    -30.92                        24  0.827  21.474    14  0.307 0.388  53 50
Flow: Mlb/hr                 107.11 (104.50 %)             23  1.043  27.467    15  0.419 0.424   3 18
                                                           22  1.170  30.621    16  1.031 1.133  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            21  1.251  32.768    17  0.778 1.104  47 40
59              -- -- -- -- -- -- --              59       20  1.307  34.482    18  0.979 1.096  19 42
55          -- -- -- -- -- -- -- -- -- --         55       19  1.320  35.338    19  1.303 1.364  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51       18  1.332* 36.398    20  1.159 1.303  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47       17  1.318  37.086    21  1.152 1.277  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   43       16  1.290  37.657
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   39       15  1.275  38.693
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   35       14  1.224  38.530
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   31       13  1.311  36.581
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   27       12  1.292  37.620
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   23       11  1.246  38.120
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   19       10  1.201  38.820
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15        9  1.133  39.594
11       -- -- -- -- -- -- -- -- -- -- -- --       11        8  1.030  39.992
 7          -- -- -- -- -- -- -- -- -- --          7        7  0.908  40.338
 3             -- -- -- -- -- -- --               3        6  0.798  41.160*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58            5  0.690  40.979
                                                           4  0.605  39.345
Control Rod Density: %           0.00                      3  0.547  36.013
                                                           2  0.441  27.411
k-effective:                 1.00030                Bottom  1  0.129   8.058
Void Fraction:                0.338
Core Delta-P: psia           25.011             % AXIAL TILT  15.394  -6.338
Core Plate Delta-P: psia     20.445          AVG BOT 8ft/12ft  0.9187  1.0378
Coolant Temp: Deg-F           544.9
In Channel Flow: Mlb/hr       95.11   Active Channel Flow: Mlb/hr        92.06
Total Bypass Flow (%):         11.2   (of total core flow)
Total Water Rod Flow (%):       2.8   (of total core flow)
Source Convergence          0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.364	19	33	44	1.607	0.890	19	33	18	7.46	0.781	48.2	17	47	22	18	8.05	0.836	55.9	17	47	40	17
1.359	19	35	42	1.610	0.888	19	25	42	7.35	0.778	49.2	17	39	14	17	7.95	0.832	56.6	17	39	48	17
1.353	19	31	42	1.611	0.888	19	31	42	7.38	0.778	48.8	16	47	26	18	7.98	0.823	55.4	16	47	26	18
1.352	19	37	18	1.619	0.883	19	23	18	7.42	0.775	48.0	16	49	24	18	8.01	0.821	54.9	16	49	24	18
1.343	19	35	46	1.626	0.879	19	25	16	7.32	0.775	49.2	16	45	24	18	7.88	0.821	56.2	16	15	42	18
1.335	19	21	42	1.630	0.878	19	17	34	7.41	0.774	47.9	16	45	28	18	7.97	0.821	55.3	16	49	42	17
1.334	19	41	36	1.630	0.877	19	41	26	7.35	0.773	48.7	16	17	36	18	7.85	0.820	56.4	16	49	34	18
1.334	19	33	40	1.635	0.875	19	39	42	7.27	0.773	49.6	16	15	42	18	7.90	0.819	55.8	16	15	24	18
1.334	19	43	28	1.636	0.874	19	31	24	7.26	0.771	49.5	16	43	30	18	7.83	0.818	56.5	16	47	32	18
1.331	19	31	38	1.638	0.873	19	23	32	7.17	0.770	50.5	16	47	30	18	7.94	0.817	55.2	17	9	26	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.79 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,720.7 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33874.6
Exposure: MWd/MTU (GWd)      18727.9 (2591.00 )
Delta E: MWd/MTU, (GWd)          7.2 (   1.00 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1044.6                    Top 25  0.308   7.760    13  0.352 0.371   5 48
Inlet Subcooling: Btu/lbm     -33.36                        24  0.817  21.481    14  0.308 0.389  53 50
Flow: Mlb/hr                  103.01 (100.50 %)             23  1.030  27.475    15  0.422 0.426   3 18
                                                            22  1.156  30.630    16  1.031 1.133  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.237  32.777    17  0.780 1.103  47 40
59             -- -- -- -- -- -- --             59          20  1.293  34.492    18  0.979 1.095  19 42
55          -- -- -- -- -- -- -- -- --          55          19  1.306  35.348    19  1.301 1.362  33 44
51       -- -- -- -- -- -- -- -- -- -- --       51          18  1.320* 36.408    20  1.159 1.301  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.307  37.096    21  1.152 1.276  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.280  37.667
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.267  38.703
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.218  38.540
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.307  36.590
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.291  37.628
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.248  38.129
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.206  38.828
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.142  39.602
11       -- -- -- -- -- -- -- -- -- -- --       11           8  1.043  39.999
 7          -- -- -- -- -- -- -- -- --          7           7  0.923  40.344
 3             -- -- -- -- -- -- --             3           6  0.815  41.165*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.708  40.984
                                                            4  0.622  39.349
Control Rod Density: %           0.00                       3  0.565  36.017
                                                            2  0.456  27.414
k-effective:                  0.99981                Bottom  1  0.134   8.059
Void Fraction:                 0.341
Core Delta-P: psia            23.525             % AXIAL TILT  14.289  -6.332
Core Plate Delta-P: psia      18.953          AVG BOT 8ft/12ft  0.9250  1.0378
Coolant Temp: Deg-F           544.3
In Channel Flow: Mlb/hr        91.42   Active Channel Flow: Mlb/hr        88.47
Total Bypass Flow (%):         11.3   (of total core flow)
Total Water Rod Flow (%):       2.9   (of total core flow)
Source Convergence          0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.362	19	33	44	1.599	0.894	19	33	18	7.38	0.773	48.2	17	47	22	18	7.92	0.827	56.4	17	47	40	17
1.357	19	35	42	1.602	0.893	19	25	42	7.28	0.771	49.2	17	39	14	17	7.87	0.824	56.6	17	39	48	17
1.351	19	31	42	1.603	0.892	19	31	42	7.31	0.770	48.8	16	47	26	18	7.89	0.814	55.4	16	47	26	18
1.350	19	37	18	1.611	0.888	19	23	18	7.34	0.767	48.1	16	49	24	18	7.89	0.813	55.3	16	49	42	17
1.341	19	35	46	1.619	0.883	19	25	16	7.24	0.767	49.3	16	15	38	18	7.79	0.812	56.2	16	15	42	18
1.334	19	21	42	1.623	0.881	19	17	34	7.33	0.766	47.9	16	45	28	18	7.92	0.812	54.9	16	49	24	18
1.333	19	41	36	1.623	0.881	19	41	26	7.27	0.765	48.7	16	17	36	18	7.77	0.811	56.4	16	49	34	18
1.332	19	33	40	1.628	0.879	19	39	42	7.19	0.765	49.6	16	15	42	18	7.81	0.811	55.8	16	15	24	18
1.332	19	43	28	1.629	0.878	19	31	24	7.19	0.763	49.5	16	43	30	18	7.62	0.810	57.8	16	41	50	15
1.329	19	31	38	1.631	0.877	19	23	32	7.10	0.763	50.6	16	47	30	18	7.74	0.810	56.5	16	47	32	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.80 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,727.9 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    33968.5
Exposure: MWd/MTU (GWd)      18821.9 (2604.00 )
Delta E: MWd/MTU, (GWd)         94.0 (  13.00 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3952.0 (100.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1044.6                    Top 25  0.312   7.791    13  0.351 0.370   5 48
Inlet Subcooling: Btu/lbm     -31.83                        24  0.831  21.564    14  0.307 0.388  53 50
Flow: Mlb/hr                  107.62 (105.00 %)             23  1.048  27.579    15  0.421 0.425   3 18
                                                            22  1.176  30.749    16  1.030 1.131  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.256  32.904    17  0.780 1.103  47 40
59              -- -- -- -- -- -- --              59        20  1.310  34.624    18  0.978 1.094  19 42
55          -- -- -- -- -- -- -- -- -- --         55        19  1.321  35.481    19  1.301 1.361  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --      51        18  1.332* 36.543    20  1.162 1.305  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47        17  1.317  37.229    21  1.155 1.278  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   43        16  1.287  37.797
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   39        15  1.273  38.832
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   35        14  1.222  38.663
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   31        13  1.312  36.705
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   27        12  1.294  37.742
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   23        11  1.250  38.238
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --   19        10  1.205  38.934
15    -- -- -- -- -- -- -- -- -- -- -- -- -- --    15         9  1.136  39.702
11       -- -- -- -- -- -- -- -- -- -- -- --       11         8  1.031  40.090
 7          -- -- -- -- -- -- -- -- -- --          7         7  0.905  40.425
 3             -- -- -- -- -- -- --                3         6  0.793  41.236*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.684  41.045
                                                            4  0.598  39.403
Control Rod Density: %            0.00                      3  0.541  36.065
                                                            2  0.437  27.454
k-effective:                  1.00012                Bottom  1  0.128   8.071
Void Fraction:                 0.333
Core Delta-P: psia            25.099             % AXIAL TILT  15.547  -6.254
Core Plate Delta-P: psia      20.527          AVG BOT 8ft/12ft  0.9172  1.0374
Coolant Temp: Deg-F            544.5
In Channel Flow: Mlb/hr        95.61   Active Channel Flow: Mlb/hr        92.57
Total Bypass Flow (%):         11.2   (of total core flow)
Total Water Rod Flow (%):       2.8   (of total core flow)
Source Convergence          0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.361	19	33	44	1.617	0.885	19	33	18	7.45	0.782	48.4	17	47	22	18	8.04	0.837	56.1	17	47	40	17
1.355	19	35	42	1.620	0.883	19	25	42	7.34	0.778	49.4	17	39	14	17	7.94	0.833	56.8	17	39	48	17
1.350	19	31	42	1.621	0.882	19	31	42	7.37	0.778	48.9	16	47	26	18	7.97	0.824	55.5	16	47	26	18
1.350	19	37	18	1.629	0.878	19	23	18	7.42	0.776	48.2	16	49	24	18	7.97	0.823	55.5	16	49	42	17
1.340	19	35	46	1.635	0.874	19	25	16	7.31	0.775	49.4	16	45	24	18	8.01	0.823	55.0	16	49	24	18
1.332	19	21	42	1.639	0.873	19	17	34	7.26	0.773	49.7	16	15	42	18	7.87	0.822	56.4	16	15	42	18
1.331	19	41	26	1.639	0.872	19	41	26	7.39	0.773	48.1	16	45	28	18	7.85	0.821	56.5	16	49	34	18
1.331	19	43	28	1.644	0.870	19	49	40	7.33	0.772	48.8	16	17	36	18	7.89	0.820	56.0	16	15	24	18
1.330	19	33	40	1.645	0.869	19	39	42	7.16	0.770	50.7	16	47	30	18	8.08	0.820	54.1	17	9	26	18
1.327	19	39	16	1.648	0.868	19	31	24	7.24	0.770	49.6	16	43	30	18	7.82	0.819	56.6	16	47	32	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.81 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,821.9 MWd/MTU

```
Cycle:                          21                    Core Average Exposure: MWd/MTU    34120.1
Exposure: MWd/MTU (GWd)     18973.7 (2625.00 )
Delta E: MWd/MTU, (GWd)       151.8 (  21.00 )              Axial Profile    Edit   Radial Power
Power: MWt                   3833.4 ( 97.00 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1042.4                  Top 25  0.318   7.842    13  0.351 0.370   5 48
Inlet Subcooling: Btu/lbm    -30.76                      24  0.848  21.700    14  0.307 0.389  53 50
Flow: Mlb/hr                 107.62 (105.00 %)           23  1.070  27.751    15  0.420 0.425   3 18
                                                         22  1.200  30.943    16  1.029 1.129  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          21  1.278  33.111    17  0.781 1.103  47 40
59              -- -- -- -- -- -- --             59      20  1.330  34.840    18  0.975 1.092  19 42
55          -- -- -- -- -- -- -- -- -- --        55      19  1.336  35.699    19  1.300 1.359  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --     51      18  1.344* 36.762    20  1.165 1.309  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --  47      17  1.325  37.445    21  1.157 1.281  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43      16  1.291  38.008
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39      15  1.275  39.041
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35      14  1.222  38.864
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31      13  1.311  36.891
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27      12  1.293  37.925
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23      11  1.247  38.415
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19      10  1.198  39.105
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15       9  1.125  39.863
11       -- -- -- -- -- -- -- -- -- -- --       11       8  1.016  40.235
 7          -- -- -- -- -- -- -- -- --           7       7  0.887  40.552
 3             -- -- -- -- -- -- --              3       6  0.772  41.347*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          5  0.663  41.141
                                                         4  0.579  39.486
Control Rod Density: %           0.00                    3  0.524  36.141
                                                         2  0.424  27.515
k-effective:                 1.00007                Bottom  1  0.124   8.090
Void Fraction:                 0.326
Core Delta-P: psia            24.937            % AXIAL TILT  16.828  -6.124
Core Plate Delta-P: psia      20.368         AVG BOT 8ft/12ft  0.9086  1.0367
Coolant Temp: Deg-F           544.3
In Channel Flow: Mlb/hr        95.71   Active Channel Flow: Mlb/hr        92.70
Total Bypass Flow (%):         11.1   (of total core flow)
Total Water Rod Flow (%):       2.8   (of total core flow)
Source Convergence          0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.359	19	33	44	1.664	0.860	19	33	18	7.29	0.767	48.6	17	47	22	18	7.98	0.822	55.3	17	47	40	18
1.353	19	35	42	1.668	0.857	19	25	42	7.26	0.762	48.4	16	49	24	18	7.76	0.817	57.0	17	39	48	17
1.347	19	37	18	1.669	0.857	19	31	42	7.20	0.762	49.2	16	47	26	18	7.80	0.809	55.8	16	47	26	18
1.347	19	31	42	1.677	0.853	19	23	18	7.22	0.761	48.8	17	39	14	18	7.85	0.809	55.3	16	49	24	18
1.339	19	35	46	1.683	0.850	19	25	16	7.14	0.759	49.6	16	45	24	18	7.93	0.809	54.5	16	49	42	18
1.330	19	21	42	1.683	0.849	19	49	40	7.10	0.758	50.0	16	15	42	18	7.70	0.807	56.6	16	15	42	18
1.328	19	43	28	1.687	0.848	19	17	34	7.21	0.756	48.3	16	45	28	18	7.92	0.807	54.3	17	9	26	18
1.328	19	41	26	1.688	0.847	19	41	26	7.15	0.755	49.1	16	17	36	18	7.68	0.806	56.8	16	49	34	18
1.328	19	49	40	1.694	0.844	19	39	42	7.17	0.755	48.7	16	49	42	18	7.71	0.804	56.2	16	15	24	18
1.327	19	33	40	1.696	0.843	19	39	16	6.99	0.754	50.9	16	47	30	18	7.76	0.804	55.7	16	41	50	17

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.82 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 18,973.7 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    34357.7
Exposure: MWd/MTU (GWd)      19211.3 (2657.90 )
Delta E: MWd/MTU, (GWd)        237.6 (  32.87 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3651.6 ( 92.40 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1038.8                    Top 25  0.328   7.923    13  0.351 0.371   5 48
Inlet Subcooling: Btu/lbm     -29.11                        24  0.876  21.919    14  0.307 0.390  53 50
Flow: Mlb/hr                  107.62 (105.00 %)             23  1.104  28.028    15  0.420 0.425   3 18
                                                            22  1.236  31.256    16  1.028 1.126  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.313  33.443    17  0.782 1.103  47 40
59             -- -- -- -- -- -- --             59          20  1.359  35.185    18  0.972 1.089  19 42
55          -- -- -- -- -- -- -- -- -- --       55          19  1.359  36.044    19  1.298 1.355  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --    51          18  1.361* 37.109    20  1.171 1.315  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47          17  1.335  37.786    21  1.162 1.285  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.296  38.340
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.276  39.368
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.221  39.177
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.309  37.182
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.290  38.212
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.240  38.691
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.185  39.370
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.106  40.111
11       -- -- -- -- -- -- -- -- -- -- --       11           8  0.991  40.458
 7          -- -- -- -- -- -- -- -- --          7           7  0.858  40.746
 3             -- -- -- -- -- -- --             3           6  0.742  41.515*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.635  41.285
                                                            4  0.553  39.612
Control Rod Density: %            0.00                      3  0.501  36.255
                                                            2  0.406  27.607
k-effective:                   0.99989                Bottom  1  0.119   8.118
Void Fraction:                   0.315
Core Delta-P: psia              24.693             % AXIAL TILT  18.735  -5.910
Core Plate Delta-P: psia        20.129          AVG BOT 8ft/12ft  0.8955  1.0356
Coolant Temp: Deg-F             544.1
In Channel Flow: Mlb/hr          95.85   Active Channel Flow: Mlb/hr        92.89
Total Bypass Flow (%):           10.9   (of total core flow)
Total Water Rod Flow (%):         2.8   (of total core flow)
Source Convergence            0.00009
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.355	19	33	44	1.743	0.821	19	33	18	7.03	0.743	49.0	17	47	22	18	7.71	0.799	55.7	17	47	40	18
1.348	19	35	42	1.748	0.818	19	25	42	7.01	0.739	48.8	16	49	24	18	7.58	0.792	56.5	17	39	48	18
1.344	19	37	44	1.749	0.817	19	31	42	6.97	0.737	49.2	17	39	14	18	7.68	0.788	54.9	16	49	42	18
1.343	19	31	42	1.751	0.817	19	49	40	6.93	0.736	49.5	16	47	26	18	7.58	0.785	55.7	16	49	24	18
1.336	19	35	46	1.757	0.814	19	23	18	6.95	0.734	49.1	16	49	42	18	7.67	0.785	54.7	17	9	26	18
1.331	19	49	40	1.762	0.812	19	25	16	6.84	0.733	50.3	16	15	42	18	7.52	0.784	56.2	16	47	26	18
1.326	19	21	42	1.767	0.809	19	17	34	6.86	0.733	50.0	16	45	24	18	7.43	0.782	57.0	16	15	42	18
1.325	19	43	28	1.769	0.808	19	41	26	6.87	0.730	49.5	16	37	12	18	7.40	0.781	57.2	16	49	34	18
1.324	19	39	16	1.770	0.808	20	9	40	6.93	0.730	48.7	16	45	28	18	7.62	0.781	54.9	16	41	50	18
1.324	19	41	26	1.774	0.806	19	39	16	6.86	0.728	49.5	16	17	36	18	7.43	0.778	56.6	16	15	24	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.83 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 19,211.3 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    34640.7
Exposure: MWd/MTU (GWd)       19494.1 (2697.00 )
Delta E: MWd/MTU, (GWd)         282.8 (  39.13 )                Axial Profile    Edit   Radial Power
Power: MWt                     3418.5 ( 86.50 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1034.3                    Top 25  0.340   8.023    13  0.350 0.371   5 48
Inlet Subcooling: Btu/lbm     -27.02                         24  0.911  22.190    14  0.306 0.391  53 50
Flow: Mlb/hr                   107.62 (105.00 %)             23  1.149  28.369    15  0.420 0.425   3 18
                                                             22  1.283  31.640    16  1.026 1.122  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.355  33.851    17  0.783 1.104  47 40
59             -- -- -- -- -- -- --             59          20  1.396* 35.605    18  0.968 1.085  19 42
55          -- -- -- -- -- -- -- -- --          55          19  1.387  36.464    19  1.296 1.351  33 44
51       -- -- -- -- -- -- -- -- -- -- --       51          18  1.381  37.527    20  1.178 1.323  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.348  38.196    21  1.167 1.290  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.302  38.737
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.278  39.757
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.219  39.549
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.307  37.527
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.285  38.553
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.230  39.018
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.168  39.681
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.081  40.400
11       -- -- -- -- -- -- -- -- -- -- --       11           8  0.959  40.716
 7          -- -- -- -- -- -- -- -- --          7           7  0.822  40.968
 3             -- -- -- -- -- -- --             3           6  0.706  41.707*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.601  41.448
                                                             4  0.522  39.754
Control Rod Density: %            0.00                       3  0.473  36.384
                                                             2  0.384  27.712
k-effective:                   0.99987                Bottom  1  0.113   8.150
Void Fraction:                   0.301
Core Delta-P: psia              24.390             % AXIAL TILT  21.125  -5.643
Core Plate Delta-P: psia        19.831          AVG BOT 8ft/12ft  0.8789  1.0341
Coolant Temp: Deg-F             543.8
In Channel Flow: Mlb/hr          96.03   Active Channel Flow: Mlb/hr        93.13
Total Bypass Flow (%):           10.8   (of total core flow)
Total Water Rod Flow (%):         2.7   (of total core flow)
Source Convergence            0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.351	19	33	44	1.849	0.773	19	49	40	6.69	0.710	49.5	17	47	22	18	7.35	0.767	56.2	17	47	40	18
1.343	19	35	42	1.857	0.770	19	33	18	6.68	0.707	49.3	16	49	24	18	7.22	0.760	57.0	17	39	48	18
1.340	19	37	44	1.864	0.767	19	25	42	6.64	0.705	49.5	16	49	42	18	7.35	0.758	55.4	16	49	42	18
1.339	19	31	42	1.865	0.767	19	31	42	6.62	0.704	49.7	17	39	14	18	7.33	0.755	55.2	17	9	26	18
1.336	19	49	40	1.866	0.766	20	9	40	6.57	0.702	50.0	16	47	26	18	7.23	0.753	56.2	16	49	24	18
1.333	19	35	46	1.873	0.763	19	23	18	6.49	0.699	50.8	16	15	42	18	7.28	0.751	55.4	16	41	50	18
1.323	20	51	40	1.876	0.762	19	25	16	6.57	0.698	49.5	16	41	50	18	7.15	0.750	56.7	16	47	26	18
1.323	19	37	48	1.884	0.759	19	39	50	6.54	0.698	50.0	16	37	50	18	7.06	0.748	57.5	16	15	42	18
1.322	19	39	16	1.884	0.759	19	17	34	6.57	0.697	49.4	16	13	18	18	7.18	0.747	56.1	17	25	10	18
1.321	19	21	42	1.886	0.758	19	47	24	6.50	0.697	50.4	16	45	24	18	7.04	0.747	57.7	16	49	34	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.84 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 19,494.1 MWd/MTU

```
Cycle:                            21                    Core Average Exposure: MWd/MTU    34957.5
Exposure: MWd/MTU (GWd)      19811.1 (2740.90 )
Delta E: MWd/MTU, (GWd)        317.0 (  43.86 )                 Axial Profile    Edit   Radial Power
Power: MWt                    3141.8 ( 79.50 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia           1029.0                    Top 25  0.354   8.139    13  0.350 0.371   5 48
Inlet Subcooling: Btu/lbm     -24.54                        24  0.955  22.507    14  0.306 0.391  53 50
Flow: Mlb/hr                  107.62 (105.00 %)             23  1.203  28.768    15  0.419 0.424   3 18
                                                            22  1.340  32.089    16  1.024 1.117  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             21  1.407  34.323    17  0.785 1.104  47 40
59             -- -- -- -- -- -- --             59          20  1.440* 36.090    18  0.963 1.083  17 18
55          -- -- -- -- -- -- -- -- --          55          19  1.420  36.944    19  1.294 1.346  33 44
51       -- -- -- -- -- -- -- -- -- -- --       51          18  1.405  38.004    20  1.186 1.333  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.363  38.660    21  1.174 1.296  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.309  39.183
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.278  40.195
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.215  39.966
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.303  37.914
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.278  38.932
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.215  39.380
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.145  40.024
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.049  40.716
11       -- -- -- -- -- -- -- -- -- -- --       11           8  0.920  40.995
 7          -- -- -- -- -- -- -- -- --           7           7  0.780  41.206
 3             -- -- -- -- -- -- --              3           6  0.664  41.910*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58             5  0.562  41.621
                                                            4  0.488  39.904
Control Rod Density: %            0.00                      3  0.442  36.519
                                                            2  0.360  27.822
k-effective:                   1.00004                Bottom  1  0.106   8.185
Void Fraction:                   0.284
Core Delta-P: psia              24.040            % AXIAL TILT  23.982  -5.324
Core Plate Delta-P: psia        19.486         AVG BOT 8ft/12ft  0.8589  1.0323
Coolant Temp: Deg-F             543.5
In Channel Flow: Mlb/hr          96.24   Active Channel Flow: Mlb/hr        93.42
Total Bypass Flow (%):           10.6   (of total core flow)
Total Water Rod Flow (%):         2.6   (of total core flow)
Source Convergence            0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.346	19	33	44	1.986	0.720	19	49	40	6.25	0.668	50.0	17	47	22	18	6.90	0.725	56.8	17	47	40	18
1.342	19	49	40	2.000	0.715	20	9	40	6.24	0.667	50.0	16	49	42	18	6.92	0.719	56.0	16	49	42	18
1.337	19	35	42	2.016	0.709	19	33	18	6.26	0.667	49.8	16	49	24	18	6.77	0.718	57.5	17	39	48	18
1.335	19	37	44	2.026	0.706	19	25	42	6.30	0.662	48.5	16	47	36	20	6.90	0.715	55.8	17	9	26	18
1.333	20	51	40	2.026	0.706	19	39	50	6.19	0.662	50.2	17	39	14	18	6.85	0.712	56.0	16	41	50	18
1.333	19	31	42	2.027	0.706	19	31	42	6.26	0.662	49.1	16	49	34	20	6.78	0.711	56.7	16	49	24	18
1.329	19	35	46	2.028	0.705	20	9	42	6.18	0.660	50.0	16	41	50	18	6.87	0.710	55.6	16	49	34	20
1.322	19	37	48	2.032	0.704	19	47	24	6.44	0.660	46.3	17	51	36	20	6.76	0.708	56.7	17	25	10	18
1.320	19	39	16	2.034	0.703	19	23	18	6.17	0.659	50.1	16	47	32	20	6.79	0.707	56.1	16	47	18	18
1.319	19	39	50	2.034	0.703	19	25	16	6.17	0.659	50.0	16	13	18	18	6.89	0.707	54.9	16	47	26	20

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.85 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 19,811.1 MWd/MTU

```
Cycle:                              21                    Core Average Exposure: MWd/MTU    35557.4
Exposure: MWd/MTU (GWd)       20411.0 (2823.90 )
Delta E: MWd/MTU, (GWd)         599.9 (  82.99 )                Axial Profile    Edit   Radial Power
Power: MWt                     2647.8 ( 67.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1019.4                    Top 25  0.384   8.373    13  0.349 0.373   5 48
Inlet Subcooling: Btu/lbm      -20.17                        24  1.047  23.149    14  0.305 0.394  53 50
Flow: Mlb/hr                   107.62 (105.00 %)             23  1.317  29.577    15  0.419 0.424   3 18
                                                             22  1.458  32.995    16  1.019 1.117  49 42
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.512  35.268    17  0.789 1.105  47 40
59              -- -- -- -- -- -- --             59         20  1.527* 37.051    18  0.953 1.080  17 18
55          -- -- -- -- -- -- -- -- -- --        55         19  1.483  37.883    19  1.289 1.354  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --     51         18  1.448  38.927    20  1.203 1.352  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --  47         17  1.385  39.549    21  1.189 1.309  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43         16  1.312  40.032
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39         15  1.271  41.020
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35         14  1.200  40.748
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31         13  1.283  38.638
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27         12  1.250  39.641
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23         11  1.173  40.049
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19         10  1.087  40.651
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15          9  0.978  41.285
11       -- -- -- -- -- -- -- -- -- -- --       11          8  0.842  41.489
 7          -- -- -- -- -- -- -- -- --           7          7  0.703  41.622
 3             -- -- -- -- -- -- --              3          6  0.592  42.262*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.500  41.919
                                                             4  0.434  40.163
Control Rod Density: %            0.00                       3  0.395  36.754
                                                             2  0.324  28.014
k-effective:                   0.99933                Bottom  1  0.096   8.244
Void Fraction:                   0.252
Core Delta-P: psia              23.433            % AXIAL TILT  29.388  -4.667
Core Plate Delta-P: psia        18.890         AVG BOT 8ft/12ft  0.8190  1.0286
Coolant Temp: Deg-F             543.0
In Channel Flow: Mlb/hr          96.61   Active Channel Flow: Mlb/hr        93.93
Total Bypass Flow (%):           10.2   (of total core flow)
Total Water Rod Flow (%):         2.5   (of total core flow)
Source Convergence            0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.354	19	49	40	2.259	0.633	19	49	40	5.82	0.607	48.0	16	49	42	20	6.48	0.655	53.7	16	49	42	20
1.352	20	51	40	2.279	0.628	20	9	40	5.68	0.603	49.5	16	49	38	20	6.49	0.653	53.4	17	9	26	20
1.342	20	51	42	2.307	0.620	20	9	42	5.79	0.601	47.3	17	51	36	20	6.33	0.653	55.4	17	47	40	20
1.335	19	33	44	2.312	0.619	19	39	50	5.67	0.600	49.2	16	15	16	20	6.37	0.645	53.8	16	41	50	20
1.328	19	39	50	2.326	0.615	19	9	18	5.75	0.600	47.8	16	13	18	20	6.37	0.644	53.8	16	47	18	20
1.325	20	49	44	2.335	0.613	20	49	18	5.66	0.599	49.3	17	47	40	20	6.21	0.644	55.9	16	49	24	20
1.324	19	37	44	2.336	0.612	19	47	42	5.73	0.599	48.1	16	41	50	20	6.24	0.644	55.4	16	15	16	20
1.323	19	35	42	2.337	0.612	19	47	16	5.57	0.595	50.1	16	49	34	20	6.13	0.643	56.7	16	49	34	20
1.321	20	41	52	2.338	0.612	20	39	10	5.70	0.595	47.9	16	43	48	20	6.16	0.641	56.2	17	39	48	20
1.321	19	35	46	2.340	0.611	19	15	48	5.59	0.594	49.6	16	47	36	20	6.30	0.640	54.3	17	25	10	20

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure A.86 Browns Ferry Equilibrium Cycle Control Rod Pattern and Axial Distributions at 20,411.0 MWd/MTU

Appendix B Elevation Views of the Browns Ferry Equilibrium Cycle Fresh Reload Batch Fuel Assemblies

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Figure B.1 Elevation View for the Browns Ferry Equilibrium Cycle Fresh Fuel Reload Batch BFE ATRIUM 10XM [ ] CGU Fuel Assembly Design

[

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Figure B.2 Elevation View for the Browns Ferry Equilibrium Cycle Fresh Fuel Reload Batch BFE ATRIUM 10XM [ ] BLEU Fuel Assembly Design

[

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Figure B.3 Elevation View for the Browns Ferry Equilibrium Cycle Fresh Fuel Reload Batch BFE ATRIUM 10XM [ ] CGU Fuel Assembly Design

Appendix C Browns Ferry Equilibrium Cycle Fresh Fuel Locations

Table C.1 Browns Ferry Equilibrium Cycle Reload Fuel Identification and Locations (Core Coordinates)

Assembly Type: ATRIUM 10XM
Bundle Description: [ ]
Number Loaded: 208

Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.
21A001	29-54	21A039	45-44	21A077	37-36	21A115	49-30
21A002	31-54	21A040	51-44	21A078	41-36	21A116	53-30
21A003	17-52	21A041	13-42	21A079	45-36	21A117	9-28
21A004	27-52	21A042	17-42	21A080	49-36	21A118	13-28
21A005	33-52	21A043	21-42	21A081	9-34	21A119	17-28
21A006	43-52	21A044	25-42	21A082	13-34	21A120	21-28
21A007	21-50	21A045	29-42	21A083	17-34	21A121	25-28
21A008	25-50	21A046	31-42	21A084	21-34	21A122	29-28
21A009	29-50	21A047	35-42	21A085	25-34	21A123	31-28
21A010	31-50	21A048	39-42	21A086	29-34	21A124	35-28
21A011	35-50	21A049	43-42	21A087	31-34	21A125	39-28
21A012	39-50	21A050	47-42	21A088	35-34	21A126	43-28
21A013	15-48	21A051	11-40	21A089	39-34	21A127	47-28
21A014	19-48	21A052	15-40	21A090	43-34	21A128	51-28
21A015	23-48	21A053	19-40	21A091	47-34	21A129	11-26
21A016	27-48	21A054	23-40	21A092	51-34	21A130	15-26
21A017	33-48	21A055	27-40	21A093	7-32	21A131	19-26
21A018	37-48	21A056	33-40	21A094	11-32	21A132	23-26
21A019	41-48	21A057	37-40	21A095	15-32	21A133	27-26
21A020	45-48	21A058	41-40	21A096	19-32	21A134	33-26
21A021	13-46	21A059	45-40	21A097	23-32	21A135	37-26
21A022	17-46	21A060	49-40	21A098	27-32	21A136	41-26
21A023	21-46	21A061	13-38	21A099	33-32	21A137	45-26
21A024	25-46	21A062	17-38	21A100	37-32	21A138	49-26
21A025	29-46	21A063	21-38	21A101	41-32	21A139	13-24
21A026	31-46	21A064	25-38	21A102	45-32	21A140	17-24
21A027	35-46	21A065	29-38	21A103	49-32	21A141	21-24
21A028	39-46	21A066	31-38	21A104	53-32	21A142	25-24
21A029	43-46	21A067	35-38	21A105	7-30	21A143	29-24
21A030	47-46	21A068	39-38	21A106	11-30	21A144	31-24
21A031	9-44	21A069	43-38	21A107	15-30	21A145	35-24
21A032	15-44	21A070	47-38	21A108	19-30	21A146	39-24
21A033	19-44	21A071	11-36	21A109	23-30	21A147	43-24
21A034	23-44	21A072	15-36	21A110	27-30	21A148	47-24
21A035	27-44	21A073	19-36	21A111	33-30	21A149	11-22
21A036	33-44	21A074	23-36	21A112	37-30	21A150	15-22
21A037	37-44	21A075	27-36	21A113	41-30	21A151	19-22
21A038	41-44	21A076	33-36	21A114	45-30	21A152	23-22

Table C.1 Browns Ferry Equilibrium Cycle Reload Fuel Identification and Locations (Core Coordinates) *(Continued)*

Assembly Type: ATRIUM 10XM
Bundle Description: [ ]
Number Loaded: 208

Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.
21A153	27-22	21A167	43-20	21A181	21-16	21A195	41-14
21A154	33-22	21A168	47-20	21A182	25-16	21A196	45-14
21A155	37-22	21A169	9-18	21A183	29-16	21A197	21-12
21A156	41-22	21A170	15-18	21A184	31-16	21A198	25-12
21A157	45-22	21A171	19-18	21A185	35-16	21A199	29-12
21A158	49-22	21A172	23-18	21A186	39-16	21A200	31-12
21A159	13-20	21A173	27-18	21A187	43-16	21A201	35-12
21A160	17-20	21A174	33-18	21A188	47-16	21A202	39-12
21A161	21-20	21A175	37-18	21A189	15-14	21A203	17-10
21A162	25-20	21A176	41-18	21A190	19-14	21A204	27-10
21A163	29-20	21A177	45-18	21A191	23-14	21A205	33-10
21A164	31-20	21A178	51-18	21A192	27-14	21A206	43-10
21A165	35-20	21A179	13-16	21A193	33-14	21A207	29- 8
21A166	39-20	21A180	17-16	21A194	37-14	21A208	31- 8

Table C.1 Browns Ferry Equilibrium Cycle Reload Fuel Identification and Locations (Core Coordinates) *(Continued)*

Assembly Type: ATRIUM 10XM
Bundle Description: [ ]
Number Loaded: 92

Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.
21B001	19-56	21B024	13-48	21B047	5-28	21B070	49-14
21B002	23-56	21B025	47-48	21B048	55-28	21B071	13-12
21B003	27-56	21B026	49-48	21B049	7-26	21B072	17-12
21B004	33-56	21B027	9-46	21B050	53-26	21B073	43-12
21B005	37-56	21B028	51-46	21B051	5-24	21B074	47-12
21B006	41-56	21B029	7-44	21B052	7-24	21B075	15-10
21B007	17-54	21B030	11-44	21B053	53-24	21B076	19-10
21B008	23-54	21B031	49-44	21B054	55-24	21B077	21-10
21B009	25-54	21B032	53-44	21B055	9-22	21B078	39-10
21B010	35-54	21B033	5-42	21B056	51-22	21B079	41-10
21B011	37-54	21B034	9-42	21B057	5-20	21B080	45-10
21B012	43-54	21B035	51-42	21B058	9-20	21B081	17- 8
21B013	15-52	21B036	55-42	21B059	51-20	21B082	23- 8
21B014	19-52	21B037	9-40	21B060	55-20	21B083	25- 8
21B015	21-52	21B038	51-40	21B061	7-18	21B084	35- 8
21B016	39-52	21B039	5-38	21B062	11-18	21B085	37- 8
21B017	41-52	21B040	7-38	21B063	49-18	21B086	43- 8
21B018	45-52	21B041	53-38	21B064	53-18	21B087	19- 6
21B019	13-50	21B042	55-38	21B065	9-16	21B088	23- 6
21B020	17-50	21B043	7-36	21B066	51-16	21B089	27- 6
21B021	43-50	21B044	53-36	21B067	11-14	21B090	33- 6
21B022	47-50	21B045	5-34	21B068	13-14	21B091	37- 6
21B023	11-48	21B046	55-34	21B069	47-14	21B092	41- 6

Table C.1 Browns Ferry Equilibrium Cycle Reload Fuel Identification and Locations (Core Coordinates) *(Continued)*

Assembly Type: ATRIUM 10XM
Bundle Description: [ ]
Number Loaded: 32

Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.	Fuel ID	Core Coord.
21C001	19-54	21C009	9-48	21C017	7-28	21C025	13-10
21C002	27-54	21C010	51-48	21C018	53-28	21C026	23-10
21C003	33-54	21C011	7-42	21C019	9-24	21C027	37-10
21C004	41-54	21C012	53-42	21C020	51-24	21C028	47-10
21C005	13-52	21C013	9-38	21C021	7-20	21C029	19- 8
21C006	23-52	21C014	51-38	21C022	53-20	21C030	27- 8
21C007	37-52	21C015	7-34	21C023	9-14	21C031	33- 8
21C008	47-52	21C016	53-34	21C024	51-14	21C032	41- 8

Appendix D Browns Ferry Equilibrium Cycle Radial Exposure and Power Distributions

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
60									40.750	36.840	36.746	36.885	36.801	36.158	36.042
58								38.158	34.498	23.826	22.934	20.923	21.500	21.325	19.116
56						38.741	37.306	23.257	22.085	0.000	22.176	0.000	24.128	0.000	23.008
54						37.911	24.098	19.149	0.000	0.000	23.529	0.000	0.000	0.000	0.000
52					41.378	24.692	0.000	0.000	0.000	0.000	0.000	0.000	25.194	0.000	24.651
50			38.371	37.880	24.292	23.922	0.000	23.807	0.000	24.806	0.000	23.994	0.000	23.937	0.000
48			36.938	23.990	0.000	0.000	0.000	0.000	24.679	0.000	25.024	0.000	24.495	0.000	23.645
46		38.021	23.039	18.940	0.000	24.174	0.000	23.561	0.000	23.799	0.000	25.372	0.000	22.942	0.000
44	40.507	34.483	21.966	0.000	0.000	0.000	24.636	0.000	22.091	0.000	24.803	0.000	24.615	0.000	25.126
42	36.416	23.478	0.000	0.000	0.000	25.029	0.000	24.228	0.000	22.089	0.000	24.623	0.000	24.703	0.000
40	36.912	23.362	22.137	23.796	0.000	0.000	24.849	0.000	24.186	0.000	23.537	0.000	23.740	0.000	24.598
38	36.613	20.726	0.000	0.000	0.000	23.995	0.000	25.393	0.000	24.531	0.000	23.072	0.000	24.980	0.000
36	37.040	21.544	24.139	0.000	24.124	0.000	24.738	0.000	25.039	0.000	23.853	0.000	25.042	0.000	24.471
34	36.146	21.132	0.000	0.000	0.000	23.875	0.000	23.395	0.000	24.957	0.000	24.022	0.000	25.121	0.000
32	35.756	19.067	23.054	0.000	24.973	0.000	25.170	0.000	25.064	0.000	24.123	0.000	25.418	0.000	25.162
30	35.791	19.056	22.999	0.000	24.930	0.000	25.122	0.000	25.059	0.000	24.128	0.000	25.418	0.000	25.116
28	36.425	21.136	0.000	0.000	0.000	23.884	0.000	23.397	0.000	24.933	0.000	24.021	0.000	25.028	0.000
26	36.912	21.552	24.140	0.000	24.123	0.000	24.736	0.000	25.038	0.000	23.857	0.000	24.177	0.000	24.468
24	36.631	20.742	0.000	0.000	0.000	23.977	0.000	25.378	0.000	24.557	0.000	23.062	0.000	24.979	0.000
22	36.816	23.355	22.129	23.797	0.000	0.000	24.844	0.000	24.765	0.000	23.563	0.000	23.738	0.000	24.555
20	36.461	23.485	0.000	0.000	0.000	25.029	0.000	24.196	0.000	22.104	0.000	24.646	0.000	24.667	0.000
18	40.517	34.491	21.959	0.000	0.000	0.000	24.628	0.000	22.097	0.000	25.161	0.000	24.610	0.000	25.118
16		38.014	23.037	18.965	0.000	24.160	0.000	23.547	0.000	23.783	0.000	25.362	0.000	22.831	0.000
14			37.326	23.995	0.000	0.000	0.000	0.000	24.671	0.000	25.022	0.000	24.486	0.000	23.638
12			38.362	38.127	24.292	23.914	0.000	23.780	0.000	24.803	0.000	23.982	0.000	23.948	0.000
10					41.422	24.695	0.000	0.000	0.000	0.000	0.000	0.000	25.196	0.000	24.618
8						38.146	24.096	19.169	0.000	0.000	23.533	0.000	0.000	0.000	0.000
6						38.740	37.036	23.258	22.084	0.000	22.171	0.000	24.131	0.000	23.078
4								38.157	34.483	23.825	22.811	20.922	21.494	21.334	19.114
2									40.752	36.867	36.928	36.907	37.026	36.433	36.034

Figure D.1 Browns Ferry Equilibrium Cycle BOC Exposure Distribution (GWd/MTU)

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60	36.104	36.178	37.068	36.923	36.934	36.907	40.756								
58	19.105	21.338	21.545	20.964	22.791	23.860	34.485	38.193							
56	23.110	0.000	23.136	0.000	22.155	0.000	22.076	23.253	36.935	38.732					
54	0.000	0.000	0.000	0.000	23.539	0.000	0.000	19.184	24.144	37.903					
52	24.579	0.000	25.205	0.000	0.000	0.000	0.000	0.000	0.000	24.694	41.379				
50	0.000	23.948	0.000	23.980	0.000	24.821	0.000	23.771	0.000	23.885	24.291	37.915	38.358		
48	23.607	0.000	24.487	0.000	25.005	0.000	24.637	0.000	0.000	0.000	0.000	24.061	37.298		
46	0.000	22.822	0.000	25.321	0.000	23.774	0.000	23.907	0.000	24.152	0.000	18.977	23.031	38.080	
44	25.126	0.000	24.605	0.000	24.727	0.000	22.407	0.000	24.594	0.000	0.000	0.000	21.953	34.485	40.525
42	0.000	24.626	0.000	24.633	0.000	22.398	0.000	24.165	0.000	25.072	0.000	0.000	0.000	23.529	36.506
40	24.529	0.000	23.775	0.000	23.889	0.000	25.162	0.000	24.828	0.000	0.000	23.853	22.115	23.330	36.913
38	0.000	24.997	0.000	23.116	0.000	24.540	0.000	25.335	0.000	23.975	0.000	0.000	0.000	20.795	36.641
36	24.474	0.000	24.180	0.000	23.923	0.000	25.040	0.000	24.749	0.000	24.135	0.000	23.134	21.633	36.763
34	0.000	25.008	0.000	24.046	0.000	24.888	0.000	23.387	0.000	23.876	0.000	0.000	0.000	21.135	36.173
32	25.100	0.000	25.452	0.000	24.099	0.000	25.079	0.000	25.068	0.000	24.872	0.000	22.986	19.053	35.880
30	25.172	0.000	25.451	0.000	24.083	0.000	25.085	0.000	25.105	0.000	24.927	0.000	23.110	19.049	35.850
28	0.000	25.114	0.000	24.043	0.000	24.883	0.000	23.383	0.000	23.865	0.000	0.000	0.000	21.122	36.422
26	24.474	0.000	25.022	0.000	23.915	0.000	25.041	0.000	24.752	0.000	24.131	0.000	23.109	21.621	37.000
24	0.000	25.005	0.000	23.107	0.000	24.508	0.000	25.359	0.000	23.992	0.000	0.000	0.000	20.782	36.604
22	24.559	0.000	23.786	0.000	24.770	0.000	24.183	0.000	24.834	0.000	0.000	23.849	22.115	23.330	36.909
20	0.000	24.632	0.000	24.607	0.000	22.415	0.000	24.202	0.000	25.071	0.000	0.000	0.000	23.524	36.464
18	25.138	0.000	24.622	0.000	23.832	0.000	22.407	0.000	24.604	0.000	0.000	0.000	21.949	34.522	40.511
16	0.000	22.944	0.000	25.344	0.000	23.813	0.000	23.822	0.000	24.168	0.000	18.946	23.029	38.069	
14	23.606	0.000	24.501	0.000	25.007	0.000	24.643	0.000	0.000	0.000	0.000	24.054	37.041		
12	0.000	23.931	0.000	24.004	0.000	24.829	0.000	23.813	0.000	23.889	24.289	38.118	38.356		
10	24.630	0.000	25.209	0.000	0.000	0.000	0.000	0.000	0.000	24.695	41.410				
8	0.000	0.000	0.000	0.000	23.549	0.000	0.000	19.159	24.154	38.148					
6	23.015	0.000	23.111	0.000	22.154	0.000	22.070	23.249	37.325	38.732					
4	19.099	21.326	21.562	20.966	22.915	23.865	34.527	38.190							
2	36.107	36.443	36.961	36.887	36.947	36.882	40.749								

Figure D.1 Browns Ferry Equilibrium Cycle BOC Exposure Distribution (GWd/MTU) *(Continued)*

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
60									46.048	43.442	44.267	44.850	45.008	44.410	44.461
58								45.482	43.906	36.840	37.068	36.043	36.928	36.916	34.489
56						43.890	45.604	36.426	38.129	19.163	40.753	20.937	43.088	21.514	42.297
54						46.437	38.158	36.888	21.338	22.410	44.412	23.837	24.110	23.753	23.543
52					50.085	38.743	19.129	22.097	23.267	24.699	25.198	24.984	47.643	24.817	46.322
50			43.529	46.400	38.376	41.424	22.188	45.056	25.030	47.134	25.151	46.622	25.125	46.408	24.482
48			45.258	38.023	19.080	22.150	23.932	24.686	47.075	25.107	46.802	23.957	46.292	24.498	46.190
46		45.338	36.182	36.619	21.979	45.290	24.643	46.249	25.370	46.299	23.762	46.296	23.797	44.738	24.621
44	45.790	43.835	37.909	21.147	23.050	24.855	46.979	25.390	44.372	24.644	45.749	22.998	45.153	22.944	46.117
42	42.999	36.421	18.955	22.103	24.302	47.053	25.029	46.808	24.963	44.114	23.644	45.421	22.934	45.161	23.117
40	44.335	37.331	40.512	44.285	24.133	24.178	46.586	24.189	46.706	25.165	45.972	24.701	45.117	23.883	45.107
38	44.546	35.760	20.741	23.491	24.030	45.897	23.958	46.723	24.787	46.692	24.954	45.559	24.586	46.145	23.058
36	45.175	36.914	43.035	24.003	46.673	25.064	46.607	24.162	45.978	23.359	44.973	24.113	47.010	24.602	45.852
34	44.399	36.752	21.559	23.867	25.040	46.568	24.741	45.434	23.394	45.649	23.538	44.967	24.511	46.960	23.923
32	44.223	34.496	42.435	23.809	47.324	25.427	47.683	25.041	46.945	24.117	44.924	23.016	46.519	23.861	46.956
30	44.255	34.488	42.389	23.811	47.287	25.427	47.638	25.040	46.942	24.117	44.933	23.021	46.529	23.870	46.882
28	44.660	36.768	21.567	23.870	25.039	46.574	24.738	45.430	23.395	45.632	23.540	44.983	24.537	46.905	23.934
26	45.091	36.935	43.045	24.009	46.669	25.059	46.598	24.148	45.965	23.351	44.968	24.118	46.377	24.625	45.855
24	44.581	35.795	20.757	23.499	24.029	45.875	23.940	46.684	24.748	46.681	24.929	45.535	24.543	46.114	23.052
22	44.296	37.351	40.522	44.292	24.131	24.169	46.564	24.156	47.051	25.117	45.965	24.666	45.051	23.808	45.060
20	43.061	36.466	18.981	22.111	24.302	47.045	25.015	46.758	24.921	44.085	23.637	45.429	22.811	45.027	23.092
18	45.803	43.898	37.920	21.151	23.049	24.851	46.965	25.376	44.352	24.611	46.111	22.989	45.055	22.833	46.091
16		45.326	36.177	36.637	21.972	45.276	24.635	46.229	25.360	46.271	23.747	46.271	23.770	44.626	24.615
14			45.604	38.016	19.070	22.142	23.925	24.678	47.064	25.103	46.790	23.946	46.274	24.489	46.177
12			43.507	46.615	38.367	41.412	22.183	45.031	25.027	47.129	25.150	46.606	25.117	46.413	24.480
10					50.120	38.742	19.127	22.097	23.268	24.702	25.201	24.984	47.641	24.814	46.291
8						46.653	38.157	36.910	21.347	22.419	44.420	23.837	24.108	23.751	23.547
6						43.888	45.349	36.434	38.149	19.183	40.755	20.935	43.086	21.509	42.359
4								45.483	43.948	36.868	36.962	36.035	36.909	36.915	34.488
2									46.051	43.482	44.420	44.865	45.183	44.645	44.451

Figure D.2 Browns Ferry Equilibrium Cycle EOC Exposure Distribution (19.8 GWd/MTU)

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60	44.519	44.427	45.244	44.896	44.436	43.525	46.058								
58	34.487	36.950	36.999	36.104	36.964	36.907	43.955	45.529							
56	42.392	21.559	42.326	20.977	40.758	19.197	38.151	36.444	45.276	43.872					
54	23.554	23.788	24.156	23.871	44.438	22.426	21.350	36.926	38.192	46.419					
52	46.264	24.832	47.667	25.000	25.208	24.700	23.262	22.087	19.117	38.733	50.083				
50	24.485	46.420	25.125	46.611	25.150	47.136	25.010	45.005	22.166	41.380	38.363	46.429	43.517		
48	46.150	24.490	46.277	23.943	46.769	25.085	47.007	24.642	23.894	22.127	19.066	38.081	45.568		
46	24.610	44.614	23.760	46.227	23.736	46.240	25.318	46.448	24.600	45.250	21.965	36.647	36.162	45.374	
44	46.094	22.824	45.038	22.975	45.660	24.571	44.573	25.332	46.907	24.833	23.042	21.149	37.916	43.889	45.809
42	23.090	44.980	22.791	45.393	23.605	44.290	24.862	46.696	24.995	47.073	24.299	22.117	18.992	36.510	43.107
40	45.033	23.798	45.063	24.625	46.149	25.062	47.397	24.125	46.540	24.171	24.141	44.356	40.529	37.348	44.396
38	23.049	46.119	24.517	45.545	24.884	46.629	24.710	46.629	23.938	45.883	24.052	23.541	20.808	35.883	44.613
36	45.860	24.613	46.363	24.089	45.001	23.326	45.951	24.139	46.616	25.078	46.710	24.073	42.289	37.069	44.989
34	23.934	46.880	24.520	44.988	23.523	45.577	23.385	45.421	24.751	46.591	25.081	23.935	21.646	36.821	44.462
32	46.868	23.863	46.548	23.006	44.895	24.108	46.953	25.041	47.605	25.459	47.274	23.866	42.427	34.531	44.369
30	46.961	23.851	46.535	22.997	44.877	24.105	46.959	25.042	47.638	25.459	47.320	23.862	42.533	34.527	44.350
28	23.917	46.943	24.488	44.965	23.513	45.567	23.380	45.422	24.753	46.581	25.080	23.927	21.634	36.806	44.699
26	45.849	24.586	46.967	24.072	44.988	23.326	45.959	24.155	46.624	25.084	46.707	24.065	42.256	37.040	45.155
24	23.053	46.148	24.547	45.529	24.880	46.620	24.753	46.678	23.954	45.901	24.049	23.535	20.796	35.853	44.555
22	45.067	23.864	45.129	24.631	46.899	25.099	46.665	24.161	46.563	24.173	24.138	44.345	40.515	37.322	44.341
20	23.115	45.089	22.914	45.383	23.605	44.348	24.916	46.756	25.008	47.078	24.297	22.103	18.960	36.468	43.048
18	46.128	22.946	45.159	23.004	44.915	24.622	44.608	25.356	46.926	24.839	23.039	21.136	37.885	43.864	45.792
16	24.627	44.744	23.802	46.283	23.775	46.304	25.341	46.394	24.610	45.266	21.961	36.609	36.150	45.363	
14	46.160	24.504	46.303	23.966	46.791	25.100	47.022	24.649	23.898	22.126	19.061	38.070	45.322		
12	24.486	46.412	25.137	46.641	25.159	47.151	25.012	45.041	22.165	41.379	38.361	46.616	43.511		
10	46.312	24.840	47.681	25.008	25.213	24.701	23.259	22.081	19.111	38.733	50.109				
8	23.564	23.799	24.165	23.876	44.448	22.418	21.338	36.889	38.188	46.645					
6	42.327	21.576	42.314	20.979	40.751	19.173	38.120	36.423	45.622	43.859					
4	34.501	36.964	37.025	36.107	37.062	36.882	43.936	45.521							
2	44.542	44.706	45.167	44.864	44.461	43.484	46.048								

Figure D.2 Browns Ferry Equilibrium Cycle EOC Exposure Distribution (19.8 GWd/MTU) *(Continued)*

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
60									0.322	0.395	0.456	0.488	0.508	0.521	0.535
58								0.428	0.542	0.737	0.819	0.870	0.897	0.915	0.933
56						0.294	0.473	0.727	0.854	0.947	1.005	1.054	1.049	1.103	1.102
54						0.467	0.748	0.919	0.995	1.041	1.079	1.135	1.164	1.168	1.169
52					0.493	0.744	0.907	1.022	1.040	1.106	1.138	1.159	1.166	1.206	1.218
50			0.296	0.468	0.747	0.902	1.028	1.069	1.133	1.090	1.088	1.122	1.185	1.228	1.257
48			0.478	0.750	0.907	1.028	1.094	1.122	1.128	1.101	0.866	0.893	1.158	1.242	1.275
46		0.431	0.730	0.921	1.021	1.065	1.121	1.157	1.169	1.130	0.894	0.889	1.168	1.245	1.260
44	0.323	0.543	0.855	0.995	1.039	1.131	1.126	1.168	1.181	1.184	1.145	1.162	1.189	1.224	1.211
42	0.397	0.739	0.946	1.040	1.104	1.086	1.099	1.125	1.184	1.209	1.226	1.211	1.219	1.174	1.140
40	0.453	0.814	1.003	1.075	1.136	1.086	0.866	0.893	1.155	1.227	1.248	1.249	1.196	1.141	0.823
38	0.488	0.869	1.052	1.134	1.157	1.120	0.891	0.887	1.160	1.211	1.249	1.250	1.216	1.110	0.839
36	0.504	0.895	1.047	1.162	1.175	1.181	1.150	1.161	1.180	1.216	1.195	1.217	1.192	1.186	1.146
34	0.520	0.914	1.100	1.164	1.201	1.221	1.230	1.230	1.216	1.167	1.140	1.122	1.185	1.195	1.220
32	0.536	0.932	1.098	1.163	1.207	1.245	1.239	1.244	1.202	1.134	0.826	0.839	1.131	1.217	1.247
30	0.535	0.932	1.099	1.164	1.208	1.245	1.239	1.244	1.202	1.134	0.827	0.839	1.132	1.218	1.245
28	0.519	0.915	1.100	1.165	1.201	1.221	1.230	1.229	1.215	1.167	1.141	1.124	1.187	1.198	1.221
26	0.507	0.896	1.048	1.163	1.175	1.181	1.149	1.160	1.178	1.215	1.195	1.218	1.207	1.188	1.147
24	0.489	0.870	1.053	1.134	1.157	1.120	0.890	0.886	1.158	1.209	1.248	1.251	1.218	1.112	0.840
22	0.456	0.816	1.005	1.076	1.136	1.086	0.865	0.892	1.143	1.225	1.247	1.249	1.197	1.142	0.824
20	0.399	0.741	0.948	1.041	1.104	1.086	1.099	1.124	1.182	1.207	1.225	1.210	1.219	1.175	1.140
18	0.324	0.547	0.857	0.996	1.039	1.131	1.126	1.168	1.180	1.183	1.143	1.161	1.189	1.225	1.211
16		0.431	0.730	0.921	1.021	1.065	1.121	1.157	1.169	1.129	0.894	0.889	1.169	1.246	1.260
14			0.475	0.749	0.907	1.027	1.093	1.121	1.128	1.101	0.866	0.893	1.158	1.242	1.275
12			0.295	0.467	0.747	0.902	1.028	1.069	1.133	1.090	1.088	1.123	1.185	1.228	1.257
10					0.493	0.744	0.907	1.022	1.041	1.106	1.138	1.159	1.166	1.206	1.218
8						0.466	0.748	0.920	0.996	1.042	1.080	1.135	1.164	1.167	1.169
6						0.294	0.475	0.728	0.855	0.948	1.005	1.054	1.048	1.102	1.101
4								0.428	0.545	0.739	0.819	0.870	0.896	0.915	0.933
2									0.322	0.396	0.454	0.488	0.505	0.518	0.535

Figure D.3 Browns Ferry Equilibrium Cycle Radial Power Distribution at 0.0 MWd/MTU

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60	0.534	0.521	0.506	0.489	0.455	0.396	0.322								
58	0.934	0.916	0.899	0.871	0.821	0.739	0.546	0.429							
56	1.101	1.105	1.062	1.056	1.007	0.949	0.856	0.729	0.476	0.293					
54	1.170	1.170	1.167	1.137	1.081	1.042	0.996	0.920	0.748	0.467					
52	1.219	1.207	1.167	1.160	1.138	1.106	1.040	1.022	0.907	0.744	0.493				
50	1.257	1.229	1.185	1.123	1.088	1.090	1.132	1.068	1.027	0.902	0.747	0.468	0.296		
48	1.275	1.242	1.158	0.893	0.866	1.100	1.126	1.119	1.092	1.027	0.907	0.749	0.474		
46	1.260	1.246	1.168	0.889	0.893	1.128	1.167	1.149	1.119	1.064	1.021	0.921	0.730	0.430	
44	1.211	1.224	1.188	1.160	1.143	1.181	1.175	1.165	1.125	1.130	1.039	0.996	0.857	0.546	0.324
42	1.140	1.174	1.218	1.209	1.223	1.201	1.179	1.122	1.097	1.085	1.104	1.041	0.949	0.741	0.399
40	0.824	1.141	1.195	1.247	1.239	1.221	1.139	0.891	0.865	1.086	1.137	1.077	1.006	0.818	0.457
38	0.840	1.111	1.217	1.248	1.246	1.207	1.155	0.885	0.890	1.121	1.159	1.137	1.056	0.873	0.491
36	1.147	1.188	1.206	1.217	1.193	1.214	1.177	1.160	1.150	1.182	1.178	1.167	1.062	0.899	0.510
34	1.221	1.198	1.186	1.122	1.139	1.167	1.215	1.229	1.231	1.223	1.204	1.169	1.105	0.919	0.522
32	1.245	1.218	1.131	0.838	0.826	1.133	1.201	1.244	1.240	1.247	1.211	1.167	1.103	0.935	0.537
30	1.246	1.217	1.130	0.838	0.826	1.133	1.202	1.244	1.240	1.247	1.210	1.167	1.101	0.936	0.538
28	1.220	1.194	1.184	1.120	1.138	1.167	1.215	1.230	1.231	1.222	1.203	1.168	1.104	0.918	0.521
26	1.145	1.184	1.191	1.214	1.192	1.214	1.178	1.161	1.150	1.182	1.177	1.166	1.061	0.898	0.506
24	0.839	1.108	1.214	1.245	1.244	1.208	1.157	0.887	0.890	1.121	1.159	1.136	1.055	0.871	0.490
22	0.823	1.140	1.194	1.245	1.230	1.223	1.152	0.892	0.866	1.086	1.136	1.076	1.005	0.816	0.454
20	1.140	1.174	1.218	1.209	1.224	1.203	1.181	1.123	1.098	1.085	1.104	1.040	0.947	0.739	0.397
18	1.211	1.224	1.189	1.162	1.153	1.183	1.176	1.166	1.125	1.130	1.039	0.995	0.855	0.543	0.323
16	1.260	1.245	1.168	0.889	0.894	1.129	1.168	1.151	1.119	1.064	1.021	0.920	0.729	0.430	
14	1.275	1.242	1.158	0.893	0.866	1.101	1.126	1.120	1.092	1.027	0.907	0.749	0.475		
12	1.257	1.229	1.185	1.123	1.089	1.090	1.132	1.067	1.027	0.901	0.746	0.467	0.295		
10	1.219	1.207	1.167	1.160	1.139	1.106	1.040	1.021	0.906	0.744	0.493				
8	1.170	1.170	1.168	1.138	1.080	1.042	0.996	0.919	0.746	0.466					
6	1.104	1.106	1.063	1.056	1.006	0.947	0.854	0.727	0.473	0.292					
4	0.935	0.918	0.900	0.871	0.820	0.737	0.542	0.429							
2	0.536	0.521	0.508	0.489	0.455	0.395	0.322								

Figure D.3 Browns Ferry Equilibrium Cycle Radial Power Distribution at 0.0 MWd/MTU *(Continued)*

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29
60									0.216	0.272	0.307	0.324	0.332	0.334	0.334
58								0.308	0.409	0.566	0.609	0.650	0.659	0.665	0.650
56						0.221	0.361	0.590	0.733	0.945	0.840	1.017	0.861	1.040	0.862
54						0.381	0.644	0.825	1.085	1.138	0.984	1.185	1.196	1.183	1.190
52					0.381	0.648	0.981	1.128	1.214	1.259	1.273	1.251	1.059	1.266	1.056
50			0.224	0.384	0.651	0.828	1.134	1.020	1.265	1.077	1.304	1.090	1.295	1.080	1.302
48			0.366	0.649	0.985	1.136	1.224	1.264	1.068	1.296	1.104	1.331	1.106	1.328	1.102
46		0.313	0.598	0.833	1.133	1.021	1.265	1.075	1.293	1.092	1.335	1.114	1.351	1.134	1.340
44	0.220	0.414	0.742	1.094	1.222	1.271	1.070	1.292	1.092	1.325	1.117	1.363	1.140	1.374	1.128
42	0.277	0.574	0.954	1.150	1.272	1.083	1.297	1.084	1.315	1.104	1.348	1.124	1.371	1.138	1.369
40	0.309	0.614	0.849	0.994	1.295	1.321	1.104	1.321	1.097	1.317	1.106	1.332	1.103	1.349	1.131
38	0.327	0.655	1.024	1.196	1.272	1.103	1.325	1.099	1.320	1.093	1.322	1.109	1.325	1.085	1.349
36	0.331	0.661	0.863	1.200	1.070	1.292	1.095	1.329	1.115	1.348	1.100	1.329	1.086	1.311	1.104
34	0.334	0.665	1.038	1.178	1.255	1.065	1.305	1.110	1.345	1.120	1.344	1.098	1.311	1.075	1.302
32	0.335	0.649	0.857	1.177	1.030	1.266	1.062	1.305	1.095	1.336	1.126	1.344	1.093	1.299	1.048
30	0.335	0.649	0.856	1.177	1.030	1.266	1.062	1.305	1.095	1.336	1.127	1.344	1.093	1.300	1.046
28	0.333	0.666	1.038	1.178	1.255	1.066	1.305	1.109	1.345	1.121	1.345	1.099	1.313	1.078	1.303
26	0.333	0.661	0.864	1.200	1.070	1.292	1.095	1.329	1.115	1.348	1.101	1.332	1.100	1.314	1.105
24	0.328	0.656	1.025	1.196	1.272	1.104	1.325	1.099	1.320	1.093	1.324	1.111	1.329	1.089	1.350
22	0.312	0.615	0.850	0.994	1.295	1.322	1.105	1.320	1.085	1.317	1.107	1.335	1.107	1.352	1.132
20	0.278	0.576	0.955	1.151	1.272	1.084	1.298	1.084	1.315	1.104	1.348	1.125	1.374	1.142	1.370
18	0.220	0.417	0.743	1.095	1.222	1.271	1.070	1.292	1.093	1.325	1.119	1.364	1.143	1.377	1.128
16		0.313	0.598	0.834	1.134	1.021	1.266	1.076	1.294	1.092	1.336	1.115	1.353	1.136	1.340
14			0.365	0.648	0.985	1.136	1.224	1.265	1.069	1.297	1.105	1.332	1.107	1.328	1.102
12			0.224	0.383	0.651	0.828	1.134	1.020	1.265	1.077	1.304	1.090	1.296	1.080	1.302
10					0.381	0.648	0.981	1.128	1.214	1.260	1.274	1.252	1.059	1.266	1.056
8						0.381	0.644	0.826	1.085	1.138	0.984	1.186	1.197	1.183	1.190
6						0.221	0.361	0.590	0.734	0.946	0.840	1.017	0.860	1.040	0.862
4								0.308	0.411	0.567	0.610	0.649	0.658	0.664	0.650
2									0.216	0.273	0.306	0.323	0.330	0.332	0.334

Figure D.4 Browns Ferry Equilibrium Cycle Radial Power Distribution at 18,392.1 MWd/MTU (EOFP)

	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
60	0.334	0.334	0.330	0.324	0.307	0.273	0.216								
58	0.651	0.666	0.660	0.651	0.611	0.568	0.412	0.309							
56	0.862	1.042	0.870	1.019	0.841	0.947	0.735	0.591	0.363	0.221					
54	1.190	1.185	1.198	1.187	0.985	1.139	1.086	0.826	0.644	0.382					
52	1.057	1.267	1.060	1.253	1.275	1.260	1.215	1.128	0.981	0.648	0.382				
50	1.303	1.081	1.297	1.091	1.305	1.078	1.266	1.020	1.134	0.829	0.652	0.384	0.224		
48	1.103	1.329	1.108	1.333	1.106	1.298	1.069	1.264	1.224	1.136	0.985	0.649	0.365		
46	1.340	1.137	1.354	1.116	1.337	1.093	1.294	1.070	1.266	1.021	1.134	0.834	0.598	0.313	
44	1.129	1.378	1.144	1.365	1.118	1.325	1.090	1.292	1.070	1.271	1.223	1.095	0.743	0.417	0.220
42	1.370	1.143	1.375	1.126	1.349	1.102	1.315	1.084	1.298	1.084	1.272	1.151	0.956	0.576	0.278
40	1.133	1.353	1.107	1.335	1.102	1.317	1.087	1.320	1.105	1.322	1.295	0.994	0.850	0.616	0.312
38	1.350	1.089	1.329	1.110	1.324	1.092	1.320	1.099	1.326	1.104	1.273	1.197	1.026	0.657	0.328
36	1.105	1.314	1.100	1.332	1.101	1.349	1.115	1.329	1.096	1.292	1.071	1.201	0.873	0.663	0.335
34	1.303	1.078	1.313	1.099	1.345	1.121	1.346	1.110	1.306	1.066	1.255	1.179	1.040	0.668	0.335
32	1.047	1.300	1.093	1.345	1.127	1.336	1.095	1.305	1.063	1.267	1.031	1.178	0.857	0.650	0.335
30	1.048	1.299	1.092	1.344	1.127	1.336	1.095	1.305	1.062	1.267	1.030	1.178	0.857	0.650	0.336
28	1.302	1.075	1.310	1.097	1.344	1.121	1.345	1.110	1.305	1.066	1.255	1.179	1.040	0.667	0.335
26	1.104	1.311	1.086	1.329	1.099	1.348	1.115	1.329	1.096	1.292	1.071	1.201	0.873	0.663	0.332
24	1.349	1.085	1.324	1.107	1.321	1.092	1.320	1.099	1.326	1.104	1.273	1.197	1.026	0.656	0.328
22	1.131	1.349	1.102	1.331	1.094	1.316	1.096	1.320	1.105	1.322	1.295	0.994	0.850	0.615	0.309
20	1.369	1.139	1.370	1.124	1.348	1.101	1.315	1.084	1.298	1.083	1.272	1.151	0.954	0.574	0.277
18	1.128	1.375	1.140	1.364	1.124	1.325	1.090	1.291	1.070	1.271	1.222	1.094	0.742	0.414	0.220
16	1.340	1.134	1.352	1.115	1.337	1.093	1.293	1.071	1.265	1.021	1.133	0.833	0.597	0.313	
14	1.102	1.328	1.106	1.331	1.105	1.297	1.068	1.264	1.223	1.136	0.984	0.648	0.365		
12	1.302	1.080	1.296	1.090	1.304	1.077	1.265	1.019	1.134	0.828	0.651	0.383	0.224		
10	1.057	1.266	1.059	1.252	1.274	1.260	1.214	1.128	0.981	0.648	0.381				
8	1.190	1.184	1.198	1.186	0.984	1.138	1.085	0.825	0.643	0.381					
6	0.862	1.042	0.870	1.018	0.840	0.945	0.734	0.590	0.361	0.220					
4	0.651	0.666	0.660	0.650	0.609	0.566	0.409	0.308							
2	0.335	0.334	0.332	0.324	0.307	0.272	0.216								

Figure D.4 Browns Ferry Equilibrium Cycle Radial Power Distribution at 18,392.1 MWd/MTU (EOFP) *(Continued)*

Appendix E Browns Ferry Cycle N-1 EOC Projection Control Rod Patterns and Core Average Axial Power and Exposure Distributions

```
Cycle:                              20                    Core Average Exposure: MWd/MTU    34359.9
Exposure: MWd/MTU (GWd)       19211.3 (2657.90 )
Delta E: MWd/MTU, (GWd)         237.6 (  32.87 )                Axial Profile    Edit   Radial Power
Power: MWt                     3651.6 ( 92.40 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia            1038.8                    Top 25  0.328   7.925    10  0.351 0.372   5 48
Inlet Subcooling: Btu/lbm      -29.11                        24  0.877  21.924    11  0.307 0.390  53 50
Flow: Mlb/hr                   107.62 (105.00 %)             23  1.105  28.035    12  0.421 0.426   3 18
                                                             22  1.237  31.264    13  1.027 1.125  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              21  1.313  33.454    14  0.783 1.103  47 40
59             -- -- -- -- -- -- --             59          20  1.359  35.197    15  0.971 1.088  19 42
55          -- -- -- -- -- -- -- -- --          55          19  1.358  36.059    16  1.298 1.354  33 44
51       -- -- -- -- -- -- -- -- -- -- --       51          18  1.359* 37.126    17  1.171 1.316  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- --    47          17  1.333  37.806    18  1.163 1.285  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.294  38.360
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.273  39.385
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.219  39.191
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.307  37.192
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.288  38.219
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.238  38.695
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.184  39.371
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.106  40.109
11       -- -- -- -- -- -- -- -- -- -- --       11           8  0.992  40.454
 7          -- -- -- -- -- -- -- -- --          7           7  0.859  40.741
 3             -- -- -- -- -- -- --             3           6  0.744  41.508*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58              5  0.638  41.274
                                                             4  0.556  39.595
Control Rod Density: %            0.00                       3  0.504  36.232
                                                             2  0.409  27.584
k-effective:                   0.99980                Bottom  1  0.120   8.111
Void Fraction:                   0.315
Core Delta-P: psia              24.694            % AXIAL TILT  18.648  -5.881
Core Plate Delta-P: psia        20.130         AVG BOT 8ft/12ft  0.8956  1.0354
Coolant Temp: Deg-F             544.1
In Channel Flow: Mlb/hr          95.85   Active Channel Flow: Mlb/hr        92.89
Total Bypass Flow (%):           10.9   (of total core flow)
Total Water Rod Flow (%):         2.8   (of total core flow)
Source Convergence            0.00006
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.354	16	33	44	1.744	0.820	16	33	18	7.03	0.743	49.0	14	47	22	18	7.71	0.799	55.8	14	47	40	18
1.347	16	35	42	1.750	0.817	16	25	42	7.01	0.739	48.8	13	49	24	18	7.57	0.792	56.5	14	39	48	18
1.343	16	37	18	1.751	0.817	16	49	40	6.96	0.737	49.2	14	39	14	18	7.68	0.787	54.9	13	49	42	18
1.342	16	31	42	1.752	0.816	16	31	42	6.93	0.736	49.5	13	47	26	18	7.58	0.785	55.7	13	49	24	18
1.335	16	35	46	1.758	0.813	16	23	18	6.94	0.734	49.1	13	49	42	18	7.67	0.785	54.8	14	9	26	18
1.331	16	49	40	1.762	0.811	16	25	16	6.84	0.733	50.3	13	15	42	18	7.52	0.784	56.2	13	47	26	18
1.325	16	21	42	1.768	0.809	16	17	34	6.86	0.732	50.0	13	15	38	18	7.43	0.782	57.0	13	15	42	18
1.324	16	17	34	1.769	0.809	17	9	40	6.87	0.730	49.5	13	37	12	18	7.40	0.781	57.2	13	49	34	18
1.324	16	39	16	1.771	0.807	16	41	26	6.92	0.729	48.7	13	15	34	18	7.61	0.781	54.9	13	41	50	18
1.323	16	37	48	1.775	0.806	16	39	16	6.89	0.728	49.0	13	13	18	18	7.42	0.778	56.7	13	15	24	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure E.1 Browns Ferry Cycle N-1 Control Rod Pattern and Axial Distributions at 19,211.3 MWd/MTU (Short Window)

```
Cycle:                          20                     Core Average Exposure: MWd/MTU    34959.8
Exposure: MWd/MTU (GWd)     19811.1 (2740.90 )
Delta E: MWd/MTU, (GWd)       317.0 (  43.86 )             Axial Profile    Edit   Radial Power
Power: MWt                   3141.8 ( 79.50 %)        N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia          1029.0                  Top 25  0.354   8.141    10  0.350 0.372   5 48
Inlet Subcooling: Btu/lbm    -24.54                      24  0.956  22.512    11  0.306 0.392  53 50
Flow: Mlb/hr                 107.62 (105.00 %)           23  1.204  28.776    12  0.420 0.425   3 18
                                                         22  1.341  32.098    13  1.024 1.116  35 44
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58          21  1.407  34.334    14  0.786 1.104  47 40
59             -- -- -- -- -- -- -- --          59       20  1.440* 36.102    15  0.962 1.083  17 18
55          -- -- -- -- -- -- -- -- -- --       55       19  1.419  36.957    16  1.293 1.345  33 44
51       -- -- -- -- -- -- -- -- -- -- -- --    51       18  1.404  38.020    17  1.187 1.334  51 40
47    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 47       17  1.360  38.678    18  1.175 1.297  51 38
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43       16  1.306  39.201
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39       15  1.276  40.211
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35       14  1.213  39.979
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31       13  1.300  37.923
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27       12  1.277  38.938
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23       11  1.214  39.383
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19       10  1.145  40.024
15    -- -- -- -- -- -- -- -- -- -- -- -- -- -- 15        9  1.049  40.714
11       -- -- -- -- -- -- -- -- -- -- -- --    11        8  0.921  40.992
 7          -- -- -- -- -- -- -- -- -- --        7        7  0.782  41.201
 3             -- -- -- -- -- -- -- --           3        6  0.666  41.904*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58           5  0.564  41.611
                                                          4  0.490  39.889
Control Rod Density: %         0.00                       3  0.444  36.498
                                                          2  0.362  27.800
k-effective:                0.99996               Bottom  1  0.107   8.177
Void Fraction:                0.284
Core Delta-P: psia           24.041           % AXIAL TILT  23.873  -5.297
Core Plate Delta-P: psia     19.488        AVG BOT 8ft/12ft  0.8592  1.0322
Coolant Temp: Deg-F           543.5
In Channel Flow: Mlb/hr       96.24   Active Channel Flow: Mlb/hr        93.42
Total Bypass Flow (%):         10.6   (of total core flow)
Total Water Rod Flow (%):       2.6   (of total core flow)
Source Convergence          0.00010
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR							LHGR						
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.345	16	33	44	1.986	0.720	16	49	40	6.25	0.667	50.0	14	47	22	18	6.90	0.725	56.8	14	47	40	18
1.342	16	49	40	1.999	0.715	17	9	40	6.24	0.667	50.1	13	49	42	18	6.92	0.719	56.0	13	49	42	18
1.336	16	35	42	2.017	0.709	16	33	18	6.25	0.666	49.8	13	49	24	18	6.77	0.717	57.5	14	39	48	18
1.334	16	37	44	2.027	0.706	16	39	50	6.31	0.662	48.5	13	47	36	20	6.90	0.715	55.8	14	9	26	18
1.334	17	51	40	2.027	0.705	17	9	42	6.18	0.662	50.2	14	39	14	18	6.85	0.711	56.0	13	41	50	18
1.331	16	31	42	2.028	0.705	16	25	42	6.26	0.661	49.1	13	49	34	20	6.78	0.711	56.7	13	49	24	18
1.329	16	35	46	2.030	0.705	16	31	42	6.44	0.660	46.3	14	51	36	20	6.87	0.710	55.5	13	49	34	20
1.321	16	37	48	2.032	0.704	16	47	24	6.18	0.660	50.1	13	41	50	18	6.75	0.707	56.7	14	25	10	18
1.319	16	39	16	2.035	0.703	16	25	16	6.16	0.659	50.1	13	47	32	20	6.89	0.707	54.9	13	47	26	20
1.319	17	9	20	2.035	0.703	16	23	18	6.30	0.659	48.1	13	15	16	20	6.79	0.707	56.1	13	47	18	18

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure E.2 Browns Ferry Cycle N-1 Control Rod Pattern and Axial Distributions at 19,811.1 MWd/MTU (Nominal Window)

```
Cycle:                              20                    Core Average Exposure: MWd/MTU    35359.7
Exposure: MWd/MTU (GWd)        20211.0 (2796.20 )
Delta E: MWd/MTU, (GWd)          399.9 (  55.33 )                 Axial Profile    Edit   Radial Power
Power: MWt                      2845.4 ( 72.00 %)          N(PRA) Power Exposure  Zone  Avg.  Max.  IR JR
Core Pressure: psia             1023.2                    Top 25  0.372   8.295    10  0.350 0.373   5 48
Inlet Subcooling: Btu/lbm       -21.91                        24  1.009  22.932    11  0.306 0.393  53 50
Flow: Mlb/hr                    107.62 (105.00 %)             23  1.269  29.305    12  0.420 0.425   3 18
                                                              22  1.409  32.692    13  1.021 1.112  11 20
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               21  1.467  34.954    14  0.788 1.104  47 40
59              -- -- -- -- -- -- --              59          20  1.489* 36.734    15  0.956 1.081  17 18
55          -- -- -- -- -- -- -- -- -- --         55          19  1.454  37.577    16  1.290 1.349  49 40
51       -- -- -- -- -- -- -- -- -- -- -- --      51          18  1.426  38.631    17  1.198 1.345   9 22
47    -- -- -- -- -- -- -- -- -- -- -- -- -- --   47          17  1.371  39.268    18  1.184 1.304   9 24
43 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 43          16  1.306  39.765
39 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 39          15  1.269  40.760
35 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 35          14  1.203  40.500
31 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 31          13  1.288  38.406
27 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 27          12  1.259  39.412
23 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 23          11  1.189  39.832
19 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- 19          10  1.112  40.447
15    -- -- -- -- -- -- -- -- -- -- -- -- --    15           9  1.009  41.099
11       -- -- -- -- -- -- -- -- -- -- --       11           8  0.877  41.328
 7          -- -- -- -- -- -- -- -- --           7           7  0.738  41.486
 3             -- -- -- -- -- -- --              3           6  0.626  42.145*
    2  6 10 14 18 22 26 30 34 38 42 46 50 54 58               5  0.530  41.816
                                                              4  0.461  40.067
Control Rod Density: %             0.00                       3  0.420  36.660
                                                              2  0.344  27.932
k-effective:                    0.99941                Bottom  1  0.102   8.218
Void Fraction:                    0.265
Core Delta-P: psia               23.676            % AXIAL TILT  26.890  -4.871
Core Plate Delta-P: psia         19.129         AVG BOT 8ft/12ft  0.8365  1.0298
Coolant Temp: Deg-F              543.2
In Channel Flow: Mlb/hr          96.46   Active Channel Flow: Mlb/hr        93.72
Total Bypass Flow (%):            10.4   (of total core flow)
Total Water Rod Flow (%):          2.5   (of total core flow)
Source Convergence             0.00007
```

Top Ten Thermal Limits Summary - Sorted by Margin

Power				MCPR					APLHGR						LHGR					
Value	FT	IR	JR	Value	Margin	FT	IR	JR	Value	Margin	Exp.	FT	IR	JR	K	Value	Margin	Exp.	FT	IR	JR	K
1.349	16	49	40	2.138	0.669	16	49	40	6.07	0.631	47.6	13	49	42	20	6.62	0.679	54.9	14	47	40	20
1.345	17	9	22	2.159	0.662	17	9	40	5.95	0.629	49.1	13	49	38	20	6.75	0.679	53.3	13	49	42	20
1.338	16	33	44	2.187	0.654	16	39	50	5.94	0.626	48.9	14	47	40	20	6.77	0.678	53.0	14	9	26	20
1.333	17	9	20	2.190	0.653	17	9	42	6.05	0.625	47.0	14	51	36	20	6.49	0.670	55.4	13	49	24	20
1.328	16	37	44	2.205	0.648	16	47	42	6.01	0.625	47.5	13	13	18	20	6.42	0.670	56.3	13	49	34	20
1.327	16	35	42	2.209	0.647	16	47	24	5.93	0.625	48.8	13	15	16	20	6.65	0.669	53.4	13	41	50	20
1.323	16	39	50	2.212	0.646	16	9	18	5.98	0.622	47.7	13	41	50	20	6.52	0.669	55.0	13	15	16	20
1.323	16	35	46	2.215	0.646	17	49	18	5.85	0.622	49.7	13	49	34	20	6.25	0.669	58.3	14	39	48	18
1.323	16	31	42	2.215	0.646	17	39	10	5.88	0.622	49.2	13	47	36	20	6.64	0.668	53.4	13	47	18	20
1.319	16	37	48	2.215	0.645	16	47	16	5.96	0.620	47.6	13	17	14	20	6.45	0.667	55.7	13	47	26	20

* LHGR calculated with pin-power reconstruction
* CPR calculated with pin-power reconstruction & CPR limit type 3

Figure E.3 Browns Ferry Cycle N-1 Control Rod Pattern and Axial Distributions at 20,211.0 MWd/MTU (Long Window)