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Civilian Radioactive Waste Management System
Management & Operating Contractor

Summary Report of Commercial Reactor Criticality Data for McGuire Unit 1

Revision 01

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New data added. Changes are marked with change bars in the left margin or as otherwise noted (Figures 3-1 through 3-15, Tables 3-3 and 3-4).

Acknowledgments

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1.0 INTRODUCTION

The "Summary Report of Commercial Reactor Criticality Data for McGuire Unit 1" contains the detailed information necessary to perform commercial reactor criticality (CRC) analyses for the McGuire Unit 1 reactor.

1.1 Background

The United States Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM) is developing a methodology for criticality analysis to support disposal of commercial spent nuclear fuel in a geologic repository. A topical report on the disposal criticality analysis methodology is scheduled to be submitted to the United States Nuclear Regulatory Commission (NRC) for formal review in October 1998. This summary report provides data that will be used in analyses that will support the development of parts of the disposal criticality analysis methodology.

1.2 Objective

The objective of this report is to present the data required for performing analytical CRC evaluations for the McGuire Unit 1 reactor. Results from the CRC evaluations will support the development and validation of the neutronics models used for criticality analyses involving commercial spent nuclear fuel. These models and their validation will be discussed in the Disposal Criticality Analysis Methodology Topical Report.

1.3 Scope

The scope of this Summary Report is the presentation of data required to perform 6 statepoint calculations from cycles 1, 6 and 7 of McGuire Unit 1. The only interface for the development of the information in this document is with Framatome Cogema Fuels (FCF). FCF is one of the teammates of the Civilian Radioactive Waste Management System Management and Operating Contractor (M&O). FCF independently requested and received permission from Duke Power Company, the owner/operator of McGuire Unit 1, to publish the information related to statepoint measurements that is recorded in this document. All the information contained in this report is documented in an FCF calculational file (Reference 5). The data provided in Reference 5 was obtained from various other reports, calculations, and drawings developed under an NRC accepted quality assurance program (Reference 1) and the data has supported prior licensing submittals. The data therefore will be considered acceptable for quality affecting activities and for use in analyses affecting procurement, construction, or fabrication.

1.4 Quality Assurance

The Quality Assurance (QA) program applies to the development of this report. The data provided in this report will indirectly be used to develop the methodology for evaluating the Monitored Geologic Repository (MGR) waste package and engineered barrier segment. The QAP-2-3 (*Classification of Permanent Items*) evaluation entitled *Classification of the*

Preliminary MGDS Repository Design (Reference 2, TBV-228) has identified the waste package as an MGR (formerly MGDS) item important to safety, waste isolation, and physical protection of materials. The Waste Package responsible manager has evaluated the technical document development activity in accordance with QAP-2-0, *Conduct of Activities*. The QAP-2-0 activity evaluation, *Develop Technical Documents* (Reference 3), has determined that the preparation and review of this technical document is subject to *Quality Assurance Requirements and Description* (Reference 4) requirements. As specified in NLP-3-18, *Documentation of QA Controls on Drawings, Specifications, Design Analyses, and Technical Documents*, this activity is subject to QA controls. No scientific and engineering software or computational software was used in the development of this report.

2.0 REACTOR DESIGN INFORMATION

This section provides general material and geometry data for modeling the McGuire Unit 1 reactor. Figures 2-1 through 2-20 provide pictorial representations of various components that must be modeled. A horizontal view of the vessel internals is presented in Figure 2-1. This includes the 193 fuel assemblies (FA) in the reactor core region. All dimensions in this figure are measured from the center of the reactor core. A radial view of the fuel assembly layout (along the core flat) and extending through the core liner is provided in Figure 2-2. The core liner, core barrel, neutron pad, and vessel weld liner are represented as stainless steel (SS304 from Reference 5 or A240, Type 304 from 1997 *Annual Book of ASTM Standards*, Vol. 01.03, Section 1, Iron and Steel Products, p. 37, Table 1). The pressure vessel is carbon steel (CS508 from Reference 5 or A508, Grade 2, Class 1 from *Annual Book of ASTM Standards*, Vol. 01.05, Section 1, Iron and Steel Products, p. 281, Table 1). Table 2-1 provides dimensions from the center of the core (along the core flat) to the outside surface of the pressure vessel.

Table 2-1. Dimensions from Core Center to Outside Surface of Pressure Vessel

	Thickness (cm)		Outer Radius (cm)	
Description	STD[1] & OFA[2]	MKBW[3]	STD & OFA	MKBW
Core Center	-	-	00.00000	00.00000
½ FA-1	10.70102	10.69975	10.70102	10.69975
Water	0.10160	0.10414	10.80262	10.80389
FA-2	21.40204	21.39950	32.20466	32.20339
Water	0.10160	0.10414	32.30626	32.30753
FA-3	21.40204	21.39950	53.70830	53.70703
Water	0.10160	0.10414	53.80990	53.81117
FA-4	21.40204	21.39950	75.21194	75.21067
Water	0.10160	0.10414	75.31354	75.31481
FA-5	21.40204	21.39950	96.71558	96.71431
Water	0.10160	0.10414	96.81718	96.81845
FA-6	21.40204	21.39950	118.21922	118.21795
Water	0.10160	0.10414	118.32082	118.32209
FA-7	21.40204	21.39950	139.72286	139.72159
Water	0.10160	0.10414	139.82446	139.82573
FA-8	21.40204	21.39950	161.22650	161.22523
Water	0.21350	0.21477	161.44	161.44
Core Liner	2.85000	2.85000	164.29	164.29
Water	23.67	23.67	187.96	187.96
Core Barrel	5.72	5.72	193.68	193.68
Water	25.47	25.47	219.15	219.15
Vessel Liner	0.56	0.56	219.71	219.71
Pressure Vessel	21.99	21.99	241.70	241.70

[1] STD = Westinghouse 17 x 17 standard fuel assembly
[2] OFA = Westinghouse 17 x 17 optimized fuel assembly
[3] MKBW = Framatome Cogema Fuels Mark-BW 17 x 17 fuel assembly

For Figure 2-1, the axial dimensions of the four symmetric neutron pads can be represented as the same as the active height of the fuel in the core.

Table 2-2 summarizes fuel assembly and reactor core data used for modeling the McGuire Unit 1 reactor for cycles 1 through 7. Additional fuel cycle design, core operations, and reactor criticality statepoint information will be provided in Sections 3 and 4.

Figure 2-3 presents a radial view of either a single Westinghouse 17 x 17 standard fuel assembly (17 x 17 STD) or a 17 x 17 optimized fuel assembly (17 x 17 OFA) showing the locations of the guide tubes, instrument tube, and fuel pins. Figure 2-4 presents a similar radial view of a single Framatome Cogema Fuels Mark-BW fuel assembly (17 x 17 MKBW). Axial dimensions, by region, for the 17 x 17 STD, OFA, and MKBW fuel assemblies are presented in Figures 2-5 through 2-7. The STD assembly contains 6 Inconel intermediate spacer grids and two Inconel end spacer grids. The OFA and MKBW fuel assemblies contain 6 zircaloy intermediate spacer grids and two Inconel end spacer grids. The upper end spacer grid is above the active fuel region, whereas the lower end spacer grid and the 6 intermediate spacer grids are inside the active fuel region.

Figure 2-1. Horizontal View of Vessel Internals Along Core Midplane

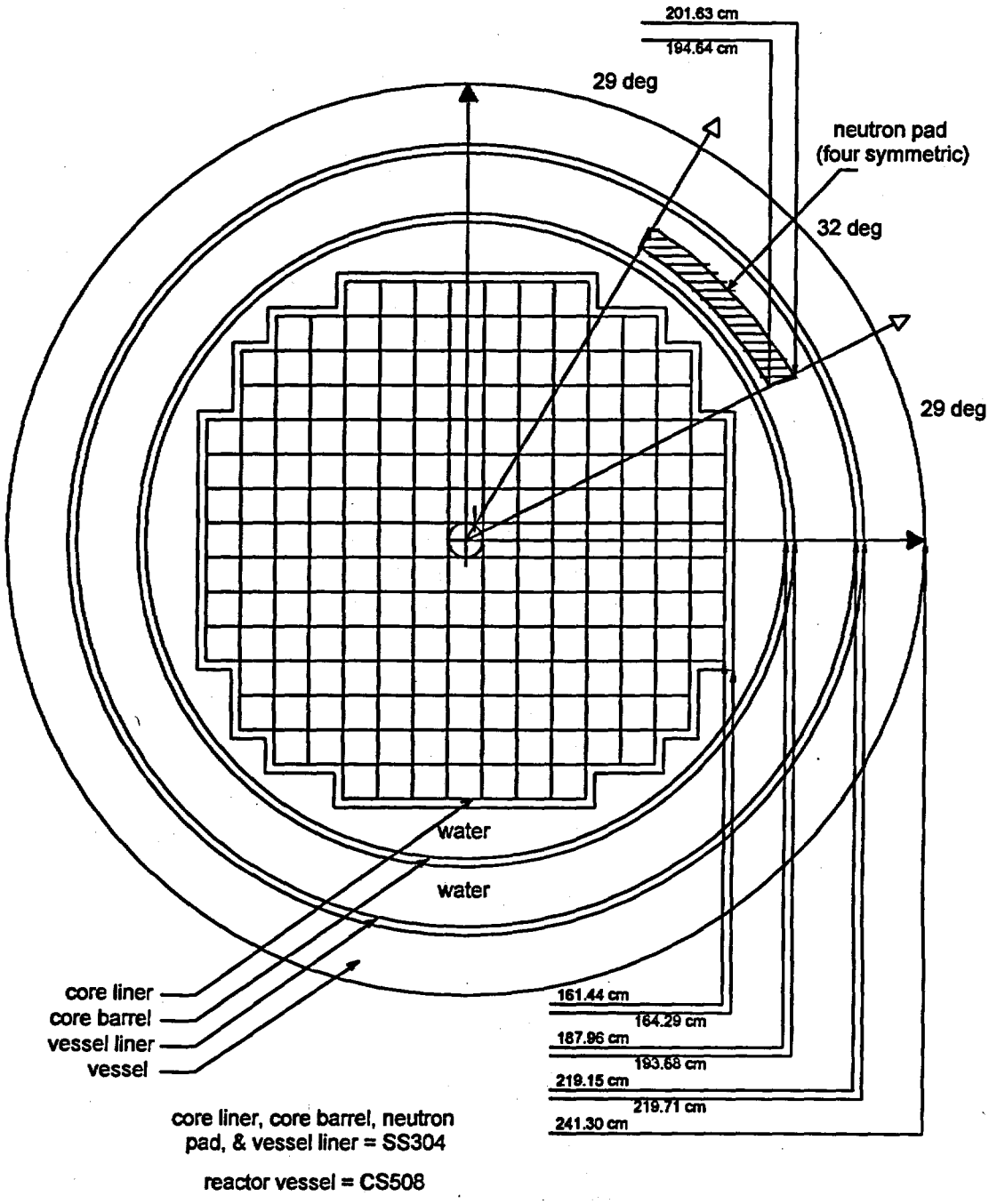


Figure 2-2. Radial View of Fuel Assembly Layout Along the Core Flat

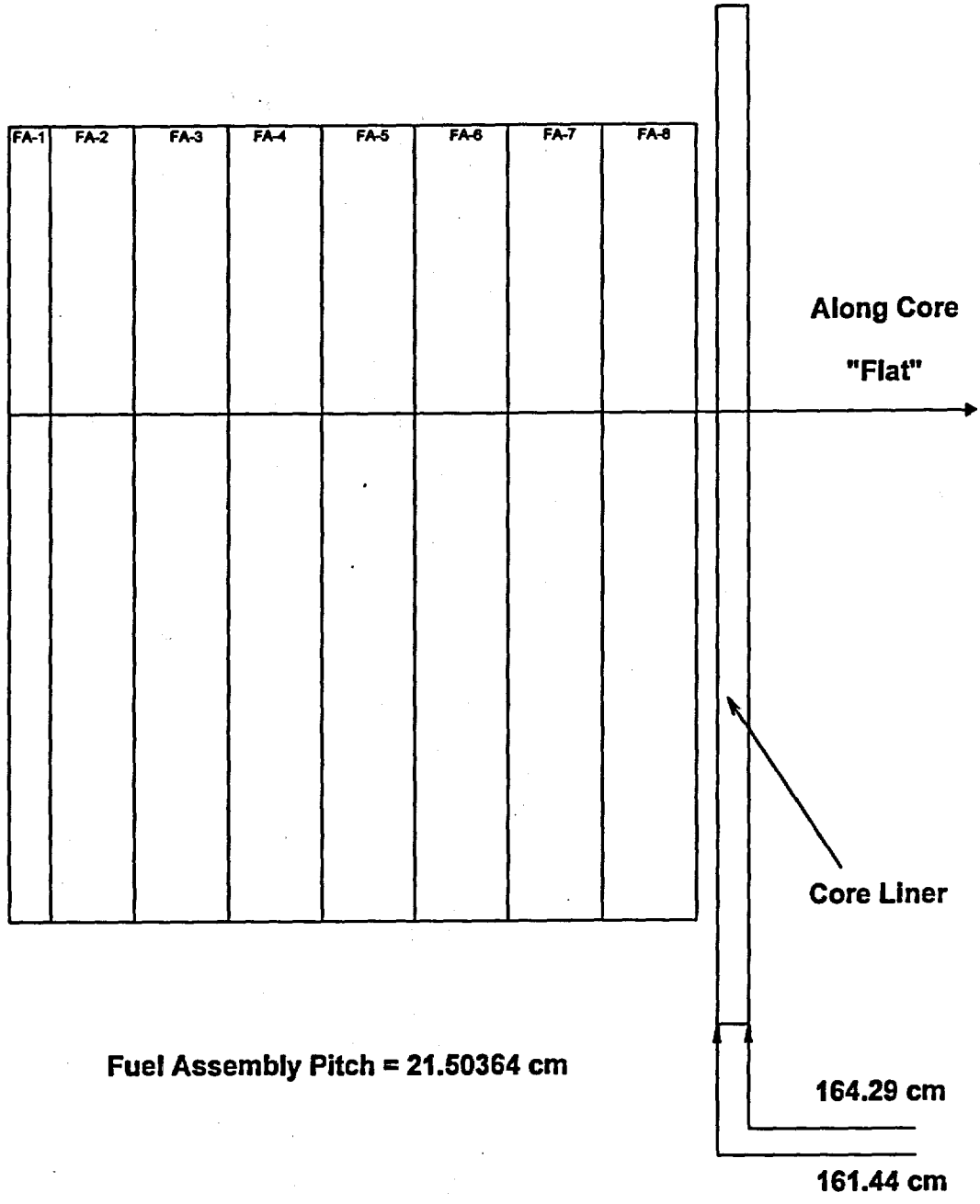


Table 2-2. McGuire 1 Fuel Assembly/Core Data

Fuel Assembly Array Size and Types	17 x 17 STD 17 x 17 OFA 17 x 17 MKBW
Number of Fuel Pins (N_R) / Assembly	264
Number of Guide Tubes (N_{GT}) / Assembly	24
Number of Instrument Tubes (N_{IT}) / Assembly	1
Number of Assemblies in Core	193
System Pressure	2250 psia/1.55132 x 10^7 Pa
Core Height (H)	365.76 cm
Pin Pitch	1.25984 cm
Fuel Pin Cladding OD (outer diameter - OD_C)	0.94996 cm - STD & MKBW 0.91440 cm - OFA
Fuel Cladding Material	zircaloy
Guide Tube Upper Region	
Length in Active Fuel Region (H_1)	308.4703 cm - STD 310.9722 cm - OFA & MKBW
Guide Tube OD (OD_{GT-U})	1.22428 cm - STD & MKBW 1.20396 cm - OFA
Guide Tube Lower Region	
Length in Active Fuel Region (H_2)	57.2897 cm - STD 54.7878 cm - OFA & MKBW
Guide Tube OD (OD_{GT-L})	1.08966 cm
Guide Tube Material	zircaloy
Instrument Tube OD (OD_{IT})	1.22428 cm - STD & MKBW 1.20396 cm - OFA
Instrument Tube Material	zircaloy
Assembly Pitch (P)	21.50364 cm
Intermediate Spacer Grid Material	Inconel - STD zircaloy - OFA & MKBW
Intermediate Spacer Grid Height	3.35788 cm - STD 5.71500 cm - OFA 5.70000 cm - MKBW
End Spacer Grid Material	Inconel
End Spacer Grid Height	3.35788 cm - STD & OFA 3.80000 cm - MKBW

Table 2-2. McGuire 1 Fuel Assembly/Core Data (Cont'd)

Spacer Grid Volumes for Active Fuel Region in Single Assembly:

Six Intermediate Spacer Grids
V_{IG} = 571.4016 cm^3 - STD
V_{ZG} = 1066.690 cm^3 - OFA
V_{ZG} = 1065.979 cm^3 - MKBW

One Lower End Spacer Grid
V_{IG} = 95.2336 cm^3 - STD & OFA
V_{IG} = 91.3467 cm^3 - MKBW

One Set Lower End Grid Sleeves (Stainless Steel) None for STD
V_{SS} = 11.3366 cm^3 - OFA
V_{SS} = 19.8644 cm^3 - MKBW

V_{M+G} = Volume of Moderator plus Grid in Fuel Assembly (excluding inside guide tubes and instrument tube)

$$= P^2 \cdot H - H \cdot \frac{\pi}{4}\left[N_R \cdot OD_C^2 + N_{IT} \cdot OD_{IT}^2\right] - N_{GT} \cdot \frac{\pi}{4}\left[H_1 \cdot OD_{GT-U}^2 + H_2 \cdot OD_{GT-L}^2\right]$$

= 90,263.3285 cm^3 - STD
= 95,579.8799 cm^3 - OFA
= 90,248.6380 cm^3 - MKBW

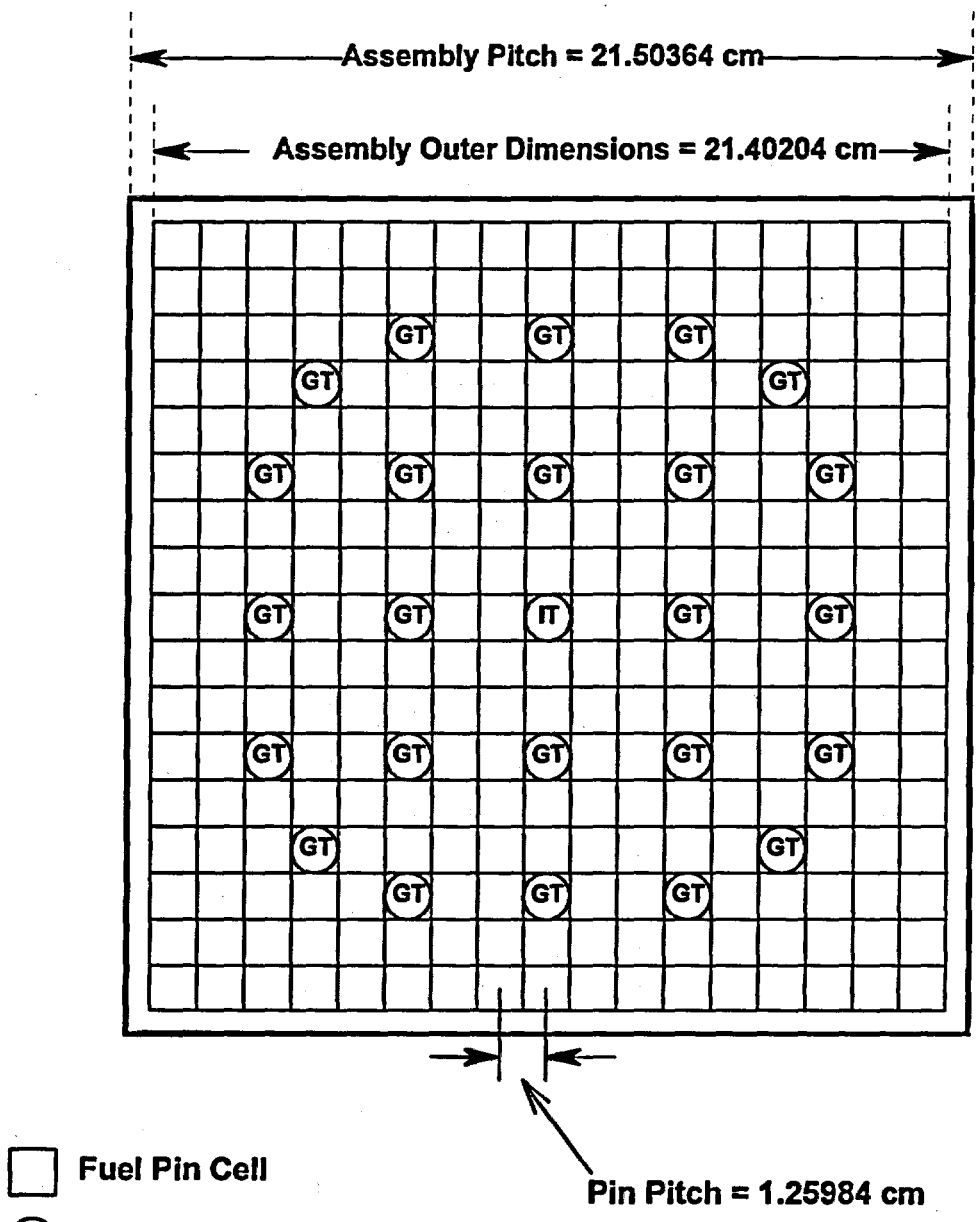
Assembly Volume Fraction of Inconel Grids = V_{IG}/V_{M+G} = 0.0073854 - STD
= V_{IG}/V_{M+G} = 0.0009964 - OFA
= V_{IG}/V_{M+G} = 0.0010122 - MKBW

Assembly Volume Fraction of zircaloy Grids = V_{ZG}/V_{M+G} = 0.0000000 - STD
= V_{ZG}/V_{M+G} = 0.0111602 - OFA
= V_{ZG}/V_{M+G} = 0.0118116 - MKBW

Assembly Volume Fractions of Stainless Steel Sleeves = V_{SS}/V_{M+G} = 0.0000000 - STD
= V_{SS}/V_{M+G} = 0.0001186 - OFA
= V_{SS}/V_{M+G} = 0.0002201 - MKBW

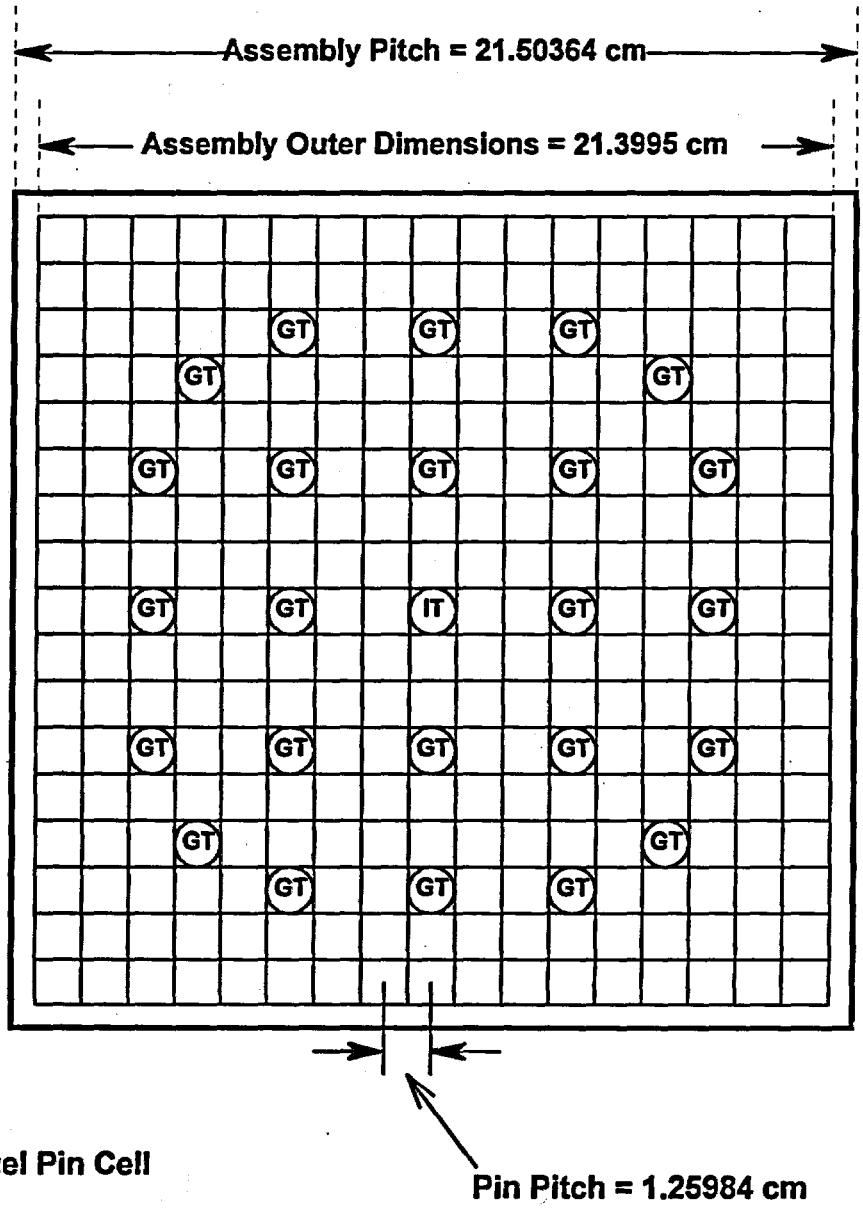
(Note: The number of digits shown above for volumes and volume fractions are an artifact of the computational process and are taken directly from Reference 5).

Figure 2-3. Radial View of a Single 17 x 17 STD or OFA Fuel Assembly



Note: Assembly outer dimension is less than 17 times the pin pitch. The outermost cells (except corners) are rectangular and not square like the other cells

Figure 2-4. Radial View of a Single 17 x 17 MKBW Fuel Assembly



Note: Assembly outer dimension is less than 17 times the pin pitch. The outermost cells (except corners) are rectangular and not square like the other cells

Figure 2-5. Axial Dimensions by Region for 17 x 17 STD Fuel Assembly

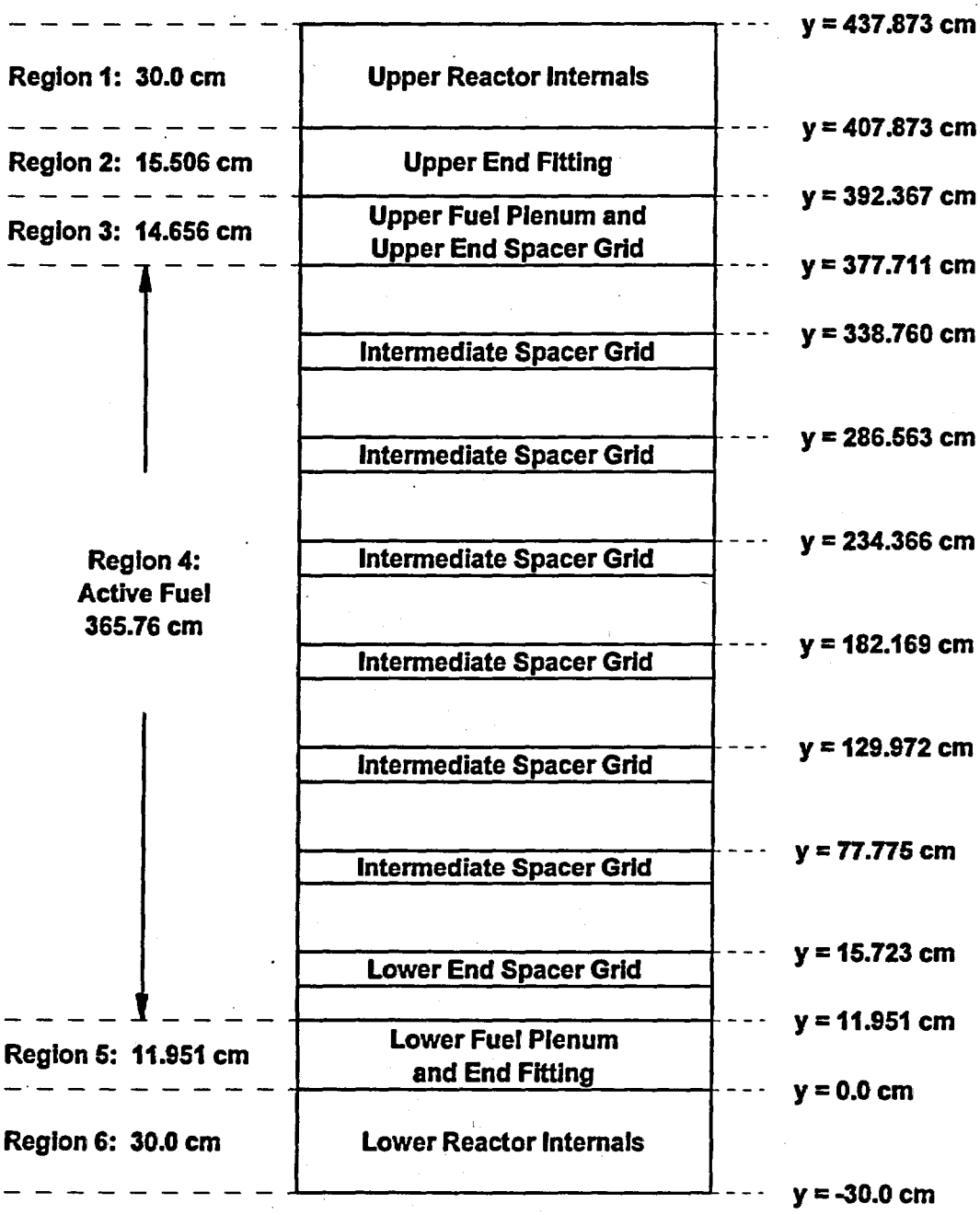


Figure 2-6. Axial Dimensions by Region for 17 x 17 OFA Fuel Assembly

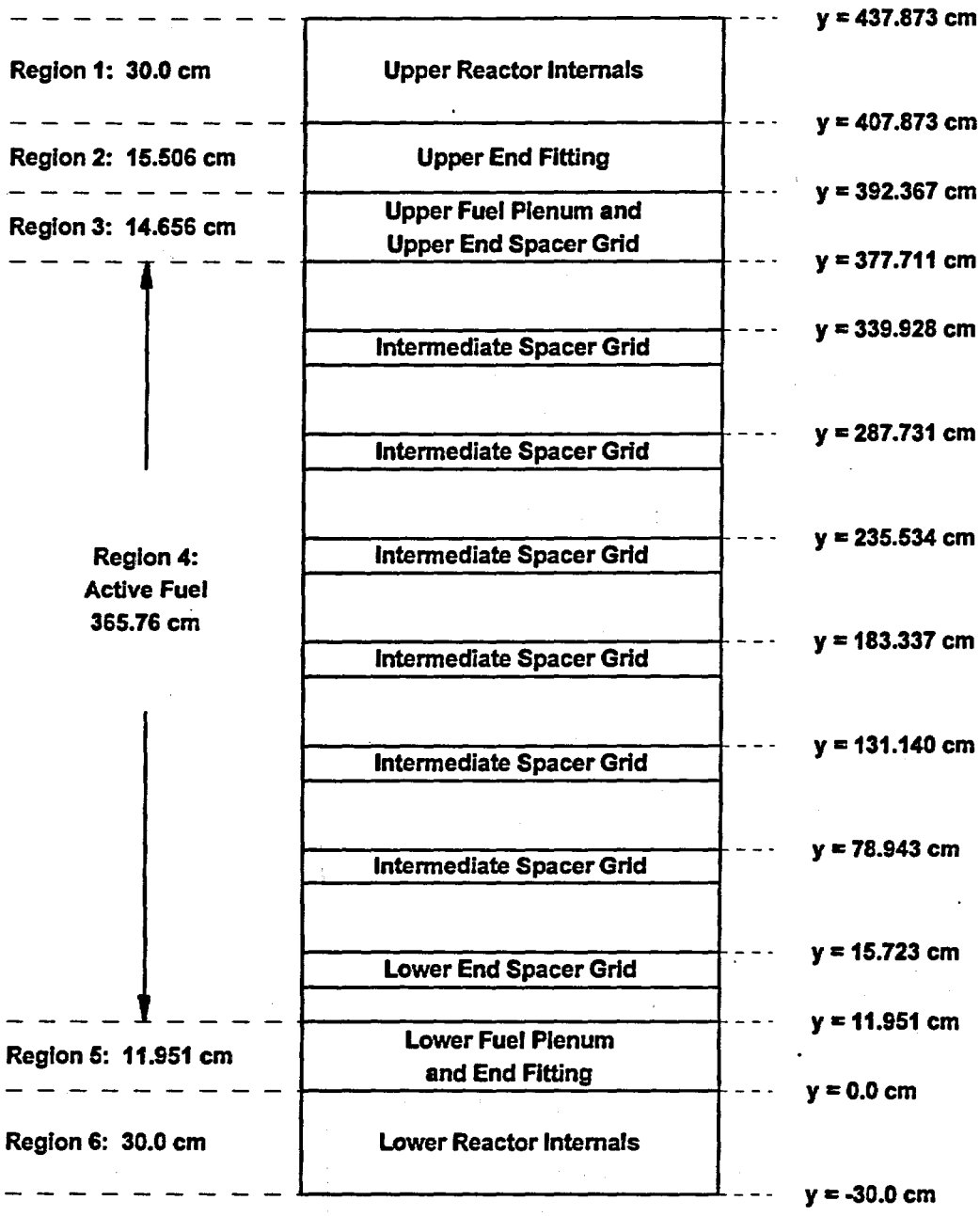
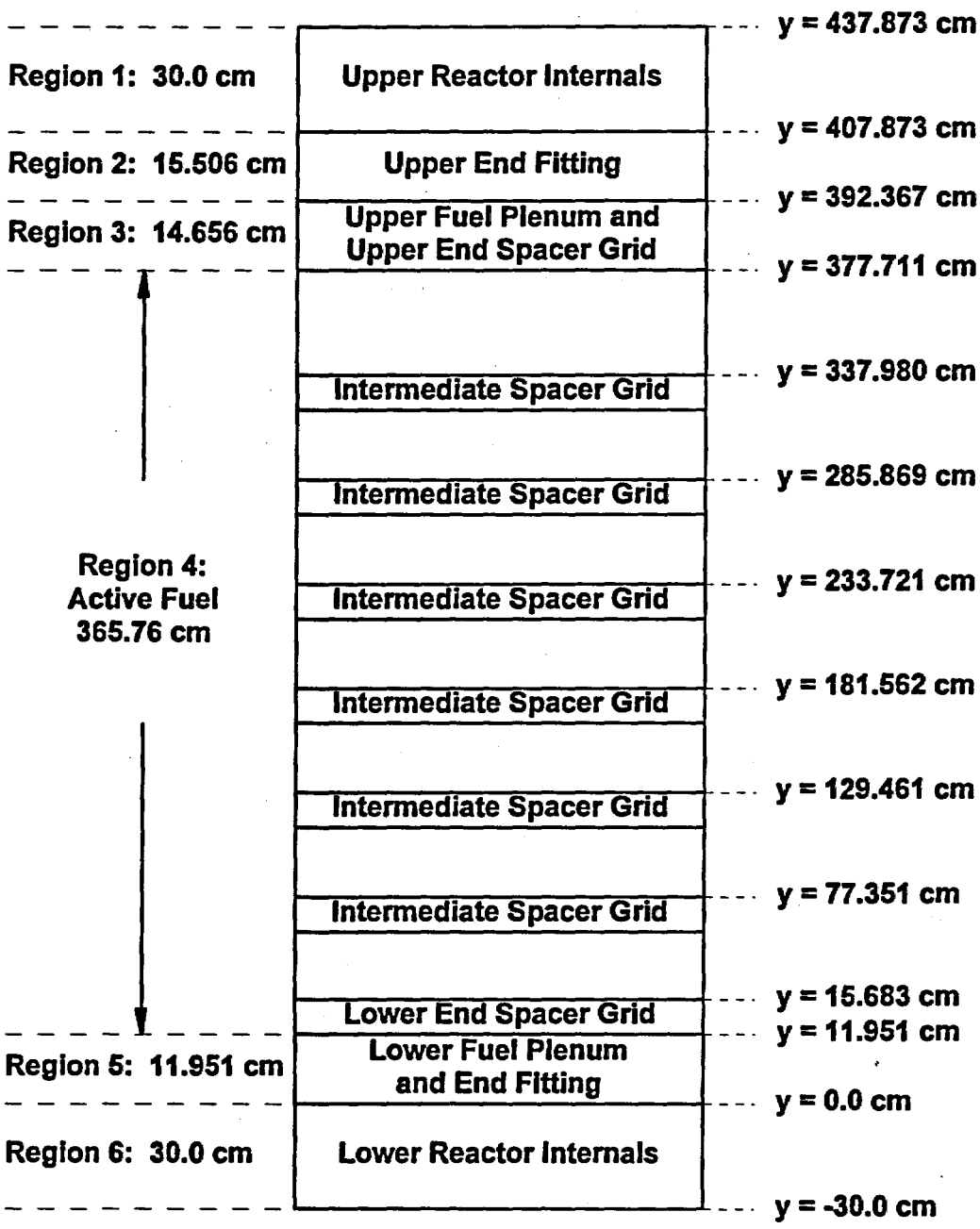


Figure 2-7. Axial Dimensions by Region for 17 x 17 MKBW Fuel Assembly



Figures 2-8 through 2-10 provide axial dimensions for the guide tubes, instrument tube, and fuel pins shown in Figure 2-3 for the Westinghouse 17 x 17 standard fuel assembly. Figures 2-11 through 2-13 provide axial dimensions for the guide tubes, instrument tube, and fuel pins shown in Figure 2-3 for the Westinghouse 17 x 17 optimized fuel assembly. Figures 2-14 through 2-16 provide axial dimensions for the guide tubes, instrument tube, and fuel pins shown in Figure 2-4 for the Framatome Cogema Fuels Mark-BW fuel assembly. Figures 2-17 through 2-20 provide axial dimensions for rod cluster control assemblies (RCCAs) with rods at 0% withdrawn, pyrex burnable poison rod assemblies (BPRAs), wet annular burnable absorber (WABA) type BPRAs, and thimble plugs that are attached to BPRAs at empty locations.

Regions 1 and 6, in Figures 2-5 through 2-20, are represented as homogenized regions of stainless steel and water. Regions 2, 3, and 5 contain various combinations of guide tubes, instrument tube, and fuel rod assemblies (no fuel pellets), as well as other materials (stainless steel, Inconel, and water). The fraction of guide tubes, instrument tube, and fuel rod assemblies will be represented explicitly in these regions. (Note: the fuel rod assemblies do not extend to region 2.) The other materials will be homogenized within the remaining portions of the regions. The water inside the guide tubes and instrument tube will be represented explicitly within the respective tubes. The volume fractions of other materials, by region, for the Westinghouse 17 x 17 standard fuel assembly are presented in Table 2-3.

Table 2-3. Volume Fractions for Non-Fuel Regions for Non-Control Assemblies (STD)

	Volume Fractions*		
Region	SS	Inc	Water
1	0.1770	0.0	0.8230
2	0.1243	0.0168	0.8589
3	0.0031	0.0264	0.9705
5	0.1625	0.0	0.8375
6	0.1720	0.0	0.8280

* The volume fractions presented exclude the guide tubes, instrument tube, and fuel rod assembly portions of these regions.

Note: Inc = Inconel
SS = Stainless Steel

The fuel rods are contained in regions 3, 4, and 5. Region 4 is modeled explicitly. Regions 3 and 5 contain various amounts of stainless steel and zircaloy in the fuel rod assembly which represent plenum springs and end caps. In addition, these regions also contain helium and fission gases, as well as the zircaloy cladding. The fuel rod assembly volume fractions for materials in these regions for the Westinghouse 17 x 17 standard fuel assembly are as follows:

Table 2-4. STD Fuel Rod Assembly Volume Fractions for Regions 3 and 5

Region	Fuel Rod Assembly Volume Fractions			
	SS	Zr	Cladding*	Gas
3	0.0764	0.0513	0.2173	0.6550
5	0.1241	0.1685	0.1898	0.5176

* The zircaloy (Zr) cladding extends from Y = 8.278 cm to Y = 391.615 cm. For all 264 rods, 13.904 cm length of fuel cladding is included in region 3 and 3.673 cm length of fuel cladding is included in region 5.

The volume fractions of other materials, by region, for the Westinghouse 17 x 17 optimized fuel assembly are presented in Table 2-5.

Table 2-5. Volume Fractions for Non-Fuel Regions for Non-Control Assemblies (OFA)

Region	Volume Fractions*			
	SS	Inc	Zr	Water
1	0.1770	0.0	0.0	0.8230
2	0.1303	0.0178	0.0051	0.8469
3	0.0030	0.0249	0.0	0.9721
5	0.1439	0.0	0.0137	0.8424
6	0.1720	0.0	0.0	0.8280

* The volume fractions presented exclude the guide tubes, instrument tube, and fuel rod assembly portions of these regions.

The fuel rods are contained in regions 2, 3, 4, and 5. Region 4 is modeled explicitly. Regions 2, 3, and 5 contain various amounts of stainless steel and zircaloy in the fuel rod assembly which represents plenum springs and end caps. In addition, these regions also contain helium and fission gases, as well as the zircaloy cladding. The fuel rod assembly volume fractions for materials in these regions for the Westinghouse 17 x 17 optimized fuel assembly are presented in Table 2-6.

Table 2-6. OFA Fuel Rod Assembly Volume Fractions for Regions 2, 3, and 5

Region	Fuel Rod Assembly Volume Fractions			
	SS	Zr	Cladding*	Gas
2	0.0703	0.4268	0.1720	0.3309
3	0.1342	0.0	0.2344	0.6314
5	-	Solid (diameter = 0.9144 cm)		-

* The zircaloy cladding extends from Y = 11.3157 cm to Y = 394.2309 cm. For all 264 rods, the 0.524 cm length of cladding is included in region 2, 14.656 cm in region 3, and 0.635 cm length is included in region 5. Region 5 may be modeled as a solid zircaloy rod of 1.748 cm length and 0.9144 cm diameter.

The volume fractions of other materials, by region, for the Mark-BW 17 x 17 fuel assembly are presented in Table 2-7.

Table 2-7. Volume Fractions for Non-Fuel Regions for Non-Control Assemblies (MKBW)

Region	Volume Fractions*			
	SS	Inc	Zr	Water
1	0.1770	0.0	0.0	0.8230
2	0.1040	0.0210	0.0090	0.8660
3	0.0058	0.0247	0.0	0.9695
5	0.1417	0.0	0.0059	0.8524
6	0.1720	0.0	0.0	0.8280

* The volume fractions presented exclude the guide tubes, instrument tube, and fuel rod assembly portions of these regions.

The fuel rods are contained in regions 3, 4, and 5. Region 4 is modeled explicitly. Regions 3 and 5 contain various amounts of stainless steel and zircaloy in the fuel rod assembly which represents plenum springs and end caps. In addition, these regions also contain helium and fission gases, as well as zircaloy cladding. The fuel rod assembly volume fractions for materials in these regions for the Mark-BW 17 x 17 fuel assembly are presented in Table 2-8.

Table 2-8. MKBW Fuel Rod Assembly Volume Fractions for Regions 2, 3, and 5

Region	Fuel Rod Assembly Volume Fractions			
	SS	Zr	Cladding*	Gas
3	0.0779	0.0523	0.2307	0.6391
5	0.1256	0.1705	0.2040	0.4999

* The zircaloy cladding extends from Y = 8.278 cm to Y = 391.340 cm. For all 264 rods, the 13.629 cm length of cladding is included in region 3, and 3.673 cm length is included in region 5.

Figure 2-8. Axial Dimensions for Guide Tubes for STD Fuel Assembly

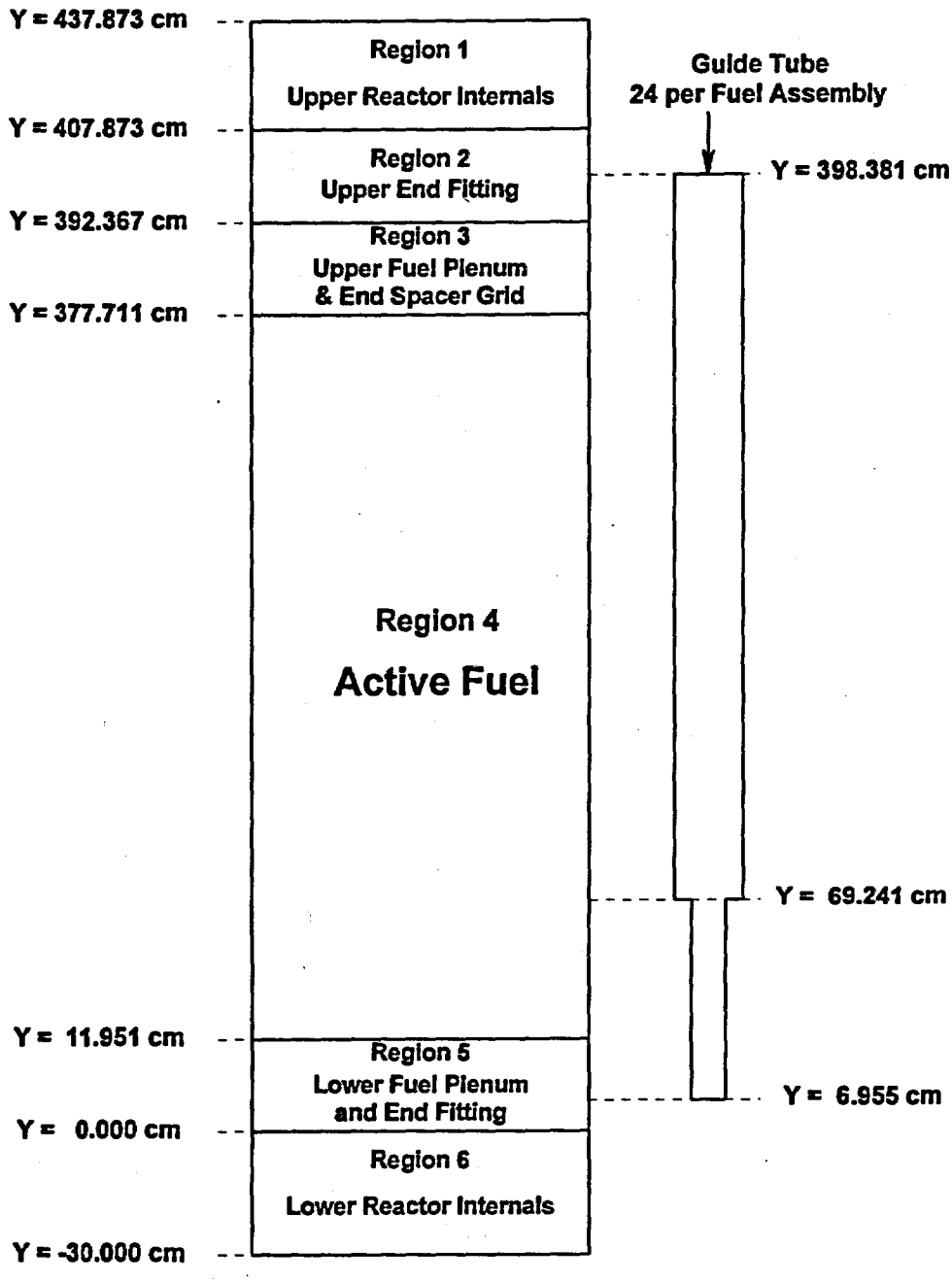


Figure 2-9. Instrument Tube Axial Dimensions for STD Fuel Assembly

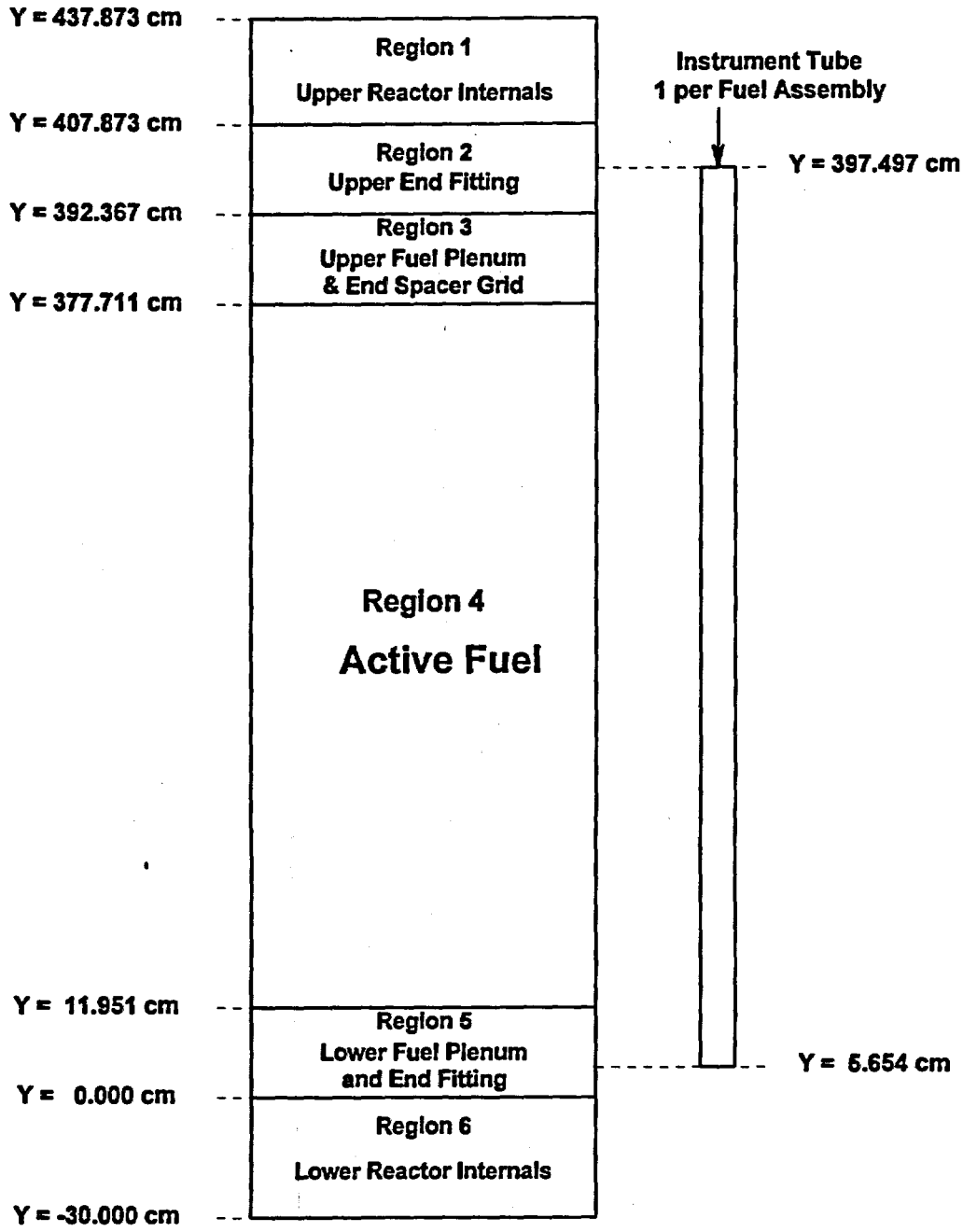


Figure 2-10. Fuel Rod Assembly Axial Dimensions for STD Fuel Assembly

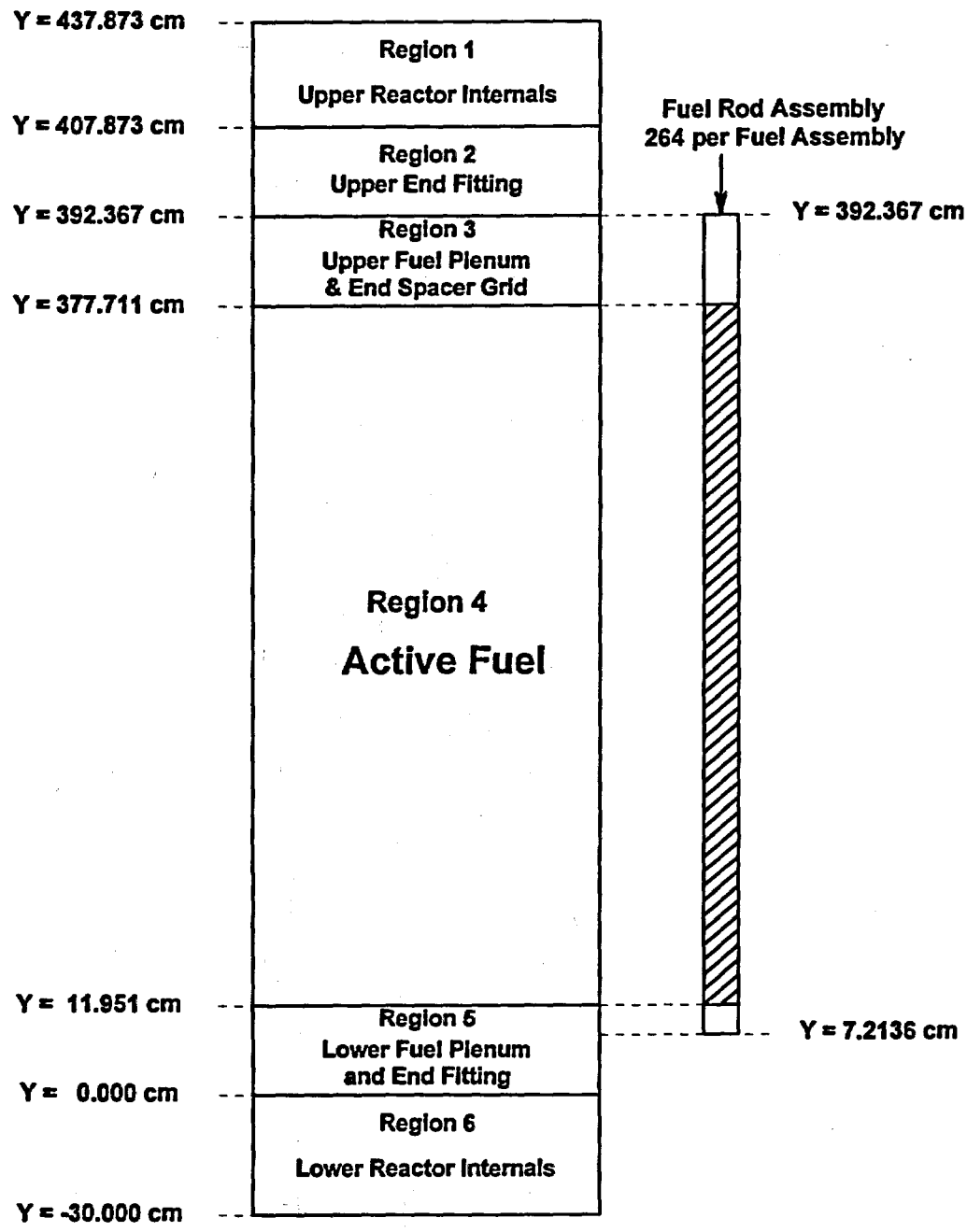


Figure 2-11. Axial Dimensions for Guide Tubes for OFA Fuel Assembly

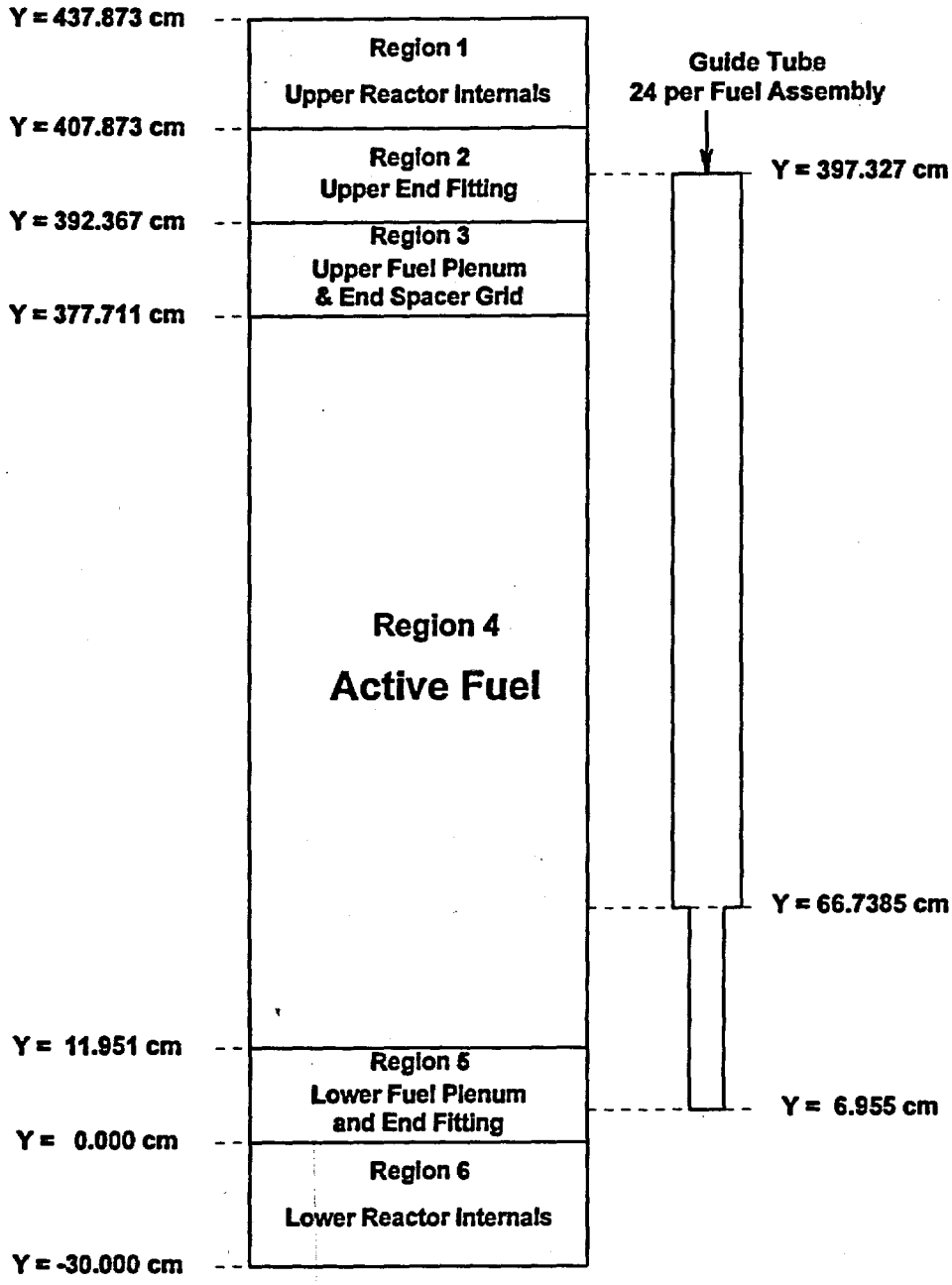


Figure 2-12. Instrument Tube Axial Dimensions for OFA Fuel Assembly

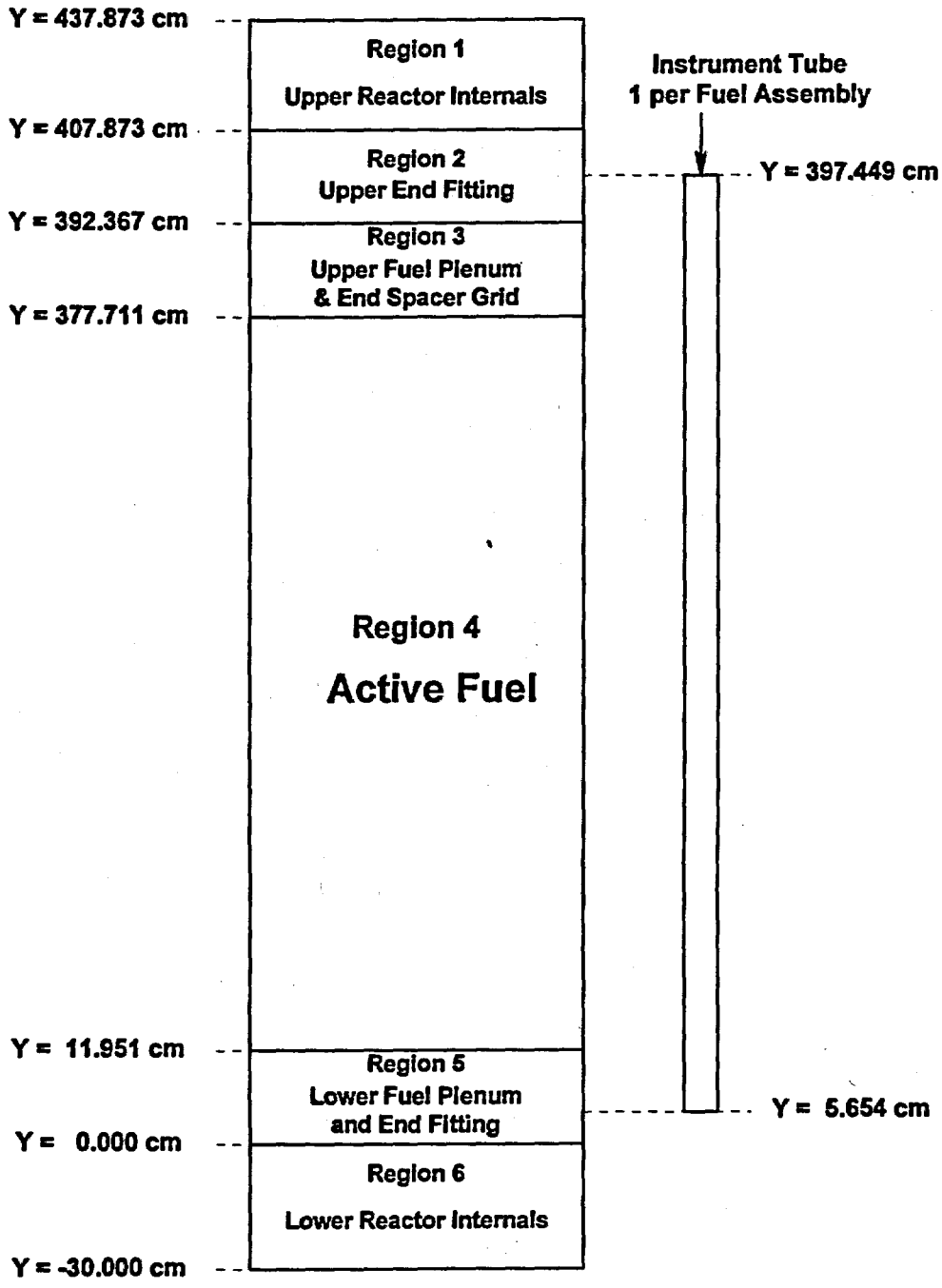


Figure 2-13. Fuel Rod Assembly Axial Dimensions for OFA Fuel Assembly

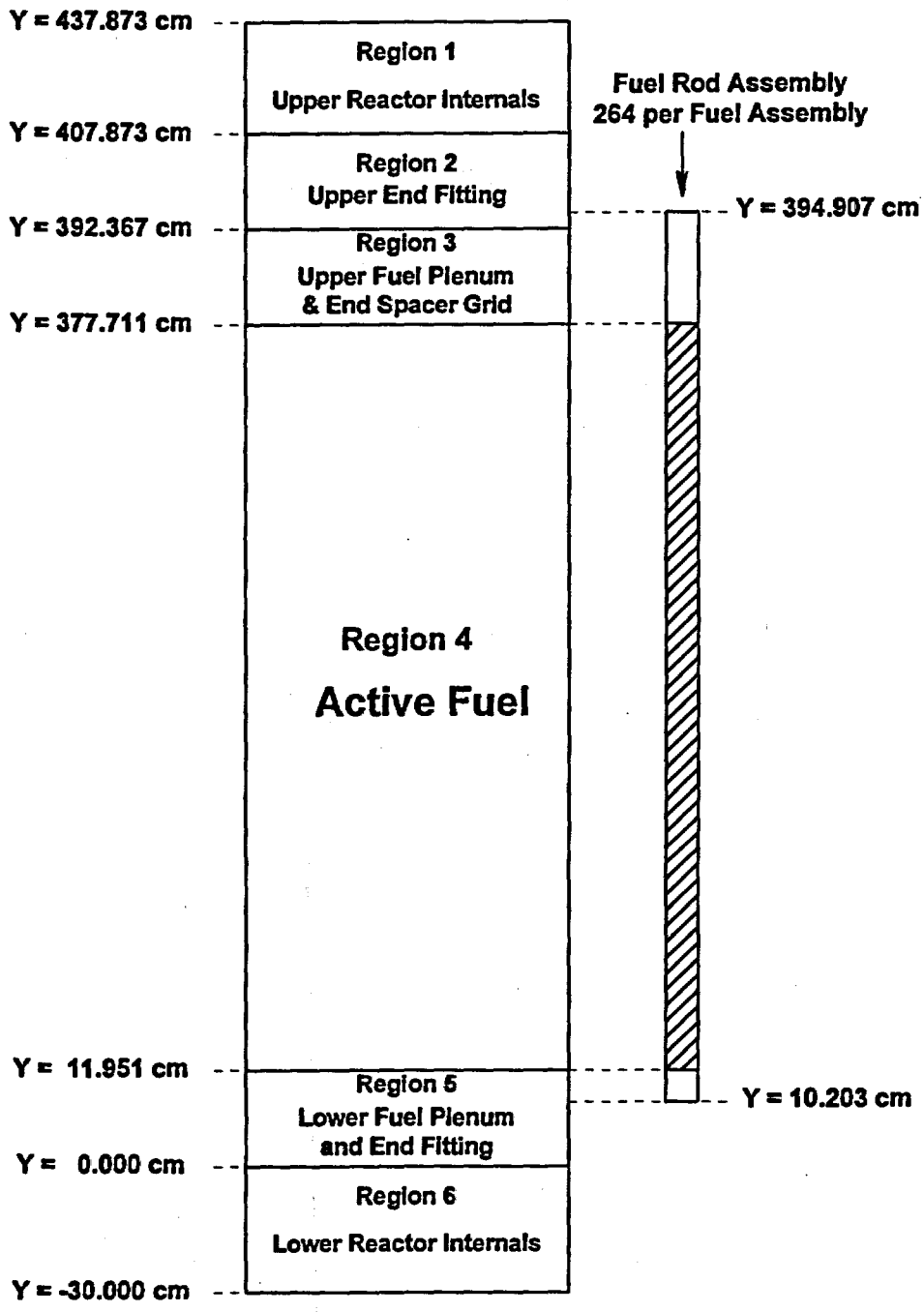


Figure 2-14. Axial Dimensions for Guide Tubes for MKBW Fuel Assembly

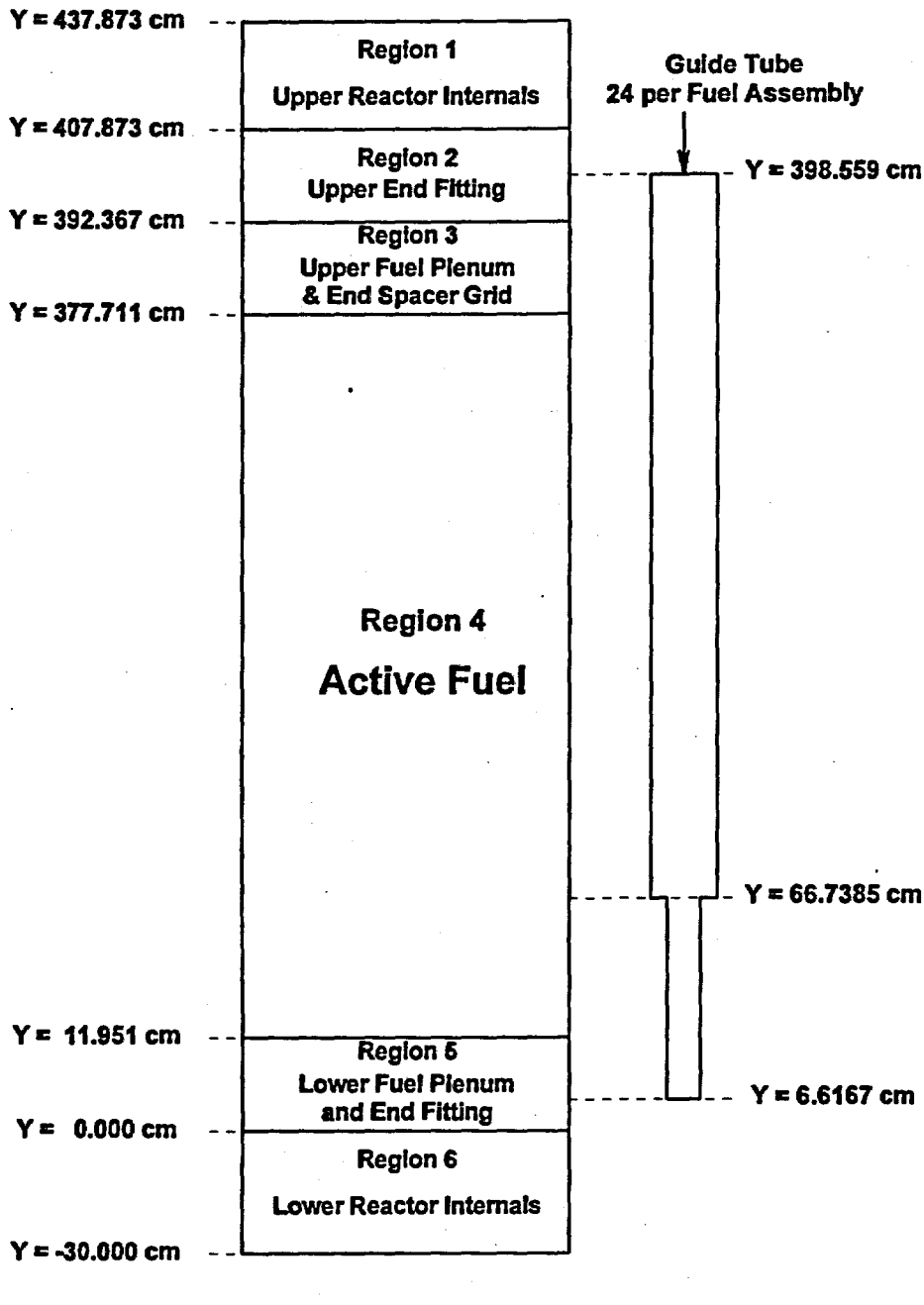


Figure 2-15. Instrument Tube Axial Dimensions for MKBW Fuel Assembly

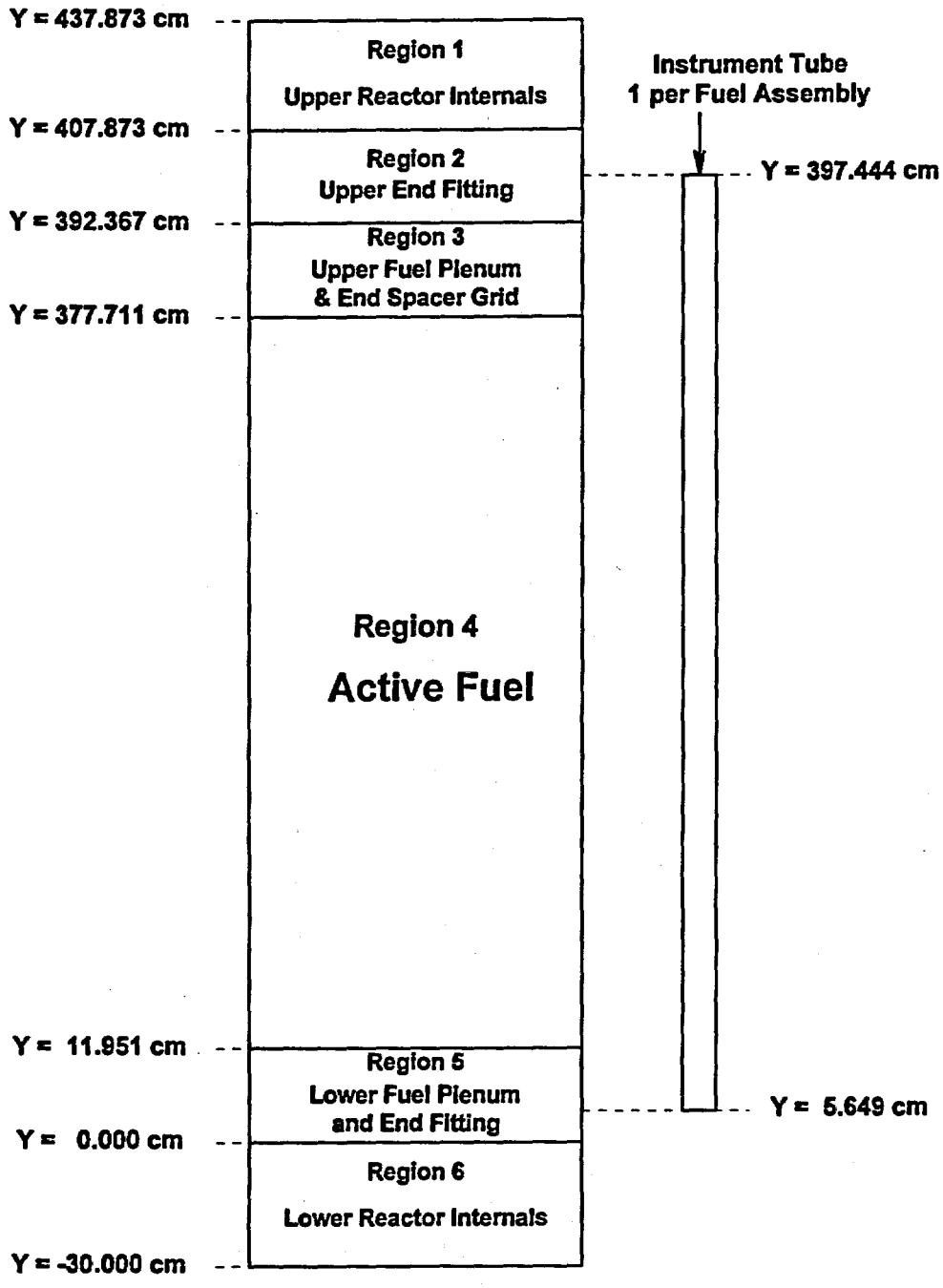


Figure 2-16. Fuel Rod Assembly Axial Dimensions for MKBW Fuel Assembly

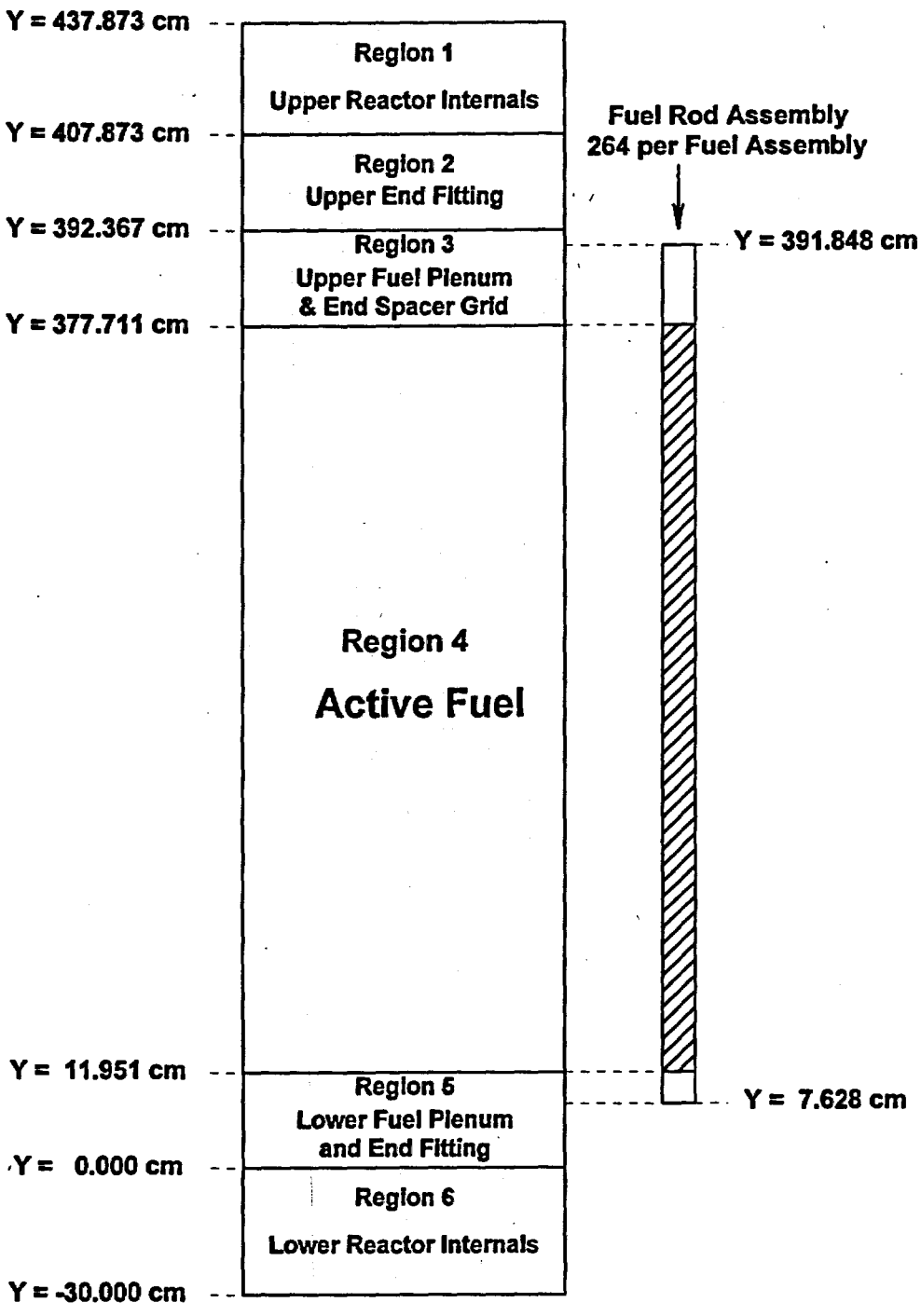


Figure 2-17 provides axial dimensions for a fully inserted (0% withdrawn) control rod for a fuel assembly. These dimensions are applicable for a STD, OFA, or MKBW fuel assembly.

RCCA Materials/Dimensions:

Lower cap - stainless steel (diameter = 0.96774 cm)

Cladding - stainless steel (Clad OD = 0.96774 cm , Clad ID = 0.87376 cm,
where OD = outer diameter, ID = inner diameter)

Absorber - Ag-In-Cd (diameter = 0.86614 cm)

Spacer - stainless steel (diameter = 0.8585 cm)

Upper plenum/spring area - Volume Fractions:

Clad - Stainless Steel	= 0.1848
Spring - Inconel	= 0.2784
Gas	= 0.5368

Upper cap - stainless steel (diameter = 0.96774 cm)

Upper stem - stainless steel (diameter = 0.5563 cm)

RCCA Volume Fractions:

The control rods are represented explicitly in regions 2, 3, and 4. The remainder of materials (excluding fuel rods, instrument tube, and guide tubes) are homogenized in regions 1, 2, and 3. The volume fractions of these materials (including non-RCCA materials) for RCCAs with rods at 0% withdrawn (WD) are given in Tables 2-9 through 2-10a.

Table 2-9. Volume Fractions for STD Assemblies with RCCAs (0% Withdrawn) for Regions 1 - 3

	Volume Fractions (Rods 0% WD)		
Region	SS	Inc	Water
1	0.1907	0.0035	0.8058
2	0.1444	0.0218	0.8338
3*	0.0031	0.0264	0.9705

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-3).

For fully withdrawn control rods (100% withdrawn) the volume fractions presented in Table 2-3

(for STD non-control assemblies) should be used.

Table 2-10. Volume Fractions for OFA Assemblies with RCCAs (0% Withdrawn) for Regions 1 - 3

Region	Volume Fractions (Rods 0% WD) SS	Inc	Zr	Water
1	0.1907	0.0035	0.0	0.8058
2	0.1516	0.0232	0.0051	0.8201
3*	0.0030	0.0249	0.0	0.9721

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-5).

For fully withdrawn control rods (100% withdrawn) the volume fractions presented in Table 2-5 (for OFA non-control assemblies) should be used.

Table 2-10a. Volume Fractions for MKBW Assemblies with RCCAs (0% Withdrawn) for Regions 1 - 3

Region	Volume Fractions (Rods 0% WD) SS	Inc	Zr	Water
1	0.1907	0.0035	0.0	0.8058
2	0.1241	0.0260	0.0090	0.8409
3*	0.0058	0.0247	0.0	0.9695

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-7).

For fully withdrawn control rods (100% withdrawn) the volume fractions presented in Table 2-7 (for MKBW non-control assemblies) should be used.

Figure 2-17. Axial Dimensions for RCCAs (Rods 0% Withdrawn) for STD, OFA, and MKBW Fuel Assemblies

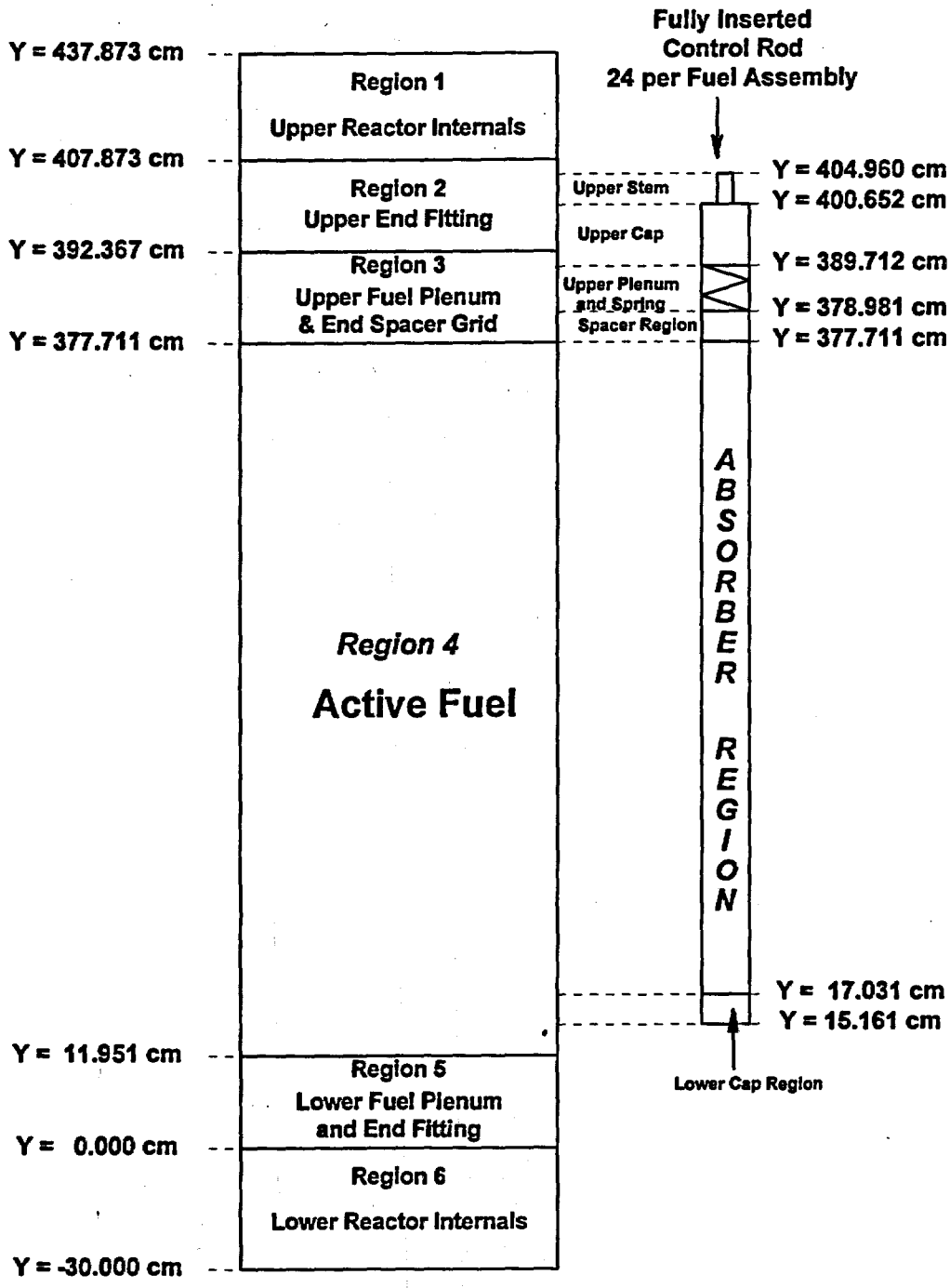


Figure 2-18 provides axial dimensions for the pyrex burnable absorber rod assembly (BPRA). Figure 2-19 provides axial dimensions for the wet annular burnable absorber (WABA) rod assembly. These dimensions are applicable for a STD, OFA, or MKBW fuel assembly.

Pyrex BPRA Materials/Dimensions:

Lower cap - stainless steel (diameter = 0.96774 cm)

Cladding - stainless steel Outer tube - OD = 0.96774 cm, ID = 0.87376 cm
Inner tube - OD = 0.46101 cm, ID = 0.42799 cm

Absorber - B_2O_3-SiO_2 Pyrex tube - OD = 0.85344 cm, ID = 0.48260 cm

Upper plenum region - stainless steel clad (outer tube), helium gas in annulus

Upper cap - stainless steel (diameter = 0.96774 cm)

Upper stem - stainless steel (diameter = 0.54356 cm)

WABA Materials/Dimensions:

Lower cap - zircaloy (OD = 0.96774 cm, ID = 0.254 cm)
Water annulus (diameter = 0.254 cm)

Cladding - zircaloy Outer tube - OD = 0.96774 cm, ID = 0.8357 cm
Inner tube - OD = 0.6782 cm, ID = 0.5715 cm

Absorber - B_4C-Al_2O_3 WABA - OD = 0.8077 cm, ID = 0.7061 cm
Helium in gap between absorber and cladding

Water annulus - diameter = 0.5715 cm

Upper plenum region - zircaloy clad OD = 0.96774 cm, Volume Fractions: zircaloy = 0.3967
Water = 0.6033

Upper cap - zircaloy (diameter = 0.96774 cm)

Upper stem - zircaloy (diameter = 0.54356 cm)

BPRA Volume Fractions:

The burnable poison and other materials inside the guide tubes are represented explicitly through region 3 and into region 2. This includes most of the upper end cap. The BPRA upper structure (beyond the end cap) is homogenized with the other assembly components within region 2. The volume fractions of these materials (including non-BPRA materials) are given in Tables 2-11 through 2-13. For a given assembly type (STD, OFA, or MKBW) the volume fractions are the same for both Pyrex and WABA. There are 24 locations (guide tubes) for rod insertion in the fuel assembly. The number of burnable poison rods varies from 4 to 20 among the BPRAs for cycles 1 through 7 of McGuire 1. A thimble plug (Figure 2-20) is used for any empty location where a burnable poison (BP) rod is not installed.

Table 2-11. Volume Fractions for STD Fuel Assemblies with WABA or Pyrex BPRAs for Regions 2 - 3

	Volume Fractions BPRAs		
Region	SS	Inc	Water
2	0.1649	0.0228	0.8123
3*	0.0031	0.0264	0.9705

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-3).

Table 2-12. Volume Fractions for OFA Fuel Assemblies with WABA or Pyrex BPRAs for Regions 2 - 3

	Volume Fractions BPRAs			
Region	SS	Inc	Zr	Water
2	0.1733	0.0242	0.0051	0.7974
3*	0.0030	0.0249	0.0	0.9721

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-5).

Table 2-13. Volume Fractions for MKBW Fuel Assemblies with WABA or Pyrex BPRAs for Regions 2 - 3

	Volume Fractions BPRAs			
Region	SS	Inc	Zr	Water
2	0.1446	0.0270	0.0090	0.8194
3*	0.0058	0.0247	0.0	0.9695

* Region 3 volume fractions are the same as for non-control assemblies (Table 2-7).

Figure 2-18. Axial Dimensions for Pyrex BPRAs for STD, OFA, and MKBW Fuel Assemblies

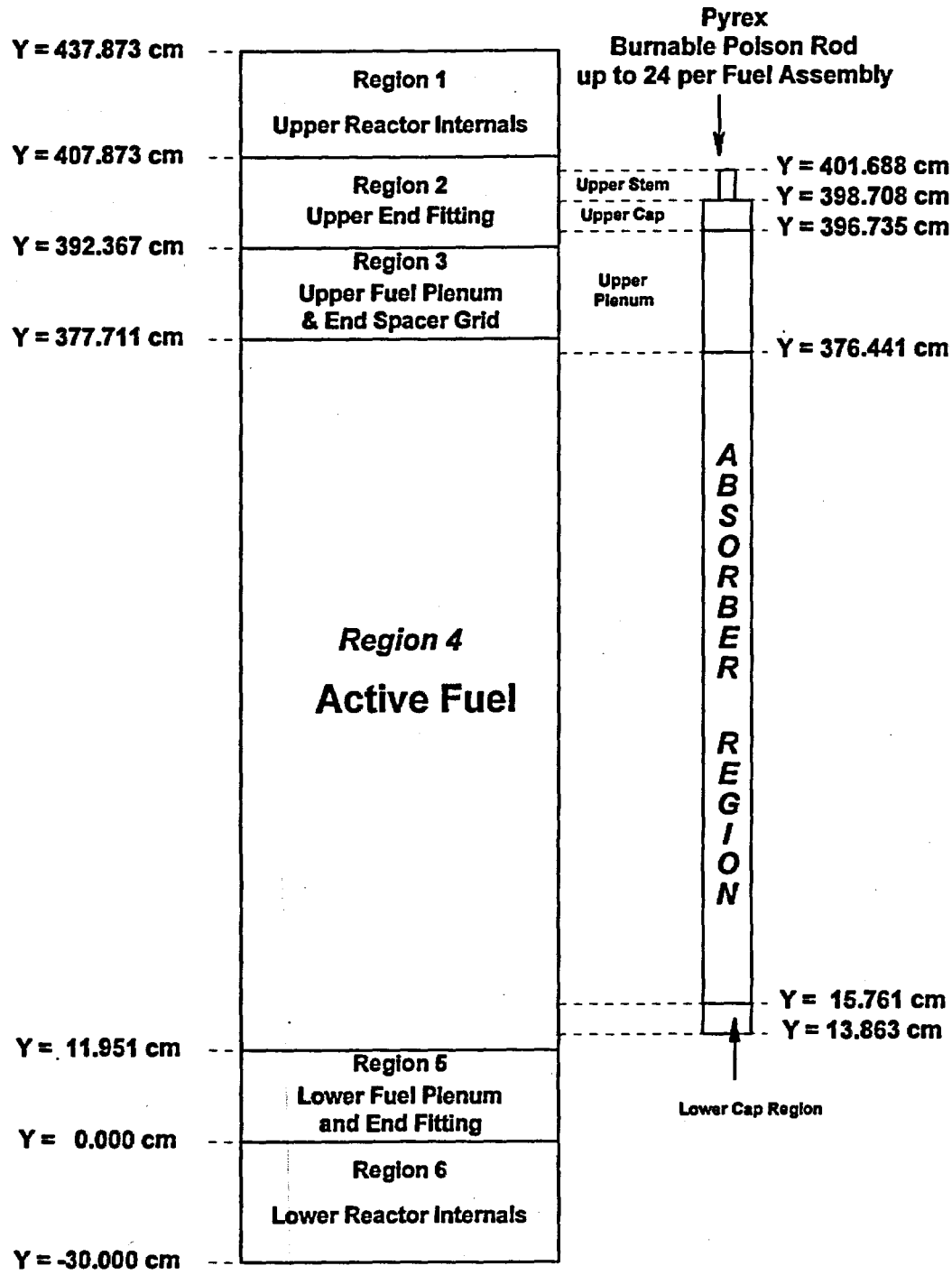


Figure 2-19. Axial Dimensions for WABA BPRAs for STD, OFA, and MKBW Fuel Assemblies

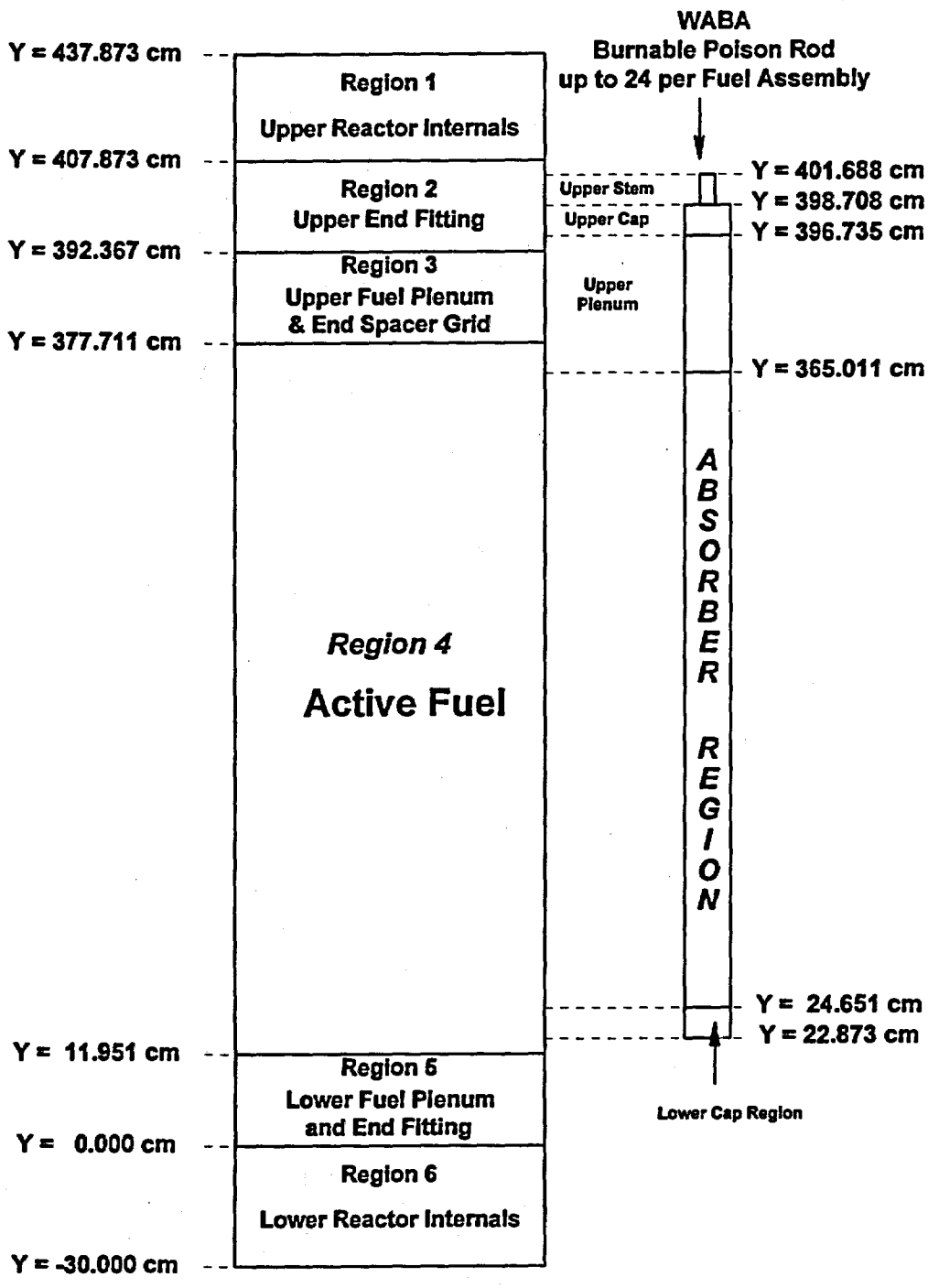
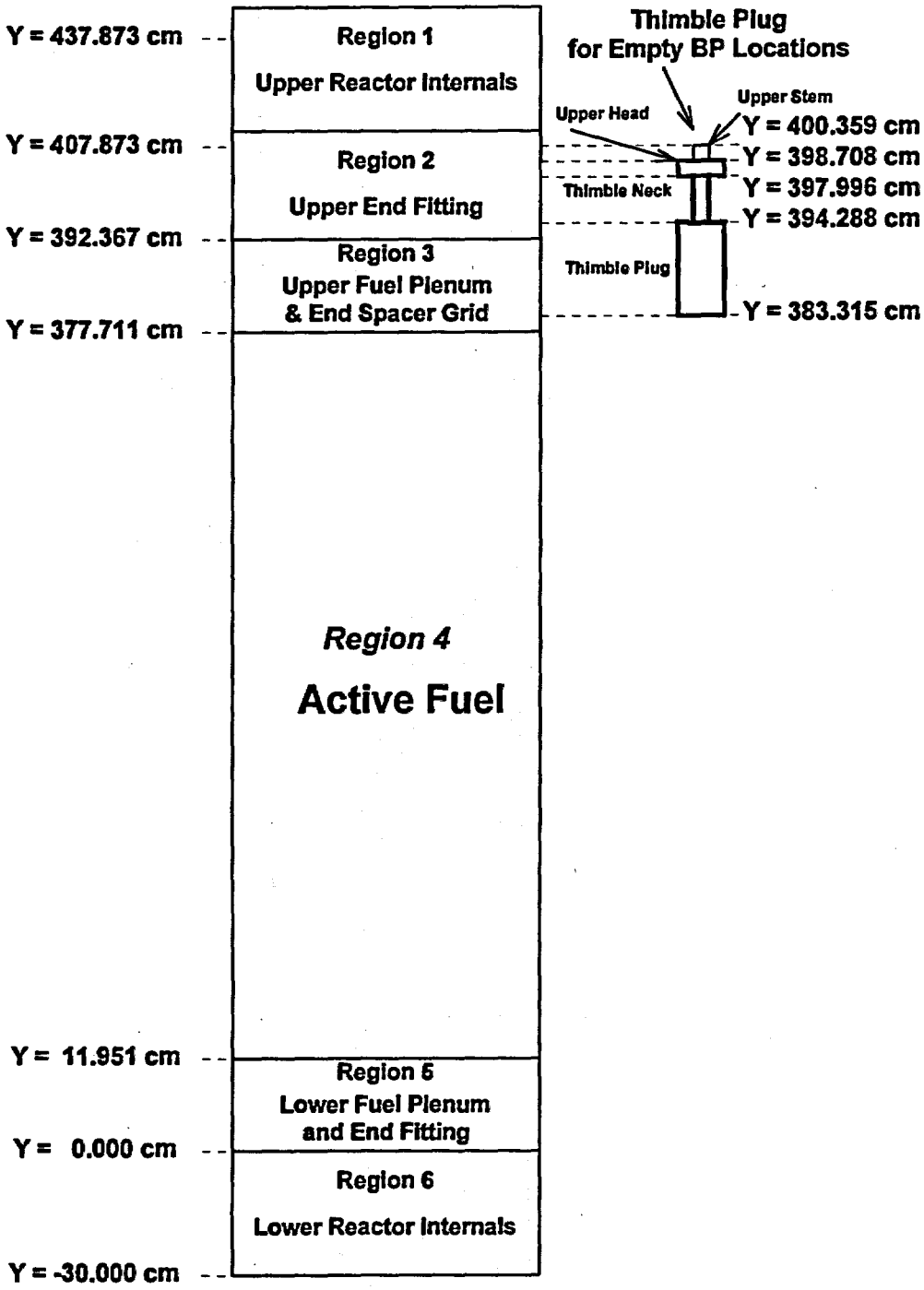


Figure 2-20. Axial Dimensions for Thimble Plug for STD, OFA, and MKBW Fuel Assemblies



Thimble Plug Materials/Dimensions:

Thimble plug - stainless steel (diameter = 1.08204 cm)

Thimble neck - stainless steel (diameter = 0.4826 cm)

Upper head - stainless steel (diameter = 0.96774 cm)

Upper stem - stainless steel (diameter = 0.54356 cm)

3.0 FUEL CYCLE DESIGN INFORMATION

This section provides fuel assembly design data for cycles 1 through 7 of the McGuire Unit 1 reactor. Material and geometry data for the fuel assembly components along with cycle length data are presented in Section 3.1. The fuel assembly locations for each cycle, fuel enrichments and number of burnable absorber rods for each assembly, and control rod bank locations are presented in Section 3.2.

3.1 Fuel Batch Data

Material and geometry data for each fresh fuel batch present in cycles 1-7 are given in Table 3-1. This includes the cycle in which the fuel was first loaded, the fuel assembly type, the enrichment and kilograms of uranium in each fuel assembly (by batch), the diameter of the fuel pellets, the BPRA type, and the type of fuel assembly grid material. The radial dimensions of the fuel clad, instrument tube, and guide tube are also presented. In addition, material and radial dimensions for RCCAs and BPRAs are provided. This data should be used in modeling each fuel assembly type for burnup calculations and the reactor criticality calculations for the statepoints defined in Table 3-2.

The length of each fuel cycle, expressed as effective-full-power-days (EFPD), is provided in Table 3-2. The time during each cycle where statepoint criticality data was measured is also presented.

Table 3-1. Fuel Assembly/Pin/Cycle Description for Cycles 1-7

Cycle	Fresh Fuel Batch	Assembly Type	wt% U235	kgU/ Assembly	FP Pellet OD (cm)	FP Clad OD (cm)	FP Clad ID (cm)	FA Grid Material	BPRA Type
1	1	STD	2.108	458.93	0.819150	0.94996	0.83566	Inconel	None
	2	STD	2.601	458.97	0.819150	0.94996	0.83566	Inconel	Pyrex
	3	STD	3.106	460.39	0.819150	0.94996	0.83566	Inconel	Pyrex
2	4	OFA	3.204	424.28	0.784352	0.91440	0.80010	zircaloy	Pyrex
3	5	OFA	3.204	424.39	0.784352	0.91440	0.80010	zircaloy	Pyrex
4	6A	OFA	3.20	423.12	0.784352	0.91440	0.80010	zircaloy	Pyrex
	6B	OFA	3.40	423.12	0.784352	0.91440	0.80010	zircaloy	Pyrex
5	7A	OFA	3.40	423.12	0.784352	0.91440	0.80010	zircaloy	WABA
	7B	OFA	3.60	423.12	0.784352	0.91440	0.80010	zircaloy	WABA
	7C	MKBW	2.92	456.20	0.811530	0.94996	0.82804	zircaloy	WABA
6	8	OFA	3.60	423.12	0.784352	0.91440	0.80010	zircaloy	WABA
7	9	OFA	3.75	423.12	0.784352	0.91440	0.80010	zircaloy	WABA

FP - Fuel Pin; FA - Fuel Assembly; BPRA - Burnable Poison Rod Assembly
OD - outer diameter; ID - inner diameter

Description	Assembly Type	Material	OD (cm)	ID (cm)
Instrument Tube	STD	zircaloy	1.22428	1.14300
	OFA	zircaloy	1.20396	1.12268
	MKBW	zircaloy	1.22428	1.14300
Guide Tube (Upper Region)	STD	zircaloy	1.22428	1.14300
	OFA	zircaloy	1.20396	1.12268
	MKBW	zircaloy	1.22428	1.14300
(Lower Region)	STD, OFA & MKBW	zircaloy	1.08966	1.00838

RCCAs	
Pellet Material	Ag-In-Cd
Fraction of Pellet Materials	Ag(80%), In(15.0%), Cd(5.0%)
Pellet Density	10.16 g/cc
Pellet OD	0.86614 cm
Clad Material	SS304
Clad OD	0.96774 cm
Clad ID	0.87376 cm

BPRAs (Annular)	Pyrex	WABA
Material	B_2O_3-SiO_2	B_4C-Al_2O_3
Boron Loading	12.5 wt% B_2O_3	14.0 wt% B_4C
	0.00624 g/cm (B-10)	0.006165 g/cm (B-10)
Absorber OD	0.85344 cm	0.8077 cm
Absorber ID	0.48260 cm	0.7061 cm
Clad Material	SS304	zircaloy
Outer Clad OD	0.96774 cm	0.96774 cm
Outer Clad ID	0.87376 cm	0.83570 cm
Inner Clad OD	0.46101 cm	0.67820 cm
Inner Clad ID	0.42799 cm	0.57150 cm

Table 3-2. Cycle Length and Time During Cycle Statepoint Data Measured for Cycles 1-7

Cycle	End-of-Cycle EFPD	Statepoint Number*	Time of Measurement EFPD
1	401.4	SP46	0.0
2	268.0	-	-
3	288.5	-	-
4	300.0	-	-
5	316.3	-	-
6	298.0	SP47	0.0
		SP48	62.4
7	408.0	SP49	0.0
		SP50	129.0
		SP51	282.3

* The unique statepoint numbers SP46, SP47, SP48, SP49, SP50, and SP51 are assigned to McGuire Unit 1 data.

3.2 Fuel Assembly Data

The fuel assembly loadings for each cycle are presented in Figures 3-1 through 3-7. A one-eighth core representation is used, where the fuel assembly at the center of the core is in location H8. Included in these figures are the location of the fuel assemblies in the current cycle, the location in a previous cycle (if applicable), the cycle that the fuel was first inserted, and the fuel batch number for each fuel assembly. The enrichment of U-235 (by batch), the locations of BPRAs, and number of burnable poison (BP) rods in each, and the location of the various control rod banks are also presented. The fuel assemblies with BPRAs may contain different number of BP rods (i.e., 4 to 20 BP rods). The location of these BP rods in a fuel assembly along with the orientation of the assembly in the reactor core are presented in Figure 3-8.

Each fuel assembly is given a unique alphanumeric designation which is then used in tracking the fuel assembly through its entire period of operation. This includes both the time that each fuel assembly was in the reactor during reactor operation (i.e., producing power) and the time spent in a non-power producing mode (e.g., in the reactor during shutdown or in the spent fuel pool).

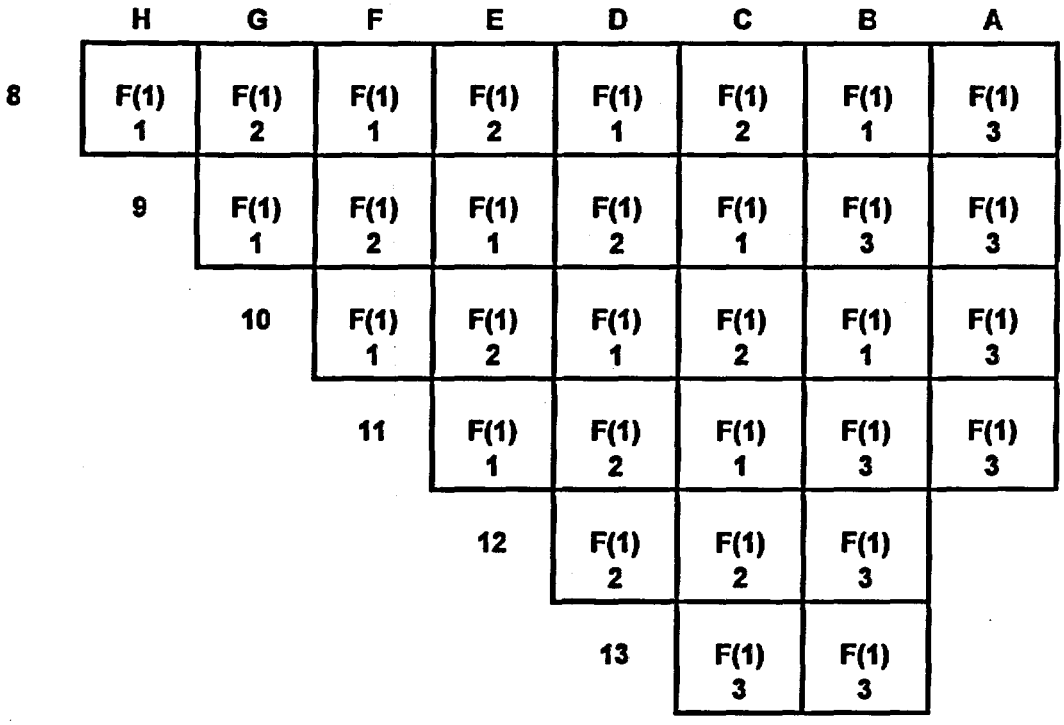
Starting with the letter A for cycle 1, each subsequent cycle is assigned a unique letter designation (B for cycle 2, C for cycle 3, to G for cycle 7). In addition, each one-eighth core

location is assigned a unique number. As noted in Table 2-2, the McGuire Unit 1 reactor contains 193 fuel assemblies. Assuming eighth core symmetry reduces this number to 31 fuel assemblies represented. Thus, the assemblies are numbered 1 through 31. Starting at the center of the core, location H8 is number 1. Numbers 2 through 8 are assigned to locations G8 through A8. Proceeding from left to right (then down), number 9 is assigned to location G9, number 15 to location A9, number 16 to location F10, number 22 to location E11, etc., to number 31 being assigned to location B13.

Using this nomenclature, the assemblies in cycle 1 are labeled A1 (for H8) through A31 (for B13). For subsequent cycles, a complete set of labels is not required since a combination of burned and fresh fuel is used. From Figure 3-10 it is seen that the first fresh fuel assembly encountered in cycle 2 is in location A8. Thus, the cycle 2 labeling for new fuel starts with assembly B8. Figures 3-9 through 3-15 were constructed by applying this nomenclature to the fuel assembly location data given in Figures 3-1 through 3-7. Note that the nomenclature accommodates the shuffling of symmetric components of fuel assemblies to two separate locations in the one-eighth core representation. This is seen in Figure 3-10 where assembly A21 from core location A10 (representing 8 fuel assemblies in the core) in cycle 1 was shuffled for cycle 2 to core locations F10 and G9 (each representing 4 fuel assemblies in the core). The assembly represented at location G9 was then given the identification A21a.

One of the four MKBW (batch 7C) assemblies represented by number E2 at location F10 in cycle 6 (see Figure 3-14) was removed from the core at the end of cycle 6, and the remaining three assemblies were shuffled into full core locations symmetric to location G9 in cycle 7. Assembly number E12 (batch 7A) from core location D8 in cycle 6 was shuffled to location G9 in cycle 7. For the statepoint calculations in cycle 7 (SP49, SP50, and SP51), a one-eighth core representation can be used with assembly number E2 inserted in location G9. However, for the beginning-of-cycle (BOC) statepoint (SP49), a full core representation should be analyzed with assembly number E12 in location G9 and assembly number E2 in the three full-core symmetric locations (i.e., locations J7, G7, and J9). This will quantify the effect on k_{eff} of making the one-eighth core approximation for the cycle 7 statepoints.

Figure 3-1. Cycle 1 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure changed from REV 00)



CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
1	1	2.108
	2	2.601
	3	3.106

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B13	9
A8, A10	10
B11	12
E8, C8, D9, E10, C10	16
G8, F9, B9, D11, C12	20

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-2. Cycle 2 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	B10 F(1) 1	C8 F(1) 2	A10 F(1) 3	G8 F(1) 2	B11 F(1) 3	B8 F(1) 1	D12 F(1) 2	 F(2) 4
9		A10 F(1) 3	B12 F(1) 3	C10 F(1) 2	B9 F(1) 3	E10 F(1) 2	 F(2) 4	 F(2) 4
10			C13 F(1) 3	A11 F(1) 3	D11 F(1) 2	C12 F(1) 2	D9 F(1) 2	 F(2) 4
11				B11 F(1) 3	A9 F(1) 3	F9 F(1) 2	 F(2) 4	 F(2) 4
12					A8 F(1) 3	B13 F(1) 3	 F(2) 4	
13						E8 F(1) 2	 F(2) 4	

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
2	1	2.108
	2	2.601
	3	3.106
	4	3.204

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B9, B11	4

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-3. Cycle 3 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	B10 * F(1) 1	B13 F(2) 4	D8 F(1) 3	F(3) 5	C11 * F(1) 1	A8 F(2) 4	F8 F(1) 3	B13 F(2) 4
9	D12 F(1) 3	A9 F(2) 4	F9 F(1) 3	F(3) 5	D11 F(1) 3	F(3) 5	A11 F(2) 4	
10	E11 F(1) 3	F(3) 5	D9 F(1) 3	F(3) 5	C12 F(1) 3	B12 F(2) 4		
11	F10 F(1) 3	F(3) 5	E10 F(1) 3	F(3) 5	B11 F(2) 4			
12	D10 * F(1) 1	F(3) 5	B9 F(2) 4					
13	G9 F(1) 3	A10 F(2) 4						

* = Cycle 1 Location

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
3	1	2.108
	2	2.601
	3	3.106
	4	3.204
	5	3.204

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B9, C12	4
E8, D9, E10, C10, D11	8

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-4. Cycle 4 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	B10 * F(1) 1	F(4) 6A	G8 F(2) 4	E8 F(3) 5	D9 F(3) 5	B9 F(3) 5	C8 F(2) 4	F(4) 6B
9	B10* F(1) 1	C12 F(3) 5	A9 F(2) 4	F(4) 6A	F9 F(2) 4	F(4) 6B	B11 F(3) 5	
10	A11 F(2) 4	F(4) 6B	E9 * F(1) 1	F(4) 6B	A10 F(2) 4	F(4) 6B		
11	B9 F(3) 5	C10 F(3) 5	B12 F(2) 4	F(4) 6B	B13 F(2) 4			
12	E10 F(3) 5	F(4) 6B	D11 F(3) 5					
13	D9 F(3) 5	A8 F(2) 4						

* = Cycle 1 Location

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
4	1	2.108
	4	3.204
	5	3.204
	6A	3.2
	6B	3.4

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B9, C12, G8	4
D9, C10	8
E10	12

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-5. Cycle 5 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	A11 * F(2) 4	F(5) 7C	C13 F(3) 5	E10 F(4) 6B	D8 F(3) 5	A8 F(4) 6B	G8 F(4) 6A	F(5) 7B
9		E11 F(3) 5	F(5) 7A	D9 F(4) 6A	F(5) 7A	B12 F(3) 5	F(5) 7A	C12 F(4) 6B
10			D12 F(3) 5	F(5) 7A	D11 F(3) 5	A10 F(4) 6B	B11 F(4) 6B	F(5) 7A
11				E8 F(3) 5	F(5) 7A	C10 F(4) 6B	F(5) 7B	F9 F(3) 5
12					C8 F(3) 5	F(5) 7A	B9 F(4) 6B	
13						E10 F(4) 6B	A9 F(3) 5	

* = Cycle 3 Location

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
5	4	3.204
	5	3.204
	6A	3.20
	6B	3.40
	7A	3.40
	7B	3.60
	7C	2.92

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
G8, B11, C12	4
F9, D9, B9, E10, D11	8

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-6. Cycle 6 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	A11* F(2) 4	F(6) 8	B10 F(4) 6B	F(6) 8	D9 F(5) 7A	A8 F(5) 7B	B12 F(4) 6B	F(6) 8
9	B12 F(4) 6B	A10 F(5) 7A	C10 F(4) 6B	F(6) 8	A9 F(4) 6B	F(6) 8	F9 F(5) 7A	
10	G8 F(5) 7C	F(6) 8	B13 F(3) 5	F(6) 8	D11 F(5) 7A	F(6) 8		
11	C13 F(4) 6B	F(6) 8	C12 F(5) 7A	F(6) 8	E10 F(5) 7A			
12	C8 F(4) 6B	F(6) 8	B11 F(5) 7B					
13	D9 F(5) 7A	B9 F(5) 7A						

* = Cycle 3 Location

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
6	4	3.204
	5	3.204
	6B	3.40
	7A	3.40
	7B	3.60
	7C	2.92
	8	3.60

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B11	4
B9, C12	8
G8, E8, D9, E10, C10, D11	12

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-7. Cycle 7 One-Eighth Core Loading for McGuire Unit 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	B13* F(2) 4		G8 F(6) 8		C8 F(5) 7B	A8 F(6) 8	A11 F(5) 7A	
		F(7) 9		F(7) 9				F(7) 9
9		F10$ F(5) 7C		B12 F(5) 7B		C10 F(6) 8		D9 F(6) 8
			F(7) 9		F(7) 9		F(7) 9	
		10	B13 F(5) 7A		A9 F(5) 7A		A10 F(6) 8	D11 F(6) 8
				F(7) 9		F(7) 9		
			11	A11 F(5) 7A		C12 F(6) 8		B9 F(6) 8
					F(7) 9		F(7) 9	
	* = Cycle 4 Location			12	B13 F(5) 7A		B11 F(6) 8	
						F(7) 9		
					13	E8 F(6) 8	E10 F(6) 8	

$ - In cycle 7, the assembly in full-core location G9 was replaced by an assembly from cycle 6 eighth-core location D8. The 3 assemblies in locations symmetric to G9 are the same as the assembly in cycle 6 location F10.

CR	= Previous FA position Column/Row (C/R) - 1/8th Core
F	= Cycle FA was Fresh (F)
B	= Fuel Batch (B)

Cycle	Batch	Wt% U-235
7	4	3.204
	7A	3.40
	7B	3.60
	7C	2.92
	8	3.60
	9	3.75

BPRA Loading	
Fuel Assembly Location	Number BP Rods/ Assembly
B11, C12	8
F9, B9, E10	12
G8, E8, D9, C10, D11	16

Control Rod Bank	Core Location
CA	F8
CB	B10
CC	B8, F10
CD	H8, D12

Figure 3-8. Burnable Poison Rod Locations within a Fuel Assembly (Note: This figure was changed for REV 01)

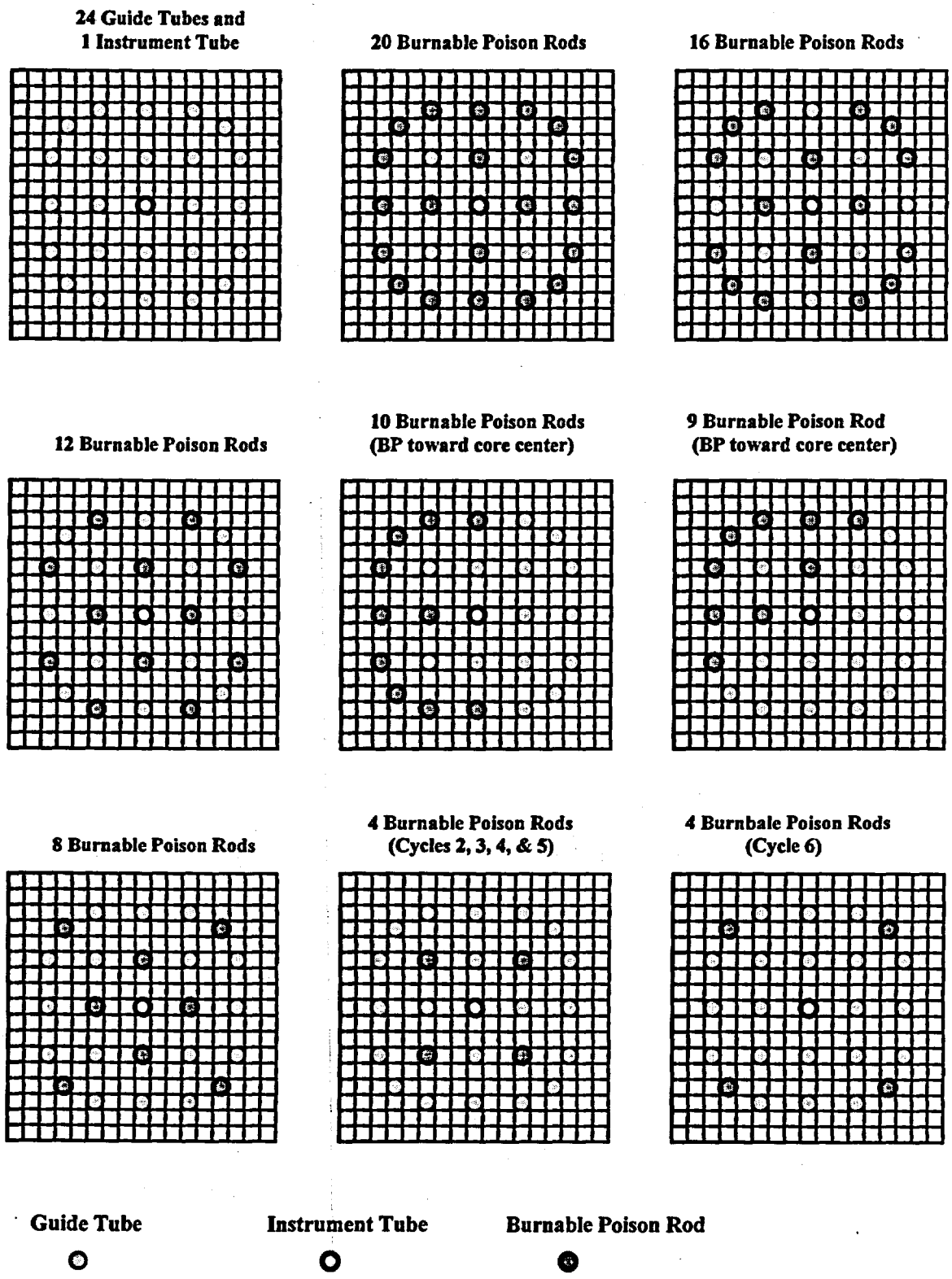
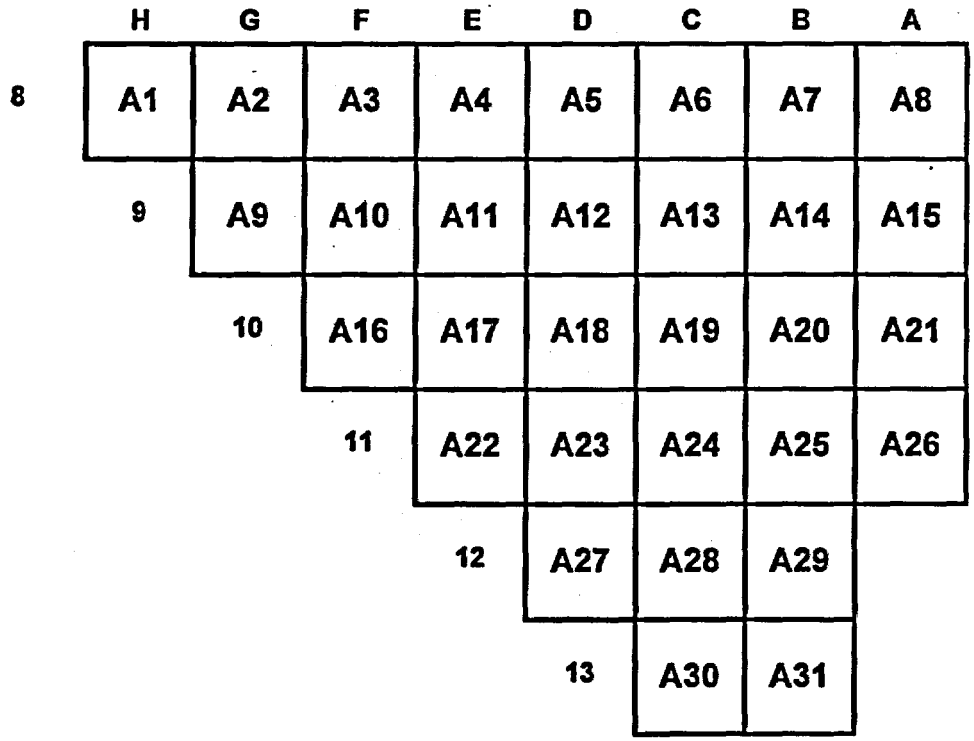
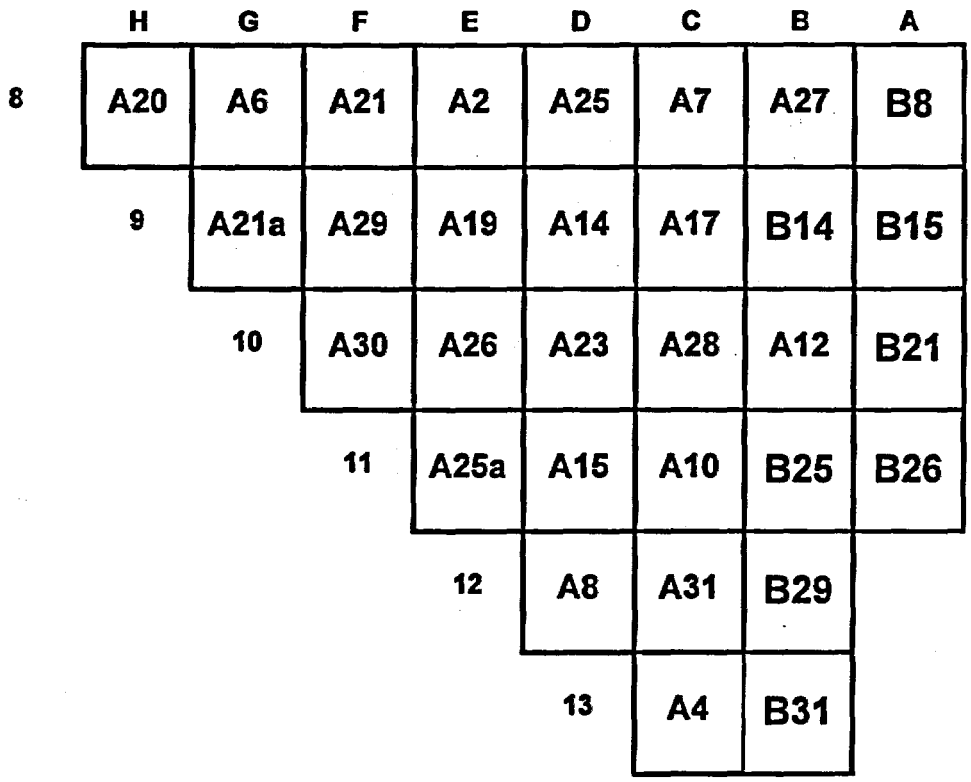


Figure 3-9. Cycle 1 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)



A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-10. Cycle 2 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)



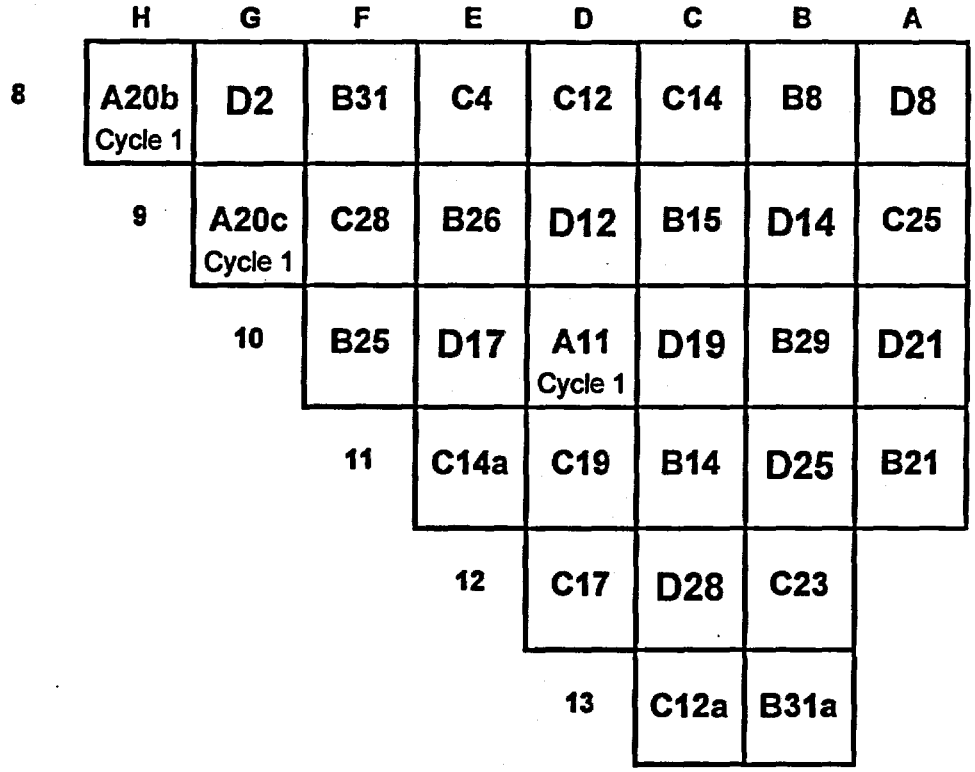
A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-11. Cycle 3 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	A20a Cycle 1	B31	A25	C4	A24 Cycle 1	B8	A21	B31a
9	A8	B15	A29	C12	A15	C14	B26	
10	A25a	C17	A14	C19	A31	B29		
11	A30	C23	A26	C25	B25			
12	A18 Cycle 1	C28	B14					
13	A21a	B21						

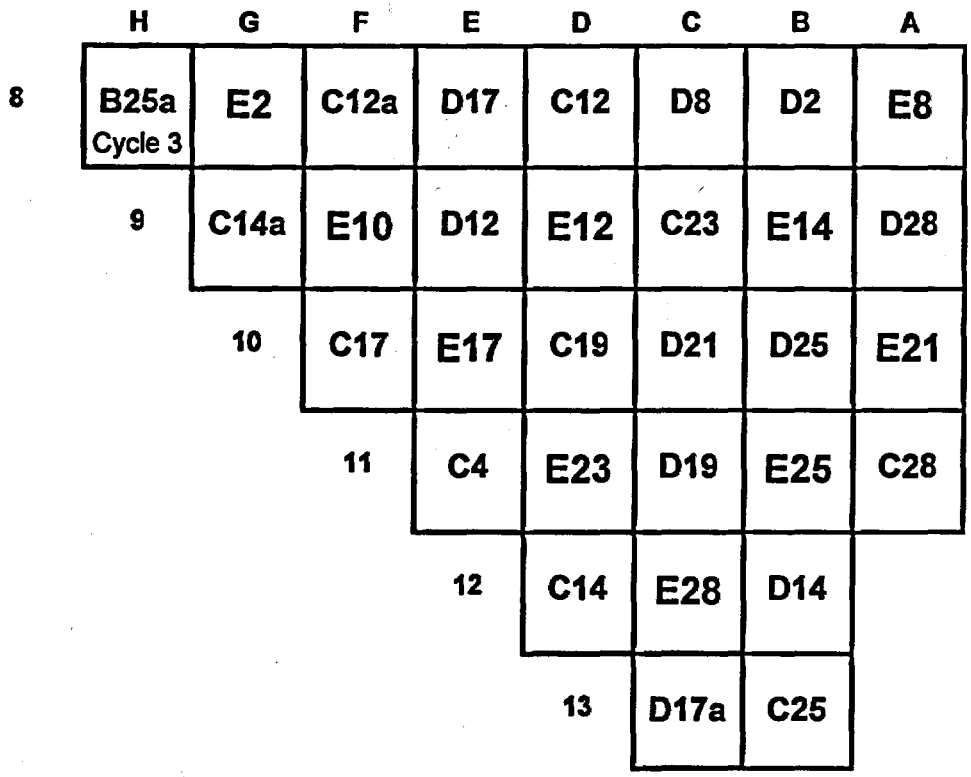
A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-12. Cycle 4 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)



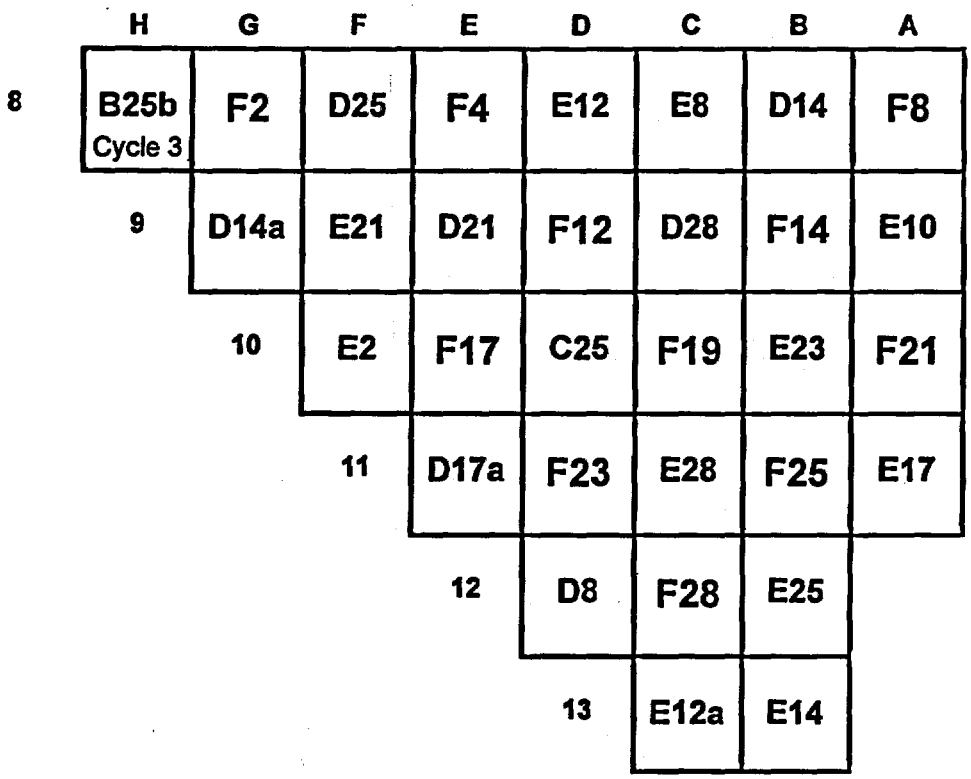
A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-13. Cycle 5 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)



A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-14. Cycle 6 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)



A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

Figure 3-15. Cycle 7 Fuel Assembly Identification & Locations for McGuire 1 (Note: This figure was added to REV 01)

	H	G	F	E	D	C	B	A
8	B31a Cycle 4	G2	F2	G4	E8	F8	E17	G8
9	E2*	G10	E25	G12	F19	G14	F12	
10	E14	G17	E10	G19	F21	F23		
11	E17a	G23	F28	G25	F14			
12	E14a	G28	F25					
13	F4	F17						

* The assembly in location G9 in cycle 7 is E12. The three assemblies symmetric to location G9 are the same as assembly E2. Thus, for eighth core calculations assembly E2 is used.

A Cycle 1
B Cycle 2
C Cycle 3
D Cycle 4
E Cycle 5
F Cycle 6
G Cycle 7

To aid in the burnup calculations, and thus the generation of isotopic data for the statepoint calculations, the information provided in Figures 3-1 through 3-15 was reduced to two tables. Table 3-3 traces each fuel assembly (and subsequent split by shuffling symmetric components to more than one location, if applicable) by assembly identification and cycle from the time the assembly was first inserted in the reactor to either cycle 6 or cycle 7. Those assemblies which split for a subsequent cycle (i.e., with an "a" or "b" designator) carry a hyphen (-) designator in the cycle column to indicate those cycles where the assemblies are present prior to the split. This will aid the burnup calculation process by indicating where redundant data generation is not required. Note that only those fuel assemblies which contribute to the statepoint calculations in cycles 6 or 7 are included in this table. These are the fuel assemblies that require burnup calculations. The location of each assembly in each cycle is indicated by the coordinates given in the figures (e.g., H8, B13).

Table 3-4 is a repeat of portions of Table 3-3 where control rod bank insertion and burnable absorber (BA) loadings are given for those assemblies that contained control rods or burnable absorber rods during cycle operation. Control rod insertion and burnable absorber rods must be modeled in the burnup calculations for those assemblies and axial locations where either type of rod are present. (More data concerning control rod insertion time by axial node is given in Section 4.) The rod bank indicator CD is given for those assemblies and cycles where rod bank CD was inserted. (This is the only bank inserted during normal cycle operation.) The burnable absorber loadings are given as the number of burnable absorber (or burnable poison) rods present in the fuel assembly. For those cycles where the rod bank or the burnable absorber rods are not present, the assembly presence in the core is indicated with an "X".

Table 3-3. Fuel Assembly Locations by Cycle for Burnup Calculations (Note: This table was added to REV 01)

Assembly Number/Batch	Assembly Location in Cycle 1	2	3	4	5	6	7	Comments
No assemblies from cycle 1 are present in cycles 6 or 7								Cycle 1
B25b/4		B11	A11			H8		Cycle 2
B31a/4		B13	A8	B13			H8	
C25/5			B11	A9	B13	D10		Cycle 3
D8/6B				A8	C8	D12		Cycle 4
D14/6B				B9	B12	B8		
D14a/6B				-	-	G9		
D17a/6B				E10	C13	E11		
D21/6B				A10	C10	E9		
D25/6B				B11	B10	F8		
D28/6B				C12	A9	C9		
E2/7C					G8	F10	G9*	Cycle 5
E8/7B					A8	C8	D8	* For cycle 7, assembly
E10/7A					F9	A9	D10	E2 represents 3 batch 7C
E12/7A					D9	D8	G9*	assemblies in a full core
E12a/7A					-	C13		representation (I.e.,
E14/7A					B9	B13	F10	symmetric to location G9).
E14a/7A					-	-	D12	Assembly E12 represents
E17/7A					E10	A11	B8	1 batch 7A assembly
E17a/7A					-	-	E11	in location G9. BOC cycle 7
E21/7A					A10	F9		should be examined with a
E23/7A					D11	B10		full core representation to
E25/7B					B11	B12	E9	examine asymmetry effects.
E28/7A					C12	C11		
F2/8						G8	F8	Cycle 6
F4/8						E8	C13	
F8/8						A8	C8	
F12/8						D9	A9	
F14/8						B9	A11	
F17/8						E10	B13	
F19/8						C10	C9	
F21/8						A10	B10	
F23/8						D11	A10	
F25/8						B11	B12	
F28/8						C12	C11	
G2/9							G8	Cycle 7
G4/9							E8	
G8/9							A8	
G10/9							F9	
G12/9							D9	
G14/9							B9	
G17/9							E10	
G19/9							C10	
G23/9							D11	
G25/9							B11	
G28/9							C12	

Table 3-4. Control Rod and BA Loading by Cycle for Burnup Calculations (Note: This table was added to REV 01)

Assembly Number/Batch	Number of BA Rods or Rod Bank ID# / Assembly Location in Cycle 1	2	3	4	5	6	7	Cycle Burnable Absorber Type
No assemblies from cycle 1 are present in cycles 6 or 7								Cycle 1
B25b/4		4/B11	X			CD/H8		Cycle 2
B31a/4		X	X	X			CD/H8	BA => Pyrex
	CD=> Rod bank; X=> Assembly also present in cycle indicated							
No assemblies from cycle 3 with BA or rod histories are present in cycles 6 or 7								Cycle 3
D8/6B				X	X	CD/D12		Cycle 4
D14/6B				4/B9	X	X		BA => Pyrex
D14a/6B				4/B9	X	X		
D17a/6B				12/E10	X	X		
D28/6B				4/C12	X	X		
E2/7C					4/G8	X	X	Cycle 5
E10/7A					8/F9	X	X	BA => WABA
E12/7A					8/D9	X	X	
E12a/7A					8/D9	X		
E14/7A					8/B9	X	X	
E14a/7A					8/B9	X	CD/D12	
E17/7A					8/E10	X	X	
E17a/7A					8/E10	X	X	
E23/7A					8/D11	X		
E25/7B					4/B11	X	X	
E28/7A					4/C12	X		
F2/8						12/G8	X	Cycle 6
F4/8						12/E8	X	BA => WABA
F12/8						12/D9	X	
F14/8						8/B9	X	
F17/8						12/E10	X	
F19/8						12/C10	X	
F23/8						12/D11	X	
F25/8						4/B11	X	
F28/8						8/C12	X	
G2/9							16/G8	Cycle 7
G4/9							16/E8	BA => WABA
G10/9							12/F9	
G12/9							16/D9	
G14/9							12/B9	
G17/9							12/E10	
G19/9							16/C10	
G23/9							16/D11	
G25/9							8/B11	
G28/9							8/C12	

4.0 CORE OPERATIONS AND STATEPOINT INFORMATION

This section provides core operations data for the burnup calculations required to generate isotopic concentrations for the statepoint evaluations. The measured critical conditions for the statepoints evaluated are also contained in this section.

4.1 Core Follow Data

The use of commercial reactor criticality data for model validation requires detailed knowledge of how the reactor was operated for the lifetime of every fuel assembly contributing to the criticality database. This is necessary in order to adequately model the conditions for burnup calculations at each axial location of each fuel assembly represented in the reactor core for each statepoint evaluation. Thus, core follow calculations based on core operation data are used to provide local conditions as a function of time to be used for all burnup calculations performed in support of the statepoint evaluations. In addition, measured global data such as rod insertions and boron letdown data are also provided.

The core follow calculations provide three-dimensional thermal-hydraulic (TH) feedback and burnup data. These data are presented at axial node locations. The nodal spacings for the axial nodes are presented in Table 4-1, where node 1 represents the top axial node in the reactor core. Tables 4-2 through 4-46 provide axial burnup profiles for each assembly at each datapoint or statepoint along with axial fuel temperature and moderator specific volume distributions used in the burnup calculations between datapoints or statepoints. The statepoint evaluations for McGuire 1 were performed at beginning-of-life (0 EFPD of cycle 1), BOC of cycle 6 (0 EFPD), 62.4 EFPD of cycle 6, BOC (0 EFPD) of cycle 7, 129.0 EFPD of cycle 7, and 282.3 EFPD of cycle 7. Some of the fuel assemblies present in cycle 6 and 7 for the statepoint evaluations were initially inserted in the core in cycles 2, 3, 4 , and 5. No cycle 1 assemblies appear in cycles 6 or 7. The modeling of fuel assembly operating history for assemblies which were first inserted prior to cycles 6 or 7 require burnup, fuel temperature, and moderator specific volume data for the cycles since the fuel was first inserted into the core. These data are provided at datapoints for the cycles prior to cycle 6 and at statepoints for cycles 6 and 7. The data is also given by axial node location.

Control rod insertion time (by axial node) for each assembly with a control rod inserted during core operation is provided in Tables 4-47 through 4-50. This data was also obtained from the core follow calculations based on core operation data. In addition, boron letdown data for cycles 2 through 7 are provided in Table 4-51. Boron letdown data for cycle 1 is not required since no fuel assemblies from cycle 1 are present for the statepoint calculations in cycles 6 or 7 and no burnup calculations are required for cycle 1. The data provided in Table 4-51 are coefficients from a linear regression fit of core operation data for each cycle.

Table 4-1. Axial Node Spacings for McGuire 1 Burnup Calculations

Axial Node	Node Spacings (cm)
1	22.86
2	22.86
3	22.86
4	22.86
5	22.86
6	22.86
7	22.86
8	22.86
9	22.86
10	22.86
11	22.86
12	22.86
13	22.86
14	22.86
15	22.86
16	22.86

Table 4-2. Burnup and TH Feedback Parameters by Axial Node for Assembly B25b

Axial	Burnup	DP1 to DP2		Burnup	DP2 to DP3		Burnup	DP3 to SP47	
Node	DP2	T-Fuel	Spec.Vol	DP3	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol
1	6.956	978.5	0.0249	8.748	723.7	0.0227	10.579	749.3	0.0228
2	11.217	1142.0	0.0247	14.064	777.6	0.0227	16.741	794.1	0.0227
3	13.162	1199.6	0.0244	16.483	795.9	0.0226	19.399	798.5	0.0226
4	13.932	1212.1	0.0242	17.461	800.5	0.0225	20.405	794.2	0.0226
5	14.263	1210.8	0.0239	17.886	800.0	0.0224	20.800	788.4	0.0225
6	14.456	1207.1	0.0237	18.119	797.5	0.0223	20.999	783.1	0.0224
7	14.613	1204.2	0.0235	18.289	794.1	0.0223	21.141	778.7	0.0223
8	14.763	1202.8	0.0232	18.434	790.5	0.0222	21.267	775.2	0.0222
9	14.906	1203.0	0.0230	18.562	786.9	0.0221	21.389	772.5	0.0221
10	15.044	1204.7	0.0228	18.675	783.6	0.0220	21.506	770.7	0.0221
11	15.176	1208.4	0.0226	18.768	780.1	0.0220	21.616	769.8	0.0220
12	15.285	1213.8	0.0224	18.818	776.2	0.0219	21.694	770.0	0.0219
13	15.291	1218.8	0.0222	18.723	770.6	0.0218	21.633	771.1	0.0218
14	14.894	1213.3	0.0220	18.135	761.5	0.0217	21.047	772.0	0.0218
15	13.194	1162.3	0.0218	16.013	742.3	0.0217	18.747	765.7	0.0217
16	8.280	975.3	0.0217	10.079	689.3	0.0216	11.983	721.9	0.0216

Axial	Burnup	SP47 to SP48	
Node	SP48	T-Fuel	Spec.Vol
1	11.391	756.8	0.0242
2	18.379	850.9	0.0241
3	22.059	995.8	0.0240
4	23.412	1042.7	0.0237
5	23.942	1057.1	0.0235
6	24.199	1060.3	0.0233
7	24.355	1057.0	0.0231
8	24.464	1049.3	0.0229
9	24.543	1038.1	0.0227
10	24.595	1023.9	0.0225
11	24.618	1006.7	0.0223
12	24.584	986.3	0.0222
13	24.378	961.8	0.0220
14	23.587	930.1	0.0219
15	20.929	881.4	0.0217
16	13.385	794.3	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP1	0.0 / Cy2
DP2	0.0 / Cy3
DP3	160.0 / Cy3
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-3. Burnup and TH Feedback Parameters by Axial Node for Assembly B31a

Axial	Burnup	DP1 to DP2		Burnup	DP2 to DP3		Burnup	DP3 to DP4	
Node	DP2	T-Fuel	Spec.Vol	DP3	T-Fuel	Spec.Vol	DP4	T-Fuel	Spec.Vol
1	3.887	805.4	0.0233	6.624	823.9	0.0235	9.305	848.6	0.0235
2	6.447	921.6	0.0232	10.823	918.3	0.0234	14.752	918.8	0.0234
3	7.648	965.7	0.0231	12.760	948.9	0.0232	17.058	930.3	0.0232
4	8.126	976.5	0.0230	13.561	957.4	0.0231	17.913	925.3	0.0231
5	8.312	976.1	0.0228	13.904	959.0	0.0230	18.231	918.1	0.0230
6	8.401	973.3	0.0227	14.076	957.3	0.0228	18.373	911.9	0.0228
7	8.464	970.8	0.0226	14.184	954.3	0.0227	18.462	907.2	0.0227
8	8.520	969.3	0.0225	14.263	951.1	0.0226	18.537	903.9	0.0226
9	8.573	968.7	0.0224	14.321	948.0	0.0224	18.607	901.7	0.0225
10	8.624	969.2	0.0222	14.362	945.2	0.0223	18.676	900.9	0.0223
11	8.673	970.7	0.0221	14.379	942.2	0.0222	18.740	901.5	0.0222
12	8.707	973.0	0.0220	14.350	938.4	0.0220	18.776	903.8	0.0221
13	8.679	974.2	0.0219	14.192	931.7	0.0219	18.691	907.8	0.0220
14	8.404	966.8	0.0218	13.638	917.6	0.0218	18.157	911.1	0.0218
15	7.366	926.8	0.0217	11.917	883.9	0.0217	16.158	900.1	0.0217
16	4.527	797.4	0.0216	7.379	785.2	0.0216	10.299	821.6	0.0216

Axial	Burnup	DP4 to DP5		Burnup	DP5 to SP49		Burnup	SP49 to SP50	
Node	DP5	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	10.535	681.1	0.0225	11.803	703.5	0.0226	13.422	742.5	0.0239
2	16.686	719.8	0.0224	18.634	734.2	0.0225	22.159	883.0	0.0238
3	19.310	732.9	0.0224	21.551	740.4	0.0224	26.377	947.7	0.0236
4	20.296	736.8	0.0223	22.638	740.0	0.0224	27.962	971.8	0.0234
5	20.659	736.7	0.0222	23.024	737.5	0.0223	28.576	981.6	0.0233
6	20.807	734.9	0.0222	23.172	734.9	0.0222	28.833	983.8	0.0231
7	20.883	732.3	0.0221	23.251	732.7	0.0222	28.952	981.4	0.0229
8	20.936	729.5	0.0220	23.315	731.0	0.0221	29.011	976.0	0.0227
9	20.979	726.6	0.0220	23.381	729.6	0.0220	29.037	968.3	0.0226
10	21.017	723.7	0.0219	23.450	728.7	0.0220	29.035	958.6	0.0224
11	21.044	720.7	0.0219	23.516	728.4	0.0219	28.994	946.5	0.0222
12	21.033	717.3	0.0218	23.548	728.7	0.0219	28.869	931.2	0.0221
13	20.879	712.6	0.0218	23.422	729.8	0.0218	28.507	910.9	0.0220
14	20.224	705.4	0.0217	22.727	730.6	0.0217	27.432	882.0	0.0218
15	17.968	692.4	0.0217	20.237	725.7	0.0217	24.250	835.9	0.0217
16	11.479	656.3	0.0216	13.009	693.7	0.0216	15.587	760.0	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP1	0.0 / Cy2
DP2	0.0 / Cy3
DP3	160.0 / Cy3
DP4	0.0 / Cy4
DP5	136.2 / Cy4
SP49	0.0 / Cy7
SP50	129.0 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-3. Burnup and TH Feedback Parameters by Axial Node for Assembly B31a (Cont'd)

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	15.964	824.9	0.0241
2	27.354	948.1	0.0240
3	32.785	977.3	0.0238
4	34.675	983.3	0.0236
5	35.346	980.1	0.0234
6	35.591	973.9	0.0232
7	35.687	967.7	0.0230
8	35.732	962.7	0.0229
9	35.762	959.1	0.0227
10	35.783	956.9	0.0225
11	35.782	955.9	0.0224
12	35.699	955.2	0.0222
13	35.343	952.4	0.0220
14	34.128	940.5	0.0219
15	30.347	907.9	0.0218
16	19.794	821.7	0.0216

Table 4-4. Burnup and TH Feedback Parameters by Axial Node for Assembly C25

Axial	Burnup	DP2 to DP3		Burnup	DP3 to DP4		Burnup	DP4 to DP5	
Node	DP3	T-Fuel	Spec.Vol	DP4	T-Fuel	Spec.Vol	DP5	T-Fuel	Spec.Vol
1	3.650	948.8	0.0247	7.243	969.7	0.0245	9.479	791.0	0.0234
2	6.077	1126.6	0.0245	11.492	1083.0	0.0244	15.076	870.1	0.0233
3	7.328	1199.8	0.0243	13.377	1110.6	0.0241	17.584	899.5	0.0231
4	7.946	1227.3	0.0240	14.142	1110.2	0.0239	18.616	908.7	0.0230
5	8.271	1236.0	0.0238	14.471	1103.2	0.0237	19.055	909.9	0.0229
6	8.460	1237.2	0.0236	14.640	1096.1	0.0235	19.262	907.8	0.0227
7	8.579	1235.9	0.0233	14.751	1090.8	0.0233	19.377	904.6	0.0226
8	8.658	1234.0	0.0231	14.842	1087.5	0.0231	19.455	900.9	0.0225
9	8.710	1232.6	0.0229	14.928	1085.9	0.0229	19.516	897.2	0.0224
10	8.735	1231.7	0.0227	15.012	1086.3	0.0227	19.566	893.4	0.0222
11	8.727	1230.9	0.0225	15.090	1088.9	0.0225	19.595	889.2	0.0221
12	8.659	1228.5	0.0223	15.136	1094.1	0.0223	19.568	883.9	0.0220
13	8.473	1220.4	0.0221	15.072	1101.5	0.0221	19.378	875.6	0.0219
14	8.014	1195.2	0.0219	14.643	1105.4	0.0220	18.697	860.4	0.0218
15	6.872	1122.9	0.0218	13.060	1083.1	0.0218	16.551	827.6	0.0217
16	4.167	926.0	0.0216	8.359	958.2	0.0217	10.547	745.5	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP2	0.0 / Cy3
DP3	160.0 / Cy3
DP4	0.0 / Cy4
DP5	136.2 / Cy4
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-4. Burnup and TH Feedback Parameters by Axial Node for Assembly C25 (Cont'd)

Axial	Burnup	DP5 to DP6		Burnup	DP6 to DP7		Burnup	DP7 to SP47	
Node	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol
1	12.717	816.0	0.0234	13.966	664.1	0.0223	15.607	691.5	0.0224
2	19.811	872.8	0.0233	21.737	692.3	0.0223	24.070	716.0	0.0224
3	22.772	881.6	0.0232	25.005	703.9	0.0222	27.529	719.1	0.0223
4	23.878	879.0	0.0230	26.252	707.0	0.0222	28.792	715.2	0.0223
5	24.296	874.1	0.0229	26.730	706.2	0.0221	29.240	710.5	0.0222
6	24.474	870.2	0.0228	26.927	703.8	0.0221	29.406	706.5	0.0221
7	24.577	867.4	0.0227	27.027	700.9	0.0220	29.485	703.5	0.0221
8	24.660	865.7	0.0225	27.097	698.0	0.0220	29.542	701.2	0.0220
9	24.745	864.7	0.0224	27.160	695.1	0.0219	29.603	699.4	0.0220
10	24.835	864.6	0.0223	27.222	692.2	0.0219	29.671	698.2	0.0219
11	24.924	865.4	0.0222	27.274	689.3	0.0218	29.738	697.4	0.0219
12	24.974	867.4	0.0221	27.274	686.0	0.0218	29.763	697.3	0.0218
13	24.864	870.6	0.0220	27.090	681.8	0.0217	29.608	697.8	0.0218
14	24.191	872.1	0.0218	26.291	675.5	0.0217	28.818	698.1	0.0217
15	21.690	860.5	0.0217	23.535	663.6	0.0216	25.933	693.5	0.0217
16	14.108	797.1	0.0216	15.335	638.0	0.0216	17.069	668.1	0.0216

Axial	Burnup	SP47 to SP48	
Node	SP48	T-Fuel	Spec.Vol
1	16.944	824.3	0.0240
2	26.140	900.0	0.0239
3	29.987	944.5	0.0237
4	31.465	969.3	0.0235
5	32.036	982.9	0.0233
6	32.269	988.2	0.0231
7	32.376	988.0	0.0229
8	32.434	983.6	0.0228
9	32.471	975.7	0.0226
10	32.492	964.6	0.0224
11	32.488	950.2	0.0223
12	32.413	932.0	0.0221
13	32.121	908.3	0.0220
14	31.129	876.1	0.0218
15	27.905	830.8	0.0217
16	18.356	755.8	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-5. Burnup and TH Feedback Parameters by Axial Node for Assembly D8

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	2.475	864.4	0.0238	6.070	891.2	0.0238	10.567	955.7	0.0246
2	4.140	1016.1	0.0237	9.613	995.0	0.0237	16.490	1070.5	0.0244
3	4.961	1081.1	0.0235	11.072	1018.3	0.0235	18.945	1110.2	0.0242
4	5.329	1105.4	0.0234	11.583	1019.6	0.0234	19.863	1119.6	0.0240
5	5.490	1112.7	0.0232	11.750	1015.6	0.0232	20.209	1118.1	0.0237
6	5.557	1113.4	0.0230	11.806	1012.3	0.0231	20.343	1112.3	0.0235
7	5.580	1111.7	0.0229	11.833	1010.4	0.0229	20.395	1105.0	0.0233
8	5.580	1109.4	0.0227	11.859	1009.9	0.0228	20.414	1097.5	0.0230
9	5.566	1107.0	0.0225	11.892	1010.5	0.0226	20.416	1090.3	0.0228
10	5.540	1104.7	0.0224	11.933	1012.1	0.0225	20.403	1083.5	0.0226
11	5.497	1101.7	0.0222	11.978	1015.2	0.0223	20.365	1076.5	0.0224
12	5.420	1096.6	0.0221	12.012	1019.9	0.0222	20.269	1068.2	0.0223
13	5.270	1085.7	0.0220	11.970	1025.9	0.0220	20.013	1056.6	0.0221
14	4.946	1059.0	0.0218	11.637	1028.0	0.0219	19.279	1036.7	0.0219
15	4.189	990.9	0.0217	10.361	1006.6	0.0218	17.095	992.7	0.0218
16	2.496	825.4	0.0216	6.573	886.2	0.0216	10.968	874.6	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	15.666	962.8	0.0246	16.375	726.8	0.0241
2	23.590	1039.5	0.0244	25.032	803.8	0.0240
3	26.558	1052.6	0.0241	28.939	936.1	0.0238
4	27.512	1046.2	0.0239	30.256	986.2	0.0237
5	27.798	1036.4	0.0237	30.712	1006.9	0.0235
6	27.881	1028.2	0.0235	30.888	1016.0	0.0232
7	27.914	1022.2	0.0233	30.965	1017.9	0.0230
8	27.943	1018.3	0.0231	31.007	1015.0	0.0228
9	27.982	1016.1	0.0229	31.031	1008.2	0.0227
10	28.033	1015.5	0.0227	31.041	997.8	0.0225
11	28.088	1016.7	0.0225	31.030	983.6	0.0223
12	28.119	1020.0	0.0223	30.959	964.9	0.0221
13	28.011	1025.2	0.0221	30.702	939.6	0.0220
14	27.363	1028.4	0.0220	29.827	903.6	0.0218
15	24.827	1013.7	0.0218	26.906	850.2	0.0217
16	16.568	924.0	0.0217	17.899	764.8	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-6. Burnup and TH Feedback Parameters by Axial Node for Assembly D14

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	3.568	989.5	0.0250	8.635	1002.6	0.0250	11.032	771.5	0.0232
2	5.868	1181.0	0.0248	13.444	1115.3	0.0248	17.286	845.2	0.0231
3	7.004	1261.9	0.0245	15.438	1147.3	0.0245	19.984	872.5	0.0230
4	7.521	1292.4	0.0243	16.154	1149.0	0.0242	21.034	880.6	0.0229
5	7.758	1302.7	0.0240	16.412	1144.7	0.0240	21.445	880.1	0.0228
6	7.868	1304.7	0.0237	16.520	1141.1	0.0237	21.618	876.3	0.0227
7	7.915	1303.7	0.0235	16.587	1139.4	0.0235	21.705	871.4	0.0225
8	7.930	1301.7	0.0232	16.650	1139.3	0.0233	21.764	866.4	0.0224
9	7.924	1299.5	0.0230	16.720	1140.6	0.0231	21.815	861.5	0.0223
10	7.899	1297.4	0.0228	16.801	1143.3	0.0228	21.861	856.9	0.0222
11	7.850	1294.6	0.0225	16.887	1147.7	0.0226	21.895	852.0	0.0221
12	7.755	1289.3	0.0223	16.958	1154.5	0.0224	21.882	846.3	0.0220
13	7.561	1276.9	0.0221	16.933	1163.2	0.0222	21.713	838.3	0.0219
14	7.132	1245.5	0.0219	16.534	1168.0	0.0220	21.037	825.0	0.0218
15	6.103	1162.1	0.0218	14.860	1141.2	0.0218	18.761	798.3	0.0217
16	3.707	948.6	0.0216	9.619	1001.9	0.0217	12.107	728.8	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	14.002	805.6	0.0233	15.326	827.8	0.0239
2	21.618	858.2	0.0232	23.669	902.9	0.0238
3	24.740	868.6	0.0231	27.148	943.5	0.0236
4	25.857	864.5	0.0229	28.454	964.1	0.0235
5	26.238	857.4	0.0228	28.947	974.9	0.0233
6	26.373	851.2	0.0227	29.146	979.3	0.0231
7	26.440	846.6	0.0226	29.243	979.0	0.0229
8	26.497	843.3	0.0225	29.304	975.0	0.0227
9	26.563	841.2	0.0224	29.351	967.8	0.0226
10	26.641	840.0	0.0222	29.388	957.5	0.0224
11	26.725	840.0	0.0221	29.406	944.1	0.0222
12	26.781	841.2	0.0220	29.369	926.9	0.0221
13	26.689	843.3	0.0219	29.145	904.8	0.0220
14	26.035	843.7	0.0218	28.296	875.1	0.0218
15	23.473	831.0	0.0217	25.404	830.8	0.0217
16	15.430	775.5	0.0216	16.681	756.2	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-7. Burnup and TH Feedback Parameters by Axial Node for Assembly D14a

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	3.568	989.5	0.0250	8.635	1002.6	0.0250	11.032	771.5	0.0232
2	5.868	1181.0	0.0248	13.444	1115.3	0.0248	17.286	845.2	0.0231
3	7.004	1261.9	0.0245	15.438	1147.3	0.0245	19.984	872.5	0.0230
4	7.521	1292.4	0.0243	16.154	1149.0	0.0242	21.034	880.6	0.0229
5	7.758	1302.7	0.0240	16.412	1144.7	0.0240	21.445	880.1	0.0228
6	7.868	1304.7	0.0237	16.520	1141.1	0.0237	21.618	876.3	0.0227
7	7.915	1303.7	0.0235	16.587	1139.4	0.0235	21.705	871.4	0.0225
8	7.930	1301.7	0.0232	16.650	1139.3	0.0233	21.764	866.4	0.0224
9	7.924	1299.5	0.0230	16.720	1140.6	0.0231	21.815	861.5	0.0223
10	7.899	1297.4	0.0228	16.801	1143.3	0.0228	21.861	856.9	0.0222
11	7.850	1294.6	0.0225	16.887	1147.7	0.0226	21.895	852.0	0.0221
12	7.755	1289.3	0.0223	16.958	1154.5	0.0224	21.882	846.3	0.0220
13	7.561	1276.9	0.0221	16.933	1163.2	0.0222	21.713	838.3	0.0219
14	7.132	1245.5	0.0219	16.534	1168.0	0.0220	21.037	825.0	0.0218
15	6.103	1162.1	0.0218	14.860	1141.2	0.0218	18.761	798.3	0.0217
16	3.707	948.6	0.0216	9.619	1001.9	0.0217	12.107	728.8	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	14.005	805.6	0.0233	15.442	848.9	0.0242
2	21.622	858.2	0.0232	23.864	932.7	0.0240
3	24.742	868.6	0.0231	27.415	984.1	0.0239
4	25.858	864.5	0.0229	28.756	1010.3	0.0236
5	26.239	857.4	0.0228	29.252	1021.5	0.0234
6	26.374	851.2	0.0227	29.441	1024.2	0.0232
7	26.441	846.6	0.0226	29.522	1021.4	0.0230
8	26.498	843.3	0.0225	29.564	1014.4	0.0228
9	26.564	841.2	0.0224	29.591	1004.1	0.0226
10	26.643	840.0	0.0222	29.607	990.7	0.0225
11	26.726	840.0	0.0221	29.607	974.4	0.0223
12	26.783	841.2	0.0220	29.556	955.1	0.0221
13	26.691	843.3	0.0219	29.326	931.8	0.0220
14	26.038	843.7	0.0218	28.481	902.3	0.0218
15	23.479	831.0	0.0217	25.594	858.3	0.0217
16	15.435	775.5	0.0216	16.826	778.4	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-8. Burnup and TH Feedback Parameters by Axial Node for Assembly D17a

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	3.856	1017.7	0.0252	9.265	1022.4	0.0254	11.884	789.8	0.0235
2	6.310	1217.6	0.0250	14.481	1147.1	0.0252	18.711	870.9	0.0234
3	7.510	1303.4	0.0247	16.679	1187.1	0.0249	21.732	902.0	0.0232
4	8.017	1334.4	0.0244	17.424	1192.2	0.0246	22.882	912.2	0.0231
5	8.223	1343.3	0.0241	17.654	1189.5	0.0243	23.299	912.9	0.0229
6	8.298	1343.3	0.0239	17.723	1186.6	0.0240	23.447	909.4	0.0228
7	8.311	1340.0	0.0236	17.753	1185.4	0.0237	23.503	904.4	0.0227
8	8.293	1335.7	0.0233	17.782	1185.9	0.0235	23.529	899.1	0.0225
9	8.254	1331.1	0.0231	17.820	1187.6	0.0232	23.546	894.0	0.0224
10	8.196	1326.4	0.0228	17.867	1190.8	0.0230	23.556	889.0	0.0223
11	8.116	1320.9	0.0226	17.925	1195.7	0.0227	23.555	883.8	0.0221
12	8.000	1313.3	0.0224	17.978	1203.2	0.0225	23.514	877.5	0.0220
13	7.802	1300.0	0.0222	17.955	1213.8	0.0223	23.329	868.1	0.0219
14	7.387	1268.7	0.0220	17.566	1219.1	0.0220	22.633	851.9	0.0218
15	6.353	1184.1	0.0218	15.792	1184.6	0.0218	20.203	823.7	0.0217
16	3.878	965.5	0.0217	10.175	1026.8	0.0217	13.021	750.9	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	15.176	832.4	0.0235	16.511	827.8	0.0241
2	23.548	890.4	0.0234	25.659	909.1	0.0240
3	27.077	904.2	0.0233	29.630	961.7	0.0238
4	28.312	899.1	0.0231	31.114	992.6	0.0236
5	28.697	890.9	0.0230	31.638	1008.2	0.0234
6	28.805	884.0	0.0229	31.821	1014.6	0.0232
7	28.841	879.0	0.0227	31.889	1014.8	0.0230
8	28.867	875.6	0.0226	31.918	1010.4	0.0228
9	28.904	873.4	0.0225	31.930	1002.3	0.0226
10	28.953	872.4	0.0223	31.931	990.7	0.0225
11	29.011	872.6	0.0222	31.914	975.6	0.0223
12	29.050	874.2	0.0221	31.848	956.3	0.0221
13	28.954	876.8	0.0220	31.605	931.1	0.0220
14	28.289	877.6	0.0219	30.722	896.7	0.0218
15	25.563	864.2	0.0217	27.631	846.4	0.0217
16	16.850	803.3	0.0216	18.192	765.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-9. Burnup and TH Feedback Parameters by Axial Node for Assembly D21

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	2.322	846.6	0.0237	5.716	873.9	0.0237	10.195	961.9	0.0248
2	3.902	991.8	0.0236	9.091	975.4	0.0236	16.051	1084.6	0.0246
3	4.688	1054.7	0.0234	10.491	999.1	0.0234	18.576	1132.2	0.0244
4	5.044	1078.9	0.0233	10.988	1000.3	0.0233	19.576	1146.0	0.0241
5	5.202	1086.7	0.0231	11.154	997.1	0.0231	19.981	1146.2	0.0239
6	5.269	1087.8	0.0229	11.212	994.1	0.0230	20.154	1141.2	0.0236
7	5.294	1086.5	0.0228	11.241	992.4	0.0228	20.236	1134.4	0.0234
8	5.297	1084.4	0.0226	11.268	992.0	0.0227	20.277	1127.5	0.0231
9	5.286	1082.3	0.0225	11.301	992.6	0.0226	20.298	1120.9	0.0229
10	5.264	1080.2	0.0223	11.342	994.3	0.0224	20.301	1114.6	0.0227
11	5.225	1077.5	0.0222	11.388	997.3	0.0223	20.277	1108.2	0.0225
12	5.155	1072.7	0.0221	11.423	1001.9	0.0221	20.189	1100.5	0.0223
13	5.014	1062.2	0.0219	11.385	1007.7	0.0220	19.933	1088.9	0.0221
14	4.706	1036.2	0.0218	11.069	1009.8	0.0219	19.185	1067.5	0.0219
15	3.984	971.0	0.0217	9.849	988.9	0.0217	16.973	1019.0	0.0218
16	2.369	812.1	0.0216	6.234	871.4	0.0216	10.846	892.1	0.0217

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	15.313	970.3	0.0247	16.780	848.6	0.0241
2	23.266	1052.3	0.0245	25.518	931.7	0.0240
3	26.380	1067.4	0.0242	29.019	976.4	0.0238
4	27.451	1061.8	0.0240	30.293	999.5	0.0236
5	27.808	1051.8	0.0238	30.762	1011.0	0.0234
6	27.935	1043.3	0.0235	30.947	1014.6	0.0232
7	28.000	1037.3	0.0233	31.033	1012.8	0.0230
8	28.057	1033.5	0.0231	31.081	1006.8	0.0228
9	28.121	1031.4	0.0229	31.111	997.3	0.0226
10	28.195	1031.0	0.0227	31.129	984.8	0.0225
11	28.272	1032.4	0.0225	31.127	969.1	0.0223
12	28.321	1036.2	0.0223	31.069	949.8	0.0221
13	28.224	1041.8	0.0222	30.830	925.9	0.0220
14	27.567	1045.1	0.0220	29.972	894.0	0.0218
15	24.982	1029.4	0.0218	27.046	847.2	0.0217
16	16.629	935.2	0.0217	17.981	767.7	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-10. Burnup and TH Feedback Parameters by Axial Node for Assembly D25

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	3.243	952.2	0.0247	7.844	963.0	0.0246	11.787	900.6	0.0244
2	5.410	1137.2	0.0245	12.341	1072.1	0.0244	18.522	1008.3	0.0242
3	6.507	1216.6	0.0243	14.241	1101.4	0.0242	21.441	1046.3	0.0240
4	7.013	1247.4	0.0241	14.937	1104.6	0.0240	22.593	1057.0	0.0238
5	7.245	1257.7	0.0238	15.185	1101.7	0.0237	23.059	1057.3	0.0236
6	7.351	1259.8	0.0236	15.286	1098.7	0.0235	23.266	1053.1	0.0233
7	7.398	1258.8	0.0233	15.346	1097.1	0.0233	23.376	1047.2	0.0231
8	7.414	1257.0	0.0231	15.402	1096.9	0.0231	23.449	1041.0	0.0229
9	7.412	1255.2	0.0229	15.467	1097.9	0.0229	23.506	1035.2	0.0228
10	7.393	1253.6	0.0227	15.541	1100.1	0.0227	23.551	1029.5	0.0226
11	7.351	1251.4	0.0225	15.623	1103.9	0.0225	23.572	1023.7	0.0224
12	7.268	1247.0	0.0223	15.692	1110.0	0.0223	23.532	1016.4	0.0222
13	7.093	1235.9	0.0221	15.675	1118.0	0.0222	23.312	1005.4	0.0220
14	6.693	1206.6	0.0219	15.309	1122.6	0.0220	22.537	985.4	0.0219
15	5.723	1127.8	0.0218	13.760	1100.1	0.0218	20.059	943.5	0.0217
16	3.456	922.7	0.0216	8.887	971.8	0.0217	12.933	834.6	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	16.359	920.2	0.0243	17.795	836.0	0.0240
2	25.010	991.6	0.0241	27.189	912.9	0.0238
3	28.470	1009.2	0.0239	31.012	953.0	0.0237
4	29.691	1004.0	0.0237	32.421	975.5	0.0235
5	30.118	995.1	0.0235	32.945	985.5	0.0233
6	30.286	987.5	0.0233	33.158	987.5	0.0231
7	30.384	982.0	0.0231	33.265	984.3	0.0229
8	30.473	978.5	0.0230	33.335	977.2	0.0227
9	30.570	976.5	0.0228	33.391	967.0	0.0226
10	30.680	976.0	0.0226	33.439	953.9	0.0224
11	30.793	977.1	0.0224	33.470	938.2	0.0222
12	30.876	980.2	0.0223	33.447	919.5	0.0221
13	30.793	984.8	0.0221	33.232	896.9	0.0220
14	30.084	987.1	0.0219	32.342	867.6	0.0218
15	27.232	969.1	0.0218	29.192	825.9	0.0217
16	18.076	884.0	0.0217	19.388	755.8	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-11. Burnup and TH Feedback Parameters by Axial Node for Assembly D28

Axial	Burnup	DP4 to DP5		Burnup	DP5 to DP6		Burnup	DP6 to DP7	
Node	DP5	T-Fuel	Spec.Vol	DP6	T-Fuel	Spec.Vol	DP7	T-Fuel	Spec.Vol
1	3.198	945.2	0.0249	7.714	949.6	0.0248	10.377	793.8	0.0233
2	5.581	1150.6	0.0247	12.723	1070.7	0.0246	16.930	867.8	0.0232
3	6.870	1246.3	0.0245	15.056	1120.0	0.0244	19.941	890.3	0.0231
4	7.441	1281.9	0.0242	15.885	1131.8	0.0242	21.062	896.0	0.0230
5	7.687	1293.2	0.0240	16.158	1131.0	0.0239	21.466	895.7	0.0228
6	7.793	1295.0	0.0237	16.255	1128.5	0.0237	21.621	892.4	0.0227
7	7.833	1293.4	0.0235	16.305	1126.9	0.0234	21.693	888.1	0.0226
8	7.842	1290.9	0.0232	16.352	1126.7	0.0232	21.740	883.5	0.0225
9	7.831	1288.4	0.0230	16.408	1127.7	0.0230	21.780	878.9	0.0223
10	7.803	1286.1	0.0228	16.476	1130.0	0.0228	21.817	874.4	0.0222
11	7.753	1283.3	0.0225	16.554	1134.1	0.0226	21.844	869.7	0.0221
12	7.663	1278.4	0.0223	16.623	1140.4	0.0224	21.827	863.7	0.0220
13	7.481	1267.0	0.0221	16.609	1148.9	0.0222	21.659	854.7	0.0219
14	7.073	1237.8	0.0219	16.244	1154.0	0.0220	20.989	838.9	0.0218
15	6.072	1157.4	0.0218	14.635	1128.9	0.0218	18.715	808.4	0.0217
16	3.692	946.2	0.0216	9.481	993.3	0.0217	12.052	734.1	0.0216

Axial	Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	13.567	818.9	0.0234	15.043	859.5	0.0242
2	21.524	871.9	0.0233	23.798	941.4	0.0241
3	24.919	879.9	0.0231	27.586	986.1	0.0239
4	26.087	875.6	0.0230	28.969	1010.2	0.0237
5	26.462	869.2	0.0229	29.471	1023.6	0.0235
6	26.587	863.7	0.0228	29.670	1029.4	0.0233
7	26.647	859.6	0.0226	29.765	1029.6	0.0231
8	26.700	856.8	0.0225	29.823	1025.4	0.0229
9	26.765	855.1	0.0224	29.866	1017.5	0.0227
10	26.843	854.4	0.0223	29.899	1006.2	0.0225
11	26.929	854.8	0.0222	29.912	991.4	0.0223
12	26.990	856.4	0.0221	29.869	972.2	0.0221
13	26.903	858.6	0.0219	29.636	947.4	0.0220
14	26.245	858.4	0.0218	28.762	913.3	0.0219
15	23.638	844.0	0.0217	25.790	863.3	0.0217
16	15.486	781.9	0.0216	16.884	779.2	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP4	0.0 / Cy4
DP5	136.2 / Cy4
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-12. Burnup and TH Feedback Parameters by Axial Node for Assembly E2

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	3.727	990.4	0.0250	8.103	1022.8	0.0250	9.504	905.9	0.0244
2	6.285	1204.4	0.0248	13.043	1159.0	0.0248	15.268	1018.8	0.0243
3	7.635	1299.7	0.0245	15.279	1192.8	0.0245	17.919	1069.1	0.0241
4	8.256	1327.4	0.0242	16.074	1188.8	0.0242	18.934	1095.5	0.0239
5	8.517	1329.8	0.0240	16.319	1178.2	0.0240	19.302	1109.4	0.0236
6	8.613	1323.8	0.0237	16.385	1169.5	0.0237	19.435	1114.9	0.0234
7	8.635	1315.3	0.0234	16.403	1163.9	0.0235	19.481	1114.3	0.0232
8	8.618	1306.6	0.0232	16.414	1161.1	0.0233	19.490	1108.9	0.0230
9	8.577	1298.6	0.0229	16.430	1160.6	0.0230	19.480	1099.4	0.0227
10	8.515	1291.2	0.0227	16.454	1162.4	0.0228	19.453	1086.3	0.0225
11	8.423	1283.7	0.0225	16.479	1166.5	0.0226	19.405	1069.5	0.0224
12	8.282	1274.1	0.0223	16.485	1173.1	0.0224	19.310	1048.5	0.0222
13	8.042	1258.3	0.0221	16.397	1181.2	0.0222	19.083	1022.2	0.0220
14	7.567	1225.1	0.0219	15.956	1183.7	0.0220	18.433	987.2	0.0219
15	6.485	1143.6	0.0218	14.314	1151.4	0.0218	16.421	932.9	0.0217
16	3.958	936.6	0.0216	9.269	1005.8	0.0217	10.595	821.3	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	15.705	932.8	0.0244	18.027	806.2	0.0238	21.417	842.5	0.0240
2	24.321	1012.5	0.0242	28.026	879.6	0.0237	33.090	914.5	0.0239
3	27.950	1035.4	0.0240	32.401	919.8	0.0236	38.158	950.1	0.0237
4	29.218	1034.7	0.0238	34.053	942.8	0.0234	40.029	956.5	0.0235
5	29.613	1027.8	0.0236	34.643	952.3	0.0232	40.656	952.8	0.0233
6	29.715	1020.3	0.0233	34.839	954.4	0.0230	40.832	946.4	0.0231
7	29.728	1013.7	0.0231	34.885	952.0	0.0229	40.851	940.2	0.0230
8	29.720	1008.5	0.0230	34.871	946.8	0.0227	40.819	935.0	0.0228
9	29.711	1004.6	0.0228	34.825	939.5	0.0225	40.772	931.3	0.0226
10	29.706	1002.1	0.0226	34.756	930.4	0.0224	40.720	928.9	0.0225
11	29.695	1000.7	0.0224	34.651	919.2	0.0222	40.647	927.7	0.0223
12	29.644	1000.1	0.0222	34.461	904.9	0.0221	40.493	926.8	0.0222
13	29.425	998.7	0.0221	34.031	885.4	0.0219	40.069	924.2	0.0220
14	28.609	991.9	0.0219	32.868	856.2	0.0218	38.781	913.3	0.0219
15	25.772	962.6	0.0218	29.396	814.3	0.0217	34.770	876.9	0.0217
16	17.040	873.3	0.0216	19.370	743.4	0.0216	23.080	795.4	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-13. Burnup and TH Feedback Parameters by Axial Node for Assembly E8

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	3.018	878.9	0.0238	6.613	901.9	0.0239	8.261	940.0	0.0249
2	5.017	1033.2	0.0237	10.443	1008.3	0.0237	13.056	1066.1	0.0247
3	5.977	1095.9	0.0236	11.993	1031.6	0.0236	15.095	1126.3	0.0244
4	6.404	1116.0	0.0234	12.539	1030.4	0.0234	15.904	1157.6	0.0242
5	6.603	1120.0	0.0232	12.733	1023.9	0.0232	16.254	1174.4	0.0239
6	6.702	1117.8	0.0230	12.817	1017.9	0.0231	16.430	1182.1	0.0236
7	6.752	1113.6	0.0229	12.871	1013.8	0.0229	16.532	1183.3	0.0234
8	6.774	1109.1	0.0227	12.921	1011.6	0.0228	16.595	1179.2	0.0231
9	6.779	1105.0	0.0226	12.974	1011.0	0.0226	16.631	1170.7	0.0229
10	6.765	1101.4	0.0224	13.032	1012.0	0.0225	16.643	1158.1	0.0227
11	6.725	1097.6	0.0222	13.088	1014.7	0.0223	16.622	1141.1	0.0225
12	6.640	1092.1	0.0221	13.122	1019.3	0.0222	16.542	1119.1	0.0223
13	6.459	1081.4	0.0220	13.059	1025.1	0.0220	16.315	1090.6	0.0221
14	6.057	1055.4	0.0218	12.665	1026.3	0.0219	15.671	1051.5	0.0219
15	5.126	988.7	0.0217	11.238	1002.0	0.0217	13.800	988.8	0.0218
16	3.052	825.5	0.0216	7.110	881.1	0.0216	8.723	860.7	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	15.444	951.7	0.0246	18.528	851.9	0.0243	22.785	872.2	0.0242
2	23.479	1042.9	0.0244	28.225	939.0	0.0241	34.314	953.9	0.0240
3	26.622	1067.4	0.0242	32.194	986.0	0.0239	38.932	987.8	0.0238
4	27.725	1067.2	0.0239	33.717	1009.3	0.0237	40.622	991.9	0.0236
5	28.116	1060.9	0.0237	34.327	1018.7	0.0235	41.231	986.1	0.0234
6	28.267	1053.4	0.0235	34.588	1020.5	0.0233	41.446	978.1	0.0232
7	28.342	1046.6	0.0233	34.706	1017.7	0.0231	41.518	970.6	0.0231
8	28.395	1041.1	0.0231	34.757	1012.0	0.0229	41.540	964.5	0.0229
9	28.443	1037.1	0.0229	34.770	1004.2	0.0227	41.546	960.1	0.0227
10	28.491	1034.6	0.0227	34.751	994.6	0.0225	41.543	957.5	0.0225
11	28.527	1033.3	0.0225	34.686	982.9	0.0223	41.517	956.3	0.0224
12	28.514	1033.0	0.0223	34.523	968.2	0.0222	41.409	956.2	0.0222
13	28.321	1032.1	0.0221	34.104	948.6	0.0220	41.030	955.4	0.0221
14	27.523	1027.0	0.0219	32.931	919.5	0.0219	39.787	947.9	0.0219
15	24.769	1000.8	0.0218	29.456	870.8	0.0217	35.823	914.8	0.0218
16	16.352	900.8	0.0217	19.437	783.6	0.0216	23.977	823.7	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-14. Burnup and TH Feedback Parameters by Axial Node for Assembly E10

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.608	1036.5	0.0252	9.981	1042.2	0.0253	10.870	755.0	0.0232
2	7.442	1233.9	0.0250	15.376	1166.3	0.0251	16.825	826.0	0.0231
3	8.788	1314.2	0.0247	17.560	1198.4	0.0248	19.303	857.3	0.0230
4	9.384	1340.6	0.0244	18.325	1195.6	0.0245	20.225	873.3	0.0229
5	9.652	1344.1	0.0241	18.585	1185.9	0.0242	20.573	881.5	0.0228
6	9.768	1338.9	0.0238	18.677	1177.7	0.0239	20.715	884.7	0.0227
7	9.807	1331.1	0.0235	18.723	1172.3	0.0236	20.785	884.5	0.0225
8	9.805	1323.1	0.0233	18.762	1169.8	0.0234	20.828	881.5	0.0224
9	9.774	1315.6	0.0230	18.806	1169.6	0.0231	20.859	876.2	0.0223
10	9.716	1308.8	0.0228	18.856	1171.6	0.0229	20.880	868.7	0.0222
11	9.623	1301.7	0.0226	18.906	1176.1	0.0227	20.884	859.0	0.0221
12	9.472	1292.5	0.0223	18.933	1183.2	0.0225	20.842	846.4	0.0220
13	9.204	1276.5	0.0221	18.849	1192.2	0.0222	20.657	829.9	0.0219
14	8.666	1242.4	0.0219	18.356	1195.8	0.0220	20.008	807.3	0.0218
15	7.429	1161.0	0.0218	16.478	1164.2	0.0218	17.856	773.1	0.0217
16	4.548	953.0	0.0216	10.685	1013.9	0.0217	11.531	705.1	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	14.906	778.6	0.0232	17.784	838.6	0.0242	21.853	866.9	0.0242
2	22.861	831.9	0.0231	27.373	924.1	0.0240	33.302	948.9	0.0240
3	26.041	848.0	0.0230	31.414	972.8	0.0239	38.057	984.4	0.0238
4	27.148	848.7	0.0228	32.975	998.4	0.0237	39.825	989.9	0.0236
5	27.515	844.4	0.0227	33.582	1009.3	0.0235	40.450	984.7	0.0234
6	27.632	839.4	0.0226	33.821	1012.0	0.0232	40.655	977.1	0.0232
7	27.673	834.9	0.0225	33.916	1010.0	0.0230	40.711	969.9	0.0231
8	27.700	831.2	0.0224	33.948	1004.9	0.0229	40.721	964.2	0.0229
9	27.728	828.3	0.0223	33.948	997.7	0.0227	40.719	960.1	0.0227
10	27.763	826.4	0.0222	33.921	988.5	0.0225	40.713	957.7	0.0225
11	27.793	825.2	0.0221	33.854	977.1	0.0223	40.688	956.7	0.0224
12	27.780	824.4	0.0220	33.694	962.5	0.0222	40.582	956.6	0.0222
13	27.594	823.1	0.0219	33.277	942.6	0.0220	40.200	955.4	0.0221
14	26.804	817.6	0.0218	32.098	912.3	0.0219	38.932	946.7	0.0219
15	24.036	797.5	0.0217	28.589	863.1	0.0217	34.889	911.0	0.0218
16	15.704	741.4	0.0216	18.665	777.3	0.0216	23.102	820.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-15. Burnup and TH Feedback Parameters by Axial Node for Assembly E12

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.606	1033.0	0.0251	9.947	1036.7	0.0252	11.560	906.7	0.0248
2	7.406	1226.1	0.0249	15.248	1157.6	0.0250	17.810	1022.9	0.0246
3	8.697	1301.7	0.0247	17.316	1187.5	0.0247	20.365	1076.2	0.0243
4	9.248	1325.4	0.0244	17.999	1183.8	0.0244	21.307	1103.9	0.0241
5	9.495	1328.1	0.0241	18.221	1173.8	0.0241	21.679	1118.5	0.0238
6	9.607	1322.9	0.0238	18.300	1165.3	0.0238	21.844	1124.7	0.0236
7	9.651	1315.4	0.0235	18.343	1159.6	0.0236	21.927	1124.9	0.0233
8	9.656	1307.6	0.0233	18.381	1156.5	0.0233	21.971	1120.2	0.0231
9	9.633	1300.5	0.0230	18.423	1155.7	0.0231	21.991	1111.3	0.0229
10	9.584	1294.0	0.0228	18.471	1157.0	0.0229	21.988	1098.6	0.0226
11	9.501	1287.4	0.0226	18.521	1160.8	0.0227	21.957	1082.0	0.0224
12	9.363	1279.0	0.0223	18.551	1167.3	0.0224	21.873	1060.8	0.0222
13	9.116	1264.6	0.0221	18.486	1175.8	0.0222	21.644	1033.4	0.0221
14	8.614	1233.5	0.0219	18.049	1180.0	0.0220	20.959	996.8	0.0219
15	7.433	1156.9	0.0218	16.288	1151.5	0.0218	18.757	940.7	0.0217
16	4.585	953.5	0.0217	10.630	1007.0	0.0217	12.187	826.6	0.0216

Axial	Burnup	SP48 to SP49	
Node	SP49	T-Fuel	Spec.Vol
1	18.642	929.3	0.0246
2	28.117	1017.4	0.0244
3	31.815	1048.5	0.0242
4	33.077	1051.6	0.0239
5	33.499	1046.1	0.0237
6	33.641	1038.9	0.0235
7	33.696	1032.3	0.0233
8	33.728	1026.9	0.0231
9	33.758	1023.0	0.0229
10	33.787	1020.4	0.0227
11	33.809	1019.0	0.0225
12	33.784	1018.4	0.0223
13	33.573	1016.7	0.0221
14	32.702	1008.5	0.0219
15	29.570	975.3	0.0218
16	19.700	876.4	0.0217

Note: Assembly E12 for BOC cycle 7 is in assembly location G9. Assembly E2 represents 3 batch 7C assemblies symmetric to G9 in a full-core representation. BOC 7 should be examined with a full-core representation with assembly E12 in location G9 and assembly E2 in the 3 full-core locations symmetric to G9 (i.e., G7, J7, & J9). Additionally, BOC cycle 7 should be examined with a one-eighth core representation with assembly E2 in core location G9. Subsequent calculations for SP50 and SP51 can then be performed with a one-eighth representation with assembly E2 in location G9. The BOC full-core and one-eighth core calculations will demonstrate any bias associated with representing the assembly in G9 and the corresponding 3 full-core symmetric locations as the batch 7C assembly E2.

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-16. Burnup and TH Feedback Parameters by Axial Node for Assembly E12a

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.606	1033.0	0.0251	9.949	1036.7	0.0252	10.823	756.7	0.0235
2	7.406	1226.1	0.0249	15.252	1157.6	0.0250	16.734	835.2	0.0234
3	8.697	1301.7	0.0247	17.321	1187.5	0.0247	19.203	883.5	0.0233
4	9.248	1325.4	0.0244	18.005	1183.8	0.0244	20.128	913.1	0.0231
5	9.495	1328.1	0.0241	18.227	1173.8	0.0241	20.483	928.2	0.0230
6	9.607	1322.9	0.0238	18.306	1165.3	0.0238	20.634	934.5	0.0228
7	9.651	1315.4	0.0235	18.349	1159.6	0.0236	20.711	935.5	0.0227
8	9.656	1307.6	0.0233	18.386	1156.5	0.0233	20.756	932.6	0.0225
9	9.633	1300.5	0.0230	18.429	1155.7	0.0231	20.785	926.8	0.0224
10	9.584	1294.0	0.0228	18.477	1157.0	0.0229	20.801	918.3	0.0223
11	9.501	1287.4	0.0226	18.526	1160.8	0.0227	20.797	907.0	0.0221
12	9.363	1279.0	0.0223	18.556	1167.3	0.0224	20.748	892.2	0.0220
13	9.116	1264.6	0.0221	18.491	1175.8	0.0222	20.564	872.6	0.0219
14	8.614	1233.5	0.0219	18.054	1180.0	0.0220	19.945	845.7	0.0218
15	7.433	1156.9	0.0218	16.291	1151.5	0.0218	17.872	805.9	0.0217
16	4.585	953.5	0.0217	10.632	1007.0	0.0217	11.611	728.6	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-17. Burnup and TH Feedback Parameters by Axial Node for Assembly E14

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.087	984.9	0.0248	8.911	1002.0	0.0249	9.393	670.1	0.0225
2	6.696	1171.7	0.0246	13.908	1119.8	0.0247	14.709	712.4	0.0224
3	7.945	1245.8	0.0244	15.933	1150.8	0.0244	16.922	735.5	0.0224
4	8.501	1270.7	0.0241	16.640	1149.1	0.0241	17.741	749.1	0.0223
5	8.766	1275.8	0.0239	16.902	1140.9	0.0239	18.065	755.9	0.0223
6	8.902	1273.0	0.0236	17.023	1133.5	0.0237	18.218	758.3	0.0222
7	8.974	1267.8	0.0234	17.107	1128.6	0.0234	18.314	757.8	0.0221
8	9.010	1262.2	0.0231	17.185	1126.1	0.0232	18.391	755.3	0.0221
9	9.021	1257.1	0.0229	17.267	1125.6	0.0230	18.461	751.3	0.0220
10	9.005	1252.7	0.0227	17.353	1127.1	0.0228	18.525	746.0	0.0219
11	8.956	1248.1	0.0225	17.437	1130.9	0.0226	18.578	739.3	0.0219
12	8.849	1241.5	0.0223	17.497	1137.2	0.0224	18.593	730.9	0.0218
13	8.624	1228.4	0.0221	17.446	1145.2	0.0222	18.479	720.3	0.0217
14	8.128	1198.2	0.0219	16.997	1148.3	0.0220	17.938	706.3	0.0217
15	6.948	1121.4	0.0218	15.213	1118.0	0.0218	16.000	685.9	0.0216
16	4.212	921.9	0.0216	9.766	978.3	0.0217	10.255	645.8	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	11.893	702.6	0.0225	14.650	841.8	0.0244	18.511	871.2	0.0244
2	18.506	742.9	0.0225	23.277	957.5	0.0243	29.517	978.1	0.0242
3	21.203	751.3	0.0224	26.950	1015.6	0.0241	34.032	1013.9	0.0240
4	22.161	751.0	0.0224	28.393	1042.4	0.0238	35.705	1020.2	0.0238
5	22.497	747.7	0.0223	28.989	1054.0	0.0236	36.330	1015.6	0.0236
6	22.625	743.8	0.0222	29.250	1057.0	0.0234	36.563	1008.0	0.0234
7	22.692	740.3	0.0222	29.374	1055.0	0.0232	36.654	1000.9	0.0232
8	22.745	737.2	0.0221	29.434	1049.6	0.0230	36.695	995.2	0.0230
9	22.799	734.8	0.0220	29.457	1041.7	0.0227	36.720	991.2	0.0228
10	22.858	732.8	0.0220	29.447	1031.7	0.0226	36.737	988.9	0.0226
11	22.912	731.3	0.0219	29.394	1019.1	0.0224	36.732	988.2	0.0224
12	22.930	729.9	0.0218	29.248	1003.0	0.0222	36.645	988.3	0.0223
13	22.799	728.2	0.0218	28.863	981.2	0.0220	36.297	987.1	0.0221
14	22.155	724.3	0.0217	27.794	948.8	0.0219	35.128	977.6	0.0219
15	19.831	714.0	0.0217	24.663	894.2	0.0217	31.416	944.3	0.0218
16	12.840	675.9	0.0216	15.940	800.1	0.0216	20.654	848.9	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-18. Burnup and TH Feedback Parameters by Axial Node for Assembly E14a

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.087	984.9	0.0248	8.911	1002.0	0.0249	9.393	670.1	0.0225
2	6.696	1171.7	0.0246	13.908	1119.8	0.0247	14.709	712.4	0.0224
3	7.945	1245.8	0.0244	15.933	1150.8	0.0244	16.922	735.5	0.0224
4	8.501	1270.7	0.0241	16.640	1149.1	0.0241	17.741	749.1	0.0223
5	8.766	1275.8	0.0239	16.902	1140.9	0.0239	18.065	755.9	0.0223
6	8.902	1273.0	0.0236	17.023	1133.5	0.0237	18.218	758.3	0.0222
7	8.974	1267.8	0.0234	17.107	1128.6	0.0234	18.314	757.8	0.0221
8	9.010	1262.2	0.0231	17.185	1126.1	0.0232	18.391	755.3	0.0221
9	9.021	1257.1	0.0229	17.267	1125.6	0.0230	18.461	751.3	0.0220
10	9.005	1252.7	0.0227	17.353	1127.1	0.0228	18.525	746.0	0.0219
11	8.956	1248.1	0.0225	17.437	1130.9	0.0226	18.578	739.3	0.0219
12	8.849	1241.5	0.0223	17.497	1137.2	0.0224	18.593	730.9	0.0218
13	8.624	1228.4	0.0221	17.446	1145.2	0.0222	18.479	720.3	0.0217
14	8.128	1198.2	0.0219	16.997	1148.3	0.0220	17.938	706.3	0.0217
15	6.948	1121.4	0.0218	15.213	1118.0	0.0218	16.000	685.9	0.0216
16	4.212	921.9	0.0216	9.766	978.3	0.0217	10.255	645.8	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	11.895	702.6	0.0225	13.644	759.7	0.0243	16.274	833.9	0.0242
2	18.509	742.9	0.0225	22.398	918.2	0.0242	27.789	963.3	0.0241
3	21.205	751.3	0.0224	26.597	994.6	0.0240	33.231	993.0	0.0239
4	22.162	751.0	0.0224	28.166	1025.2	0.0238	35.091	996.1	0.0237
5	22.498	747.7	0.0223	28.796	1038.1	0.0236	35.756	990.5	0.0235
6	22.625	743.8	0.0222	29.076	1042.0	0.0233	36.008	982.7	0.0233
7	22.690	740.3	0.0222	29.216	1040.9	0.0231	36.116	975.5	0.0231
8	22.742	737.2	0.0221	29.293	1036.7	0.0229	36.176	970.0	0.0229
9	22.796	734.8	0.0220	29.335	1030.3	0.0227	36.224	966.2	0.0227
10	22.854	732.8	0.0220	29.347	1021.9	0.0225	36.266	964.2	0.0226
11	22.907	731.3	0.0219	29.316	1011.3	0.0224	36.289	963.7	0.0224
12	22.923	729.9	0.0218	29.194	997.3	0.0222	36.233	964.2	0.0222
13	22.792	728.2	0.0218	28.829	977.3	0.0220	35.915	963.7	0.0221
14	22.147	724.3	0.0217	27.767	946.1	0.0219	34.769	955.4	0.0219
15	19.824	714.0	0.0217	24.625	891.2	0.0217	31.068	924.3	0.0218
16	12.836	675.9	0.0216	15.893	796.4	0.0216	20.368	834.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-19. Burnup and TH Feedback Parameters by Axial Node for Assembly E17

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.577	1034.2	0.0253	9.956	1043.7	0.0254	10.574	697.0	0.0227
2	7.416	1232.2	0.0251	15.383	1169.5	0.0251	16.405	748.8	0.0227
3	8.788	1314.2	0.0248	17.622	1203.2	0.0248	18.864	772.8	0.0226
4	9.410	1342.1	0.0245	18.428	1201.0	0.0245	19.792	785.4	0.0225
5	9.699	1346.8	0.0241	18.717	1191.6	0.0242	20.150	791.9	0.0224
6	9.832	1342.5	0.0239	18.831	1183.2	0.0239	20.301	794.4	0.0223
7	9.887	1335.3	0.0236	18.894	1177.8	0.0237	20.381	794.1	0.0223
8	9.899	1327.8	0.0233	18.950	1175.2	0.0234	20.438	791.7	0.0222
9	9.881	1320.9	0.0231	19.009	1174.9	0.0232	20.486	787.6	0.0221
10	9.836	1314.6	0.0228	19.074	1176.8	0.0229	20.529	781.9	0.0220
11	9.754	1308.1	0.0226	19.139	1181.3	0.0227	20.559	774.5	0.0219
12	9.612	1299.4	0.0224	19.179	1188.5	0.0225	20.548	765.0	0.0218
13	9.347	1283.7	0.0221	19.102	1197.9	0.0222	20.396	752.7	0.0218
14	8.799	1249.3	0.0219	18.600	1201.8	0.0220	19.777	736.0	0.0217
15	7.531	1166.2	0.0218	16.675	1169.1	0.0218	17.650	710.8	0.0217
16	4.600	956.1	0.0217	10.790	1016.7	0.0217	11.385	661.9	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	13.496	721.2	0.0227	15.876	796.0	0.0238	19.092	812.1	0.0237
2	20.829	763.3	0.0226	24.900	889.3	0.0237	30.044	894.0	0.0236
3	23.826	773.9	0.0226	28.665	932.2	0.0235	34.413	919.0	0.0234
4	24.898	774.2	0.0225	30.096	950.0	0.0234	35.966	921.3	0.0233
5	25.266	770.8	0.0224	30.648	956.7	0.0232	36.502	915.4	0.0231
6	25.392	766.7	0.0223	30.866	957.5	0.0230	36.673	908.1	0.0230
7	25.444	763.1	0.0222	30.956	954.8	0.0229	36.720	901.4	0.0228
8	25.481	760.0	0.0222	30.995	949.9	0.0227	36.733	896.1	0.0227
9	25.521	757.6	0.0221	31.009	943.4	0.0225	36.741	892.3	0.0225
10	25.566	755.8	0.0220	31.003	935.5	0.0224	36.749	889.9	0.0224
11	25.609	754.5	0.0219	30.965	926.1	0.0222	36.746	889.0	0.0222
12	25.611	753.5	0.0219	30.846	914.2	0.0221	36.677	889.0	0.0221
13	25.447	752.1	0.0218	30.494	898.4	0.0220	36.366	888.6	0.0220
14	24.710	747.6	0.0217	29.434	874.9	0.0218	35.256	882.8	0.0219
15	22.113	733.1	0.0217	26.202	835.2	0.0217	31.615	858.5	0.0217
16	14.370	690.9	0.0216	17.031	760.7	0.0216	20.859	790.3	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-20. Burnup and TH Feedback Parameters by Axial Node for Assembly E17a

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.577	1034.2	0.0253	9.956	1043.7	0.0254	10.574	697.0	0.0227
2	7.416	1232.2	0.0251	15.383	1169.5	0.0251	16.405	748.8	0.0227
3	8.788	1314.2	0.0248	17.622	1203.2	0.0248	18.864	772.8	0.0226
4	9.410	1342.1	0.0245	18.428	1201.0	0.0245	19.792	785.4	0.0225
5	9.699	1346.8	0.0241	18.717	1191.6	0.0242	20.150	791.9	0.0224
6	9.832	1342.5	0.0239	18.831	1183.2	0.0239	20.301	794.4	0.0223
7	9.887	1335.3	0.0236	18.894	1177.8	0.0237	20.381	794.1	0.0223
8	9.899	1327.8	0.0233	18.950	1175.2	0.0234	20.438	791.7	0.0222
9	9.881	1320.9	0.0231	19.009	1174.9	0.0232	20.486	787.6	0.0221
10	9.836	1314.6	0.0228	19.074	1176.8	0.0229	20.529	781.9	0.0220
11	9.754	1308.1	0.0226	19.139	1181.3	0.0227	20.559	774.5	0.0219
12	9.612	1299.4	0.0224	19.179	1188.5	0.0225	20.548	765.0	0.0218
13	9.347	1283.7	0.0221	19.102	1197.9	0.0222	20.396	752.7	0.0218
14	8.799	1249.3	0.0219	18.600	1201.8	0.0220	19.777	736.0	0.0217
15	7.531	1166.2	0.0218	16.675	1169.1	0.0218	17.650	710.8	0.0217
16	4.600	956.1	0.0217	10.790	1016.7	0.0217	11.385	661.9	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	13.492	721.2	0.0227	16.301	840.7	0.0242	20.318	875.3	0.0243
2	20.822	763.3	0.0226	25.328	931.6	0.0241	31.302	959.9	0.0241
3	23.818	773.9	0.0226	29.263	986.0	0.0239	36.030	994.8	0.0239
4	24.890	774.2	0.0225	30.829	1012.1	0.0237	37.831	1000.7	0.0237
5	25.258	770.8	0.0224	31.454	1023.5	0.0235	38.483	995.5	0.0235
6	25.383	766.7	0.0223	31.710	1026.5	0.0233	38.708	987.8	0.0233
7	25.436	763.1	0.0222	31.820	1024.6	0.0231	38.780	980.5	0.0231
8	25.473	760.0	0.0222	31.864	1019.5	0.0229	38.803	974.7	0.0229
9	25.513	757.6	0.0221	31.874	1012.1	0.0227	38.812	970.6	0.0227
10	25.558	755.8	0.0220	31.856	1002.6	0.0225	38.816	968.1	0.0226
11	25.601	754.5	0.0219	31.797	990.8	0.0223	38.800	967.1	0.0224
12	25.603	753.5	0.0219	31.646	975.6	0.0222	38.703	967.1	0.0222
13	25.440	752.1	0.0218	31.243	955.0	0.0220	38.334	965.8	0.0221
14	24.703	747.6	0.0217	30.103	924.4	0.0219	37.099	956.7	0.0219
15	22.106	733.1	0.0217	26.742	873.9	0.0217	33.186	921.8	0.0218
16	14.365	690.9	0.0216	17.362	785.5	0.0216	21.881	830.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-21. Burnup and TH Feedback Parameters by Axial Node for Assembly E21

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	2.623	840.1	0.0235	5.806	868.4	0.0236	7.434	939.9	0.0248
2	4.379	980.1	0.0234	9.209	969.9	0.0235	11.800	1071.0	0.0246
3	5.232	1037.3	0.0233	10.597	991.9	0.0233	13.677	1131.4	0.0243
4	5.614	1056.7	0.0231	11.084	989.9	0.0232	14.424	1162.5	0.0241
5	5.790	1060.3	0.0230	11.251	983.2	0.0230	14.733	1178.0	0.0238
6	5.874	1057.8	0.0228	11.314	977.1	0.0229	14.872	1183.7	0.0236
7	5.912	1053.4	0.0227	11.349	972.9	0.0227	14.938	1182.7	0.0233
8	5.926	1048.8	0.0226	11.380	970.5	0.0226	14.967	1176.5	0.0231
9	5.924	1044.7	0.0224	11.415	969.6	0.0225	14.969	1166.0	0.0229
10	5.905	1040.9	0.0223	11.454	970.3	0.0224	14.949	1151.7	0.0226
11	5.865	1037.1	0.0222	11.492	972.6	0.0222	14.901	1133.6	0.0224
12	5.785	1031.8	0.0220	11.512	976.7	0.0221	14.805	1111.3	0.0222
13	5.623	1021.5	0.0219	11.451	981.8	0.0220	14.586	1083.7	0.0221
14	5.272	997.5	0.0218	11.102	982.8	0.0218	14.004	1047.2	0.0219
15	4.463	938.2	0.0217	9.849	960.5	0.0217	12.333	989.0	0.0217
16	2.659	792.4	0.0216	6.223	846.8	0.0216	7.788	858.9	0.0216

Table 4-22. Burnup and TH Feedback Parameters by Axial Node for Assembly E23

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	4.069	991.4	0.0252	8.951	1023.6	0.0252	10.329	866.0	0.0244
2	6.892	1202.1	0.0250	14.468	1157.4	0.0250	16.711	973.9	0.0242
3	8.438	1298.1	0.0247	17.056	1196.2	0.0247	19.762	1022.7	0.0240
4	9.195	1330.5	0.0244	18.047	1193.2	0.0244	21.011	1049.2	0.0238
5	9.551	1336.2	0.0241	18.409	1182.7	0.0241	21.527	1064.1	0.0236
6	9.719	1332.7	0.0238	18.557	1173.9	0.0239	21.767	1071.3	0.0234
7	9.798	1326.2	0.0236	18.644	1168.1	0.0236	21.904	1073.3	0.0232
8	9.832	1319.5	0.0233	18.719	1165.1	0.0234	21.997	1070.6	0.0230
9	9.834	1313.5	0.0230	18.796	1164.5	0.0231	22.064	1064.1	0.0227
10	9.809	1308.2	0.0228	18.878	1166.1	0.0229	22.110	1053.9	0.0225
11	9.746	1302.8	0.0226	18.958	1170.1	0.0227	22.127	1039.9	0.0224
12	9.621	1295.2	0.0224	19.013	1177.0	0.0225	22.081	1020.8	0.0222
13	9.370	1280.8	0.0221	18.950	1185.8	0.0222	21.864	994.7	0.0220
14	8.828	1247.4	0.0219	18.461	1189.6	0.0220	21.129	957.9	0.0219
15	7.558	1165.2	0.0218	16.556	1159.0	0.0218	18.789	902.9	0.0217
16	4.615	955.9	0.0217	10.714	1010.1	0.0217	12.092	795.6	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-23. Burnup and TH Feedback Parameters by Axial Node for Assembly E25

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	3.637	945.5	0.0245	7.983	969.6	0.0245	8.852	762.1	0.0234
2	6.058	1126.8	0.0244	12.617	1085.4	0.0243	14.078	841.7	0.0233
3	7.291	1202.1	0.0242	14.606	1112.6	0.0241	16.420	885.8	0.0232
4	7.880	1228.6	0.0239	15.359	1110.0	0.0239	17.381	911.0	0.0230
5	8.171	1234.0	0.0237	15.650	1101.1	0.0237	17.791	924.2	0.0229
6	8.321	1231.4	0.0235	15.784	1093.3	0.0235	17.991	929.9	0.0228
7	8.401	1226.5	0.0232	15.871	1088.2	0.0233	18.110	930.6	0.0226
8	8.444	1221.4	0.0230	15.950	1085.4	0.0231	18.197	927.7	0.0225
9	8.462	1216.9	0.0228	16.031	1084.6	0.0229	18.267	922.1	0.0224
10	8.456	1213.1	0.0226	16.116	1085.7	0.0227	18.322	913.8	0.0222
11	8.418	1209.4	0.0224	16.199	1088.9	0.0225	18.356	902.8	0.0221
12	8.325	1203.9	0.0222	16.259	1094.6	0.0223	18.342	888.6	0.0220
13	8.118	1192.4	0.0221	16.214	1102.0	0.0221	18.186	869.6	0.0219
14	7.650	1164.1	0.0219	15.790	1105.4	0.0220	17.588	843.1	0.0218
15	6.529	1090.8	0.0218	14.123	1079.8	0.0218	15.618	802.0	0.0217
16	3.942	899.4	0.0216	9.056	949.3	0.0217	9.968	722.6	0.0216

Axial	Burnup	SP48 to SP49		Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	13.103	802.3	0.0234	16.216	867.0	0.0244	20.593	893.4	0.0244
2	20.559	869.2	0.0233	25.427	958.1	0.0242	31.783	979.0	0.0242
3	23.756	886.4	0.0231	29.512	1008.9	0.0240	36.599	1012.8	0.0240
4	24.970	886.8	0.0230	31.182	1033.5	0.0238	38.469	1018.5	0.0238
5	25.421	881.7	0.0229	31.874	1044.1	0.0236	39.178	1013.2	0.0236
6	25.600	876.0	0.0227	32.178	1046.7	0.0234	39.448	1005.5	0.0234
7	25.693	870.9	0.0226	32.324	1044.4	0.0232	39.557	998.2	0.0232
8	25.763	866.7	0.0225	32.399	1038.9	0.0229	39.611	992.4	0.0230
9	25.833	863.6	0.0224	32.435	1031.0	0.0227	39.647	988.4	0.0228
10	25.904	861.4	0.0223	32.438	1020.9	0.0225	39.675	986.0	0.0226
11	25.968	860.0	0.0221	32.395	1008.5	0.0224	39.678	985.2	0.0224
12	25.985	859.1	0.0220	32.251	992.6	0.0222	39.594	985.3	0.0223
13	25.824	857.6	0.0219	31.844	971.3	0.0220	39.226	984.2	0.0221
14	25.064	852.1	0.0218	30.674	939.7	0.0219	37.966	975.3	0.0219
15	22.405	831.3	0.0217	27.233	887.4	0.0217	33.969	940.0	0.0218
16	14.527	764.2	0.0216	17.660	795.2	0.0216	22.404	842.9	0.0217

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-24. Burnup and TH Feedback Parameters by Axial Node for Assembly E28

Axial	Burnup	DP6 to DP7		Burnup	DP7 to SP47		Burnup	SP47 to SP48	
Node	DP7	T-Fuel	Spec.Vol	SP47	T-Fuel	Spec.Vol	SP48	T-Fuel	Spec.Vol
1	3.536	942.2	0.0248	7.859	984.7	0.0248	9.260	881.9	0.0248
2	6.132	1145.2	0.0246	12.946	1114.9	0.0246	15.283	1001.7	0.0246
3	7.606	1239.0	0.0244	15.401	1147.7	0.0244	18.306	1068.8	0.0244
4	8.352	1270.1	0.0241	16.371	1144.4	0.0241	19.608	1107.4	0.0241
5	8.711	1275.9	0.0239	16.736	1134.2	0.0239	20.167	1128.2	0.0239
6	8.886	1273.1	0.0236	16.894	1125.7	0.0236	20.438	1138.2	0.0236
7	8.977	1267.6	0.0234	16.992	1120.2	0.0234	20.597	1140.9	0.0234
8	9.023	1262.1	0.0231	17.077	1117.2	0.0232	20.706	1138.3	0.0231
9	9.041	1257.2	0.0229	17.163	1116.4	0.0230	20.785	1131.2	0.0229
10	9.033	1253.1	0.0227	17.253	1117.7	0.0228	20.839	1120.1	0.0227
11	8.991	1249.0	0.0225	17.342	1121.2	0.0226	20.859	1104.5	0.0224
12	8.889	1243.0	0.0223	17.406	1127.4	0.0224	20.813	1083.3	0.0222
13	8.667	1230.7	0.0221	17.358	1135.3	0.0222	20.596	1054.5	0.0221
14	8.166	1200.6	0.0219	16.911	1138.8	0.0220	19.875	1013.7	0.0219
15	6.976	1123.5	0.0218	15.146	1111.2	0.0218	17.624	949.7	0.0217
16	4.224	923.4	0.0216	9.752	975.8	0.0217	11.276	825.3	0.0216

Datapoint or Statepoint	EFPD / Cycle
DP6	0.0 / Cy5
DP7	159.0 / Cy5
SP47	0.0 / Cy6
SP48	62.4 / Cy6

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-25. Burnup and TH Feedback Parameters by Axial Node for Assembly F2

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.420	949.8	0.0249	8.163	1005.7	0.0251	11.421	910.5	0.0249
2	2.459	1160.4	0.0248	13.323	1167.4	0.0248	18.589	1032.0	0.0247
3	3.143	1291.5	0.0245	15.724	1212.8	0.0246	22.055	1086.7	0.0244
4	3.505	1357.8	0.0243	16.571	1214.6	0.0243	23.466	1113.6	0.0242
5	3.681	1386.3	0.0240	16.838	1208.2	0.0240	24.042	1126.5	0.0239
6	3.768	1397.0	0.0237	16.918	1200.3	0.0238	24.290	1131.5	0.0236
7	3.803	1397.7	0.0234	16.937	1193.5	0.0235	24.394	1131.0	0.0234
8	3.801	1391.4	0.0232	16.937	1188.6	0.0233	24.422	1126.7	0.0231
9	3.767	1379.6	0.0229	16.931	1185.5	0.0230	24.402	1119.7	0.0229
10	3.705	1362.8	0.0227	16.923	1184.2	0.0228	24.340	1110.2	0.0227
11	3.615	1341.2	0.0225	16.909	1184.6	0.0226	24.225	1097.7	0.0225
12	3.493	1313.7	0.0223	16.868	1186.3	0.0224	24.018	1081.3	0.0223
13	3.323	1277.6	0.0221	16.726	1187.5	0.0222	23.600	1058.4	0.0221
14	3.061	1223.7	0.0219	16.221	1180.6	0.0220	22.601	1023.7	0.0219
15	2.566	1123.8	0.0217	14.460	1136.8	0.0218	19.872	964.0	0.0218
16	1.535	908.9	0.0216	9.246	969.5	0.0217	12.621	838.6	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	16.035	943.1	0.0249
2	25.494	1037.2	0.0246
3	29.861	1074.1	0.0244
4	31.561	1079.2	0.0241
5	32.199	1074.0	0.0239
6	32.439	1066.5	0.0236
7	32.529	1059.8	0.0234
8	32.559	1054.8	0.0232
9	32.566	1051.8	0.0230
10	32.557	1050.8	0.0228
11	32.520	1051.7	0.0225
12	32.402	1053.6	0.0223
13	32.037	1054.2	0.0222
14	30.914	1046.1	0.0220
15	27.468	1007.4	0.0218
16	17.795	896.2	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-26. Burnup and TH Feedback Parameters by Axial Node for Assembly F4

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.601	994.5	0.0251	8.853	1022.3	0.0252	10.851	780.8	0.0235
2	2.666	1208.4	0.0249	13.869	1172.5	0.0249	17.215	867.8	0.0234
3	3.242	1316.0	0.0246	16.005	1216.5	0.0247	20.122	908.2	0.0233
4	3.546	1369.1	0.0243	16.789	1221.8	0.0244	21.316	926.5	0.0232
5	3.717	1395.8	0.0240	17.076	1217.3	0.0241	21.812	933.6	0.0230
6	3.812	1407.7	0.0238	17.184	1210.3	0.0238	22.025	935.2	0.0229
7	3.858	1409.7	0.0235	17.231	1203.9	0.0235	22.119	933.4	0.0227
8	3.866	1405.2	0.0232	17.256	1199.3	0.0233	22.157	929.7	0.0226
9	3.842	1395.3	0.0230	17.273	1196.5	0.0231	22.161	924.6	0.0224
10	3.788	1380.5	0.0227	17.285	1195.6	0.0228	22.139	918.3	0.0223
11	3.704	1359.7	0.0225	17.288	1196.3	0.0226	22.079	910.6	0.0222
12	3.582	1332.1	0.0223	17.256	1197.8	0.0224	21.946	900.7	0.0220
13	3.406	1294.6	0.0221	17.107	1198.4	0.0222	21.625	886.7	0.0219
14	3.128	1237.5	0.0219	16.562	1190.2	0.0220	20.767	865.5	0.0218
15	2.609	1132.9	0.0217	14.722	1145.1	0.0218	18.305	828.8	0.0217
16	1.556	913.7	0.0216	9.400	975.4	0.0217	11.641	745.5	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	13.765	817.8	0.0235
2	21.702	883.3	0.0234
3	25.231	902.2	0.0232
4	26.598	901.1	0.0231
5	27.103	894.1	0.0230
6	27.283	886.8	0.0228
7	27.345	880.5	0.0227
8	27.365	875.9	0.0226
9	27.371	872.7	0.0224
10	27.370	871.0	0.0223
11	27.351	870.7	0.0222
12	27.271	871.4	0.0221
13	26.989	871.9	0.0219
14	26.070	868.0	0.0218
15	23.175	847.2	0.0217
16	14.956	781.3	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-27. Burnup and TH Feedback Parameters by Axial Node for Assembly F8

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.010	840.3	0.0237	5.578	864.1	0.0236	8.931	938.1	0.0249
2	1.729	995.6	0.0236	8.898	981.9	0.0235	14.313	1071.3	0.0247
3	2.123	1073.3	0.0234	10.289	1016.8	0.0233	16.753	1134.1	0.0245
4	2.333	1112.3	0.0233	10.798	1021.2	0.0232	17.793	1162.7	0.0242
5	2.452	1131.9	0.0231	10.978	1016.7	0.0230	18.258	1174.8	0.0239
6	2.521	1141.0	0.0229	11.042	1010.6	0.0229	18.479	1178.2	0.0237
7	2.557	1143.7	0.0228	11.068	1005.3	0.0227	18.586	1176.6	0.0234
8	2.569	1141.8	0.0226	11.083	1001.5	0.0226	18.631	1171.9	0.0232
9	2.560	1136.1	0.0225	11.095	999.2	0.0225	18.635	1165.0	0.0229
10	2.531	1126.9	0.0223	11.107	998.5	0.0223	18.602	1156.1	0.0227
11	2.481	1113.6	0.0222	11.112	999.2	0.0222	18.522	1144.9	0.0225
12	2.401	1094.9	0.0220	11.092	1000.9	0.0221	18.358	1130.4	0.0223
13	2.279	1067.3	0.0219	10.981	1001.6	0.0220	18.007	1110.1	0.0221
14	2.076	1023.4	0.0218	10.581	994.6	0.0218	17.168	1077.7	0.0219
15	1.704	944.4	0.0217	9.321	958.2	0.0217	14.991	1016.1	0.0218
16	0.987	785.5	0.0216	5.847	829.9	0.0216	9.417	880.2	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	13.447	942.9	0.0246
2	21.039	1040.1	0.0244
3	24.273	1066.6	0.0242
4	25.514	1066.3	0.0239
5	25.987	1059.0	0.0237
6	26.167	1050.1	0.0235
7	26.237	1042.3	0.0233
8	26.266	1036.4	0.0231
9	26.281	1032.6	0.0229
10	26.287	1030.8	0.0227
11	26.275	1031.0	0.0225
12	26.199	1032.8	0.0223
13	25.923	1034.6	0.0221
14	25.031	1031.8	0.0219
15	22.280	1006.4	0.0218
16	14.445	904.1	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-28. Burnup and TH Feedback Parameters by Axial Node for Assembly F12

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.578	990.3	0.0251	8.822	1023.2	0.0252	10.559	746.0	0.0231
2	2.641	1204.4	0.0249	13.883	1175.9	0.0250	16.714	814.1	0.0230
3	3.227	1314.3	0.0247	16.091	1222.2	0.0247	19.462	841.3	0.0229
4	3.545	1370.1	0.0244	16.933	1229.0	0.0244	20.565	852.2	0.0228
5	3.728	1399.3	0.0241	17.260	1225.7	0.0241	21.019	855.7	0.0227
6	3.834	1413.3	0.0238	17.399	1219.1	0.0239	21.218	855.3	0.0226
7	3.890	1417.1	0.0235	17.471	1213.2	0.0236	21.312	852.7	0.0224
8	3.907	1414.2	0.0232	17.519	1208.8	0.0233	21.357	848.7	0.0223
9	3.892	1405.8	0.0230	17.559	1206.4	0.0231	21.376	843.8	0.0222
10	3.846	1392.2	0.0227	17.592	1205.8	0.0229	21.373	838.1	0.0221
11	3.766	1372.5	0.0225	17.614	1206.9	0.0226	21.338	831.5	0.0220
12	3.646	1345.1	0.0223	17.596	1208.8	0.0224	21.234	823.3	0.0219
13	3.467	1306.6	0.0221	17.446	1208.6	0.0222	20.948	812.5	0.0218
14	3.176	1247.0	0.0219	16.867	1199.4	0.0220	20.129	796.4	0.0218
15	2.637	1138.1	0.0218	14.942	1152.6	0.0218	17.722	768.4	0.0217
16	1.563	915.2	0.0216	9.496	979.3	0.0217	11.231	703.4	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	13.004	766.8	0.0231
2	20.417	819.9	0.0230
3	23.606	833.2	0.0229
4	24.808	832.8	0.0228
5	25.252	827.5	0.0226
6	25.415	821.6	0.0225
7	25.476	816.5	0.0224
8	25.501	812.4	0.0223
9	25.515	809.6	0.0222
10	25.523	807.8	0.0221
11	25.514	807.1	0.0221
12	25.446	807.3	0.0220
13	25.185	807.3	0.0219
14	24.311	803.9	0.0218
15	21.550	788.0	0.0217
16	13.814	734.5	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-29. Burnup and TH Feedback Parameters by Axial Node for Assembly F14

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.453	959.3	0.0249	8.029	984.1	0.0248	9.268	697.2	0.0226
2	2.462	1166.0	0.0247	12.702	1129.0	0.0246	14.727	748.0	0.0226
3	3.023	1271.5	0.0245	14.712	1170.7	0.0243	17.134	769.8	0.0225
4	3.331	1325.9	0.0242	15.477	1174.9	0.0241	18.097	779.0	0.0224
5	3.514	1355.2	0.0239	15.781	1169.1	0.0238	18.500	782.1	0.0224
6	3.625	1370.5	0.0237	15.919	1161.8	0.0236	18.684	782.0	0.0223
7	3.689	1376.6	0.0234	15.999	1155.7	0.0234	18.780	780.0	0.0222
8	3.718	1376.0	0.0232	16.060	1151.4	0.0231	18.839	777.0	0.0221
9	3.715	1370.0	0.0229	16.115	1149.1	0.0229	18.877	773.2	0.0220
10	3.683	1358.9	0.0227	16.166	1148.7	0.0227	18.900	768.8	0.0220
11	3.618	1341.9	0.0225	16.206	1150.2	0.0225	18.897	763.7	0.0219
12	3.511	1317.1	0.0223	16.207	1153.0	0.0223	18.834	757.3	0.0218
13	3.340	1280.6	0.0221	16.079	1155.0	0.0221	18.604	748.9	0.0218
14	3.054	1221.9	0.0219	15.543	1148.8	0.0219	17.886	736.1	0.0217
15	2.521	1114.3	0.0217	13.756	1106.9	0.0218	15.740	713.4	0.0217
16	1.477	895.5	0.0216	8.715	946.6	0.0216	9.939	663.9	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	11.060	717.1	0.0226
2	17.457	761.6	0.0226
3	20.194	769.6	0.0225
4	21.237	768.0	0.0224
5	21.633	763.4	0.0224
6	21.789	758.7	0.0223
7	21.859	754.6	0.0222
8	21.899	751.3	0.0221
9	21.931	748.9	0.0221
10	21.959	747.4	0.0220
11	21.972	746.6	0.0219
12	21.932	746.4	0.0219
13	21.715	746.1	0.0218
14	20.948	743.8	0.0217
15	18.522	733.2	0.0217
16	11.790	688.6	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-30. Burnup and TH Feedback Parameters by Axial Node for Assembly F17

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.531	978.1	0.0250	8.673	1021.0	0.0252	9.748	678.9	0.0225
2	2.577	1189.9	0.0248	13.723	1175.4	0.0250	15.484	722.8	0.0224
3	3.169	1301.4	0.0246	15.974	1223.0	0.0247	18.094	741.3	0.0224
4	3.493	1359.2	0.0243	16.845	1229.7	0.0244	19.150	749.0	0.0223
5	3.678	1389.2	0.0240	17.183	1226.6	0.0241	19.579	751.5	0.0223
6	3.784	1403.5	0.0237	17.325	1220.3	0.0239	19.762	751.3	0.0222
7	3.837	1407.7	0.0235	17.397	1214.5	0.0236	19.847	749.4	0.0221
8	3.852	1404.6	0.0232	17.446	1210.4	0.0233	19.891	746.6	0.0221
9	3.835	1395.7	0.0230	17.485	1208.1	0.0231	19.914	743.2	0.0220
10	3.787	1381.4	0.0227	17.518	1207.6	0.0229	19.920	739.3	0.0219
11	3.707	1361.2	0.0225	17.540	1208.8	0.0226	19.901	734.7	0.0219
12	3.587	1333.8	0.0223	17.520	1210.6	0.0224	19.823	729.1	0.0218
13	3.408	1295.6	0.0221	17.365	1210.1	0.0222	19.577	721.8	0.0218
14	3.122	1236.4	0.0219	16.777	1200.9	0.0220	18.834	711.2	0.0217
15	2.589	1128.8	0.0217	14.838	1152.6	0.0218	16.594	693.1	0.0216
16	1.533	908.5	0.0216	9.409	977.9	0.0217	10.512	651.8	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	11.352	702.8	0.0225
2	17.925	741.5	0.0225
3	20.834	747.5	0.0224
4	21.963	745.2	0.0223
5	22.384	740.7	0.0223
6	22.539	736.2	0.0222
7	22.597	732.3	0.0221
8	22.622	729.2	0.0221
9	22.636	726.9	0.0220
10	22.644	725.4	0.0220
11	22.637	724.5	0.0219
12	22.577	724.3	0.0218
13	22.343	723.9	0.0218
14	21.560	721.7	0.0217
15	19.089	713.0	0.0217
16	12.198	675.9	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-31. Burnup and TH Feedback Parameters by Axial Node for Assembly F19

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.508	975.3	0.0252	8.576	1017.3	0.0252	11.846	905.1	0.0248
2	2.570	1191.1	0.0250	13.687	1173.6	0.0250	18.940	1024.2	0.0246
3	3.192	1308.6	0.0247	16.013	1221.9	0.0247	22.280	1075.1	0.0243
4	3.547	1372.1	0.0245	16.943	1229.2	0.0244	23.724	1097.5	0.0241
5	3.758	1406.9	0.0242	17.327	1226.2	0.0242	24.381	1108.8	0.0238
6	3.885	1424.3	0.0239	17.509	1220.0	0.0239	24.709	1111.8	0.0236
7	3.958	1430.5	0.0236	17.617	1214.4	0.0236	24.889	1109.9	0.0233
8	3.992	1429.9	0.0233	17.701	1210.5	0.0234	24.995	1104.8	0.0231
9	3.991	1423.9	0.0230	17.775	1208.5	0.0231	25.054	1097.6	0.0229
10	3.957	1412.8	0.0228	17.844	1208.5	0.0229	25.072	1088.4	0.0227
11	3.888	1395.7	0.0225	17.899	1210.4	0.0226	25.037	1076.9	0.0225
12	3.772	1370.0	0.0223	17.906	1213.1	0.0224	24.899	1062.1	0.0223
13	3.587	1330.5	0.0221	17.764	1213.6	0.0222	24.515	1041.4	0.0221
14	3.276	1266.7	0.0219	17.152	1202.7	0.0220	23.469	1009.3	0.0219
15	2.696	1149.9	0.0218	15.121	1155.2	0.0218	20.549	958.5	0.0218
16	1.577	918.2	0.0216	9.525	979.4	0.0217	12.959	841.1	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	16.308	923.2	0.0245
2	25.559	1011.3	0.0244
3	29.681	1042.4	0.0241
4	31.328	1043.5	0.0239
5	31.993	1035.6	0.0237
6	32.278	1026.3	0.0234
7	32.418	1018.2	0.0232
8	32.504	1012.0	0.0230
9	32.570	1007.8	0.0228
10	32.622	1005.7	0.0227
11	32.648	1005.4	0.0225
12	32.590	1006.8	0.0223
13	32.272	1008.1	0.0221
14	31.162	1003.8	0.0219
15	27.663	974.4	0.0218
16	17.878	876.8	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-32. Burnup and TH Feedback Parameters by Axial Node for Assembly F21

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	0.961	828.6	0.0236	5.377	856.4	0.0236	8.258	892.3	0.0245
2	1.666	981.6	0.0235	8.657	974.1	0.0234	13.415	1019.5	0.0243
3	2.065	1061.0	0.0234	10.071	1009.8	0.0233	15.831	1078.6	0.0241
4	2.287	1102.5	0.0233	10.607	1014.7	0.0232	16.891	1107.4	0.0239
5	2.414	1124.2	0.0231	10.805	1010.4	0.0230	17.373	1120.0	0.0237
6	2.489	1134.8	0.0229	10.881	1004.4	0.0229	17.607	1124.2	0.0234
7	2.529	1138.5	0.0228	10.914	999.2	0.0227	17.728	1123.6	0.0232
8	2.544	1137.4	0.0226	10.936	995.5	0.0226	17.790	1120.1	0.0230
9	2.539	1132.4	0.0225	10.956	993.3	0.0225	17.814	1114.6	0.0228
10	2.514	1123.7	0.0223	10.974	992.7	0.0223	17.806	1107.4	0.0226
11	2.466	1110.9	0.0222	10.987	993.5	0.0222	17.754	1098.0	0.0224
12	2.389	1092.5	0.0220	10.972	995.3	0.0221	17.617	1085.2	0.0222
13	2.266	1064.8	0.0219	10.860	996.0	0.0219	17.283	1066.3	0.0220
14	2.059	1019.9	0.0218	10.447	988.7	0.0218	16.437	1034.2	0.0219
15	1.679	939.2	0.0217	9.161	951.7	0.0217	14.234	973.6	0.0217
16	0.963	780.2	0.0216	5.705	823.9	0.0216	8.801	839.6	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	12.255	910.1	0.0243
2	19.490	1005.3	0.0242
3	22.697	1032.5	0.0239
4	23.982	1033.9	0.0237
5	24.493	1026.8	0.0235
6	24.704	1018.6	0.0233
7	24.803	1011.7	0.0231
8	24.862	1006.7	0.0229
9	24.909	1003.7	0.0228
10	24.950	1002.6	0.0226
11	24.972	1003.5	0.0224
12	24.927	1005.9	0.0222
13	24.665	1008.3	0.0221
14	23.744	1004.8	0.0219
15	20.917	975.4	0.0218
16	13.272	872.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-33. Burnup and TH Feedback Parameters by Axial Node for Assembly F23

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.338	934.3	0.0251	8.015	1008.0	0.0253	9.678	741.4	0.0229
2	2.364	1145.5	0.0249	13.278	1177.5	0.0251	15.945	802.5	0.0229
3	3.079	1283.9	0.0247	15.912	1231.3	0.0248	19.054	823.9	0.0228
4	3.490	1360.5	0.0244	16.969	1238.9	0.0245	20.343	832.1	0.0227
5	3.716	1398.9	0.0241	17.391	1236.5	0.0242	20.880	834.5	0.0226
6	3.846	1417.5	0.0238	17.582	1230.5	0.0239	21.125	833.8	0.0225
7	3.918	1424.2	0.0235	17.690	1225.0	0.0236	21.253	831.0	0.0224
8	3.949	1423.3	0.0233	17.770	1221.2	0.0234	21.329	827.1	0.0223
9	3.944	1416.8	0.0230	17.840	1219.3	0.0231	21.378	822.3	0.0222
10	3.908	1405.0	0.0228	17.903	1219.4	0.0229	21.404	816.9	0.0221
11	3.835	1386.9	0.0225	17.950	1221.2	0.0227	21.398	810.5	0.0220
12	3.717	1360.2	0.0223	17.948	1223.7	0.0224	21.316	802.8	0.0219
13	3.531	1320.2	0.0221	17.791	1223.8	0.0222	21.034	792.8	0.0218
14	3.221	1256.4	0.0219	17.158	1211.7	0.0220	20.182	778.5	0.0217
15	2.650	1141.2	0.0217	15.111	1162.1	0.0218	17.698	753.8	0.0217
16	1.554	913.3	0.0216	9.528	983.5	0.0217	11.154	694.6	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	12.037	762.0	0.0229
2	19.464	810.9	0.0229
3	22.944	817.9	0.0228
4	24.310	815.6	0.0227
5	24.829	809.8	0.0226
6	25.036	803.8	0.0225
7	25.129	798.7	0.0224
8	25.183	794.7	0.0223
9	25.225	791.8	0.0222
10	25.259	789.9	0.0221
11	25.274	789.0	0.0220
12	25.223	788.9	0.0219
13	24.964	788.9	0.0219
14	24.065	786.1	0.0218
15	21.266	772.8	0.0217
16	13.579	724.1	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-34. Burnup and TH Feedback Parameters by Axial Node for Assembly F25

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.293	920.4	0.0247	7.355	959.1	0.0245	9.178	767.5	0.0233
2	2.250	1120.9	0.0246	11.822	1103.0	0.0244	14.857	847.3	0.0232
3	2.827	1230.8	0.0243	13.846	1145.0	0.0242	17.541	884.2	0.0231
4	3.165	1292.1	0.0241	14.662	1149.2	0.0239	18.703	900.5	0.0230
5	3.367	1325.9	0.0239	14.996	1143.6	0.0237	19.216	906.7	0.0228
6	3.489	1343.3	0.0236	15.149	1136.3	0.0235	19.459	907.7	0.0227
7	3.560	1350.8	0.0234	15.239	1130.2	0.0233	19.589	905.7	0.0226
8	3.595	1351.5	0.0231	15.308	1126.0	0.0231	19.667	901.9	0.0224
9	3.599	1346.8	0.0229	15.371	1123.9	0.0229	19.717	897.0	0.0223
10	3.574	1337.1	0.0226	15.432	1123.7	0.0227	19.744	890.9	0.0222
11	3.516	1321.8	0.0224	15.481	1125.3	0.0225	19.737	883.7	0.0221
12	3.415	1298.9	0.0222	15.490	1128.1	0.0223	19.654	874.4	0.0220
13	3.247	1262.9	0.0220	15.363	1130.2	0.0221	19.373	861.7	0.0219
14	2.958	1203.4	0.0219	14.821	1123.4	0.0219	18.547	841.9	0.0218
15	2.419	1094.5	0.0217	13.055	1082.5	0.0218	16.211	806.1	0.0217
16	1.395	877.6	0.0216	8.211	926.6	0.0216	10.153	726.9	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	11.814	795.0	0.0233
2	18.902	860.3	0.0232
3	22.120	871.7	0.0230
4	23.427	870.6	0.0229
5	23.945	864.5	0.0228
6	24.156	857.9	0.0227
7	24.256	852.2	0.0226
8	24.317	847.8	0.0224
9	24.366	844.8	0.0223
10	24.411	843.0	0.0222
11	24.437	842.4	0.0221
12	24.399	842.8	0.0220
13	24.149	843.0	0.0219
14	23.261	839.2	0.0218
15	20.514	823.2	0.0217
16	13.033	758.5	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-35. Burnup and TH Feedback Parameters by Axial Node for Assembly F28

Axial	Burnup	SP47 to SP48		Burnup	SP48 to SP49		Burnup	SP49 to SP50	
Node	SP48	T-Fuel	Spec.Vol	SP49	T-Fuel	Spec.Vol	SP50	T-Fuel	Spec.Vol
1	1.165	891.4	0.0248	7.117	966.4	0.0248	10.125	897.2	0.0248
2	2.116	1092.1	0.0246	11.979	1129.4	0.0246	16.979	1021.5	0.0246
3	2.811	1227.6	0.0244	14.455	1179.8	0.0244	20.569	1079.6	0.0244
4	3.223	1305.3	0.0242	15.466	1185.2	0.0241	22.173	1106.1	0.0241
5	3.451	1344.9	0.0239	15.872	1179.8	0.0239	22.897	1117.7	0.0239
6	3.584	1364.9	0.0237	16.057	1172.6	0.0236	23.257	1121.4	0.0236
7	3.659	1373.1	0.0234	16.163	1166.7	0.0234	23.456	1120.2	0.0234
8	3.694	1373.9	0.0232	16.243	1162.6	0.0232	23.577	1116.0	0.0231
9	3.697	1368.9	0.0229	16.315	1160.7	0.0230	23.650	1109.5	0.0229
10	3.669	1358.5	0.0227	16.382	1160.6	0.0227	23.682	1101.2	0.0227
11	3.606	1342.2	0.0225	16.436	1162.4	0.0225	23.660	1090.6	0.0225
12	3.500	1317.6	0.0223	16.444	1165.3	0.0223	23.530	1076.6	0.0223
13	3.325	1280.0	0.0221	16.306	1167.0	0.0221	23.146	1056.4	0.0221
14	3.028	1218.7	0.0219	15.722	1159.0	0.0220	22.099	1024.4	0.0219
15	2.480	1107.6	0.0217	13.835	1113.9	0.0218	19.254	967.0	0.0218
16	1.438	887.6	0.0216	8.693	948.5	0.0216	12.053	840.0	0.0216

Axial	Burnup	SP50 to SP51	
Node	SP51	T-Fuel	Spec.Vol
1	14.366	927.3	0.0246
2	23.448	1017.8	0.0244
3	27.918	1049.4	0.0242
4	29.777	1050.5	0.0239
5	30.533	1042.5	0.0237
6	30.865	1033.3	0.0235
7	31.036	1025.6	0.0233
8	31.148	1019.8	0.0231
9	31.238	1016.1	0.0229
10	31.316	1014.4	0.0227
11	31.365	1014.7	0.0225
12	31.325	1016.5	0.0223
13	31.012	1018.1	0.0221
14	29.885	1012.8	0.0219
15	26.401	979.7	0.0218
16	16.916	878.7	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-36. Burnup and TH Feedback Parameters by Axial Node for Assembly G2

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	2.729	926.2	0.0248	6.834	988.3	0.0252
2	4.805	1134.1	0.0246	11.616	1148.7	0.0250
3	6.082	1242.4	0.0244	14.217	1200.3	0.0247
4	6.748	1292.5	0.0241	15.359	1213.3	0.0244
5	7.092	1314.7	0.0239	15.843	1210.5	0.0241
6	7.272	1323.0	0.0236	16.056	1203.8	0.0238
7	7.361	1323.6	0.0233	16.156	1197.6	0.0236
8	7.390	1319.5	0.0231	16.207	1193.3	0.0233
9	7.373	1312.0	0.0229	16.236	1191.4	0.0231
10	7.316	1301.4	0.0227	16.249	1191.8	0.0228
11	7.210	1287.1	0.0224	16.234	1194.3	0.0226
12	7.033	1267.1	0.0222	16.150	1197.8	0.0224
13	6.734	1236.8	0.0221	15.879	1198.5	0.0222
14	6.193	1185.2	0.0219	15.108	1185.0	0.0220
15	5.124	1086.3	0.0217	13.014	1131.3	0.0218
16	3.012	880.2	0.0216	7.973	960.5	0.0217

Table 4-37. Burnup and TH Feedback Parameters by Axial Node for Assembly G4

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	3.230	981.4	0.0251	7.891	1015.5	0.0253
2	5.448	1189.9	0.0250	12.827	1164.8	0.0251
3	6.686	1294.4	0.0247	15.246	1217.5	0.0248
4	7.337	1343.8	0.0244	16.302	1228.9	0.0245
5	7.692	1366.2	0.0241	16.766	1224.7	0.0242
6	7.887	1374.5	0.0238	16.977	1216.9	0.0239
7	7.989	1374.9	0.0235	17.081	1209.8	0.0237
8	8.030	1370.9	0.0233	17.139	1204.9	0.0234
9	8.023	1363.8	0.0230	17.176	1202.5	0.0231
10	7.974	1353.8	0.0228	17.199	1202.8	0.0229
11	7.874	1340.6	0.0225	17.198	1205.5	0.0227
12	7.701	1321.3	0.0223	17.134	1210.0	0.0224
13	7.403	1291.6	0.0221	16.895	1212.9	0.0222
14	6.848	1240.1	0.0219	16.159	1202.4	0.0220
15	5.711	1137.2	0.0218	14.041	1147.7	0.0218
16	3.383	917.7	0.0216	8.686	979.4	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-38. Burnup and TH Feedback Parameters by Axial Node for Assembly G8

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	1.938	816.4	0.0235	4.652	837.8	0.0234
2	3.367	962.8	0.0234	7.737	951.5	0.0233
3	4.129	1032.7	0.0233	9.151	985.2	0.0232
4	4.501	1063.0	0.0231	9.700	988.3	0.0231
5	4.686	1074.9	0.0230	9.901	982.4	0.0229
6	4.780	1078.1	0.0228	9.969	975.3	0.0228
7	4.822	1076.8	0.0227	9.987	969.3	0.0227
8	4.833	1073.0	0.0225	9.987	965.0	0.0225
9	4.820	1067.5	0.0224	9.982	962.5	0.0224
10	4.785	1060.7	0.0223	9.975	961.8	0.0223
11	4.725	1052.0	0.0221	9.960	962.8	0.0222
12	4.626	1040.2	0.0220	9.917	965.2	0.0221
13	4.455	1022.0	0.0219	9.780	967.1	0.0219
14	4.128	989.4	0.0218	9.362	962.5	0.0218
15	3.447	922.9	0.0217	8.155	931.0	0.0217
16	2.026	776.5	0.0216	5.032	813.0	0.0216

Table 4-39. Burnup and TH Feedback Parameters by Axial Node for Assembly G10

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	3.179	976.8	0.0252	7.778	1013.7	0.0254
2	5.439	1190.5	0.0250	12.792	1165.5	0.0252
3	6.722	1299.2	0.0247	15.293	1219.1	0.0249
4	7.398	1350.4	0.0244	16.389	1230.4	0.0245
5	7.766	1373.7	0.0241	16.874	1226.0	0.0242
6	7.968	1382.1	0.0239	17.097	1218.2	0.0239
7	8.074	1382.6	0.0236	17.208	1211.2	0.0237
8	8.117	1378.7	0.0233	17.271	1206.5	0.0234
9	8.112	1371.7	0.0230	17.312	1204.3	0.0232
10	8.061	1361.8	0.0228	17.337	1204.7	0.0229
11	7.959	1348.4	0.0225	17.336	1207.5	0.0227
12	7.782	1329.1	0.0223	17.269	1212.1	0.0224
13	7.475	1298.6	0.0221	17.018	1215.2	0.0222
14	6.905	1245.7	0.0219	16.264	1204.8	0.0220
15	5.749	1141.1	0.0218	14.129	1150.3	0.0218
16	3.400	919.5	0.0216	8.756	983.2	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-40. Burnup and TH Feedback Parameters by Axial Node for Assembly G12

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	3.204	977.5	0.0251	7.784	1007.6	0.0252
2	5.395	1183.4	0.0249	12.629	1154.2	0.0250
3	6.610	1285.5	0.0246	14.978	1203.7	0.0247
4	7.246	1333.2	0.0244	15.987	1213.7	0.0244
5	7.590	1354.4	0.0241	16.421	1208.5	0.0241
6	7.778	1362.2	0.0238	16.611	1200.1	0.0238
7	7.876	1362.5	0.0235	16.701	1192.6	0.0236
8	7.915	1358.5	0.0232	16.749	1187.3	0.0233
9	7.909	1351.3	0.0230	16.779	1184.5	0.0231
10	7.862	1341.5	0.0227	16.797	1184.3	0.0229
11	7.767	1328.3	0.0225	16.794	1186.5	0.0226
12	7.604	1310.1	0.0223	16.735	1190.4	0.0224
13	7.320	1282.1	0.0221	16.513	1192.9	0.0222
14	6.787	1232.9	0.0219	15.820	1184.0	0.0220
15	5.681	1133.3	0.0218	13.784	1133.1	0.0218
16	3.378	916.7	0.0216	8.555	970.0	0.0217

Table 4-41. Burnup and TH Feedback Parameters by Axial Node for Assembly G14

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	2.830	931.0	0.0246	6.795	953.1	0.0246
2	4.859	1126.9	0.0245	11.209	1094.3	0.0244
3	5.975	1221.5	0.0243	13.311	1135.5	0.0242
4	6.542	1264.1	0.0240	14.175	1140.8	0.0239
5	6.845	1282.4	0.0238	14.534	1134.6	0.0237
6	7.012	1288.9	0.0235	14.689	1126.5	0.0235
7	7.102	1289.1	0.0233	14.765	1119.4	0.0233
8	7.143	1285.7	0.0231	14.811	1114.4	0.0231
9	7.148	1279.9	0.0228	14.846	1111.7	0.0229
10	7.118	1272.1	0.0226	14.875	1111.4	0.0227
11	7.048	1261.7	0.0224	14.890	1113.3	0.0225
12	6.918	1246.9	0.0222	14.860	1116.9	0.0223
13	6.678	1223.2	0.0221	14.687	1119.7	0.0221
14	6.204	1179.7	0.0219	14.091	1114.0	0.0219
15	5.189	1088.2	0.0217	12.282	1074.3	0.0218
16	3.063	884.1	0.0216	7.591	924.9	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-42. Burnup and TH Feedback Parameters by Axial Node for Assembly G17

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	3.166	974.8	0.0252	7.731	1010.9	0.0253
2	5.410	1187.0	0.0250	12.698	1161.3	0.0251
3	6.687	1294.8	0.0247	15.168	1213.0	0.0248
4	7.361	1345.3	0.0244	16.242	1223.0	0.0245
5	7.726	1368.1	0.0241	16.709	1217.6	0.0242
6	7.925	1376.4	0.0238	16.915	1209.0	0.0239
7	8.028	1376.7	0.0235	17.014	1201.5	0.0236
8	8.069	1372.5	0.0233	17.066	1196.2	0.0234
9	8.062	1365.3	0.0230	17.097	1193.5	0.0231
10	8.011	1355.4	0.0228	17.113	1193.4	0.0229
11	7.910	1341.9	0.0225	17.105	1195.8	0.0226
12	7.737	1322.6	0.0223	17.036	1199.8	0.0224
13	7.437	1293.1	0.0221	16.796	1202.4	0.0222
14	6.882	1241.9	0.0219	16.074	1193.4	0.0220
15	5.751	1139.9	0.0218	14.006	1141.7	0.0218
16	3.420	920.9	0.0216	8.720	978.6	0.0217

Table 4-43. Burnup and TH Feedback Parameters by Axial Node for Assembly G19

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	3.097	967.9	0.0251	7.531	999.7	0.0252
2	5.306	1177.1	0.0249	12.408	1149.5	0.0250
3	6.579	1284.1	0.0247	14.854	1199.4	0.0247
4	7.262	1335.1	0.0244	15.935	1209.5	0.0244
5	7.638	1358.3	0.0241	16.411	1204.2	0.0241
6	7.849	1367.5	0.0238	16.634	1195.9	0.0238
7	7.969	1369.2	0.0236	16.754	1188.6	0.0236
8	8.029	1366.5	0.0233	16.833	1183.6	0.0233
9	8.045	1361.0	0.0230	16.896	1181.2	0.0231
10	8.020	1353.0	0.0228	16.948	1181.5	0.0229
11	7.947	1341.7	0.0225	16.981	1184.1	0.0226
12	7.802	1325.2	0.0223	16.955	1188.6	0.0224
13	7.525	1298.1	0.0221	16.754	1191.9	0.0222
14	6.973	1248.0	0.0219	16.044	1183.3	0.0220
15	5.800	1143.4	0.0218	13.911	1130.6	0.0218
16	3.404	919.2	0.0216	8.537	966.1	0.0217

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-44. Burnup and TH Feedback Parameters by Axial Node for Assembly G23

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	2.831	941.0	0.0251	6.997	994.4	0.0252
2	5.028	1157.8	0.0249	11.944	1154.3	0.0250
3	6.415	1273.5	0.0246	14.654	1204.8	0.0247
4	7.156	1327.5	0.0244	15.851	1214.5	0.0244
5	7.546	1351.6	0.0241	16.358	1208.9	0.0241
6	7.760	1361.1	0.0238	16.586	1200.3	0.0238
7	7.875	1362.7	0.0235	16.701	1192.7	0.0236
8	7.929	1359.7	0.0232	16.771	1187.6	0.0233
9	7.936	1353.5	0.0230	16.820	1185.0	0.0231
10	7.902	1344.6	0.0228	16.857	1185.0	0.0229
11	7.818	1332.4	0.0225	16.872	1187.4	0.0226
12	7.661	1314.6	0.0223	16.825	1191.5	0.0224
13	7.373	1286.3	0.0221	16.599	1194.1	0.0222
14	6.818	1235.3	0.0219	15.870	1184.5	0.0220
15	5.669	1132.1	0.0218	13.753	1131.9	0.0218
16	3.341	912.7	0.0216	8.467	966.7	0.0217

Table 4-45. Burnup and TH Feedback Parameters by Axial Node for Assembly G25

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	2.560	901.4	0.0244	6.216	931.5	0.0243
2	4.426	1086.3	0.0242	10.271	1067.0	0.0242
3	5.490	1177.6	0.0241	12.252	1104.5	0.0239
4	6.059	1220.5	0.0238	13.113	1108.0	0.0237
5	6.368	1239.5	0.0236	13.481	1101.2	0.0235
6	6.539	1246.7	0.0234	13.644	1092.7	0.0233
7	6.633	1247.6	0.0232	13.727	1085.6	0.0231
8	6.680	1245.1	0.0230	13.780	1080.7	0.0229
9	6.692	1240.3	0.0228	13.822	1078.2	0.0228
10	6.672	1233.5	0.0226	13.858	1077.9	0.0226
11	6.614	1224.3	0.0224	13.881	1079.8	0.0224
12	6.496	1210.6	0.0222	13.858	1083.5	0.0222
13	6.268	1187.9	0.0220	13.693	1086.5	0.0221
14	5.806	1145.2	0.0219	13.109	1080.8	0.0219
15	4.823	1055.7	0.0217	11.370	1042.8	0.0218
16	2.813	858.7	0.0216	6.969	898.3	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup	- GWd/MTU
T-Fuel	- °F
Spec. Vol.	- ft^3 / lbm

Table 4-46. Burnup and TH Feedback Parameters by Axial Node for Assembly G28

Axial	Burnup	SP49 to SP50		Burnup	SP50 to SP51	
Node	SP50	T-Fuel	Spec.Vol	SP51	T-Fuel	Spec.Vol
1	2.593	913.3	0.0248	6.370	961.6	0.0247
2	4.674	1123.1	0.0246	10.945	1112.2	0.0245
3	5.995	1233.1	0.0244	13.420	1151.9	0.0243
4	6.702	1283.9	0.0242	14.500	1154.9	0.0240
5	7.074	1306.2	0.0239	14.953	1147.1	0.0238
6	7.279	1314.9	0.0236	15.156	1138.0	0.0236
7	7.394	1316.5	0.0234	15.262	1130.4	0.0233
8	7.453	1314.1	0.0231	15.331	1125.3	0.0231
9	7.472	1309.2	0.0229	15.387	1122.7	0.0229
10	7.454	1302.2	0.0227	15.434	1122.5	0.0227
11	7.392	1292.2	0.0225	15.464	1124.6	0.0225
12	7.261	1277.3	0.0223	15.442	1128.6	0.0223
13	7.007	1252.6	0.0221	15.262	1131.7	0.0221
14	6.496	1206.0	0.0219	14.625	1125.6	0.0219
15	5.411	1108.6	0.0217	12.726	1084.7	0.0218
16	3.176	896.0	0.0216	7.862	935.5	0.0216

Datapoint or Statepoint	EFPD / Cycle
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Burnup - GWd/MTU
T-Fuel - °F
Spec. Vol. - ft^3 / lbm

Table 4-47. Rod Insertion Time by Axial Node for Assembly B25b

Axial Node	Time Rod Inserted (EFPD) SP47 to SP48
1	62.4
2	33.4
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0
16	0.0

Table 4-48. Rod Insertion Time by Axial Node for Assembly B31a

Axial	Time Rod Inserted (EFPD)	
Node	SP49 to SP50	SP50 to SP51
1	112.4	125.3
2	23.4	16.9
3	0.0	0.0
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	0.0	0.0
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	0.0	0.0
13	0.0	0.0
14	0.0	0.0
15	0.0	0.0
16	0.0	0.0

Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Table 4-49. Rod Insertion Time by Axial Node for Assembly D8

Axial Node	Time Rod Inserted (EFPD) SP47 to SP48
1	62.4
2	33.3
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.0
13	0.0
14	0.0
15	0.0
16	0.0

Table 4-50. Rod Insertion Time by Axial Node for Assembly E14a

Axial	Time Rod Inserted (EFPD)	
Node	SP49 to SP50	SP50 to SP51
1	112.3	125.2
2	22.8	16.9
3	0.0	0.0
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
7	0.0	0.0
8	0.0	0.0
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	0.0	0.0
13	0.0	0.0
14	0.0	0.0
15	0.0	0.0
16	0.0	0.0

Statepoint	EFPD / Cycle
SP47	0.0 / Cy6
SP48	62.4 / Cy6
SP49	0.0 / Cy7
SP50	129.0 / Cy7
SP51	282.3 / Cy7

Table 4-51. Critical Boron Data for McGuire 1 Burnup Calculations

$$ppmB = A + B \cdot EFPD$$

Cycle	A (ppmB)	B (ppmB/EFPD)
2*	877.99	-3.57
3**	904.82	-3.21
4	1018.04	-3.39
5	1116.42	-3.38
6	1159.67	-3.02
7	1363.64	-3.08

* For cycle 2, use equation out to 243.1 EFPD and 10 ppmB from 243.1 EFPD to end-of-cycle
** For cycle 3, use equation out to 287.7 EFPD and 10 ppmB from 287.7 EFPD to end-of-cycle

4.2 Statepoint Critical Condition Measurements

Measured critical conditions for 6 reactor startups (or statepoints) are provided in Table 4-52. The data includes the initial startup of the reactor or beginning-of-life (BOL), the beginning-of-cycle (BOC) of reload cycles 6 and 7, and three reactor restarts during cycles 6 and 7 of McGuire Unit 1. The cycle and statepoint number, along with the EFPDs during the cycle for which the startup occurred, is provided. The elapsed time (in hours) since the reactor was shutdown (downtime) prior to the startup is also given for each statepoint. In addition, Table 4-52 provides the measured soluble boron concentration (ppmB), rod bank positions, and temperature of the moderator or coolant in the reactor (for each statepoint) when criticality was achieved.

Table 4-53 provides shutdown and startup dates for each cycle and statepoint. The cycle shutdown and startup dates can be used in determining the downtime for fuel assemblies that are out of the reactor for one or more cycles and are then reinserted in a later cycle.

Table 4-52. Statepoint Data for McGuire Unit 1 - Measured Critical Conditions

Cycle(SP)	EFPD	Downtime (hours)	ppmB	Rod Positions, cm above bottom of fuel*				T(coolant) (F)
				Bk CA	Bk CB	Bk CC	Bk CD	
1(SP46)	0.0	0	1279	WD	WD	313	129	558.9
6(SP47)	0.0	1872	1538	WD	WD	358	174	558.1
6(SP48)	62.4	1505	1320	WD	WD	315	131	557.9
7(SP49)	0.0	3120	1689	WD	WD	313	129	558.8
7(SP50)	129.0	711	1335	WD	WD	278	94	558.2
7(SP51)	282.3	451	931	WD	WD	WD	283	557

Bk = Rod Bank
WD = Rod Withdrawn

* Measured from the bottom of active fuel region to bottom of control rod absorber region (See Figure 2-17).

Table 4-53. Statepoint Data for McGuire Unit 1 - Shutdown and Startup Dates

Cycle(SP)	EFPD	Shutdown Date	Startup Date
1(SP46)	0.0	-	08 Aug 1981
2(-)*	0.0	24 Feb 1984	28 Apr 1984
3(-)*	0.0	19 Apr 1985	24 Jun 1985
4(-)*	0.0	16 May 1986	07 Sep 1986
5(-)*	0.0	04 Sep 1987	12 Nov 1987
6(SP47)*	0.0	12 Oct 1988	29 Dec 1988
6(SP48)	62.4	07 Mar 1989	09 May 1989
7(SP49)*	0.0	08 Jan 1990	18 May 1990
7(SP50)	129.0	15 Oct 1990	14 Nov 1990
7(SP51)	282.3	25 Apr 1991	14 May 1991
	408.0 (EOC)	20 Sep 1991	

EOC = end-of-cycle

* Shutdown date is for previous cycle.

5.0 CONCLUSIONS

The data reported herein is acceptable for quality affecting activities and for use in analyses affecting procurement, construction, or fabrication. The classification analysis for the repository (which includes the waste package) carries TBV-228 because of the preliminary status of the basis for the MGR design. This report conservatively assumes that the resolution of TBV-228 will find the waste package to be quality affecting; consequently, use of any of the data reported herein does not need to carry TBV-228.

6.0 REFERENCES

1. *Quality Assurance Program for Framatome Cogema Fuels*, Document Number: 56-1177617-04, FCF, August 5, 1996.

2. *Classification of the Preliminary MGDS Repository Design,* Document Identifier Number (DI#) B00000000-01717-0200-00134 REV 00, Civilian Radioactive Waste Management System (CRWMS) Management and Operating Contractor (M&O).

3. QAP-2-0 Activity Evaluations, ID No. WP-06, *Develop Technical Documents*, CRWMS M&O, August 3, 1997.

4. *Quality Assurance Requirements and Description*, DOE/RW-0333P, REV 7, DOE OCRWM.

5. *McGuire 1 NEMO Depletion and Statepoints (HLW)*, Document Number: 32-1267165-00, FCF.