CRWMS/M&O

Calculation Cover Sheet

Complete only applicable items.

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Page: 1 Of: 246

2. Calculation Title
CRC Reactivity Calculations for Crystal River Unit 3

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	Print Name	Signature	Date
7. Originator	John M. Scaglione	John M. Scaglione	6/19/98
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10. Remarks
Attachments I through V are contained on a series of 3 attachment tapes. The page numbers shown in box 6 refer to the number of pages in the hard-copy listing of each files content on the tapes.

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Revision History

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REV 00		Initial Issuance

Table of Contents

1. Purpose

The purpose of this calculation is to document the Crystal River Unit 3 pressurized water reactor (PWR) reactivity calculations performed as part of the commercial reactor critical (CRC) evaluation program. CRC evaluation reactivity calculations are performed at a number of statepoints, representing reactor start-up critical conditions at either beginning of life (BOL), beginning of cycle (BOC), or mid-cycle when the reactor resumed operation after a shutdown. The CRC evaluations support the development and validation of the neutronics models used for criticality analyses involving commercial spent nuclear fuel in a geologic repository.

2. Method

The calculational method used to perform the Crystal River Unit 3 core reactivity calculations consisted of using the MCNP code (Ref. 7.1) to calculate the effective neutron multiplication factor (k_{eff}) for the various critical core configurations. Each of the critical core configurations were modeled in detail using measured critical conditions. The various fuel assemblies were modeled explicitly in the critical core configurations. The SAS2H code of the SCALE 4.3 modular code system (Ref. 7.2) was used to deplete the various fuel assemblies as necessary to obtain the burned fuel isotopics for use in the reactivity calculations documented herein. These fuel assembly depletion calculations are documented in Reference 7.3. The Crystal River Unit 3 CRC configurations are actual PWR cores which contained fuel loadings that varied from all fresh fuel (BOL) to a mixture of fresh and burned fuel (BOC) to a mixture of all burned fuel (mid-cycle restart).

3. Assumptions

Not Used

4. Use of Computer Software

4.1. Software Approved for QA Work

4.1.1. MCNP

The MCNP code was used to calculate the k_{eff} of the Crystal River Unit 3 critical reactor configurations. The software specifications are as follow:

- Program Name: MCNP
- Version/Revision Number: Version 4B2
- CSCI Number: 30033 V4BLV
- Computer Type: HP 9000 Series Workstations

The input and output files for the various MCNP calculations are documented in the attachments to this calculation file (the attachment tapes have been moved to Reference 7.15) as described in Sections 5 and 8, such that an independent repetition of the software use may be performed. The MCNP software used

was: (a) appropriate for the application of commercial reactor k_{eff} calculations, (b) used only within the range of validation as documented throughout References 7.1 and 7.4, (c) obtained from the Software Configuration Manager in accordance with appropriate procedures.

4.2. Software Routines

4.2.1. MACE

- Title: MCNP Accessory for CRC Evaluations (MACE)
- Version/Revision Number: Version 3

The MACE code automates the production of MCNP input decks to calculate the k_{eff} of the critical reactor configurations in the CRC evaluations. The input and output for the various MACE calculations are documented in Sections 5 and 8, such that an independent repetition of the software routine use may be performed. The description of the MACE software routine is provided in Attachment I of Reference 7.14. This description documentation contains the following information:

- Descriptions and equations of mathematical algorithms
- Description of software routine including execution environment
- Range of input parameter values for which results were verified
- Identification of any limitations on software routine applications or validity
- Reference list of all documentation relevant to the qualification
- Directory listing of executable and data files
- Computer listing of source code

The MCNP input decks that were produced for the Crystal River Unit 3 CRC evaluations and presented in Reference 7.15 serve as the test cases for MACE. These input decks were thoroughly reviewed to verify that MACE was performing correctly. An error was found when MACE uses the "Principle Isotope" fuel option. MCNP ZAID 44103.50c (Ru-103) is used instead of MCNP ZAID 45103.50c (Rh-103), and must be hand corrected in the MCNP input file before running MCNP.

4.2.2. Excel

- Title: Excel
- Version/Revision Number: Microsoft® Excel 97

The Excel spreadsheet program was used for simple numeric calculations as documented in Section 5 of this calculation file. The user-defined formulas, inputs, and results were documented in sufficient detail in Section 5 to allow an independent repetition of the various computations.

5. Calculation

The Crystal River Unit 3 CRC reactivity calculations are detailed calculations of the neutron multiplication factor for actual critical reactor configurations. This analysis provides the geometry, material, core loading, and calculational control descriptions for each CRC reactivity calculation performed with MCNP. The MCNP input decks for each CRC reactivity calculation documented in this

analysis were created with the MACE software routine. Complete documentation of the MACE software routine and MACE input deck preparation instructions are provided in Attachment I of Reference 7.14. The MACE input decks used to create each of the MCNP input decks are presented in Attachment I (moved to Reference 7.15). The MACE generated MCNP input decks are presented in Attachment II (moved to Reference 7.15). The MCNP output decks are presented in Attachment III (moved to Reference 7.15). Attachment IV (moved to Reference 7.15) contains revised MCNP input files and output files that were run in order to determine the effect of spacer grid heights being offset by 16.723 cm would have on system reactivity (see Section 5.2.2). The k_{eff} results for each CRC reactivity calculation are presented in Section 6.

5.1. Crystal River Unit 3 CRC Reactivity Calculations

The Crystal River Unit 3 CRC reactivity calculations represent 33 critical statepoints at which either BOL, BOC, or mid-cycle reactor start-ups were performed. Table 5.1-1 presents a listing of these 33 statepoints by reactor cycle and effective full-power day (EFPD) time.

Table 5.1-1. Crystal River Unit 3 CRC Reactivity Calculations (p. 27, Ref. 7.11)

Cycle	Critical Statepoint EFPD Time
1A	0.0
1B	268.8
1B	411.0
2	0.0
3	0.0
3	168.5
3	250.0
4	0.0
4	228.1
4	253.0
5	0.0
5	388.5
6	0.0
6	96.0
6	400.0
7	0.0
7	260.3
7	291.0
7	319.0
7	462.3
7	479.0
8	0.0
8	97.6
8	139.8

Table 5.1-1. Crystal River Unit 3 CRC Reactivity Calculations (p. 27, Ref. 7.11)

Cycle	Critical Statepoint EFPD Time
8	404.0
8	409.6
8	515.5
9	0.0
9	158.8
9	219.0
9	363.1
10	0.0
10	573.7

5.2. Crystal River Unit 3 MCNP Geometrical Descriptions

The MCNP models for the Crystal River Unit 3 PWR incorporated detailed and explicit representations of the fuel assemblies and reactor core components. Extensive fuel assembly and core modeling was incorporated for regions beyond the extent of the active fuel in the axial direction to ensure that neutron leakage was correctly simulated. Actual core loading patterns were utilized in all of the critical configuration models. Core symmetry was used wherever possible to minimize the number of unique fuel assembly descriptions that were required. The use of core symmetry also served to expedite the k_{eff} calculations. The depleted fuel in each assembly was composed of eighteen unique, axially differentiated, fuel compositions. These depleted fuel compositions were calculated with SAS2H as documented throughout Reference 7.3. Burnable poison rod assemblies (BPRAs), rod cluster control assemblies (RCCAs), and axial power shaping rod assemblies (APSRAs) were modeled explicitly in the core locations corresponding to the measured critical conditions at the various statepoints. The average system temperature and soluble boron concentration that was measured at each critical statepoint was utilized in the MCNP models. Sections 5.2.1 through 5.2.8 discuss the MCNP geometric modeling details for the various components of the Crystal River Unit 3 CRC configurations.

5.2.1. Crystal River Unit 3 Reactor Core Geometric Description

The Crystal River Unit 3 PWR is a B&W reactor core design consisting of 177, 15x15 cell lattice, fuel assemblies (p. 5, Ref. 7.11). A core liner surrounds the periphery fuel assemblies in the core. The periphery of the reactor consists of the core barrel, the thermal shield, the pressure vessel liner, and the pressure vessel. These peripheral components are separated by a regions of moderator (borated water). A radial view of the reactor internals is shown in Figure 5.2.1-1. The height of the active fuel region in the core is 360.172 cm for cycles 1 through 9, and 357.1113 cm for cycle 10 (p. 5, Ref. 7.11). The assembly pitch in the core is 21.81098 cm (p. 5, Ref. 7.11). Table 5.2.1-1 presents the dimensions from the center of the core to the outside surface of the pressure vessel. An axial view of the reactor core internals is shown in Figure 5.2.1-2. Due to their geometric complexity and low neutronic importance, the components in the reactor regions above and below the upper and lower end-fittings of the fuel assemblies are homogenized for each region. Four homogenized regions are modeled above the assembly upper end-fitting: Upper Plenum Region, CRGT Flange Region, Upper Core Grid Region, and Upper Pad Region. Three homogenized regions are modeled below the assembly lower end-fitting: Lower Pad Region, Lower Core Grid Region, and Region Between the Lower Grid and Vessel Plate.

These reactor regions above and below the fuel assembly end-fittings are modeled as uniform geometric cells, each containing the appropriately homogenized material composition. The homogenization of these components will allow MCNP to simulate the average axial leakage from the system.

Table 5.2.1-1. Dimensions from Core Center to Outside Surface of Pressure Vessel (p. 3, Ref. 7.11)

Description	Thickness (cm)	Outer Dimension (cm)
Core Center	---	0.00000
Half of FA[1]-1	10.84072	10.84072
Water	0.12954	10.97026
FA-2	21.68144	32.65170
Water	0.12954	32.78124
FA-3	21.68144	54.46268
Water	0.12954	54.59222
FA-4	21.68144	76.27366
Water	0.12954	76.40320
FA-5	21.68144	98.08464
Water	0.12954	98.21418
FA-6	21.68144	119.89562
Water	0.12954	120.02516
FA-7	21.68144	141.70660
Water	0.12954	141.83614
FA-8	21.68144	163.51758
Water	0.27442	163.79200
Core Liner	1.905	165.697
Water	13.373	179.070
Core Barrel	5.080	184.150
Water	2.540	186.690
Thermal Shield	5.080	191.770
Water	24.925	216.695
Pressure Vessel Clad	0.478	217.173
Pressure Vessel	21.433	238.606

[1] FA = Fuel Assembly

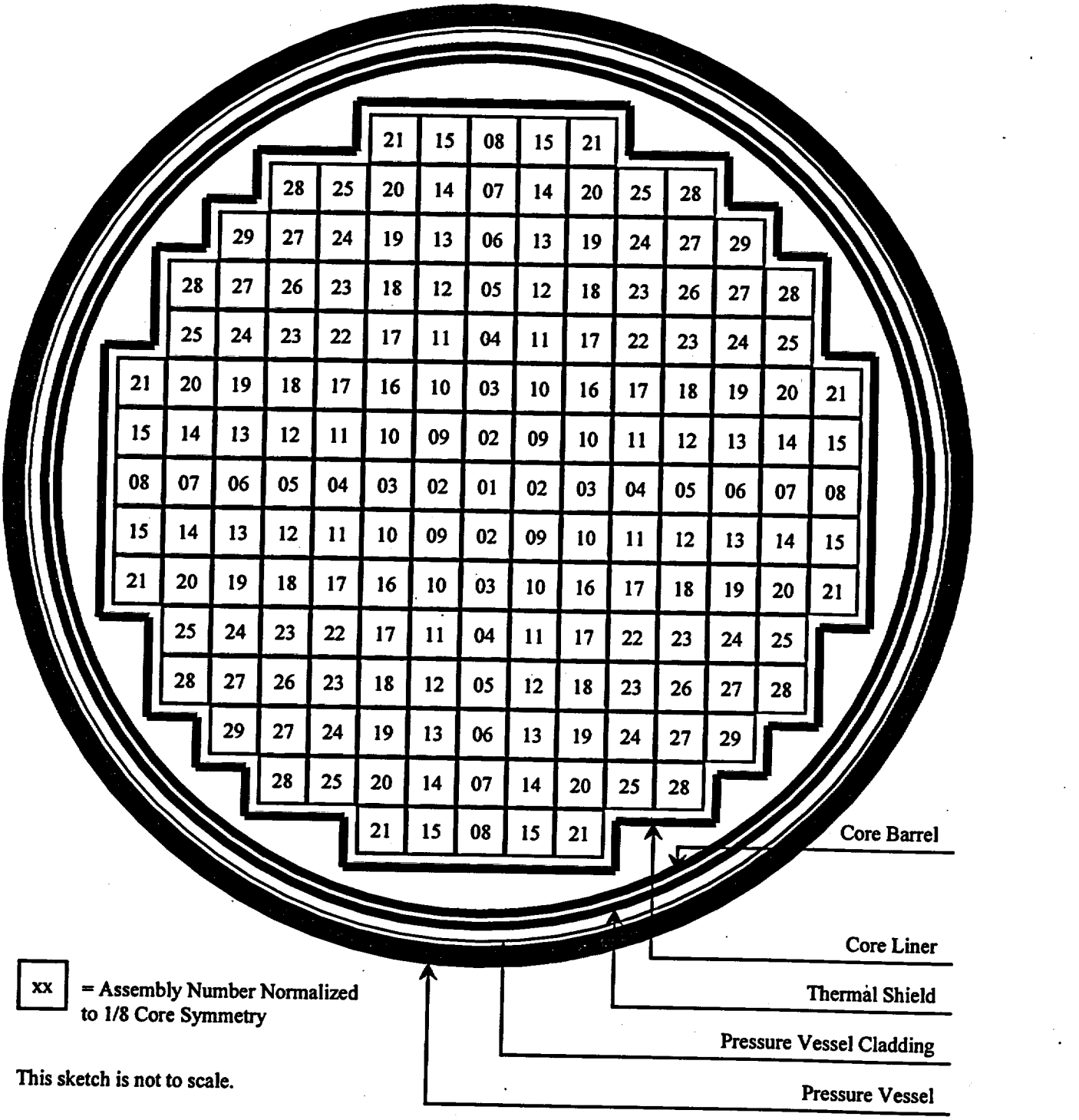


Figure 5.2.1-1. Radial View of the Crystal River Unit 3 Reactor Internals as Modeled in MCNP (p. 4, Ref. 7.11)

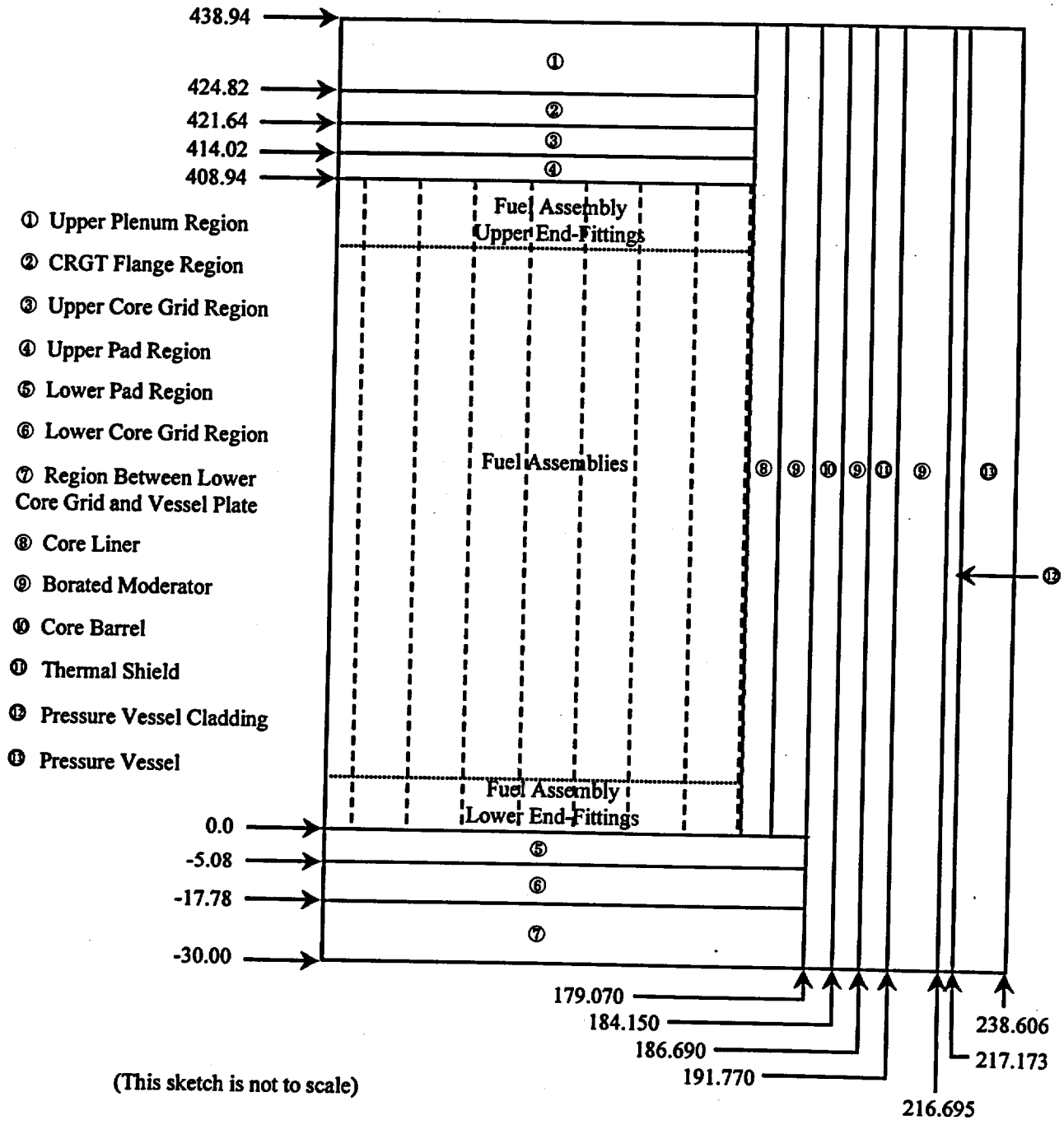


Figure 5.2.1-2. Axial View of the Crystal River Unit 3 Reactor Internals as Modeled in MCNP (Radial Dimensions: p. 3, Ref. 7.11) (Axial Dimensions: pp. 8, 9, Ref. 7.11)

5.2.2. Crystal River Unit 3 Fuel Assembly Geometric Descriptions

The Crystal River Unit 3 CRC configurations contained fuel assemblies from 15 different fuel batches. Fuel assemblies from the various fuel batches were inserted into the reactor core in different combinations for each cycle. Six different fuel assembly designs are represented in the various fuel batches: Framatome Cogema Fuels Mark-B2, Framatome Cogema Fuels Mark-B3, Framatome Cogema Fuels Mark-B4, Framatome Cogema Fuels Mark-B4Z, Framatome Cogema Fuels Mark-B9, and Framatome Cogema Fuels Mark-B10ZL. All six of the fuel assembly designs utilize 15x15 pin cell lattices. The pin cell lattice pitch is 1.44272 cm (p. 5, Ref. 7.11) in each assembly design. The specifications for each design are summarized in Table 5.2.2-1.

Table 5.2.2-1. Fuel Assembly Specification Summary (p. 26, Ref. 7.11)

Cycle	Fuel Batch	FA Type	wt% U-235	kg U per FA	FP[1] Pellet OD[2] (cm)	FP Clad OD (cm)	FP Clad ID[3] (cm)	FA Grid Material
1A	1	Mk-B3	1.93	463.63	0.93980	1.09220	0.95758	Inconel
1A	2	Mk-B3	2.54	463.63	0.93980	1.09220	0.95758	Inconel
1A	3	Mk-B3	2.83	463.63	0.93980	1.09220	0.95758	Inconel
1B	1X[4]	Mk-B2	2.00	468.62	0.93980	1.09220	0.95758	Inconel
2	4	Mk-B4	2.64	468.62	0.93904	1.09220	0.95758	Inconel
3	5	Mk-B4	2.62	463.63	0.93624	1.09220	0.95758	Inconel
4	6A	Mk-B4	2.62	463.63	0.93624	1.09220	0.95758	Inconel
4	6B	Mk-B4	2.95	463.63	0.93624	1.09220	0.95758	Inconel
5	7A	Mk-B4	3.29	463.63	0.93624	1.09220	0.95758	Inconel
5	7B	Mk-B4	2.95	463.63	0.93624	1.09220	0.95758	Inconel
6	8	Mk-B4	3.49	463.63	0.93624	1.09220	0.95758	Inconel
7	9	Mk-B4Z	3.84	463.63	0.93624	1.09220	0.95758	Zircaloy-4
8	10	Mk-B4Z	3.94	463.63	0.93624	1.09220	0.95758	Zircaloy-4
9	11	Mk-B9	3.90	463.605	0.93980	1.09220	0.95758	Zircaloy-4
10	12	Mk-B10ZL	4.167*	463.66	0.93980	1.09220	0.95758	Zircaloy-4

[1] FP = Fuel Pin, [2] OD = Outer Diameter, [3] ID = Inner Diameter
[4] Four Oconee 1, Cycle 1, fuel assemblies inserted into Crystal River Unit 3 Cycle 1B
* Assembly contains 192 fuel rods at 4.19 wt% U^{235} and 16 fuel rods at 3.89 wt% U^{235}, for an assembly average enrichment of 4.167 wt% U^{235}.

All fuel assembly designs contain 208 fuel rods, one instrument tube and sixteen guide tubes (p. 5, Ref. 7.11). The instrument tube and guide tube dimensions are the same for each of the six fuel assembly designs. Table 5.2.2-2 summarizes the instrument tube and guide tube specifications. The fuel pin, guide tube, and instrument tube positions for all assembly designs are shown in Figure 5.2.2-1.

Table 5.2.2-2. Instrument and Guide Tube Specification Summary (p. 26, Ref. 7.11)

Description	Material	OD (cm)	ID (cm)
Instrument Tube	Zircaloy-4	1.38193	1.12014
Guide Tube	Zircaloy-4	1.34620	1.26492

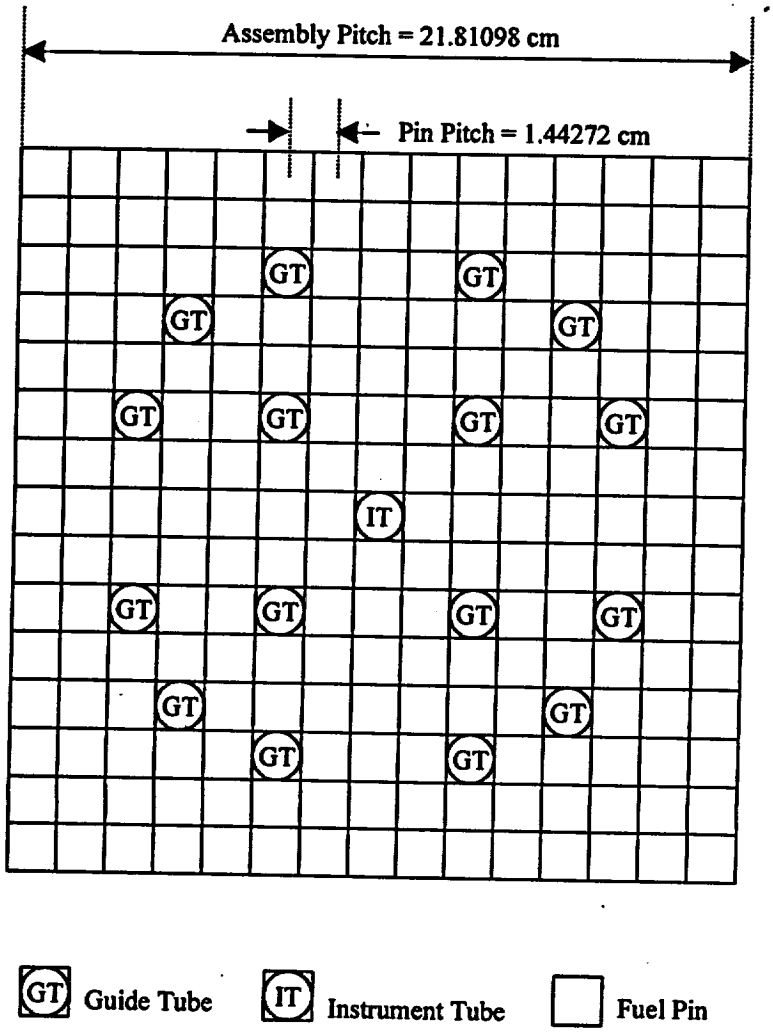


Figure 5.2.2-1. Fuel Pin, Guide Tube, and Instrument Tube Locations in Fuel Assembly (p. 7, Ref. 7.11)

All of the fuel assembly designs have six intermediate spacer grids and one upper end spacer grid (pp. 8, 9, Ref. 7.11). The upper end spacer grids are made of Inconel (p. 6, Ref. 7.11), and the intermediate spacer grids are made of Inconel and Zircaloy-4 for batches 1 through 8 and batches 9 through 12, respectively (p. 26, Ref. 7.11). According to the reference, the upper end spacer grid homogenized region also contains a Zircaloy-4 volume fraction of 0.0069 (p. 10, Ref. 7.11). Since MACE does not allow a spacer grid homogenized combination of Inconel, Zircaloy-4, and water, the Zircaloy-4 volume fraction was neglected in the modeling of the upper end spacer grids. The approximation of excluding the small Zircaloy-4 constituent in the upper spacer grid has an insignificant effect on the system reactivity. The intermediate spacer grid height and volume for the assembly designs are summarized in Table 5.2.2-4. The referenced upper end spacer grid height is 8.573 cm for each assembly design (pp. 8, 9, Ref. 7.11). Each spacer grid material volume was homogenized with the corresponding borated moderator volume and placed uniformly between the assembly rods and within the assembly pitch boundaries in each spacer grid location. The axial locations of the spacer grids are shown in Figure 5.2.2-2. However, the spacer grid positions modeled in the MCNP models for statepoints 1 through 4, and 9 through 11, are 16.723 cm lower than the referenced positions. The Cycle 4, 0.0 EFPD (Statepoint 8) k_{eff} calculations were recalculated with the spacer grids in the referenced positions. The recalculated cases are identified in Attachment IV (moved to Reference 7.15) as cr3i8(a, b, c, or d)2 and cr3i8(a, b, c, or d)2.O for the MCNP inputs and MCNP outputs, respectively. The results of the difference in k_{eff} for the four cases are shown in Table 5.2.2-3. The results of the recalculations indicate that the lower placement of the spacer grids for these statepoint calculations has a vanishingly small effect on system reactivity. The lower end-fitting of each fuel assembly design is modeled as a homogenized region, 16.723 cm in height (pp. 8, 9, Ref. 7.11), distributed uniformly between and below the fuel rods, guide tubes, and instrument tubes. The upper end-fitting of each fuel assembly design is modeled as a homogenized region, 8.731 cm in height (pp. 8, 9, Ref. 7.11), distributed uniformly between and above the fuel rods, guide tubes, instrument tubes, BPRAs, RCCAs, and APSRAs.

Table 5.2.2-3. k_{eff} Results for Spacer Grid Effect on System Reactivity

Fuel Isotope Set	Crystal River Unit 3 Cycle 4, 0.0 EFPD (k_{eff} / standard deviation)		
	Spacer Grids 16.723 cm Below Reference Heights	Spacer Grids at Reference Heights	Difference in k_{eff}
Best-Estimate	0.99134 / 0.00047	0.99140 / 0.00045	0.00006
Principle Isotope	0.99922 / 0.00045	0.99961 / 0.00043	0.00039
Principle Actinide	1.02417 / 0.00045	1.02503 / 0.00044	0.00086
Actinide-Only	1.02594 / 0.00043	1.02567 / 0.00050	0.00027

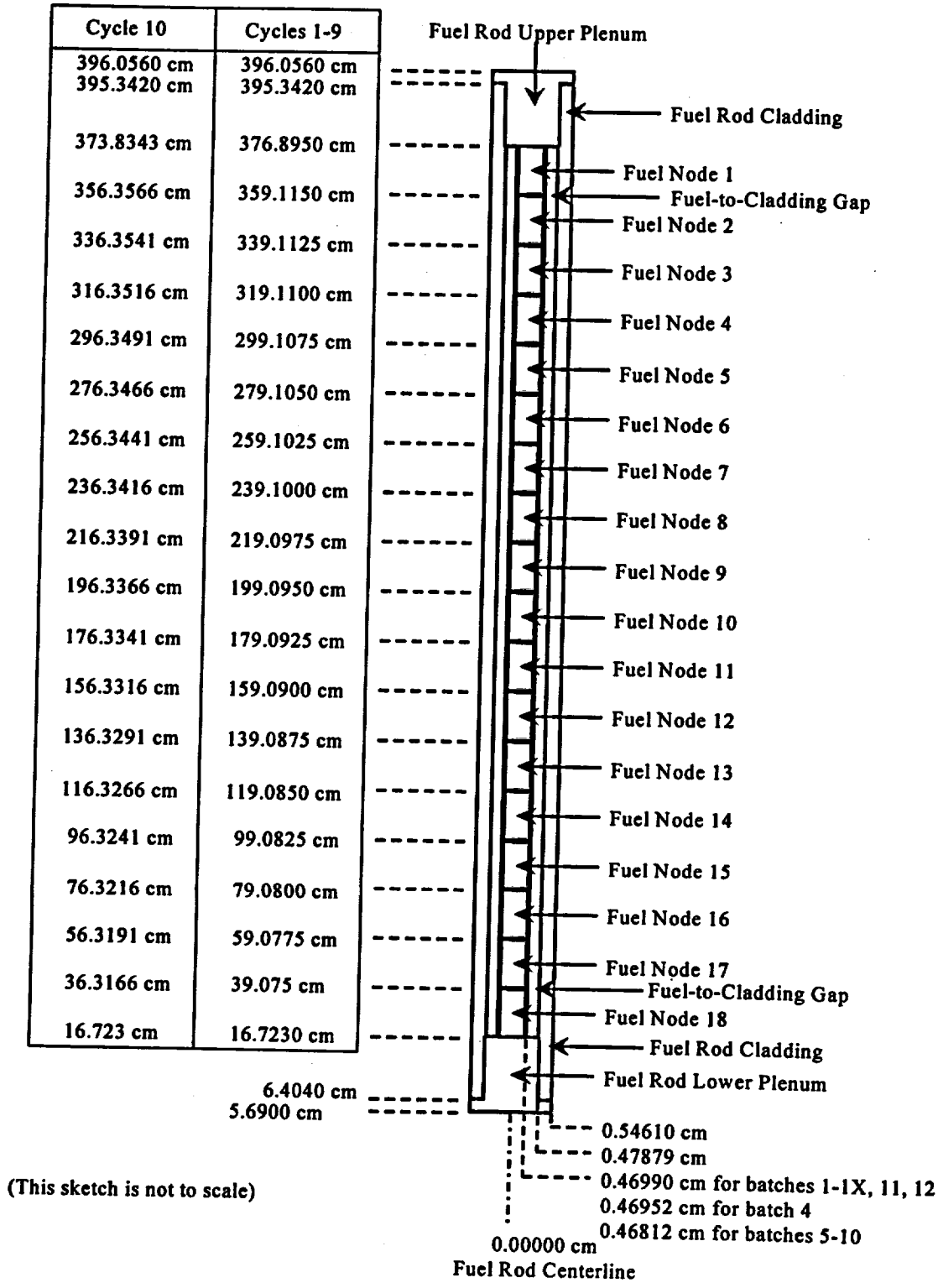
Table 5.2.2-4. Intermediate Spacer Grid Height and Volume (p. 5, Ref. 7.11)

Material	Inconel	Zircaloy-4
Height (cm)	3.81	5.08
Volume (cm^3)	88.676	125.758

The end spacer grid volume was the same for all assemblies. The height and volume were 8.573 cm and 115.698 cm^3, respectively. The moderator volume fraction in the upper end spacer grid region was 0.9474 (p. 10, Ref. 7.11). The spacer grid volume was determined by taking the volume of the moderator and grid in this region and multiplying it by 1 minus the moderator volume fraction.

5.2.3. Fuel Pin Geometric Description

The cross sectional view along the length of a fuel pin is shown in Figure 5.2.3-1, to present the modeled axial dimensions. The radial dimensions of the fuel pins for each fuel batch are presented in Table 5.2.2-1. The fuel pins in each assembly design are modeled with eighteen axial fuel nodes (p. 61, Ref. 7.11), each representing a unique fuel composition corresponding to the fuel node depletion. The height of the top and bottom fuel nodes is 17.7800 cm and 22.3520 cm, respectively, for cycles 1 through 9, and 17.4777 cm and 19.5936 cm, respectively, for cycle 10 (p. 61, Ref. 7.11). The height of the other sixteen fuel nodes is 20.0025 cm (p. 61, Ref. 7.11). The fuel pin upper end cap and upper plenum materials are homogenized and distributed uniformly throughout the plenum and end cap region. The fuel pin lower end cap and lower plenum materials are also homogenized and distributed uniformly throughout the plenum and end cap region.

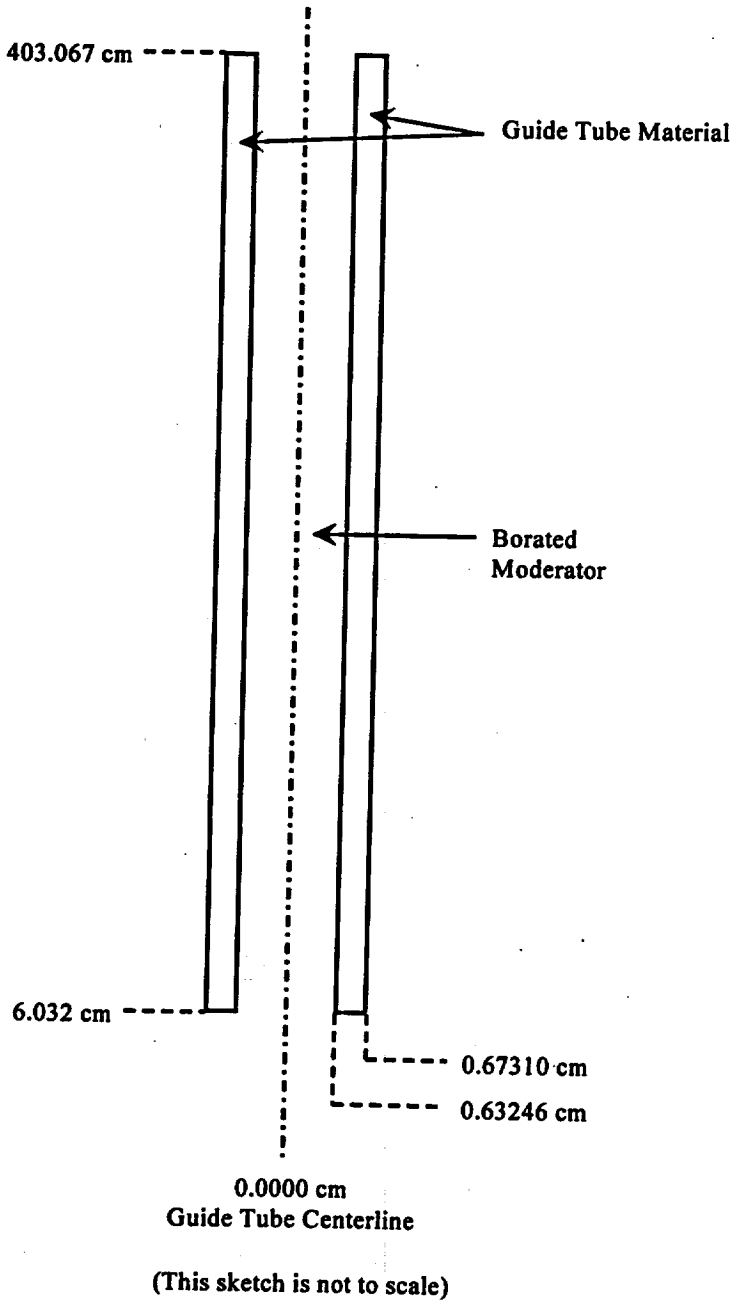


Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

Figure 5.2.3-1. Fuel Pin Geometry Model in MCNP
(Axial Dimensions: pp. 8, 9, 13, 61, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.2.4. Guide Tube Geometric Description

The cross sectional view along the length of a guide tube is presented in Figure 5.2.4-1. The MCNP model dimensions and reference dimensions are shown in Figure 5.2.4-1. The guide tubes are modeled explicitly into the upper and lower end-fittings of the fuel assembly.

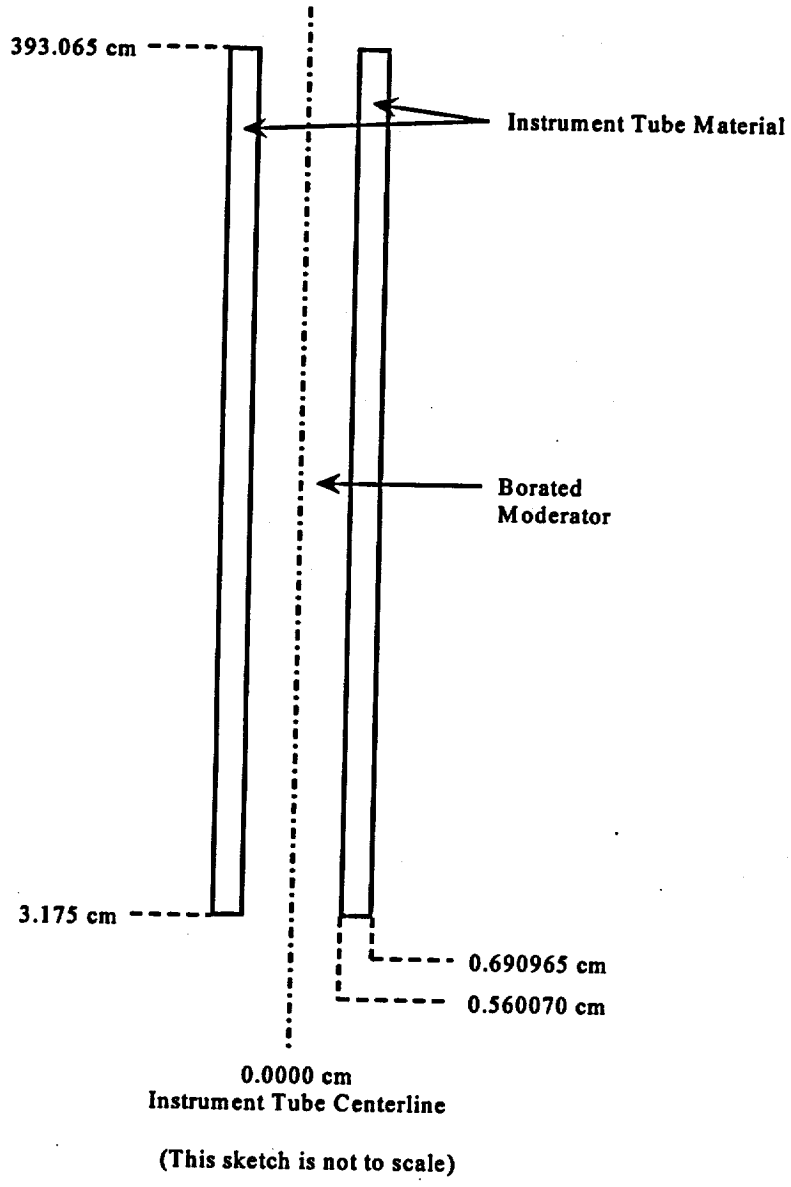


Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

Figure 5.2.4-1. Guide Tube Geometry Model in MCNP
(Axial Dimensions: p. 8, 9, 11, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.2.5. Instrument Tube Geometric Description

The cross sectional view along the length of an instrument tube is presented in Figure 5.2.5-1. The MCNP model dimensions and reference dimensions are shown in Figure 5.2.5-1. The instrument tubes are modeled explicitly up to the bottom of the upper end-fitting and into the lower end-fitting of the fuel assembly. Truncating the instrument tube at the bottom of the upper end-fitting of the assembly has a negligible effect on the reactor core k_{eff}.



Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

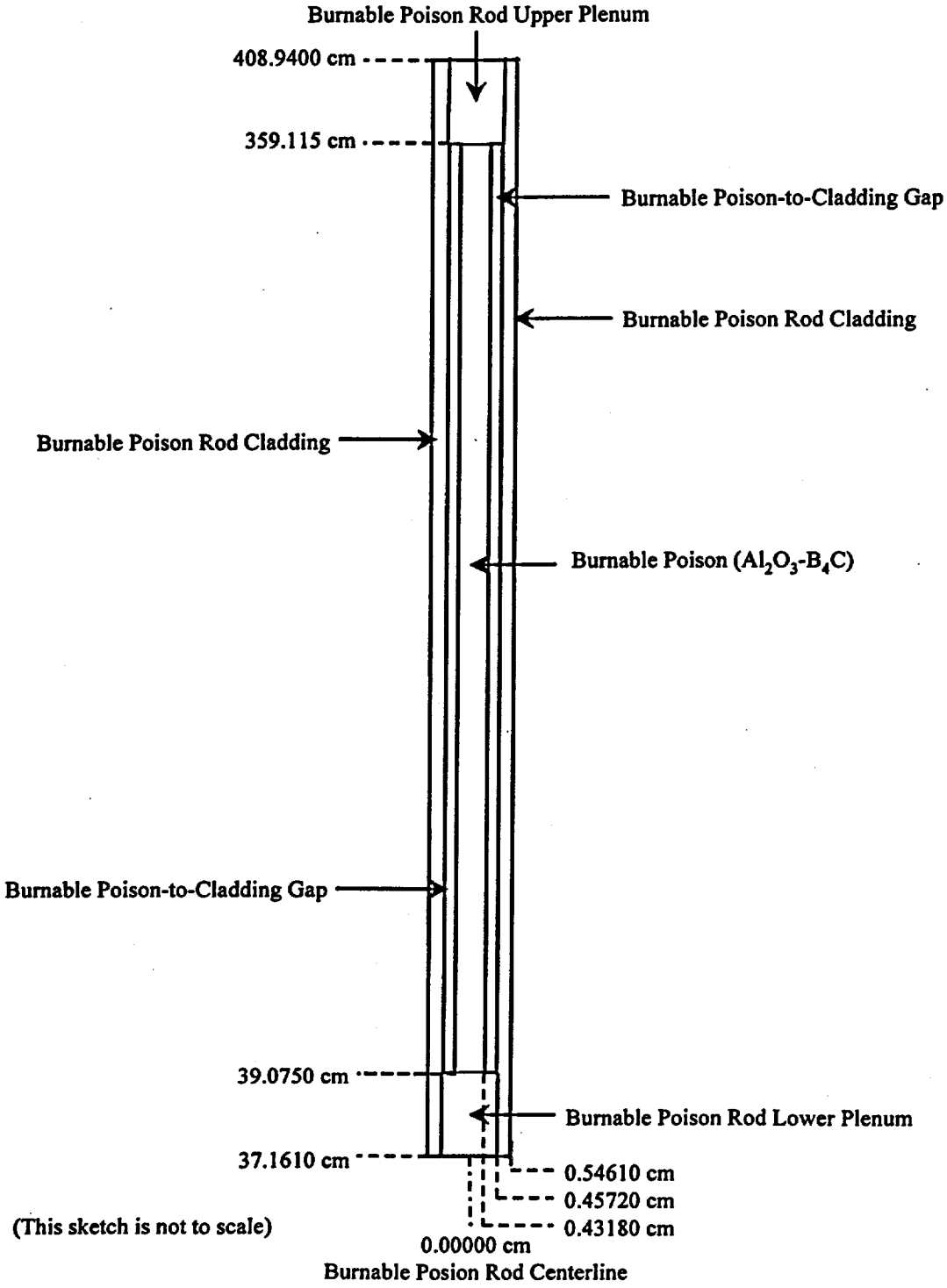
Figure 5.2.5-1. Instrument Tube Geometry Model in MCNP (Axial Dimensions: p. 8, 9, 12, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.2.6. BPRA Geometric Description

Cycles 1B, 2, and 3 of Crystal River Unit 3 operation had no BPRAs present in the core (p. 26, Ref. 7.11). All other cycles utilized BPRAs which used B_4C-Al_2O_3 as the absorber material (p. 26, Ref. 7.11). The specifications for the BPRs are summarized in Table 5.2.6-1. Each of the BPRAs contained sixteen BPRs, each being inserted into a guide tube. The burnable poison (BP) in each BPRA is depleted during reactor operation. This BP depletion was modeled in the fuel depletion calculations (p. 13 , Ref. 7.3). The depleted BP material was retained for use in the MCNP models. The cross sectional view along the length of a modeled BPR is shown in Figure 5.2.6-2.

Table 5.2.6-1. BPR Specification Summary (p. 26, Ref. 7.11)

BP Material	B_4C-Al_2O_3
BP Density (g/cm^3)	3.7
BP Diameter (cm)	0.8636
BPR Clad Material	Zircaloy-4
BPR Clad OD (cm)	1.0922
BPR Clad ID (cm)	0.9144



Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

Figure 5.2.6-2. Cross Sectional View Along Length of a BPR (Axial Dimensions: p. 8, 9, 23, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.2.7. RCCA Geometric Description

A RCCA is composed of sixteen control rods (CRs) distributed such that each guide tube has an inserted CR and all CRs are at the same height in the assembly. The CR specifications are summarized in Table 5.2.7-1. The Crystal River Unit 3 reactor contains RCCA banks that may be inserted into the core during startup and operation. Each RCCA in a given bank is moved up or down simultaneously. Each of the three RCCA banks (banks 5, 6, and 7) modeled in MCNP are at a specified axial location in each CRC statepoint reactivity calculation (p. 295, Ref. 7.11). Table 5.2.7-2 shows the RCCA bank positions in the core for each of the CRC statepoint reactivity calculations. The absorber material of the CRs was modeled with a maximum height of 340.361 cm depending on the depth of the RCCA bank insertion (p. 15, Ref. 7.11). The CRs were always explicitly modeled to the top of the fuel assembly upper end-fitting. The truncation of the RCCA at the top of the assembly upper end-fittings is acceptable due to the decreasing reactivity worth of regions extending beyond the length of the active fuel. If the RCCA bank was partially inserted, the absorber material in the CRs was modeled explicitly from the top of the upper end-fitting to the depth of insertion. The CR lower end-plug was modeled inside the CR cladding directly below the absorber material. A cross sectional view along the length of the CR is shown in Figure 5.2.7-1.

Table 5.2.7-1. RCCA Control Rod Geometric Specification Summary (p. 26, Ref. 7.11)

Pellet Material	Ag-In-Cd
Fraction of Pellet Materials	Ag (79.8 wt%), In (15 wt%), Cd (5 wt%), Al (0.2 wt%)[1]
Pellet Density	10.17 g/cm^3
Pellet Outer Diameter	0.99568 cm
Clad Material	Stainless Steel (Type 304)
Clad Outer Diameter	1.11760 cm
Clad Inner Diameter	1.01092 cm

[1] Page 26 of Reference 7.11 lists the Ag-In-Cd wt%s which total 99.8 wt%. Al was used for the balance of 0.2 wt% based on its low neutron importance and insignificant effect on system reactivity.

Table 5.2.7-2. RCCA Bank Insertion Heights for the Crystal River Unit 3 CRC Statepoints[1] (p. 295, Ref. 7.11)

Cycle	Statepoint EFPD	Bank 5	Bank 6	Bank 7
1A	0.0	WD[2]	WD	WD
1B[3]	268.8	WD[4]	WD	349
1B	411.0	342	87	17
2	0.0	WD	WD	WD
3	0.0	WD	WD	331
3	168.5	237	17	17
3	250.0	335	87	17
4	0.0	WD	WD	335

Table 5.2.7-2. RCCA Bank Insertion Heights for the Crystal River Unit 3 CRC Statepoints[1] (p. 295, Ref. 7.11)

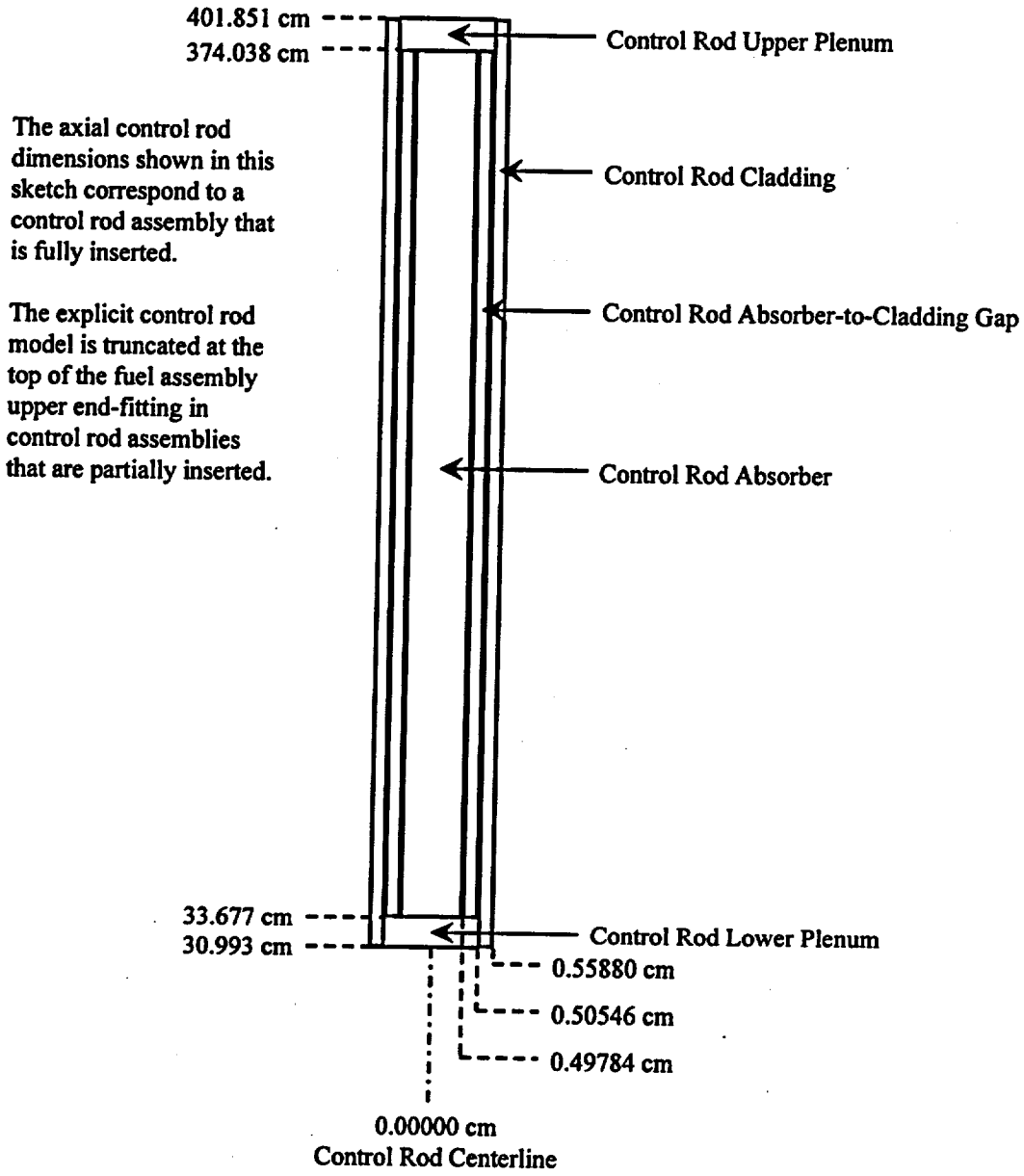
Cycle	Statepoint EFPD	Bank 5	Bank 6	Bank 7
4	228.1	WD	220	17
4	253.0	314	52	17
5	0.0	WD	WD	359
5	388.5	WD	WD	310
6	0.0	WD	WD	314
6	96.0	WD	268	17
6	400.0	310	52	17
7	0.0	WD	WD	WD
7	260.3	WD	146	17
7	291.0	WD	233	17
7	319.0	WD	143	17
7	462.3	335	85	17
7	479.0	321	59	17
8	0.0	WD	WD	WD
8	97.6	WD	227	17
8	139.8	WD	122	17
8	404.0	331	69	17
8	409.6	331	69	17
8	515.5	WD	261	17
9	0.0	WD	WD	WD
9	158.8	WD	118	17
9	219.0	WD	181	17
9	363.1	342	80	17
10	0.0	WD	WD	323
10	573.7	327	62	17

[1] The RCCA bank insertion heights are presented as the distance in centimeters between the bottom of the CR absorber material and the bottom of the active fuel.

[2] WD means that the RCCA bank is 100% withdrawn. This corresponds to a height of 366.204 cm in the table (p. 17, Ref. 7.11).

[3] Since cycle 1B is a continuation of cycle 1A, the EFPD at the beginning of cycle 1B is the same as the end of cycle 1A (p. 27, Ref. 7.11).

[4] Bank 5 rod at location C-11 (Figure 3-14, p. 43, Ref. 7.11) was uncoupled and at 17 cm above bottom of fuel (p. 295, Ref. 7.11).



Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting. Due to the axial position of the RCCA banks in the CRC configurations, modeling of the CR upper plenum was not required in any of the MCNP calculations for Crystal River Unit 3.

Figure 5.2.7-1. Cross Sectional View Along the Length of a Control Rod (Axial Dimensions: p. 8, 9, 15, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.2.8. APSRA Geometric Description

Black APSRAs were used in Cycles 1A through 5 of Crystal River Unit 3 operation, and gray APSRAs were used in cycles 6 through 10 (p. 26, Ref. 7.11). The black axial power shaping rod (APSR) modeling description is shown in Figure 5.2.8-1 and the gray APSR modeling description is shown in Figure 5.2.8-2. The APSRA consists of 16 APSRs of uniform composition that are inserted uniformly down through the guide tubes of the fuel assembly to a specified height. The Crystal River Unit 3 reactor contains one APSRA bank (Bank 8) (p. 53, Ref. 7.11). The insertion heights of the APSR bank in each CRC statepoint reactivity calculation are shown in Table 5.2.8-1. The black APSR cladding was modeled with outer and inner diameters of 1.11760 cm and 1.01092 cm, respectively (p. 26, Ref. 7.11). The gray APSR cladding was modeled with outer and inner diameters of 1.11760 cm and 0.98044 cm, respectively (p. 26, Ref. 7.11). The black APSRA absorber material is Ag-In-Cd (p. 26, Ref. 7.11). The gray APSRA absorber material is Inconel (p. 26, Ref. 7.11). The absorber material diameter of the black APSR is 0.99568 cm and the absorber material diameter of the gray APSR is 0.9525 cm (p. 26, Ref. 7.11). The absorber height of the black APSR is 91.44 cm (p. 19, Ref. 7.11), and the absorber height of the gray APSR is 160.02 cm (p. 21, Ref. 7.11). The black APSR contains a lower, annular, Zircaloy-4 spacer with a volume of 0.3819 cm^3 (p. 20, Ref. 7.11). In the MCNP model, this spacer is smeared throughout the spacer region inside of the cladding. The black APSR contains a Stainless Steel 304 lower end-plug with a height of 1.924 cm positioned directly below the lower spacer (p. 19, Ref. 7.11). The gray APSR contains a Stainless Steel 304 lower end-plug with a height of 1.924 cm positioned directly below the absorber region (p. 21, Ref. 7.11). The black APSR contains a gap (void) region 4.953 cm in height, positioned above the absorber material (p. 19, Ref. 7.11). The gray APSR contains a gap (void) region 0.952 cm in height, positioned above the absorber material (p. 21, Ref. 7.11). Above this gap region is an intermediate plug. The intermediate plug is stainless steel with a height of 1.27 cm (p. 19, Ref. 7.11) and a volume of 1.0094 cm^3 (p. 20, Ref. 7.11) for the black APSR, and a height of 1.905 cm (p. 21, Ref. 7.11) and a volume of 1.4194 cm^3 for the gray APSR. The region above the intermediate plug in both APSR designs contains moderator.

Table 5.2.8-1. RCCA Bank Insertion Heights for the Crystal River Unit 3 CRC Statepoints[1] (p. 295, Ref. 7.11)

Cycle	Statepoint EFPD	Bank 8 (APSRA)
1A	0.0	150
1B[2]	268.8	WD[3]
1B	411.0	163
2	0.0	150
3	0.0	150
3	168.5	150
3	250.0	110
4	0.0	150
4	228.1	86
4	253.0	107
5	0.0	120
5	388.5	WD
6	0.0	104

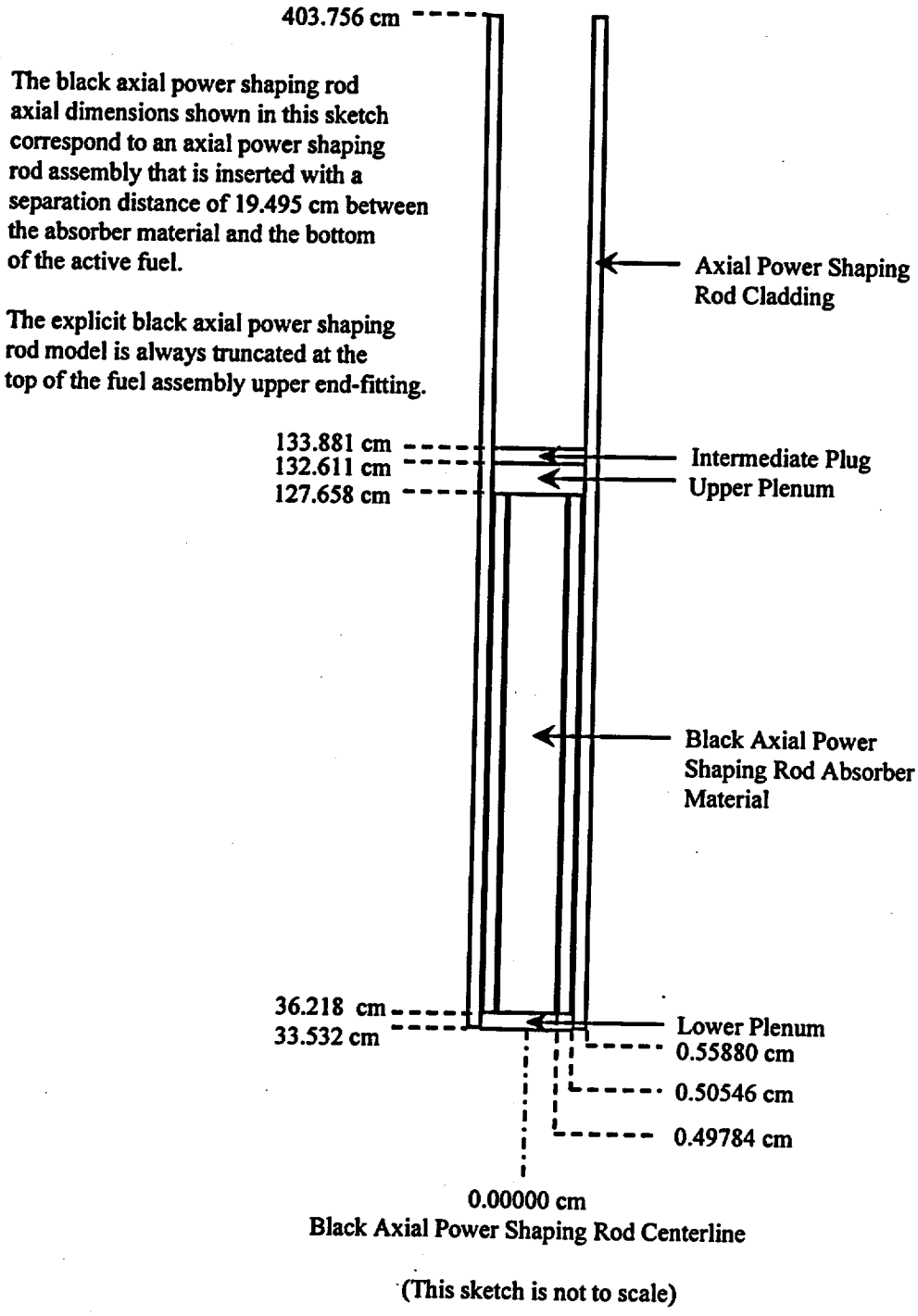
Table 5.2.8-1. RCCA Bank Insertion Heights for the Crystal River Unit 3 CRC Statepoints[1] (p. 295, Ref. 7.11)

Cycle	Statepoint EFPD	Bank 8 (APSRA)
6	96.0	136
6	400.0	WD
7	0.0	104
7	260.3	115
7	291.0	114
7	319.0	115
7	462.3	115
7	479.0	114
8	0.0	104
8	97.6	122
8	139.8	123
8	404.0	122
8	409.6	122
8	515.5	WD
9	0.0	104
9	158.8	122
9	219.0	123
9	363.1	122
10	0.0	122
10	573.7	WD

[1] The APSRA bank insertion heights are presented as the distance in centimeters between the bottom of the CR absorber material and the bottom of the active fuel.

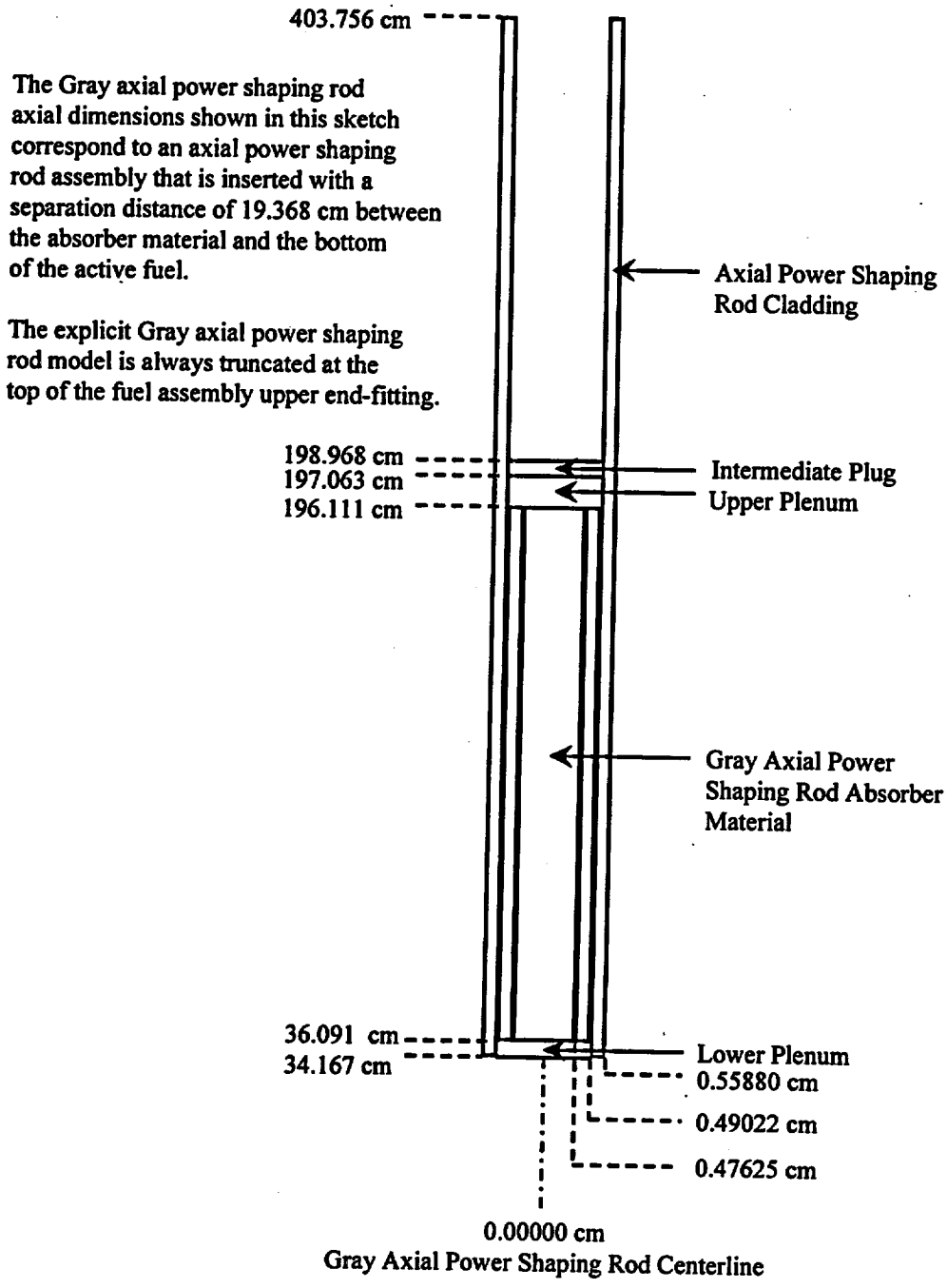
[2] Since cycle 1B is a continuation of cycle 1A, the EFPD at the beginning of cycle 1B is the same as the end of cycle 1A (p. 27, Ref. 7.11).

[3] WD means that the APSRA bank is 100% withdrawn. This corresponds to a height of 366.204 cm in the table (p. 17, Ref. 7.11).



Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

Figure 5.2.8-1. Cross Sectional View Along the Length of a Black APSR (Axial Dimensions: p. 8, 9, 19, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)



Note: The 0.0 cm reference point for the axial dimensions is located at the bottom of the lower end-fitting.

Figure 5.2.8-2. Cross Sectional View Along the Length of a Gray APSR (Axial Dimensions: p. 8, 9, 21, Ref. 7.11) (Radial Dimensions: p. 26, Ref. 7.11)

5.3. Crystal River Unit 3 MCNP Material Descriptions

The material descriptions used in the MCNP CRC reactivity calculations correspond to the actual reactor component materials. Components with detailed geometric features were homogenized where appropriate. The homogenization of these materials preserves the average neutron interaction rate such that the reactivity worth of these materials in the system is approximated. All homogenizations are based on the explicit volumes of the various component materials in the regions of interest. The depleted fuel and depleted burnable poison materials utilized in the MCNP reactivity calculations are obtained from depletion calculations performed using the SAS2H code in the SCALE 4.3 Modular Code System (Ref. 7.2). Detailed descriptions of the fuel and burnable poison depletion calculations are documented throughout Reference 7.3.

5.3.1. MCNP Cross Section Libraries

The MCNP cross section libraries utilized in the reactivity calculations are one of the primary components of the calculation that determines whether or not the neutronic behavior of the system is simulated correctly. Table 5.3.1-1 lists all of the MCNP cross section library identifiers (ZAID's) utilized in the CRC reactivity calculations documented in this calculation file. The MCNP ZAID's are used to identify the cross section libraries. The ZAID consists of a 5 integer element and isotope identifier followed by a cross section library designation suffix. The first one or two integers in the ZAID refer to the atomic number of the corresponding element. The three integers preceding the decimal always refer to the isotopic mass number. The ZAID suffixes presented in Table 5.3.1-1, correspond to libraries compiled from either ENDF/B-V, ENDF/B-VI, LANL/T-2, or LLNL evaluated cross section data sets. The atom percent in nature of the various isotopes presented in Table 5.3.1-1 are obtained from Reference 7.5. The atomic weight ratios, temperatures, library names, and data sources are obtained from Attachment I of Reference 7.12.

The cross section libraries used for the various isotopes and elements do not correspond to the temperature at which these isotopes and elements exist in the critical configurations. The U-235 and U-238 cross section libraries were processed at 587.0 K. The effects of temperature on the U-238 cross sections dominate with respect to the effects of temperature on the other isotopic and elemental cross sections. The majority of the other cross section libraries utilized in the MCNP calculations were processed at 294.0 K. Some less significant isotopic and elemental cross section libraries were processed at 0 K.

The isotopes used in the fuel of the MCNP calculations represent the majority of the isotopes present in the actual material. However, cross section libraries for some of the less significant isotopes were not available in the standard cross section package that accompanies the MCNP software distribution. The isotopes not modeled in the fuel of the MCNP calculations have a relatively low reactivity worth due to a combination of their microscopic cross sections and low abundance.

Table 5.3.1-1 MCNP Cross Section Libraries Used in the CRC Reactivity Calculations

Element / Isotope	MCNP ZAID	Atom % in Nature	Atomic Wt. Ratio [1]	Temp. (K)	Library Name	Data Source
H-1	1001.50c	99.985	0.999167	294.0	rmccs	ENDF/B-V.0
H-3	1003.50c	0.0	2.990140	294.0	rmccs	ENDF/B-V.0
He-4	2004.50c	99.999	3.968219	294.0	rmccs	ENDF/B-V.0
Li-6	3006.50c	7.5	5.963450	294.0	rmccs	ENDF/B-V.0
Li-7	3007.55c	92.5	6.955733	294.0	rmccs	ENDF/B-V.2
Be-9	4009.50c	100.0	8.934763	294.0	rmccs	ENDF/B-V.0
B-10	5010.50c	19.400 [2]	9.926922	294.0	rmccs	ENDF/B-V.0
B-11	5011.56c	80.600 [2]	10.914730	294.0	newxs	LANL/T-2
C-nat	6000.50c	100.0	11.907856	294.0	rmccs	ENDF/B-V.0
N-14	7014.50c	99.630	13.882780	294.0	rmccs	ENDF/B-V.0
O-16	8016.50c	99.760	15.857510	294.0	rmccs	ENDF/B-V.0
Al-27	13027.50c	100.0	26.749756	294.0	rmccs	ENDF/B-V.0
Si-nat	14000.50c	100.0	27.844241	294.0	endf5p	ENDF/B-V.0
P-31	15031.50c	100.0	30.707682	294.0	endf5u	ENDF/B-V.0
S-32	16032.50c	95.02	31.788939 [3]	294.0	endf5u	ENDF/B-V.0
Ti-nat	22000.50c	100.0	47.467124	294.0	endf5u	ENDF/B-V.0
Cr-50	24050.60c	4.345	49.516983	294.0	endf60	ENDF/B-VI.1
Cr-52	24052.60c	83.790	51.494313	294.0	endf60	ENDF/B-VI.1
Cr-53	24053.60c	9.500	52.485863	294.0	endf60	ENDF/B-VI.1
Cr-54	24054.60c	2.365	53.475519	294.0	endf60	ENDF/B-VI.1
Mn-55	25055.50c	100.0	54.466099	294.0	endf5u	ENDF/B-V.0
Fe-54	26054.60c	5.900	53.476242	294.0	endf60	ENDF/B-VI.1
Fe-56	26056.60c	91.720	55.454429	294.0	endf60	ENDF/B-VI.1
Fe-57	26057.60c	2.100	56.446290	294.0	endf60	ENDF/B-VI.1
Fe-58	26058.60c	0.280	57.435600	294.0	endf60	ENDF/B-VI.1
Co-59	27059.50c	100.0	58.426930	294.0	endf5u	ENDF/B-V.0
Ni-58	28058.60c	68.270	57.437652	294.0	endf60	ENDF/B-VI.1
Ni-60	28060.60c	26.100	59.415952	294.0	endf60	ENDF/B-VI.1
Ni-61	28061.60c	1.130	60.407628	294.0	endf60	ENDF/B-VI.1
Ni-62	28062.60c	3.590	61.396349	294.0	endf60	ENDF/B-VI.1
Ni-64	28064.60c	0.910	63.378793	294.0	endf60	ENDF/B-VI.1

Table 5.3.1-1 MCNP Cross Section Libraries Used in the CRC Reactivity Calculations

Element / Isotope	MCNP ZAID	Atom % in Nature	Atomic Wt. Ratio [1]	Temp. (K)	Library Name	Data Source
Cu-63	29063.60c	69.170	62.389001	294.0	endf60	ENDF/B-VI.2
Cu-65	29065.60c	30.830	64.370028	294.0	endf60	ENDF/B-VI.2
As-75	33075.35c	100.0	74.277979	0.0	rmccsa	ENDF/B-V.0
Kr-80	36080.50c	2.25	79.229851	294.0	rmccsa	ENDF/B-V.0
Kr-82	36082.50c	11.6	81.209803	294.0	rmccsa	ENDF/B-V.0
Kr-83	36083.50c	11.5	82.201858	294.0	rmccsa	ENDF/B-V.0
Kr-84	36084.50c	57.0	83.190662	294.0	rmccsa	ENDF/B-V.0
Kr-86	36086.50c	17.3	85.172596	294.0	rmccsa	ENDF/B-V.0
Y-89	39089.50c	100.0	88.142108	294.0	endf5u	ENDF/B-V.0
Zr-nat	40000.60c	100.0	90.439990	294.0	endf60	ENDF/B-VI.1
Zr-93	40093.50c	0.0	92.108361	294.0	kidman	ENDF/B-V.0
Nb-93	41093.50c	100.0	92.108263	294.0	endf5p	ENDF/B-V.0
Mo-nat	42000.50c	100.0	95.107188	294.0	endf5u	ENDF/B-V.0
Mo-95	42095.50c	15.92	94.090546	294.0	kidman	ENDF/B-V.0
Tc-99	43099.50c	0.0	98.056595	294.0	kidman	ENDF/B-V.0
Ru-101	44101.50c	17.1	100.038748	294.0	kidman	ENDF/B-V.0
Ru-103	44103.50c	0.0	102.022	294.0	kidman	ENDF/B-V.0
Rh-103	45103.50c	100.0	102.021490	294.0	rmccsa	ENDF/B-V.0
Rh-105	45105.50c	0.0	104.005	294.0	kidman	ENDF/B-V.0
Pd-105	46105.50c	22.33	104.003885	294.0	kidman	ENDF/B-V.0
Pd-108	46108.50c	26.46	106.976942	294.0	kidman	ENDF/B-V.0
Ag-107	47107.60c	51.839	105.986724	294.0	endf60	ENDF/B-VI.0
Ag-109	47109.60c	48.161	107.969204	294.0	endf60	ENDF/B-VI.0
Cd-nat	48000.50c	100.0	111.445880	294.0	endf5u	ENDF/B-V.0
In-nat	49000.60c	100.0	113.831536	294.0	endf60	ENDF/B-VI.0
Sn-nat	50000.35c	100.0	117.690428	0.0	endl85	LLNL
Xe-131	54131.50c	21.2	129.780532	294.0	kidman	ENDF/B-V.0
Xe-134	54134.35c	10.4	132.755077	0.0	endl85	LLNL
Xe-135	54135.53c	0.0	133.748208	587.0	eprixs	ENDF/B-V
Cs-133	55133.50c	100.0	131.763705	294.0	kidman	ENDF/B-V.0
Cs-135	55135.50c	0.0	133.746975	294.0	kidman	ENDF/B-V.0

Table 5.3.1-1 MCNP Cross Section Libraries Used in the CRC Reactivity Calculations

Element / Isotope	MCNP ZAID	Atom % in Nature	Atomic Wt. Ratio [1]	Temp. (K)	Library Name	Data Source
Ba-138	56138.50c	71.70	136.720557	294.0	rmccs	ENDF/B-V.0
Pr-141	59141.50c	100.0	139.697185	294.0	kidman	ENDF/B-V.0
Nd-143	60143.50c	12.18	141.682152	294.0	kidman	ENDF/B-V.0
Nd-145	60145.50c	8.30	143.667706	294.0	kidman	ENDF/B-V.0
Nd-147	60147.50c	0.0	145.654	294.0	kidman	ENDF/B-V.0
Nd-148	60148.50c	5.76	146.646216	294.0	kidman	ENDF/B-V.0
Pm-147	61147.50c	0.0	145.653	294.0	kidman	ENDF/B-V.0
Pm-148	61148.50c	0.0	146.647	294.0	kidman	ENDF/B-V.0
Pm-149	61149.50c	0.0	147.639	294.0	kidman	ENDF/B-V.0
Sm-147	62147.50c	15.0	145.652830	294.0	kidman	ENDF/B-V.0
Sm-149	62149.50c	13.8	147.637915	294.0	endf5u	ENDF/B-V.0
Sm-150	62150.50c	7.4	148.629416	294.0	kidman	ENDF/B-V.0
Sm-151	62151.50c	0.0	149.623	294.0	kidman	ENDF/B-V.0
Sm-152	62152.50c	26.7	150.614670	294.0	kidman	ENDF/B-V.0
Eu-151	63151.55c	47.8	149.623378	294.0	newxs	LANL/T-2
Eu-152	63152.50c	0.0	150.616668	294.0	endf5u	ENDF/B-V.0
Eu-153	63153.55c	52.2	151.607568	294.0	newxs	LANL/T-2
Eu-154	63154.50c	0.0	152.600719	294.0	endf5u	ENDF/B-V.0
Eu-155	63155.50c	0.0	153.592	294.0	kidman	ENDF/B-V.0
Gd-152	64152.50c	0.20	150.614731	294.0	endf5u	ENDF/B-V.0
Gd-154	64154.50c	2.18	152.598614	294.0	endf5u	ENDF/B-V.0
Gd-155	64155.50c	14.80	153.591761	294.0	endf5u	ENDF/B-V.0
Gd-156	64156.50c	20.47	154.582676	294.0	endf5u	ENDF/B-V.0
Gd-157	64157.50c	15.65	155.575907	294.0	endf5u	ENDF/B-V.0
Gd-158	64158.50c	24.84	156.567459	294.0	endf5u	ENDF/B-V.0
Gd-160	64160.50c	21.86	158.553203	294.0	endf5u	ENDF/B-V.0
Ho-165	67165.55c	100.0	163.513493	294.0	newxs	LANL/T-2
Ta-181	73181.50c	99.988	179.393575	294.0	endf5u	ENDF/B-V.0
Th-232	90232.50c	100.0	230.044724	294.0	endf5u	ENDF/B-V.0
Pa-233	91233.50c	0.0	231.038304	294.0	endf5u	ENDF/B-V.0
U-233	92233.50c	0.0	231.037695	294.0	rmccs	ENDF/B-V.0

Table 5.3.1-1 MCNP Cross Section Libraries Used in the CRC Reactivity Calculations

Element / Isotope	MCNP ZAID	Atom % in Nature	Atomic Wt. Ratio [1]	Temp. (K)	Library Name	Data Source
U-234	92234.50c	0.0055	232.030412	294.0	endf5p	ENDF/B-V.0
U-235	92235.53c	0.7200	233.024773	587.0	eprixs	ENDF/B-V.0
U-236	92236.50c	0.0	234.017806	294.0	endf5p	ENDF/B-V.0
U-237	92237.50c	0.0	235.012352	294.0	endf5p	ENDF/B-V.0
U-238	92238.53c	99.2745	236.005803	587.0	eprixs	ENDF/B-V.0
Np-235	93235.35c	0.0	233.024904	0.0	endl85	LLNL
Np-236	93236.35c	0.0	234.018854	0.0	endl85	LLNL
Np-237	93237.50c	0.0	235.011799	294.0	endf5p	ENDF/B-V.0
Np-238	93238.35c	0.0	236.005958	0.0	endl85	LLNL
Pu-237	94237.35c	0.0	235.012031	0.0	endl85	LLNL
Pu-238	94238.50c	0.0	236.004583	294.0	endf5p	ENDF/B-V.0
Pu-239	94239.55c	0.0	236.998573	294.0	rmccs	ENDF/B-V.2
Pu-240	94240.50c	0.0	237.991619	294.0	rmccs	ENDF/B-V.0
Pu-241	94241.50c	0.0	238.986041	294.0	endf5p	ENDF/B-V.0
Pu-242	94242.50c	0.0	239.979326	294.0	endf5p	ENDF/B-V.0
Am-241	95241.50c	0.0	238.986019	294.0	endf5u	ENDF/B-V.0
Am-242m	95242.50c	0.0	239.980121	294.0	endf5u	ENDF/B-V.0
Am-243	95243.50c	0.0	240.973348	294.0	endf5u	ENDF/B-V.0
Cm-242	96242.50c	0.0	239.979418	294.0	endf5u	ENDF/B-V.0
Cm-243	96243.35c	0.0	240.973356	0.0	endl85	LLNL
Cm-244	96244.50c	0.0	241.966119	294.0	endf5u	ENDF/B-V.0
Cm-245	96245.35c	0.0	242.960245	0.0	endl85	LLNL
Cm-246	96246.35c	0.0	243.953373	0.0	endl85	LLNL
Cm-247	96247.35c	0.0	244.947884	0.0	endl85	LLNL
Cm-248	96248.35c	0.0	245.941272	0.0	endl85	LLNL

[1] The atomic weight ratio presented for each isotope/element is the ratio of the isotope/element mass to the mass of a neutron. The mass of a neutron is 1.008664904 amu (p. 57, Ref. 7.5). The atomic weight ratio values are obtained from the "xsdir" file for MCNP as identified on page III-2 of Reference 7.4.

[2] The atom percent in nature of B-10 and B-11 varies significantly between different geographical regions of the world. The atom percents in nature that are listed in Table 5.3.1-1 for B-10 and B-11 were obtained from page 232 of Reference 7.6.

[3] The atomic weight ratio for natural sulfur is utilized in conjunction with the S-32 cross section library in the determination of the sulfur content in the various materials modeled in the MCNP calculations documented herein.

5.3.2. Reactor Materials

The tables presenting calculated material compositions in this section show excessive significant figures. The number of significant figures in the composition values are a result of the composition calculation and should not be interpreted as reflecting an excessively high level of precision.

The reactor components modeled in the MCNP CRC reactivity calculations include the following: core liner, core barrel, thermal shield, pressure vessel cladding, pressure vessel, borated moderator, upper plenum region, CRGT flange region, upper core grid region, upper pad region, lower pad region, lower core grid region, and region between the lower core grid and the vessel plate. The material compositions are described in terms of elemental or isotopic weight percents with an overall material density.

The core liner, core barrel, thermal shield, and pressure vessel cladding are composed of Stainless Steel 304 (SS304) (p. 3, Ref. 7.11). The SS304 composition is shown in Table 5.3.2-1. The pressure vessel is composed of carbon steel (p. 3, Ref. 7.11). The carbon steel composition is shown in Table 5.3.2-2.

The borated moderator is composed of a homogeneous mixture of boron and water. The boron concentration in water is provided in terms of parts-per-million (ppm) by mass. Since the moderator in each CRC statepoint configuration has a different boron concentration and temperature, the overall borated moderator composition and density is different in each configuration.

The composition of the borated moderator and the borated moderator constituents in the homogenized spacer grid compositions as defined in the MCNP input decks are calculated by MACE. MACE uses linear interpolation in a steam table (p. S2.5.12, Ref. 7.2) to obtain the borated moderator density value as described in Attachment I of Reference 7.14. Other materials in the MCNP input deck that contain borated moderator as a constituent are not calculated by MACE. These other material compositions are calculated in an EXCEL spreadsheet and are provided to MACE as input to be placed in the MCNP input decks. The density of the borated moderator that is used in the spreadsheet calculation of the material compositions is the same as that calculated by MACE. Table 5.3.2-3 presents the borated moderator composition, temperature, and density for each CRC statepoint reactivity calculation. The system pressure for each CRC statepoint reactivity calculation is 2200 psia (pounds per sqare inch absolute) (p. 5, Ref. 7.11). The borated moderator is used throughout the core configuration and between the various reactor components.

The following set of equations are used to calculate the borated moderator compositions shown in Table 5.3.2-3. The atomic weight ratio values for hydrogen, oxygen, boron-10, and boron-11 are obtained from Table 5.3.1-1. The atomic weight ratio for natural boron is 10.718156 (Ref. 7.12).

Equation 5.3.2-1. Boron Weight Percent in Borated Moderator

$$Boron\ wt\% = \frac{(Boron\ ppm)(1.0E-4)}{1+(Boron\ ppm)(1.0E-6)}$$

Equation 5.3.2-2. Boron-10 (B-10) Weight Percent in Borated Moderator

$$B\text{-}10\ wt\% = \frac{(B\text{-}10\ atom\%\ in\ B)(B\text{-}10\ Atomic\ Wt.\ Ratio)}{(B\ Atomic\ Wt.\ Ratio)(100.0)}(B\ wt\%)$$

where B is natural boron

Equation 5.3.2-3. Boron-11 (B-11) Weight Percent in Borated Moderator

$$B\text{-}11\ wt\% = \frac{(B\text{-}11\ atom\%\ in\ B)(B\text{-}11\ Atomic\ Wt.\ Ratio)}{(B\ Atomic\ Wt.\ Ratio)(100.0)}(B\ wt\%)$$

Equation 5.3.2-4. Hydrogen Weight Percent in Borated Moderator

$$Hydrogen\ wt\% = \frac{(H\ Atomic\ Wt.\ Ratio)(2)(100.0-B\ wt\%)}{[(H\ Atomic\ Wt.\ Ratio)(2)+(O\ Atomic\ Wt.\ Ratio)]}$$

where H is hydrogen, B is natural boron, and O is oxygen

Equation 5.3.2-5. Oxygen Weight Percent in Borated Moderator

$$Oxygen\ wt\% = \frac{(O\ Atomic\ Wt.\ Ratio)(100.0-B\ wt\%)}{[(H\ Atomic\ Wt.\ Ratio)(2)+(O\ Atomic\ Wt.\ Ratio)]}$$

where H is hydrogen, B is natural boron, and O is oxygen

A large number of homogenized material compositions are provided to MACE as input. These homogenized material compositions are made of various base components such as SS304, Inconel, Zircaloy-4, and borated moderator that are present in certain volume fractions. The homogenization of the base components into single homogenized material compositions is performed using Equations 5.3.2-6 through 5.3.2-8. Once the calculations in Equations 5.3.2-6 through 5.3.2-8 are performed, the homogenized material composition is provided as input to MACE in terms of the homogenized material composition density and various isotopic and/or elemental weight percents.

Equation 5.3.2-6. Homogenized Material Density Calculation

$$Homogenized\ Material\ Density = \sum_{m}^{M}[(\rho)_m (Volume\ Fraction\ in\ Homogenized\ Material)_m]$$

where, m=a single base component material of the homogenized material, M=the total number of base component materials in the homogenized material, ρ=the mass density of the base component material.

Equation 5.3.2-7. Calculation of Mass Fraction of Base Component Material in Homogenized Material

$$\begin{pmatrix} Mass\ Fraction\ of\ Base\ Component \\ Material\ in\ Homogenized\ Material \end{pmatrix} = \left[\frac{(\rho)_m (Volume\ Fraction\ in\ Homogenized\ Material)_m}{Homogenized\ Material\ Density} \right]$$

Equation 5.3.2-8. Calculation of Weight Percent of Base Component Material Constituent in Homogenized Material

$$\begin{pmatrix} Weight\ Percent\ of\ Base \\ Component\ Material \\ Constituent\ in \\ Homogenized\ Material \end{pmatrix} = \begin{pmatrix} Mass\ Fraction\ of\ Base \\ Component\ Material\ in \\ Homogenized\ Material \end{pmatrix} \begin{pmatrix} Weight\ Percent\ of\ Base \\ Component\ Material\ Constituent \\ in\ Base\ Component\ Material \end{pmatrix}$$

The upper plenum region of the reactor contains borated moderator and hardware composed of SS304 (pp. 10, 16, 18, 20, 24, Ref. 7.11). This region is modeled with a homogenized material composition in the MCNP CRC reactivity calculations. The upper plenum region is modeled as a number of rectangular sub-regions each placed directly above a fuel assembly. The material volume fractions in each of the rectangular upper plenum sub-regions depend on whether or not the fuel assembly below the sub-region is empty or has either a BPRA, RCCA, or APSRA inserted at the critical statepoint. Table 5.3.2-4 contains the material volume fractions for the upper plenum sub-region positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA. The SS304 material composition is presented in Table 5.3.2-1. The borated moderator compositions are presented in Table 5.3.2-3. The component material compositions are used in conjunction with their volume fractions in each of the upper plenum sub-regions to obtain a homogenized material composition and density that can be specified in the MCNP input decks. The calculated homogenized material compositions for the upper plenum sub-regions positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA are presented in Tables 5.3.2-5 through 5.3.2-8, respectively. Due to the difference in moderator specifications between the statepoints, the homogenized material compositions for each of the upper plenum sub-regions are different between CRC statepoints, as shown in Tables 5.3.2-5 through 5.3.2-8.

The CRGT flange region of the reactor contains borated moderator and hardware composed of SS304 (pp. 10, 16, 18, 20, 24, Ref. 7.11). This region is modeled with a homogenized material composition in the MCNP CRC reactivity calculations. The CRGT flange region is modeled as a number of rectangular sub-regions each placed directly above a fuel assembly. The material volume fractions in each of the rectangular CRGT flange sub-regions depend on whether or not the fuel assembly below the sub-region is empty or has either a BPRA, RCCA, or APSRA inserted at the critical statepoint. Table 5.3.2-9 contains the material volume fractions for the CRGT flange sub-region positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA. The SS304 material composition is presented in Table 5.3.2-1. The borated moderator compositions are presented in Table 5.3.2-3. The component material compositions are used in conjunction with their volume fractions in each of the CRGT flange sub-regions to obtain a homogenized material composition and density that can be

specified in the MCNP input decks. The calculated homogenized material compositions for the CRGT flange sub-regions positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA are presented in Tables 5.3.2-10 through 5.3.2-13, respectively. Due to the difference in moderator specifications between the statepoints, the homogenized material compositions for each of the CRGT flange sub-regions are different between CRC statepoints, as shown in Tables 5.3.2-10 through 5.3.2-13.

The upper core grid region of the reactor contains borated moderator and hardware composed of SS304 and Zircaloy-4 (pp. 10, 16, 18, 20, 24, Ref. 7.11). This region is modeled with a homogenized material composition in the MCNP CRC reactivity calculations. The upper core grid region is modeled as a number of rectangular sub-regions each placed directly above a fuel assembly. The material volume fractions in each of the rectangular upper core grid sub-regions depend on whether or not the fuel assembly below the sub-region is empty or has either a BPRA, RCCA, or APSRA inserted at the critical statepoint. Table 5.3.2-14 contains the material volume fractions for the upper core grid sub-region positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA. The SS304 material composition is presented in Table 5.3.2-1. The Zircaloy-4 material composition is presented in Table 5.3.2-15. The borated moderator compositions are presented in Table 5.3.2-3. The component material compositions are used in conjunction with their volume fractions in each of the upper core grid sub-regions to obtain a homogenized material composition and density that can be specified in the MCNP input decks. The calculated homogenized material compositions for the upper core grid sub-regions positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA are presented in Tables 5.3.2-16 through 5.3.2-19, respectively. Due to the difference in moderator specifications between the statepoints, the homogenized material compositions for each of the upper core grid sub-regions are different between CRC statepoints, as shown in Tables 5.3.2-16 through 5.3.2-19.

The upper pad region of the reactor contains borated moderator and hardware composed of SS304 and Zircaloy-4 (pp. 10, 16, 18, 20, 24, Ref. 7.11). This region is modeled with a homogenized material composition in the MCNP CRC reactivity calculations. The upper pad region is modeled as a number of rectangular sub-regions each placed directly above a fuel assembly. The material volume fractions in each of the rectangular upper pad sub-regions depend on whether or not the fuel assembly below the sub-region is empty or has either a BPRA, RCCA, or APSRA inserted at the critical statepoint. Table 5.3.2-20 contains the material volume fractions for the upper pad sub-region positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA. The SS304 material composition is presented in Table 5.3.2-1. The Zircaloy-4 material composition is presented in Table 5.3.2-15. The borated moderator compositions are presented in Table 5.3.2-3. The component material compositions are used in conjunction with their volume fractions in each of the upper pad sub-regions to obtain a homogenized material composition and density that can be specified in the MCNP input decks. The calculated homogenized material compositions for the upper pad sub-regions positioned above a fuel assembly containing no insertion assembly, a BPRA, a RCCA, and an APSRA are presented in Tables 5.3.2-21 through 5.3.2-24, respectively. Due to the difference in moderator specifications between the statepoints, the homogenized material compositions for each of the upper pad sub-regions are different between CRC statepoints, as shown in Tables 5.3.2-21 through 5.3.2-24.

The lower core pad region contains SS304 hardware and borated moderator. The volume fractions of SS304 and borated moderator in the lower core pad region is presented in Table 5.3.2-25. The SS304 and borated moderator compositions are presented in Tables 5.3.2-1 and 5.3.2-3, respectively. The

calculated homogenized material compositions for the lower core pad region are presented in Table 5.3.2-26. The homogenized material composition for the lower core pad region is different between CRC statepoints, as shown in Table 5.3.2-26, due to the difference in moderator specifications between the statepoints.

The lower core grid region contains SS304 hardware and borated moderator. The volume fractions of SS304 and borated moderator in the lower core grid region is presented in Table 5.3.2-27. The SS304 and borated moderator compositions are presented in Tables 5.3.2-1 and 5.3.2-3, respectively. The calculated homogenized material compositions for the lower core grid region are presented in Table 5.3.2-28. The homogenized material composition for the lower core grid region is different between CRC statepoints, as shown in Table 5.3.2-28, due to the difference in moderator specifications between the statepoints.

The region between the lower core grid and vessel plate contains SS304 hardware and borated moderator. The volume fractions of SS304 and borated moderator in this region is presented in Table 5.3.2-29. The SS304 and borated moderator compositions are presented in Tables 5.3.2-1 and 5.3.2-3, respectively. The calculated homogenized material compositions for the region between the lower core grid and vessel plate are presented in Table 5.3.2-30. The homogenized material composition for this region is different between CRC statepoints, as shown in Table 5.3.2-30, due to the difference in moderator specifications between the statepoints.

The homogenizations of the upper and lower reactor internals regions are expected to have a minimal effect on the core reactivity due to their limited reactivity worth and proximity to the active fuel. The primary objective in modeling the upper and lower reactor internals regions is to obtain a reasonable approximation of the axial leakage from the reactor core.

Table 5.3.2-1. Type 304 Stainless Steel Composition (p. 12, Ref. 7.7)

Ele./Iso.	MCNP ZAID	Wt. %	Ele./Iso.	MCNP ZAID	Wt. %
C-nat	6000.50c	0.080	Fe-54	26054.60c	3.918
N-14	7014.50c	0.100	Fe-56	26056.60c	63.156
Si-nat	14000.50c	0.750	Fe-57	26057.60c	1.472
P-31	15031.50c	0.045	Fe-58	26058.60c	0.200
S-nat	16032.50c	0.030	Ni-58	28058.60c	6.234
Cr-50	24050.60c	0.793	Ni-60	28060.60c	2.465
Cr-52	24052.60c	15.903	Ni-61	28061.60c	0.109
Cr-53	24053.60c	1.838	Ni-62	28062.60c	0.350
Cr-54	24054.60c	0.466	Ni-64	28064.60c	0.092
Mn-55	25055.50c	2.000	Density = 7.9 g/cm^3		

Table 5.3.2-2. Grade 55 A 516 Carbon Steel Composition (pp. 5, 6, Ref. 7.7)[1]

Ele./Iso.	MCNP ZAID	Wt. %	Ele./Iso.	MCNP ZAID	Wt. %
C-nat	6000.50c	0.220	Fe-54	26054.60c	5.615
Si-nat	14000.50c	0.275	Fe-56	26056.60c	90.524
P-31	15031.50c	0.035	Fe-57	26057.60c	2.110
S-nat	16032.50c	0.035	Fe-58	26058.60c	0.286
Mn-55	25055.50c	0.900	Density = 7.832 g/cm^3		

[1] The pressure vessel was actually made of CS533B carbon steel (p. 3, Ref. 7.11). Grade 55 A 516 was substituted for CS533B. The pressure vessel has no neutronic importance with respect to the k_{eff} of the reactor core. Therefore, this substitution is acceptable.

Table 5.3.2-3. Borated Moderator Composition for Each CRC Statepoint Calculation

Cycle[1] / EFPD	Temp. (F)	Boron (ppm)	Density (g/cm^3)	H wt%	O wt%	B-10 wt%	B-11 wt%
1A/ 0.0	532	1403	0.76815	11.17578	88.68392	0.02521	0.11516
1B/ 268.8	531.5	1106	0.76863	11.17911	88.71029	0.01987	0.09078
1B/ 411.0	535	493	0.76526	11.18597	88.76473	0.00886	0.04046
2/ 0.0	532	1294	0.76815	11.17700	88.69360	0.02325	0.10621
3/ 0.0	532	1428	0.76815	11.17550	88.68170	0.02566	0.11721
3/ 168.5	535	737	0.76526	11.18324	88.74306	0.01324	0.06049
3/ 250.0	537	562	0.76333	11.18519	88.75861	0.01010	0.04613
4/ 0.0	532	1384	0.76815	11.17600	88.68560	0.02487	0.11360
4/ 228.1	532	705	0.76815	11.18359	88.74591	0.01267	0.05787
4/ 253.0	537	502	0.76333	11.18587	88.76393	0.00902	0.04120
5/ 0.0	532	1540	0.76815	11.17425	88.67175	0.02767	0.12640
5/ 388.5	537	605	0.76333	11.18471	88.75479	0.01087	0.04966
6/ 0.0	532	1574	0.76815	11.17387	88.66873	0.02828	0.12919
6/ 96.0	534	1211	0.76622	11.17793	88.70097	0.02176	0.09940
6/ 400.0	535	390	0.76526	11.18712	88.77388	0.00701	0.03201
7/ 0.0	532	2033	0.76815	11.16873	88.62797	0.03653	0.16687
7/ 260.3	532	1223	0.76815	11.17780	88.69990	0.02197	0.10038
7/ 291.0	536	1149	0.76430	11.17863	88.70647	0.02065	0.09431
7/ 319.0	532	1048	0.76815	11.17976	88.71544	0.01883	0.08602
7/ 462.3	531	563	0.76912	11.18518	88.75852	0.01012	0.04621
7/ 479.0	535	520	0.76526	11.18566	88.76234	0.00934	0.04268
8/ 0.0	532	2101	0.76815	11.16797	88.62193	0.03775	0.17245
8/ 97.6	535	1751	0.76526	11.17189	88.65301	0.03146	0.14372
8/ 139.8	535	1612	0.76526	11.17344	88.66536	0.02896	0.13231

Table 5.3.2-3. Borated Moderator Composition for Each CRC Statepoint Calculation

Cycle[1] / EFPD	Temp. (F)	Boron (ppm)	Density (g/cm^3)	H wt%	O wt%	B-10 wt%	B-11 wt%
8/ 404.0	536	865	0.76430	11.18180	88.73170	0.01554	0.07100
8/ 409.6	536	865	0.76430	11.18180	88.73170	0.01554	0.07100
8/ 515.5	536	675	0.76430	11.18393	88.74857	0.01213	0.05540
9/ 0.0	532	2212	0.76815	11.16673	88.61207	0.03974	0.18156
9/ 158.8	535	1572	0.76526	11.17389	88.66891	0.02825	0.12903
9/ 219.0	535	1481	0.76526	11.17491	88.67699	0.02661	0.12156
9/ 363.1	539	963	0.76140	11.18071	88.72299	0.01730	0.07904
10/ 0.0	532	2326	0.76815	11.16545	88.60195	0.04179	0.19091
10/ 573.7	536	516	0.76430	11.18571	88.76269	0.00927	0.04235

[1] The temperature and boron ppmb data for each EFPD comes from page 295 of Reference 7.11.

Table 5.3.2-4. Upper Plenum Sub-Region Material Volume Fractions

Insertion Assembly	Material Volume Fractions	
	SS304	Borated Water
None (p. 10, Ref. 7.11)	0.0578	0.9422
BPRA (p. 24, Ref. 7.11)	0.0699	0.9301
RCCA (p. 16, Ref. 7.11)	0.0934	0.9066
APSRA (p. 20, 22, Ref. 7.11)	0.1096	0.8904

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.290	0.290	0.291	0.290	0.290
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.307	0.307	0.307	0.307	0.307
24052.60c	6.152	6.150	6.166	6.152	6.152
24053.60c	0.711	0.711	0.713	0.711	0.711
24054.60c	0.180	0.180	0.181	0.180	0.180
25055.50c	0.774	0.773	0.775	0.774	0.774
26054.60c	1.515	1.515	1.519	1.515	1.515
26056.60c	24.432	24.422	24.488	24.431	24.431

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
26057.60c	0.569	0.569	0.571	0.569	0.569
26058.60c	0.077	0.077	0.077	0.077	0.077
28058.60c	2.412	2.411	2.417	2.412	2.412
28060.60c	0.954	0.953	0.956	0.954	0.954
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.136
28064.60c	0.035	0.035	0.036	0.035	0.035
1001.50c	6.852	6.856	6.849	6.853	6.852
5010.50c	1.546E-02	1.219E-02	5.424E-03	1.426E-02	1.573E-02
5011.56c	7.061E-02	5.567E-02	2.477E-02	6.512E-02	7.187E-02
8016.50c	54.377	54.406	54.347	54.383	54.376
Density (g/cm^3)	1.1804	1.1808	1.1776	1.1804	1.1804

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.291	0.291	0.290	0.290	0.291
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.307	0.308	0.307	0.307	0.308
24052.60c	6.166	6.176	6.152	6.152	6.176
24053.60c	0.713	0.714	0.711	0.711	0.714
24054.60c	0.181	0.181	0.180	0.180	0.181
25055.50c	0.775	0.777	0.774	0.774	0.777
26054.60c	1.519	1.521	1.515	1.515	1.521
26056.60c	24.488	24.526	24.431	24.431	24.526
26057.60c	0.571	0.572	0.569	0.569	0.572
26058.60c	0.077	0.078	0.077	0.077	0.078
28058.60c	2.417	2.421	2.412	2.412	2.421
28060.60c	0.956	0.957	0.954	0.954	0.957
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.136

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28064.60c	0.036	0.036	0.035	0.035	0.036
1001.50c	6.847	6.842	6.853	6.857	6.842
5010.50c	8.108E-03	6.177E-03	1.525E-02	7.767E-03	5.517E-03
5011.56c	3.704E-02	2.821E-02	6.965E-02	3.548E-02	2.520E-02
8016.50c	54.334	54.290	54.378	54.415	54.294
Density (g/cm^3)	1.1776	1.1758	1.1804	1.1804	1.1758

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.290	0.291	0.290	0.291	0.291
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.307	0.308	0.307	0.307	0.307
24052.60c	6.152	6.176	6.152	6.162	6.166
24053.60c	0.711	0.714	0.711	0.712	0.713
24054.60c	0.180	0.181	0.180	0.181	0.181
25055.50c	0.774	0.777	0.774	0.775	0.775
26054.60c	1.515	1.521	1.515	1.518	1.519
26056.60c	24.431	24.526	24.431	24.469	24.488
26057.60c	0.569	0.572	0.569	0.570	0.571
26058.60c	0.077	0.078	0.077	0.077	0.077
28058.60c	2.412	2.421	2.412	2.415	2.417
28060.60c	0.954	0.957	0.954	0.955	0.956
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.136
28064.60c	0.035	0.036	0.035	0.036	0.036
1001.50c	6.852	6.841	6.851	6.847	6.849
5010.50c	1.697E-02	6.649E-03	1.734E-02	1.333E-02	4.290E-03
5011.56c	7.750E-02	3.037E-02	7.921E-02	6.089E-02	1.960E-02
8016.50c	54.370	54.288	54.368	54.335	54.353

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Density (g/cm^3)	1.1804	1.1758	1.1804	1.1786	1.1776
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.290	0.290	0.291	0.290	0.290
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.307	0.307	0.308	0.307	0.307
24052.60c	6.152	6.152	6.171	6.152	6.147
24053.60c	0.711	0.711	0.713	0.711	0.710
24054.60c	0.180	0.180	0.181	0.180	0.180
25055.50c	0.774	0.774	0.776	0.774	0.773
26054.60c	1.515	1.515	1.520	1.515	1.514
26056.60c	24.431	24.431	24.507	24.431	24.413
26057.60c	0.569	0.569	0.571	0.569	0.569
26058.60c	0.077	0.077	0.077	0.077	0.077
28058.60c	2.412	2.412	2.419	2.412	2.410
28060.60c	0.954	0.954	0.957	0.954	0.953
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.135
28064.60c	0.035	0.035	0.036	0.035	0.035
1001.50c	6.848	6.854	6.841	6.855	6.862
5010.50c	2.240E-02	1.347E-02	1.263E-02	1.155E-02	6.206E-03
5011.56c	1.023E-01	6.155E-02	5.771E-02	5.274E-02	2.835E-02
8016.50c	54.343	54.387	54.285	54.396	54.449
Density (g/cm^3)	1.1804	1.1804	1.1767	1.1804	1.1813
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.291	0.290	0.291	0.291	0.291
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.307	0.307	0.307	0.307	0.308
24052.60c	6.166	6.152	6.166	6.166	6.171
24053.60c	0.713	0.711	0.713	0.713	0.713
24054.60c	0.181	0.180	0.181	0.181	0.181
25055.50c	0.775	0.774	0.775	0.775	0.776
26054.60c	1.519	1.515	1.519	1.519	1.520
26056.60c	24.488	24.431	24.488	24.488	24.507
26057.60c	0.571	0.569	0.571	0.571	0.571
26058.60c	0.077	0.077	0.077	0.077	0.077
28058.60c	2.417	2.412	2.417	2.417	2.419
28060.60c	0.956	0.954	0.956	0.956	0.957
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.136
28064.60c	0.036	0.035	0.036	0.036	0.036
1001.50c	6.849	6.848	6.840	6.841	6.843
5010.50c	5.721E-03	2.315E-02	1.926E-02	1.773E-02	9.511E-03
5011.56c	2.613E-02	1.057E-01	8.799E-02	8.101E-02	4.345E-02
8016.50c	54.346	54.339	54.279	54.286	54.300
Density (g/cm^3)	1.1776	1.1804	1.1776	1.1776	1.1767

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.031	0.031	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039	0.039	0.039
14000.50c	0.291	0.291	0.290	0.291	0.291
15031.50c	0.017	0.017	0.017	0.017	0.017
16032.50c	0.012	0.012	0.012	0.012	0.012
24050.60c	0.308	0.308	0.307	0.307	0.307
24052.60c	6.171	6.171	6.152	6.166	6.166

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
24053.60c	0.713	0.713	0.711	0.713	0.713
24054.60c	0.181	0.181	0.180	0.181	0.181
25055.50c	0.776	0.776	0.774	0.775	0.775
26054.60c	1.520	1.520	1.515	1.519	1.519
26056.60c	24.507	24.507	24.431	24.488	24.488
26057.60c	0.571	0.571	0.569	0.571	0.571
26058.60c	0.077	0.077	0.077	0.077	0.077
28058.60c	2.419	2.419	2.412	2.417	2.417
28060.60c	0.957	0.957	0.954	0.956	0.956
28061.60c	0.042	0.042	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136	0.136	0.136
28064.60c	0.036	0.036	0.035	0.036	0.036
1001.50c	6.843	6.844	6.847	6.841	6.842
5010.50c	9.511E-03	7.422E-03	2.437E-02	1.729E-02	1.629E-02
5011.56c	4.345E-02	3.390E-02	1.113E-01	7.900E-02	7.443E-02
8016.50c	54.300	54.311	54.333	54.289	54.293
Density (g/cm^3)	1.1767	1.1767	1.1804	1.1776	1.1776

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.031	0.031	0.031
7014.50c	0.039	0.039	0.039
14000.50c	0.292	0.290	0.291
15031.50c	0.018	0.017	0.017
16032.50c	0.012	0.012	0.012
24050.60c	0.308	0.307	0.308
24052.60c	6.185	6.152	6.171
24053.60c	0.715	0.711	0.713
24054.60c	0.181	0.180	0.181
25055.50c	0.778	0.774	0.776
26054.60c	1.524	1.515	1.520
26056.60c	24.564	24.431	24.507
26057.60c	0.572	0.569	0.571

Table 5.3.2-5. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26058.60c	0.078	0.077	0.077
28058.60c	2.425	2.412	2.419
28060.60c	0.959	0.954	0.957
28061.60c	0.042	0.042	0.042
28062.60c	0.136	0.136	0.136
28064.60c	0.036	0.035	0.036
1001.50c	6.832	6.846	6.845
5010.50c	1.057E-02	2.563E-02	5.674E-03
5011.56c	4.830E-02	1.171E-01	2.592E-02
8016.50c	54.215	54.327	54.319
Density (g/cm^3)	1.1740	1.1804	1.1767

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.327	0.327	0.328	0.327	0.327
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.346	0.346	0.346	0.346	0.346
24052.60c	6.933	6.931	6.948	6.933	6.933
24053.60c	0.801	0.801	0.803	0.801	0.801
24054.60c	0.203	0.203	0.204	0.203	0.203
25055.50c	0.872	0.872	0.874	0.872	0.872
26054.60c	1.708	1.707	1.712	1.708	1.708
26056.60c	27.533	27.523	27.592	27.533	27.533
26057.60c	0.642	0.641	0.643	0.642	0.642
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.718	2.717	2.724	2.718	2.718
28060.60c	1.075	1.074	1.077	1.075	1.075
28061.60c	0.047	0.047	0.047	0.047	0.047

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.304	6.307	6.299	6.304	6.303
5010.50c	1.422E-02	1.121E-02	4.988E-03	1.311E-02	1.447E-02
5011.56c	6.495E-02	5.122E-02	2.279E-02	5.991E-02	6.611E-02
8016.50c	50.022	50.050	49.985	50.027	50.020
Density (g/cm^3)	1.2667	1.2671	1.2640	1.2667	1.2667

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.328	0.328	0.327	0.327	0.328
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.346	0.347	0.346	0.346	0.347
24052.60c	6.948	6.958	6.933	6.933	6.958
24053.60c	0.803	0.804	0.801	0.801	0.804
24054.60c	0.204	0.204	0.203	0.203	0.204
25055.50c	0.874	0.875	0.872	0.872	0.875
26054.60c	1.712	1.714	1.708	1.708	1.714
26056.60c	27.592	27.631	27.533	27.533	27.631
26057.60c	0.643	0.644	0.642	0.642	0.644
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.724	2.727	2.718	2.718	2.727
28060.60c	1.077	1.079	1.075	1.075	1.079
28061.60c	0.047	0.047	0.047	0.047	0.047
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.297	6.292	6.304	6.308	6.292
5010.50c	7.457E-03	5.680E-03	1.403E-02	7.145E-03	5.074E-03
5011.56c	3.406E-02	2.595E-02	6.407E-02	3.264E-02	2.318E-02
8016.50c	49.973	49.926	50.023	50.057	49.929

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
Density (g/cm^3)	1.2640	1.2622	1.2667	1.2667	1.2622
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.327	0.328	0.327	0.327	0.328
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.346	0.347	0.346	0.346	0.346
24052.60c	6.933	6.958	6.933	6.943	6.948
24053.60c	0.801	0.804	0.801	0.802	0.803
24054.60c	0.203	0.204	0.203	0.204	0.204
25055.50c	0.872	0.875	0.872	0.873	0.874
26054.60c	1.708	1.714	1.708	1.710	1.712
26056.60c	27.533	27.631	27.533	27.572	27.592
26057.60c	0.642	0.644	0.642	0.643	0.643
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.718	2.727	2.718	2.722	2.724
28060.60c	1.075	1.079	1.075	1.076	1.077
28061.60c	0.047	0.047	0.047	0.047	0.047
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.303	6.291	6.303	6.298	6.300
5010.50c	1.561E-02	6.115E-03	1.595E-02	1.226E-02	3.946E-03
5011.56c	7.130E-02	2.793E-02	7.287E-02	5.600E-02	1.803E-02
8016.50c	50.015	49.924	50.013	49.977	49.990
Density (g/cm^3)	1.2667	1.2622	1.2667	1.2649	1.2640
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.327	0.327	0.328	0.327	0.327
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.346	0.346	0.347	0.346	0.345
24052.60c	6.933	6.933	6.953	6.933	6.928
24053.60c	0.801	0.801	0.803	0.801	0.801
24054.60c	0.203	0.203	0.204	0.203	0.203
25055.50c	0.872	0.872	0.874	0.872	0.871
26054.60c	1.708	1.708	1.713	1.708	1.707
26056.60c	27.533	27.533	27.611	27.533	27.514
26057.60c	0.642	0.642	0.643	0.642	0.641
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.718	2.718	2.725	2.718	2.716
28060.60c	1.075	1.075	1.078	1.075	1.074
28061.60c	0.047	0.047	0.047	0.047	0.047
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.300	6.305	6.291	6.306	6.312
5010.50c	2.060E-02	1.239E-02	1.162E-02	1.062E-02	5.709E-03
5011.56c	9.412E-02	5.662E-02	5.308E-02	4.852E-02	2.608E-02
8016.50c	49.990	50.031	49.925	50.040	50.091
Density (g/cm^3)	1.2667	1.2667	1.2631	1.2667	1.2676

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.328	0.327	0.328	0.328	0.328
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.346	0.346	0.346	0.346	0.347
24052.60c	6.948	6.933	6.948	6.948	6.953

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
24053.60c	0.803	0.801	0.803	0.803	0.803
24054.60c	0.204	0.203	0.204	0.204	0.204
25055.50c	0.874	0.872	0.874	0.874	0.874
26054.60c	1.712	1.708	1.712	1.712	1.713
26056.60c	27.592	27.533	27.592	27.592	27.611
26057.60c	0.643	0.642	0.643	0.643	0.643
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.724	2.718	2.724	2.724	2.725
28060.60c	1.077	1.075	1.077	1.077	1.078
28061.60c	0.047	0.047	0.047	0.047	0.047
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.299	6.299	6.291	6.292	6.293
5010.50c	5.261E-03	2.129E-02	1.772E-02	1.631E-02	8.747E-03
5011.56c	2.403E-02	9.727E-02	8.093E-02	7.451E-02	3.996E-02
8016.50c	49.984	49.987	49.922	49.929	49.939
Density (g/cm^3)	1.2640	1.2667	1.2640	1.2640	1.2631

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.035	0.035	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044	0.044	0.044
14000.50c	0.328	0.328	0.327	0.328	0.328
15031.50c	0.020	0.020	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013	0.013	0.013
24050.60c	0.347	0.347	0.346	0.346	0.346
24052.60c	6.953	6.953	6.933	6.948	6.948
24053.60c	0.803	0.803	0.801	0.803	0.803
24054.60c	0.204	0.204	0.203	0.204	0.204
25055.50c	0.874	0.874	0.872	0.874	0.874
26054.60c	1.713	1.713	1.708	1.712	1.712
26056.60c	27.611	27.611	27.533	27.592	27.592
26057.60c	0.643	0.643	0.642	0.643	0.643

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
26058.60c	0.087	0.087	0.087	0.087	0.087
28058.60c	2.725	2.725	2.718	2.724	2.724
28060.60c	1.078	1.078	1.075	1.077	1.077
28061.60c	0.047	0.047	0.047	0.047	0.047
28062.60c	0.153	0.153	0.153	0.153	0.153
28064.60c	0.040	0.040	0.040	0.040	0.040
1001.50c	6.293	6.294	6.299	6.292	6.293
5010.50c	8.747E-03	6.826E-03	2.242E-02	1.591E-02	1.498E-02
5011.56c	3.996E-02	3.118E-02	1.024E-01	7.266E-02	6.845E-02
8016.50c	49.939	49.948	49.981	49.931	49.936
Density (g/cm^3)	1.2631	1.2631	1.2667	1.2640	1.2640

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.035	0.035	0.035
7014.50c	0.044	0.044	0.044
14000.50c	0.329	0.327	0.328
15031.50c	0.020	0.020	0.020
16032.50c	0.013	0.013	0.013
24050.60c	0.347	0.346	0.347
24052.60c	6.968	6.933	6.953
24053.60c	0.805	0.801	0.803
24054.60c	0.204	0.203	0.204
25055.50c	0.876	0.872	0.874
26054.60c	1.716	1.708	1.713
26056.60c	27.670	27.533	27.611
26057.60c	0.645	0.642	0.643
26058.60c	0.087	0.087	0.087
28058.60c	2.731	2.718	2.725
28060.60c	1.080	1.075	1.078
28061.60c	0.048	0.047	0.047
28062.60c	0.154	0.153	0.153
28064.60c	0.040	0.040	0.040

Table 5.3.2-6. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
1001.50c	6.282	6.298	6.295
5010.50c	9.722E-03	2.357E-02	5.218E-03
5011.56c	4.441E-02	1.077E-01	2.384E-02
8016.50c	49.851	49.976	49.956
Density (g/cm^3)	1.2604	1.2667	1.2631

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041
7014.50c	0.051	0.051	0.052	0.051	0.051
14000.50c	0.386	0.386	0.387	0.386	0.386
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.408	0.408	0.409	0.408	0.408
24052.60c	8.181	8.179	8.196	8.181	8.181
24053.60c	0.945	0.945	0.947	0.945	0.945
24054.60c	0.240	0.240	0.240	0.240	0.240
25055.50c	1.029	1.029	1.031	1.029	1.029
26054.60c	2.015	2.015	2.019	2.015	2.015
26056.60c	32.491	32.481	32.550	32.491	32.491
26057.60c	0.757	0.757	0.759	0.757	0.757
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.207	3.206	3.213	3.207	3.207
28060.60c	1.268	1.268	1.271	1.268	1.268
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.180	0.180	0.181	0.180	0.180
28064.60c	0.047	0.047	0.047	0.047	0.047
1001.50c	5.426	5.430	5.421	5.427	5.426
5010.50c	1.224E-02	9.652E-03	4.293E-03	1.129E-02	1.246E-02
5011.56c	5.591E-02	4.409E-02	1.961E-02	5.157E-02	5.691E-02
8016.50c	43.060	43.087	43.016	43.065	43.059

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Density (g/cm^3)	1.4343	1.4347	1.4316	1.4343	1.4343
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041
7014.50c	0.052	0.052	0.051	0.051	0.052
14000.50c	0.387	0.387	0.386	0.386	0.387
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.409	0.409	0.408	0.408	0.409
24052.60c	8.196	8.206	8.181	8.181	8.206
24053.60c	0.947	0.948	0.945	0.945	0.948
24054.60c	0.240	0.241	0.240	0.240	0.241
25055.50c	1.031	1.032	1.029	1.029	1.032
26054.60c	2.019	2.022	2.015	2.015	2.022
26056.60c	32.550	32.590	32.491	32.491	32.590
26057.60c	0.759	0.759	0.757	0.757	0.759
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.213	3.217	3.207	3.207	3.217
28060.60c	1.271	1.272	1.268	1.268	1.272
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.181	0.181	0.180	0.180	0.181
28064.60c	0.047	0.047	0.047	0.047	0.047
1001.50c	5.419	5.413	5.426	5.430	5.414
5010.50c	6.417E-03	4.887E-03	1.207E-02	6.151E-03	4.365E-03
5011.56c	2.931E-02	2.232E-02	5.516E-02	2.810E-02	1.994E-02
8016.50c	43.005	42.957	43.061	43.090	42.960
Density (g/cm^3)	1.4316	1.4299	1.4343	1.4343	1.4299
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
7014.50c	0.051	0.052	0.051	0.052	0.052
14000.50c	0.386	0.387	0.386	0.386	0.387
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.408	0.409	0.408	0.408	0.409
24052.60c	8.181	8.206	8.181	8.191	8.196
24053.60c	0.945	0.948	0.945	0.947	0.947
24054.60c	0.240	0.241	0.240	0.240	0.240
25055.50c	1.029	1.032	1.029	1.030	1.031
26054.60c	2.015	2.022	2.015	2.018	2.019
26056.60c	32.491	32.590	32.491	32.530	32.550
26057.60c	0.757	0.759	0.757	0.758	0.759
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.207	3.217	3.207	3.211	3.213
28060.60c	1.268	1.272	1.268	1.270	1.271
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.180	0.181	0.180	0.180	0.181
28064.60c	0.047	0.047	0.047	0.047	0.047
1001.50c	5.426	5.413	5.425	5.420	5.421
5010.50c	1.344E-02	5.261E-03	1.373E-02	1.055E-02	3.396E-03
5011.56c	6.137E-02	2.403E-02	6.273E-02	4.820E-02	1.551E-02
8016.50c	43.054	42.955	43.053	43.013	43.020
Density (g/cm^3)	1.4343	1.4299	1.4343	1.4325	1.4316

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041
7014.50c	0.051	0.051	0.052	0.051	0.051
14000.50c	0.386	0.386	0.387	0.386	0.386
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.408	0.408	0.409	0.408	0.408
24052.60c	8.181	8.181	8.201	8.181	8.176

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
24053.60c	0.945	0.945	0.948	0.945	0.945
24054.60c	0.240	0.240	0.240	0.240	0.240
25055.50c	1.029	1.029	1.031	1.029	1.028
26054.60c	2.015	2.015	2.020	2.015	2.014
26056.60c	32.491	32.491	32.570	32.491	32.471
26057.60c	0.757	0.757	0.759	0.757	0.757
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.207	3.207	3.215	3.207	3.205
28060.60c	1.268	1.268	1.271	1.268	1.268
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.180	0.180	0.181	0.180	0.180
28064.60c	0.047	0.047	0.047	0.047	0.047
1001.50c	5.423	5.427	5.414	5.428	5.434
5010.50c	1.774E-02	1.067E-02	9.998E-03	9.143E-03	4.915E-03
5011.56c	8.102E-02	4.874E-02	4.567E-02	4.177E-02	2.245E-02
8016.50c	43.033	43.068	42.960	43.076	43.124
Density (g/cm^3)	1.4343	1.4343	1.4308	1.4343	1.4351

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041
7014.50c	0.052	0.051	0.052	0.052	0.052
14000.50c	0.387	0.386	0.387	0.387	0.387
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.409	0.408	0.409	0.409	0.409
24052.60c	8.196	8.181	8.196	8.196	8.201
24053.60c	0.947	0.945	0.947	0.947	0.948
24054.60c	0.240	0.240	0.240	0.240	0.240
25055.50c	1.031	1.029	1.031	1.031	1.031
26054.60c	2.019	2.015	2.019	2.019	2.020
26056.60c	32.550	32.491	32.550	32.550	32.570
26057.60c	0.759	0.757	0.759	0.759	0.759

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.213	3.207	3.213	3.213	3.215
28060.60c	1.271	1.268	1.271	1.271	1.271
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.181	0.180	0.181	0.181	0.181
28064.60c	0.047	0.047	0.047	0.047	0.047
1001.50c	5.421	5.423	5.414	5.415	5.415
5010.50c	4.528E-03	1.833E-02	1.525E-02	1.404E-02	7.527E-03
5011.56c	2.068E-02	8.373E-02	6.965E-02	6.412E-02	3.438E-02
8016.50c	43.015	43.030	42.962	42.968	42.972
Density (g/cm^3)	1.4316	1.4343	1.4316	1.4316	1.4308

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.041	0.041	0.041	0.041	0.041
7014.50c	0.052	0.052	0.051	0.052	0.052
14000.50c	0.387	0.387	0.386	0.387	0.387
15031.50c	0.023	0.023	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015	0.015	0.015
24050.60c	0.409	0.409	0.408	0.409	0.409
24052.60c	8.201	8.201	8.181	8.196	8.196
24053.60c	0.948	0.948	0.945	0.947	0.947
24054.60c	0.240	0.240	0.240	0.240	0.240
25055.50c	1.031	1.031	1.029	1.031	1.031
26054.60c	2.020	2.020	2.015	2.019	2.019
26056.60c	32.570	32.570	32.491	32.550	32.550
26057.60c	0.759	0.759	0.757	0.759	0.759
26058.60c	0.103	0.103	0.103	0.103	0.103
28058.60c	3.215	3.215	3.207	3.213	3.213
28060.60c	1.271	1.271	1.268	1.271	1.271
28061.60c	0.056	0.056	0.056	0.056	0.056
28062.60c	0.181	0.181	0.180	0.181	0.181
28064.60c	0.047	0.047	0.047	0.047	0.047

Table 5.3.2-7. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
1001.50c	5.415	5.416	5.422	5.415	5.415
5010.50c	7.527E-03	5.874E-03	1.930E-02	1.369E-02	1.290E-02
5011.56c	3.438E-02	2.683E-02	8.815E-02	6.253E-02	5.891E-02
8016.50c	42.972	42.980	43.025	42.970	42.973
Density (g/cm^3)	1.4308	1.4308	1.4343	1.4316	1.4316

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.041	0.041	0.041
7014.50c	0.052	0.051	0.052
14000.50c	0.387	0.386	0.387
15031.50c	0.023	0.023	0.023
16032.50c	0.015	0.015	0.015
24050.60c	0.410	0.408	0.409
24052.60c	8.216	8.181	8.201
24053.60c	0.950	0.945	0.948
24054.60c	0.241	0.240	0.240
25055.50c	1.033	1.029	1.031
26054.60c	2.024	2.015	2.020
26056.60c	32.630	32.491	32.570
26057.60c	0.760	0.757	0.759
26058.60c	0.103	0.103	0.103
28058.60c	3.221	3.207	3.215
28060.60c	1.274	1.268	1.271
28061.60c	0.056	0.056	0.056
28062.60c	0.181	0.180	0.181
28064.60c	0.047	0.047	0.047
1001.50c	5.404	5.421	5.417
5010.50c	8.363E-03	2.029E-02	4.490E-03
5011.56c	3.820E-02	9.270E-02	2.051E-02
8016.50c	42.884	43.021	42.987
Density (g/cm^3)	1.4281	1.4343	1.4308

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.419	0.419	0.420	0.419	0.419
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.443	0.443	0.444	0.443	0.443
24052.60c	8.885	8.882	8.900	8.885	8.885
24053.60c	1.027	1.026	1.028	1.027	1.027
24054.60c	0.260	0.260	0.261	0.260	0.260
25055.50c	1.117	1.117	1.119	1.117	1.117
26054.60c	2.189	2.188	2.192	2.189	2.189
26056.60c	35.284	35.274	35.343	35.284	35.284
26057.60c	0.822	0.822	0.824	0.822	0.822
26058.60c	0.112	0.112	0.112	0.112	0.112
28058.60c	3.483	3.482	3.489	3.483	3.483
28060.60c	1.377	1.377	1.380	1.377	1.377
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.932	4.935	4.926	4.933	4.932
5010.50c	1.113E-02	8.773E-03	3.901E-03	1.026E-02	1.132E-02
5011.56c	5.082E-02	4.008E-02	1.782E-02	4.687E-02	5.173E-02
8016.50c	39.138	39.163	39.091	39.142	39.137
Density (g/cm^3)	1.5498	1.5502	1.5472	1.5498	1.5498

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.420	0.420	0.419	0.419	0.420
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.444	0.444	0.443	0.443	0.444

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
24052.60c	8.900	8.909	8.885	8.885	8.909
24053.60c	1.028	1.030	1.027	1.027	1.030
24054.60c	0.261	0.261	0.260	0.260	0.261
25055.50c	1.119	1.120	1.117	1.117	1.120
26054.60c	2.192	2.195	2.189	2.189	2.195
26056.60c	35.343	35.382	35.284	35.284	35.382
26057.60c	0.824	0.825	0.822	0.822	0.825
26058.60c	0.112	0.112	0.112	0.112	0.112
28058.60c	3.489	3.492	3.483	3.483	3.492
28060.60c	1.380	1.381	1.377	1.377	1.381
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.925	4.919	4.932	4.936	4.919
5010.50c	5.832E-03	4.441E-03	1.097E-02	5.590E-03	3.967E-03
5011.56c	2.664E-02	2.029E-02	5.013E-02	2.554E-02	1.812E-02
8016.50c	39.082	39.033	39.139	39.166	39.036
Density (g/cm^3)	1.5472	1.5455	1.5498	1.5498	1.5455

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.419	0.420	0.419	0.419	0.420
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.443	0.444	0.443	0.444	0.444
24052.60c	8.885	8.909	8.885	8.895	8.900
24053.60c	1.027	1.030	1.027	1.028	1.028
24054.60c	0.260	0.261	0.260	0.261	0.261
25055.50c	1.117	1.120	1.117	1.119	1.119
26054.60c	2.189	2.195	2.189	2.191	2.192
26056.60c	35.284	35.382	35.284	35.323	35.343

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
26057.60c	0.822	0.825	0.822	0.823	0.824
26058.60c	0.112	0.112	0.112	0.112	0.112
28058.60c	3.483	3.492	3.483	3.487	3.489
28060.60c	1.377	1.381	1.377	1.379	1.380
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.931	4.919	4.931	4.926	4.927
5010.50c	1.221E-02	4.781E-03	1.248E-02	9.589E-03	3.086E-03
5011.56c	5.578E-02	2.184E-02	5.701E-02	4.380E-02	1.410E-02
8016.50c	39.133	39.032	39.131	39.091	39.095
Density (g/cm^3)	1.5498	1.5455	1.5498	1.5481	1.5472

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.419	0.419	0.420	0.419	0.419
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.443	0.443	0.444	0.443	0.443
24052.60c	8.885	8.885	8.904	8.885	8.880
24053.60c	1.027	1.027	1.029	1.027	1.026
24054.60c	0.260	0.260	0.261	0.260	0.260
25055.50c	1.117	1.117	1.120	1.117	1.117
26054.60c	2.189	2.189	2.194	2.189	2.187
26056.60c	35.284	35.284	35.362	35.284	35.264
26057.60c	0.822	0.822	0.824	0.822	0.822
26058.60c	0.112	0.112	0.112	0.112	0.111
28058.60c	3.483	3.483	3.491	3.483	3.481
28060.60c	1.377	1.377	1.380	1.377	1.377
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.929	4.933	4.920	4.934	4.940
5010.50c	1.612E-02	9.698E-03	9.086E-03	8.310E-03	4.468E-03
5011.56c	7.364E-02	4.430E-02	4.150E-02	3.796E-02	2.041E-02
8016.50c	39.114	39.145	39.038	39.152	39.199
Density (g/cm^3)	1.5498	1.5498	1.5464	1.5498	1.5507

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.420	0.419	0.420	0.420	0.420
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.444	0.443	0.444	0.444	0.444
24052.60c	8.900	8.885	8.900	8.900	8.904
24053.60c	1.028	1.027	1.028	1.028	1.029
24054.60c	0.261	0.260	0.261	0.261	0.261
25055.50c	1.119	1.117	1.119	1.119	1.120
26054.60c	2.192	2.189	2.192	2.192	2.194
26056.60c	35.343	35.284	35.343	35.343	35.362
26057.60c	0.824	0.822	0.824	0.824	0.824
26058.60c	0.112	0.112	0.112	0.112	0.112
28058.60c	3.489	3.483	3.489	3.489	3.491
28060.60c	1.380	1.377	1.380	1.380	1.380
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.926	4.929	4.920	4.921	4.921
5010.50c	4.115E-03	1.666E-02	1.386E-02	1.276E-02	6.840E-03
5011.56c	1.880E-02	7.610E-02	6.329E-02	5.827E-02	3.124E-02
8016.50c	39.090	39.111	39.042	39.048	39.049

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Density (g/cm^3)	1.5472	1.5498	1.5472	1.5472	1.5464

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.045	0.045	0.045	0.045	0.045
7014.50c	0.056	0.056	0.056	0.056	0.056
14000.50c	0.420	0.420	0.419	0.420	0.420
15031.50c	0.025	0.025	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017	0.017	0.017
24050.60c	0.444	0.444	0.443	0.444	0.444
24052.60c	8.904	8.904	8.885	8.900	8.900
24053.60c	1.029	1.029	1.027	1.028	1.028
24054.60c	0.261	0.261	0.260	0.261	0.261
25055.50c	1.120	1.120	1.117	1.119	1.119
26054.60c	2.194	2.194	2.189	2.192	2.192
26056.60c	35.362	35.362	35.284	35.343	35.343
26057.60c	0.824	0.824	0.822	0.824	0.824
26058.60c	0.112	0.112	0.112	0.112	0.112
28058.60c	3.491	3.491	3.483	3.489	3.489
28060.60c	1.380	1.380	1.377	1.380	1.380
28061.60c	0.061	0.061	0.061	0.061	0.061
28062.60c	0.196	0.196	0.196	0.196	0.196
28064.60c	0.051	0.051	0.051	0.051	0.051
1001.50c	4.921	4.922	4.928	4.921	4.921
5010.50c	6.840E-03	5.337E-03	1.754E-02	1.244E-02	1.172E-02
5011.56c	3.124E-02	2.438E-02	8.013E-02	5.682E-02	5.353E-02
8016.50c	39.049	39.057	39.106	39.049	39.053
Density (g/cm^3)	1.5464	1.5464	1.5498	1.5472	1.5472

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.045	0.045	0.045

Table 5.3.2-8. Homogenized Composition for Upper Plenum Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
7014.50c	0.056	0.056	0.056
14000.50c	0.421	0.419	0.420
15031.50c	0.025	0.025	0.025
16032.50c	0.017	0.017	0.017
24050.60c	0.445	0.443	0.444
24052.60c	8.919	8.885	8.904
24053.60c	1.031	1.027	1.029
24054.60c	0.261	0.260	0.261
25055.50c	1.122	1.117	1.120
26054.60c	2.197	2.189	2.194
26056.60c	35.421	35.284	35.362
26057.60c	0.825	0.822	0.824
26058.60c	0.112	0.112	0.112
28058.60c	3.496	3.483	3.491
28060.60c	1.383	1.377	1.380
28061.60c	0.061	0.061	0.061
28062.60c	0.197	0.196	0.196
28064.60c	0.051	0.051	0.051
1001.50c	4.910	4.928	4.923
5010.50c	7.599E-03	1.844E-02	4.080E-03
5011.56c	3.471E-02	8.425E-02	1.864E-02
8016.50c	38.963	39.102	39.063
Density (g/cm^3)	1.5438	1.5498	1.5464

Table 5.3.2-9. CRGT Flange Sub-Region Material Volume Fractions

Insertion Assembly	Material Volume Fractions	
	SS304	Borated Water
None (p. 10, Ref. 7.11)	0.1381	0.8619
BPRA (p. 24, Ref. 7.11)	0.1827	0.8173
RCCA (p. 16, Ref. 7.11)	0.1945	0.8055
APSRA (p. 20, 22, Ref. 7.11)	0.2212	0.7788

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.467	0.467	0.467	0.467	0.467
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.494	0.493	0.494	0.494	0.494
24052.60c	9.897	9.895	9.911	9.897	9.897
24053.60c	1.144	1.143	1.145	1.144	1.144
24054.60c	0.290	0.290	0.291	0.290	0.290
25055.50c	1.245	1.244	1.246	1.245	1.245
26054.60c	2.438	2.437	2.441	2.438	2.438
26056.60c	39.304	39.295	39.360	39.304	39.304
26057.60c	0.916	0.916	0.917	0.916	0.916
26058.60c	0.124	0.124	0.124	0.124	0.124
28058.60c	3.880	3.879	3.885	3.880	3.880
28060.60c	1.534	1.534	1.536	1.534	1.534
28061.60c	0.068	0.068	0.068	0.068	0.068
28062.60c	0.218	0.218	0.218	0.218	0.218
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.221	4.224	4.215	4.221	4.221
5010.50c	0.010	0.008	0.003	0.009	0.010
5011.56c	0.043	0.034	0.015	0.040	0.044
8016.50c	33.493	33.516	33.445	33.497	33.492
Density (g/cm^3)	1.7531	1.7535	1.7506	1.7531	1.7531

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.467	0.468	0.467	0.467	0.468
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
24050.60c	0.494	0.495	0.494	0.494	0.495
24052.60c	9.911	9.921	9.897	9.897	9.921
24053.60c	1.145	1.146	1.144	1.144	1.146
24054.60c	0.291	0.291	0.290	0.290	0.291
25055.50c	1.246	1.248	1.245	1.245	1.248
26054.60c	2.441	2.444	2.438	2.438	2.444
26056.60c	39.360	39.397	39.304	39.304	39.397
26057.60c	0.917	0.918	0.916	0.916	0.918
26058.60c	0.124	0.125	0.124	0.124	0.125
28058.60c	3.885	3.889	3.880	3.880	3.889
28060.60c	1.536	1.538	1.534	1.534	1.538
28061.60c	0.068	0.068	0.068	0.068	0.068
28062.60c	0.218	0.219	0.218	0.218	0.219
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.214	4.208	4.221	4.224	4.208
5010.50c	0.005	0.004	0.009	0.005	0.003
5011.56c	0.023	0.017	0.043	0.022	0.016
8016.50c	33.437	33.390	33.493	33.516	33.392
Density (g/cm^3)	1.7506	1.7489	1.7531	1.7531	1.7489

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.467	0.468	0.467	0.467	0.467
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.494	0.495	0.494	0.494	0.494
24052.60c	9.897	9.921	9.897	9.906	9.911
24053.60c	1.144	1.146	1.144	1.145	1.145
24054.60c	0.290	0.291	0.290	0.290	0.291
25055.50c	1.245	1.248	1.245	1.246	1.246
26054.60c	2.438	2.444	2.438	2.440	2.441

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
26056.60c	39.304	39.397	39.304	39.341	39.360
26057.60c	0.916	0.918	0.916	0.917	0.917
26058.60c	0.124	0.125	0.124	0.124	0.124
28058.60c	3.880	3.889	3.880	3.883	3.885
28060.60c	1.534	1.538	1.534	1.536	1.536
28061.60c	0.068	0.068	0.068	0.068	0.068
28062.60c	0.218	0.219	0.218	0.218	0.218
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.220	4.208	4.220	4.215	4.215
5010.50c	0.010	0.004	0.011	0.008	0.003
5011.56c	0.048	0.019	0.049	0.037	0.012
8016.50c	33.488	33.388	33.487	33.447	33.448
Density (g/cm^3)	1.7531	1.7489	1.7531	1.7514	1.7506

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.467	0.467	0.468	0.467	0.467
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.494	0.494	0.494	0.494	0.493
24052.60c	9.897	9.897	9.916	9.897	9.892
24053.60c	1.144	1.144	1.146	1.144	1.143
24054.60c	0.290	0.290	0.291	0.290	0.290
25055.50c	1.245	1.245	1.247	1.245	1.244
26054.60c	2.438	2.438	2.443	2.438	2.437
26056.60c	39.304	39.304	39.379	39.304	39.286
26057.60c	0.916	0.916	0.918	0.916	0.916
26058.60c	0.124	0.124	0.125	0.124	0.124
28058.60c	3.880	3.880	3.887	3.880	3.878
28060.60c	1.534	1.534	1.537	1.534	1.534
28061.60c	0.068	0.068	0.068	0.068	0.068

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
28062.60c	0.218	0.218	0.218	0.218	0.218
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.218	4.221	4.209	4.222	4.228
5010.50c	0.014	0.008	0.008	0.007	0.004
5011.56c	0.063	0.038	0.036	0.032	0.017
8016.50c	33.472	33.499	33.397	33.505	33.547
Density (g/cm^3)	1.7531	1.7531	1.7497	1.7531	1.7539

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.467	0.467	0.467	0.467	0.468
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.494	0.494	0.494	0.494	0.494
24052.60c	9.911	9.897	9.911	9.911	9.916
24053.60c	1.145	1.144	1.145	1.145	1.146
24054.60c	0.291	0.290	0.291	0.291	0.291
25055.50c	1.246	1.245	1.246	1.246	1.247
26054.60c	2.441	2.438	2.441	2.441	2.443
26056.60c	39.360	39.304	39.360	39.360	39.379
26057.60c	0.917	0.916	0.917	0.917	0.918
26058.60c	0.124	0.124	0.124	0.124	0.125
28058.60c	3.885	3.880	3.885	3.885	3.887
28060.60c	1.536	1.534	1.536	1.536	1.537
28061.60c	0.068	0.068	0.068	0.068	0.068
28062.60c	0.218	0.218	0.218	0.218	0.218
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.215	4.218	4.209	4.210	4.210
5010.50c	0.004	0.014	0.012	0.011	0.006
5011.56c	0.016	0.065	0.054	0.050	0.027
8016.50c	33.444	33.469	33.403	33.407	33.406

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Density (g/cm^3)	1.7506	1.7531	1.7506	1.7506	1.7497

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.050	0.050	0.050	0.050	0.050
7014.50c	0.062	0.062	0.062	0.062	0.062
14000.50c	0.468	0.468	0.467	0.467	0.467
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.494	0.494	0.494	0.494	0.494
24052.60c	9.916	9.916	9.897	9.911	9.911
24053.60c	1.146	1.146	1.144	1.145	1.145
24054.60c	0.291	0.291	0.290	0.291	0.291
25055.50c	1.247	1.247	1.245	1.246	1.246
26054.60c	2.443	2.443	2.438	2.441	2.441
26056.60c	39.379	39.379	39.304	39.360	39.360
26057.60c	0.918	0.918	0.916	0.917	0.917
26058.60c	0.125	0.125	0.124	0.124	0.124
28058.60c	3.887	3.887	3.880	3.885	3.885
28060.60c	1.537	1.537	1.534	1.536	1.536
28061.60c	0.068	0.068	0.068	0.068	0.068
28062.60c	0.218	0.218	0.218	0.218	0.218
28064.60c	0.057	0.057	0.057	0.057	0.057
1001.50c	4.210	4.211	4.217	4.210	4.210
5010.50c	0.006	0.005	0.015	0.011	0.010
5011.56c	0.027	0.021	0.069	0.049	0.046
8016.50c	33.406	33.412	33.466	33.409	33.412
Density (g/cm^3)	1.7497	1.7497	1.7531	1.7506	1.7506

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.050	0.050	0.050

Table 5.3.2-10. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
7014.50c	0.062	0.062	0.062
14000.50c	0.468	0.467	0.468
15031.50c	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019
24050.60c	0.495	0.494	0.494
24052.60c	9.930	9.897	9.916
24053.60c	1.148	1.144	1.146
24054.60c	0.291	0.290	0.291
25055.50c	1.249	1.245	1.247
26054.60c	2.446	2.438	2.443
26056.60c	39.435	39.304	39.379
26057.60c	0.919	0.916	0.918
26058.60c	0.125	0.124	0.125
28058.60c	3.893	3.880	3.887
28060.60c	1.539	1.534	1.537
28061.60c	0.068	0.068	0.068
28062.60c	0.219	0.218	0.218
28064.60c	0.057	0.057	0.057
1001.50c	4.199	4.217	4.211
5010.50c	0.006	0.016	0.003
5011.56c	0.030	0.072	0.016
8016.50c	33.324	33.462	33.418
Density (g/cm^3)	1.7472	1.7531	1.7497

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.523	0.523	0.523	0.523
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
24050.60c	0.553	0.553	0.553	0.553	0.553
24052.60c	11.083	11.080	11.095	11.083	11.083
24053.60c	1.281	1.280	1.282	1.281	1.281
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.394	1.393	1.395	1.394	1.394
26054.60c	2.730	2.730	2.733	2.730	2.730
26056.60c	44.012	44.004	44.062	44.012	44.012
26057.60c	1.026	1.025	1.027	1.026	1.026
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.344	4.344	4.349	4.344	4.344
28060.60c	1.718	1.718	1.720	1.718	1.718
28061.60c	0.076	0.076	0.076	0.076	0.076
28062.60c	0.244	0.244	0.244	0.244	0.244
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.388	3.390	3.382	3.388	3.388
5010.50c	0.008	0.006	0.003	0.007	0.008
5011.56c	0.035	0.028	0.012	0.032	0.036
8016.50c	26.882	26.902	26.836	26.885	26.881
Density (g/cm^3)	2.0711	2.0715	2.0688	2.0711	2.0711

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.524	0.523	0.523	0.524
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.553	0.554	0.553	0.553	0.554
24052.60c	11.095	11.104	11.083	11.083	11.104
24053.60c	1.282	1.283	1.281	1.281	1.283
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.395	1.396	1.394	1.394	1.396
26054.60c	2.733	2.735	2.730	2.730	2.735

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
26056.60c	44.062	44.096	44.012	44.012	44.096
26057.60c	1.027	1.028	1.026	1.026	1.028
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.349	4.353	4.344	4.344	4.353
28060.60c	1.720	1.721	1.718	1.718	1.721
28061.60c	0.076	0.076	0.076	0.076	0.076
28062.60c	0.244	0.245	0.244	0.244	0.245
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.381	3.376	3.388	3.390	3.376
5010.50c	0.004	0.003	0.008	0.004	0.003
5011.56c	0.018	0.014	0.034	0.018	0.012
8016.50c	26.829	26.787	26.883	26.901	26.789
Density (g/cm^3)	2.0688	2.0672	2.0711	2.0711	2.0672

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.524	0.523	0.523	0.523
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.553	0.554	0.553	0.553	0.553
24052.60c	11.083	11.104	11.083	11.091	11.095
24053.60c	1.281	1.283	1.281	1.282	1.282
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.394	1.396	1.394	1.395	1.395
26054.60c	2.730	2.735	2.730	2.732	2.733
26056.60c	44.012	44.096	44.012	44.045	44.062
26057.60c	1.026	1.028	1.026	1.026	1.027
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.344	4.353	4.344	4.348	4.349
28060.60c	1.718	1.721	1.718	1.719	1.720
28061.60c	0.076	0.076	0.076	0.076	0.076

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
28062.60c	0.244	0.245	0.244	0.244	0.244
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.387	3.375	3.387	3.382	3.382
5010.50c	0.008	0.003	0.009	0.007	0.002
5011.56c	0.038	0.015	0.039	0.030	0.010
8016.50c	26.878	26.786	26.878	26.840	26.839
Density (g/cm^3)	2.0711	2.0672	2.0711	2.0696	2.0688

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.523	0.523	0.523	0.522
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.553	0.553	0.553	0.553	0.552
24052.60c	11.083	11.083	11.099	11.083	11.078
24053.60c	1.281	1.281	1.283	1.281	1.280
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.394	1.394	1.396	1.394	1.393
26054.60c	2.730	2.730	2.734	2.730	2.729
26056.60c	44.012	44.012	44.079	44.012	43.995
26057.60c	1.026	1.026	1.027	1.026	1.025
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.344	4.344	4.351	4.344	4.343
28060.60c	1.718	1.718	1.721	1.718	1.717
28061.60c	0.076	0.076	0.076	0.076	0.076
28062.60c	0.244	0.244	0.245	0.244	0.244
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.386	3.388	3.377	3.389	3.393
5010.50c	0.011	0.007	0.006	0.006	0.003
5011.56c	0.051	0.030	0.028	0.026	0.014
8016.50c	26.865	26.887	26.795	26.892	26.928

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
Density (g/cm^3)	2.0711	2.0711	2.0680	2.0711	2.0719
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.523	0.523	0.523	0.523
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.553	0.553	0.553	0.553	0.553
24052.60c	11.095	11.083	11.095	11.095	11.099
24053.60c	1.282	1.281	1.282	1.282	1.283
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.395	1.394	1.395	1.395	1.396
26054.60c	2.733	2.730	2.733	2.733	2.734
26056.60c	44.062	44.012	44.062	44.062	44.079
26057.60c	1.027	1.026	1.027	1.027	1.027
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.349	4.344	4.349	4.349	4.351
28060.60c	1.720	1.718	1.720	1.720	1.721
28061.60c	0.076	0.076	0.076	0.076	0.076
28062.60c	0.244	0.244	0.244	0.244	0.245
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.382	3.385	3.378	3.378	3.378
5010.50c	0.003	0.011	0.010	0.009	0.005
5011.56c	0.013	0.052	0.043	0.040	0.021
8016.50c	26.835	26.863	26.802	26.806	26.802
Density (g/cm^3)	2.0688	2.0711	2.0688	2.0688	2.0680
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.056	0.056	0.056	0.056	0.056

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.523	0.523	0.523	0.523	0.523
15031.50c	0.031	0.031	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.553	0.553	0.553	0.553	0.553
24052.60c	11.099	11.099	11.083	11.095	11.095
24053.60c	1.283	1.283	1.281	1.282	1.282
24054.60c	0.325	0.325	0.325	0.325	0.325
25055.50c	1.396	1.396	1.394	1.395	1.395
26054.60c	2.734	2.734	2.730	2.733	2.733
26056.60c	44.079	44.079	44.012	44.062	44.062
26057.60c	1.027	1.027	1.026	1.027	1.027
26058.60c	0.139	0.139	0.139	0.139	0.139
28058.60c	4.351	4.351	4.344	4.349	4.349
28060.60c	1.721	1.721	1.718	1.720	1.720
28061.60c	0.076	0.076	0.076	0.076	0.076
28062.60c	0.245	0.245	0.244	0.244	0.244
28064.60c	0.064	0.064	0.064	0.064	0.064
1001.50c	3.378	3.378	3.385	3.378	3.378
5010.50c	0.005	0.004	0.012	0.009	0.008
5011.56c	0.021	0.017	0.055	0.039	0.037
8016.50c	26.802	26.807	26.860	26.807	26.809
Density (g/cm^3)	2.0680	2.0680	2.0711	2.0688	2.0688

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.056	0.056	0.056
7014.50c	0.070	0.070	0.070
14000.50c	0.524	0.523	0.523
15031.50c	0.031	0.031	0.031
16032.50c	0.021	0.021	0.021
24050.60c	0.554	0.553	0.553
24052.60c	11.112	11.083	11.099

Table 5.3.2-11. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
24053.60c	1.284	1.281	1.283
24054.60c	0.326	0.325	0.325
25055.50c	1.397	1.394	1.396
26054.60c	2.737	2.730	2.734
26056.60c	44.129	44.012	44.079
26057.60c	1.028	1.026	1.027
26058.60c	0.140	0.139	0.139
28058.60c	4.356	4.344	4.351
28060.60c	1.723	1.718	1.721
28061.60c	0.076	0.076	0.076
28062.60c	0.245	0.244	0.245
28064.60c	0.064	0.064	0.064
1001.50c	3.368	3.385	3.379
5010.50c	0.005	0.013	0.003
5011.56c	0.024	0.058	0.013
8016.50c	26.729	26.857	26.812
Density (g/cm^3)	2.0656	2.0711	2.0680

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.535	0.535	0.535	0.535
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.565	0.565	0.566	0.565	0.565
24052.60c	11.338	11.336	11.350	11.338	11.338
24053.60c	1.310	1.310	1.312	1.310	1.310
24054.60c	0.332	0.332	0.333	0.332	0.332
25055.50c	1.426	1.426	1.427	1.426	1.426
26054.60c	2.793	2.792	2.796	2.793	2.793

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
26056.60c	45.025	45.017	45.074	45.025	45.025
26057.60c	1.049	1.049	1.050	1.049	1.049
26058.60c	0.142	0.142	0.143	0.142	0.142
28058.60c	4.444	4.444	4.449	4.444	4.444
28060.60c	1.758	1.757	1.760	1.758	1.758
28061.60c	0.077	0.077	0.077	0.077	0.077
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.208	3.211	3.203	3.209	3.208
5010.50c	0.007	0.006	0.003	0.007	0.007
5011.56c	0.033	0.026	0.012	0.030	0.034
8016.50c	25.459	25.478	25.414	25.462	25.459
Density (g/cm^3)	2.1553	2.1557	2.1530	2.1553	2.1553

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.536	0.535	0.535	0.536
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.566	0.566	0.565	0.565	0.566
24052.60c	11.350	11.358	11.338	11.338	11.358
24053.60c	1.312	1.313	1.310	1.310	1.313
24054.60c	0.333	0.333	0.332	0.332	0.333
25055.50c	1.427	1.428	1.426	1.426	1.428
26054.60c	2.796	2.798	2.793	2.793	2.798
26056.60c	45.074	45.106	45.025	45.025	45.106
26057.60c	1.050	1.051	1.049	1.049	1.051
26058.60c	0.143	0.143	0.142	0.142	0.143
28058.60c	4.449	4.452	4.444	4.444	4.452
28060.60c	1.760	1.761	1.758	1.758	1.761
28061.60c	0.077	0.078	0.077	0.077	0.078

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.202	3.197	3.208	3.211	3.197
5010.50c	0.004	0.003	0.007	0.004	0.003
5011.56c	0.017	0.013	0.033	0.017	0.012
8016.50c	25.408	25.367	25.460	25.477	25.368
Density (g/cm^3)	2.1530	2.1514	2.1553	2.1553	2.1514

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.536	0.535	0.535	0.535
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.565	0.566	0.565	0.566	0.566
24052.60c	11.338	11.358	11.338	11.346	11.350
24053.60c	1.310	1.313	1.310	1.311	1.312
24054.60c	0.332	0.333	0.332	0.333	0.333
25055.50c	1.426	1.428	1.426	1.427	1.427
26054.60c	2.793	2.798	2.793	2.795	2.796
26056.60c	45.025	45.106	45.025	45.057	45.074
26057.60c	1.049	1.051	1.049	1.050	1.050
26058.60c	0.142	0.143	0.142	0.142	0.143
28058.60c	4.444	4.452	4.444	4.448	4.449
28060.60c	1.758	1.761	1.758	1.759	1.760
28061.60c	0.077	0.078	0.077	0.077	0.077
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.208	3.197	3.208	3.203	3.203
5010.50c	0.008	0.003	0.008	0.006	0.002
5011.56c	0.036	0.014	0.037	0.028	0.009
8016.50c	25.456	25.366	25.455	25.419	25.417

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Density (g/cm^3)	2.1553	2.1514	2.1553	2.1537	2.1530
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.535	0.535	0.535	0.534
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.565	0.565	0.566	0.565	0.565
24052.60c	11.338	11.338	11.354	11.338	11.334
24053.60c	1.310	1.310	1.312	1.310	1.310
24054.60c	0.332	0.332	0.333	0.332	0.332
25055.50c	1.426	1.426	1.428	1.426	1.425
26054.60c	2.793	2.793	2.797	2.793	2.792
26056.60c	45.025	45.025	45.090	45.025	45.009
26057.60c	1.049	1.049	1.051	1.049	1.049
26058.60c	0.142	0.142	0.143	0.142	0.142
28058.60c	4.444	4.444	4.451	4.444	4.443
28060.60c	1.758	1.758	1.760	1.758	1.757
28061.60c	0.077	0.077	0.077	0.077	0.077
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.206	3.209	3.198	3.210	3.214
5010.50c	0.010	0.006	0.006	0.005	0.003
5011.56c	0.048	0.029	0.027	0.025	0.013
8016.50c	25.443	25.464	25.375	25.469	25.504
Density (g/cm^3)	2.1553	2.1553	2.1522	2.1553	2.1561
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.535	0.535	0.535	0.535
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.566	0.565	0.566	0.566	0.566
24052.60c	11.350	11.338	11.350	11.350	11.354
24053.60c	1.312	1.310	1.312	1.312	1.312
24054.60c	0.333	0.332	0.333	0.333	0.333
25055.50c	1.427	1.426	1.427	1.427	1.428
26054.60c	2.796	2.793	2.796	2.796	2.797
26056.60c	45.074	45.025	45.074	45.074	45.090
26057.60c	1.050	1.049	1.050	1.050	1.051
26058.60c	0.143	0.142	0.143	0.143	0.143
28058.60c	4.449	4.444	4.449	4.449	4.451
28060.60c	1.760	1.758	1.760	1.760	1.760
28061.60c	0.077	0.077	0.077	0.077	0.077
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.203	3.206	3.199	3.199	3.199
5010.50c	0.003	0.011	0.009	0.008	0.004
5011.56c	0.012	0.050	0.041	0.038	0.020
8016.50c	25.414	25.442	25.382	25.386	25.382
Density (g/cm^3)	2.1530	2.1553	2.1530	2.1530	2.1522

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.057	0.057	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.535	0.535	0.535	0.535	0.535
15031.50c	0.032	0.032	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021	0.021	0.021
24050.60c	0.566	0.566	0.565	0.566	0.566
24052.60c	11.354	11.354	11.338	11.350	11.350

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
24053.60c	1.312	1.312	1.310	1.312	1.312
24054.60c	0.333	0.333	0.332	0.333	0.333
25055.50c	1.428	1.428	1.426	1.427	1.427
26054.60c	2.797	2.797	2.793	2.796	2.796
26056.60c	45.090	45.090	45.025	45.074	45.074
26057.60c	1.051	1.051	1.049	1.050	1.050
26058.60c	0.143	0.143	0.142	0.143	0.143
28058.60c	4.451	4.451	4.444	4.449	4.449
28060.60c	1.760	1.760	1.758	1.760	1.760
28061.60c	0.077	0.077	0.077	0.077	0.077
28062.60c	0.250	0.250	0.250	0.250	0.250
28064.60c	0.065	0.065	0.065	0.065	0.065
1001.50c	3.199	3.199	3.206	3.199	3.199
5010.50c	0.004	0.003	0.011	0.008	0.008
5011.56c	0.020	0.016	0.052	0.037	0.035
8016.50c	25.382	25.387	25.439	25.387	25.389
Density (g/cm^3)	2.1522	2.1522	2.1553	2.1530	2.1530

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.057	0.057	0.057
7014.50c	0.071	0.071	0.071
14000.50c	0.536	0.535	0.535
15031.50c	0.032	0.032	0.032
16032.50c	0.021	0.021	0.021
24050.60c	0.567	0.565	0.566
24052.60c	11.366	11.338	11.354
24053.60c	1.314	1.310	1.312
24054.60c	0.333	0.332	0.333
25055.50c	1.429	1.426	1.428
26054.60c	2.800	2.793	2.797
26056.60c	45.139	45.025	45.090
26057.60c	1.052	1.049	1.051

Table 5.3.2-12. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26058.60c	0.143	0.142	0.143
28058.60c	4.456	4.444	4.451
28060.60c	1.762	1.758	1.760
28061.60c	0.078	0.077	0.077
28062.60c	0.250	0.250	0.250
28064.60c	0.066	0.065	0.065
1001.50c	3.190	3.205	3.200
5010.50c	0.005	0.012	0.003
5011.56c	0.023	0.055	0.012
8016.50c	25.311	25.436	25.391
Density (g/cm^3)	2.1499	2.1553	2.1522

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060
7014.50c	0.074	0.074	0.075	0.074	0.074
14000.50c	0.559	0.559	0.559	0.559	0.559
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.591	0.591	0.591	0.591	0.591
24052.60c	11.847	11.845	11.859	11.847	11.847
24053.60c	1.369	1.369	1.370	1.369	1.369
24054.60c	0.347	0.347	0.348	0.347	0.347
25055.50c	1.490	1.490	1.491	1.490	1.490
26054.60c	2.918	2.918	2.921	2.918	2.918
26056.60c	47.049	47.042	47.094	47.049	47.049
26057.60c	1.096	1.096	1.098	1.096	1.096
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.644	4.643	4.649	4.644	4.644
28060.60c	1.837	1.836	1.838	1.837	1.837
28061.60c	0.081	0.081	0.081	0.081	0.081

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.850	2.852	2.845	2.851	2.850
5010.50c	0.006	0.005	0.002	0.006	0.007
5011.56c	0.029	0.023	0.010	0.027	0.030
8016.50c	22.617	22.635	22.574	22.620	22.617
Density (g/cm^3)	2.3457	2.3461	2.3435	2.3457	2.3457

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060
7014.50c	0.075	0.075	0.074	0.074	0.075
14000.50c	0.559	0.560	0.559	0.559	0.560
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.591	0.592	0.591	0.591	0.592
24052.60c	11.859	11.866	11.847	11.847	11.866
24053.60c	1.370	1.371	1.369	1.369	1.371
24054.60c	0.348	0.348	0.347	0.347	0.348
25055.50c	1.491	1.492	1.490	1.490	1.492
26054.60c	2.921	2.923	2.918	2.918	2.923
26056.60c	47.094	47.124	47.049	47.049	47.124
26057.60c	1.098	1.098	1.096	1.096	1.098
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.649	4.652	4.644	4.644	4.652
28060.60c	1.838	1.840	1.837	1.837	1.840
28061.60c	0.081	0.081	0.081	0.081	0.081
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.844	2.839	2.850	2.852	2.839
5010.50c	0.003	0.003	0.006	0.003	0.002
5011.56c	0.015	0.012	0.029	0.015	0.010
8016.50c	22.569	22.530	22.618	22.633	22.532

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
Density (g/cm^3)	2.3435	2.3420	2.3457	2.3457	2.3420
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060
7014.50c	0.074	0.075	0.074	0.075	0.075
14000.50c	0.559	0.560	0.559	0.559	0.559
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.591	0.592	0.591	0.591	0.591
24052.60c	11.847	11.866	11.847	11.855	11.859
24053.60c	1.369	1.371	1.369	1.370	1.370
24054.60c	0.347	0.348	0.347	0.347	0.348
25055.50c	1.490	1.492	1.490	1.491	1.491
26054.60c	2.918	2.923	2.918	2.920	2.921
26056.60c	47.049	47.124	47.049	47.079	47.094
26057.60c	1.096	1.098	1.096	1.097	1.098
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.644	4.652	4.644	4.647	4.649
28060.60c	1.837	1.840	1.837	1.838	1.838
28061.60c	0.081	0.081	0.081	0.081	0.081
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.850	2.839	2.850	2.845	2.845
5010.50c	0.007	0.003	0.007	0.006	0.002
5011.56c	0.032	0.013	0.033	0.025	0.008
8016.50c	22.614	22.529	22.614	22.579	22.577
Density (g/cm^3)	2.3457	2.3420	2.3457	2.3442	2.3435
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
7014.50c	0.074	0.074	0.075	0.074	0.074
14000.50c	0.559	0.559	0.559	0.559	0.559
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.591	0.591	0.592	0.591	0.591
24052.60c	11.847	11.847	11.862	11.847	11.844
24053.60c	1.369	1.369	1.371	1.369	1.369
24054.60c	0.347	0.347	0.348	0.347	0.347
25055.50c	1.490	1.490	1.492	1.490	1.489
26054.60c	2.918	2.918	2.922	2.918	2.918
26056.60c	47.049	47.049	47.109	47.049	47.034
26057.60c	1.096	1.096	1.098	1.096	1.096
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.644	4.644	4.650	4.644	4.643
28060.60c	1.837	1.837	1.839	1.837	1.836
28061.60c	0.081	0.081	0.081	0.081	0.081
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.848	2.851	2.840	2.851	2.855
5010.50c	0.009	0.006	0.005	0.005	0.003
5011.56c	0.043	0.026	0.024	0.022	0.012
8016.50c	22.603	22.621	22.538	22.625	22.658
Density (g/cm^3)	2.3457	2.3457	2.3427	2.3457	2.3465

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060
7014.50c	0.075	0.074	0.075	0.075	0.075
14000.50c	0.559	0.559	0.559	0.559	0.559
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.591	0.591	0.591	0.591	0.592
24052.60c	11.859	11.847	11.859	11.859	11.862

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
24053.60c	1.370	1.369	1.370	1.370	1.371
24054.60c	0.348	0.347	0.348	0.348	0.348
25055.50c	1.491	1.490	1.491	1.491	1.492
26054.60c	2.921	2.918	2.921	2.921	2.922
26056.60c	47.094	47.049	47.094	47.094	47.109
26057.60c	1.098	1.096	1.098	1.098	1.098
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.649	4.644	4.649	4.649	4.650
28060.60c	1.838	1.837	1.838	1.838	1.839
28061.60c	0.081	0.081	0.081	0.081	0.081
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.845	2.848	2.841	2.842	2.841
5010.50c	0.002	0.010	0.008	0.007	0.004
5011.56c	0.011	0.044	0.037	0.034	0.018
8016.50c	22.574	22.602	22.546	22.549	22.545
Density (g/cm^3)	2.3435	2.3457	2.3435	2.3435	2.3427

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.060	0.060	0.060	0.060	0.060
7014.50c	0.075	0.075	0.074	0.075	0.075
14000.50c	0.559	0.559	0.559	0.559	0.559
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022	0.022	0.022
24050.60c	0.592	0.592	0.591	0.591	0.591
24052.60c	11.862	11.862	11.847	11.859	11.859
24053.60c	1.371	1.371	1.369	1.370	1.370
24054.60c	0.348	0.348	0.347	0.348	0.348
25055.50c	1.492	1.492	1.490	1.491	1.491
26054.60c	2.922	2.922	2.918	2.921	2.921
26056.60c	47.109	47.109	47.049	47.094	47.094
26057.60c	1.098	1.098	1.096	1.098	1.098

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	4.650	4.650	4.644	4.649	4.649
28060.60c	1.839	1.839	1.837	1.838	1.838
28061.60c	0.081	0.081	0.081	0.081	0.081
28062.60c	0.261	0.261	0.261	0.261	0.261
28064.60c	0.068	0.068	0.068	0.068	0.068
1001.50c	2.841	2.842	2.848	2.842	2.842
5010.50c	0.004	0.003	0.010	0.007	0.007
5011.56c	0.018	0.014	0.046	0.033	0.031
8016.50c	22.545	22.549	22.599	22.550	22.552
Density (g/cm^3)	2.3427	2.3427	2.3457	2.3435	2.3435

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.060	0.060	0.060
7014.50c	0.075	0.074	0.075
14000.50c	0.560	0.559	0.559
15031.50c	0.034	0.034	0.034
16032.50c	0.022	0.022	0.022
24050.60c	0.592	0.591	0.592
24052.60c	11.874	11.847	11.862
24053.60c	1.372	1.369	1.371
24054.60c	0.348	0.347	0.348
25055.50c	1.493	1.490	1.492
26054.60c	2.925	2.918	2.922
26056.60c	47.155	47.049	47.109
26057.60c	1.099	1.096	1.098
26058.60c	0.149	0.149	0.149
28058.60c	4.655	4.644	4.650
28060.60c	1.841	1.837	1.839
28061.60c	0.081	0.081	0.081
28062.60c	0.262	0.261	0.261
28064.60c	0.068	0.068	0.068

Table 5.3.2-13. Homogenized Composition for CRGT Flange Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
1001.50c	2.833	2.848	2.842
5010.50c	0.004	0.011	0.002
5011.56c	0.020	0.049	0.011
8016.50c	22.479	22.596	22.553
Density (g/cm^3)	2.3405	2.3457	2.3427

Table 5.3.2-14. Upper Core Grid Sub-Region Material Volume Fractions

Insertion Assembly	Material Volume Fractions		
	SS304	Zircaloy-4	Borated Water
None (p. 10, Ref. 7.11)	0.2491	0.0000	0.7509
BPRA (p. 24, Ref. 7.11)	0.2937	0.0069	0.6994
RCCA (p. 16, Ref. 7.11)	0.3481	0.0000	0.6519
APSRA (p. 20, 22, Ref. 7.11)	0.2828	0.0000	0.7172

Table 5.3.2-15. Zircaloy-4 Composition (p. 21, Ref. 7.7)

Ele./Iso.	MCNP ZAID	Wt. %	Ele./Iso.	MCNP ZAID	Wt. %
Cr-50	24050.60c	0.004	Fe-57	26057.60c	0.004
Cr-52	24052.60c	0.084	Fe-58	26058.60c	0.001
Cr-53	24053.60c	0.010	O-16	8016.50c	0.120
Cr-54	24054.60c	0.002	Zr-nat	40000.60c	98.180
Fe-54	26054.60c	0.011	Sn-nat	50000.35c	1.400
Fe-56	26056.60c	0.184	Density = 6.56 g/cm^3		

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.580	0.580	0.580	0.580	0.580
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
24050.60c	0.613	0.613	0.614	0.613	0.613
24052.60c	12.298	12.297	12.309	12.298	12.298
24053.60c	1.421	1.421	1.422	1.421	1.421
24054.60c	0.360	0.360	0.361	0.360	0.360
25055.50c	1.547	1.546	1.548	1.547	1.547
26054.60c	3.030	3.029	3.032	3.030	3.030
26056.60c	48.840	48.834	48.882	48.840	48.840
26057.60c	1.138	1.138	1.139	1.138	1.138
26058.60c	0.154	0.154	0.155	0.154	0.154
28058.60c	4.821	4.820	4.825	4.821	4.821
28060.60c	1.907	1.906	1.908	1.907	1.907
28061.60c	0.084	0.084	0.084	0.084	0.084
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.533	2.535	2.528	2.533	2.533
5010.50c	0.006	0.005	0.002	0.005	0.006
5011.56c	0.026	0.021	0.009	0.024	0.027
8016.50c	20.102	20.118	20.062	20.104	20.101
Density (g/cm^3)	2.5447	2.5451	2.5425	2.5447	2.5447

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.580	0.581	0.580	0.580	0.581
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.614	0.614	0.613	0.613	0.614
24052.60c	12.309	12.316	12.298	12.298	12.316
24053.60c	1.422	1.423	1.421	1.421	1.423
24054.60c	0.361	0.361	0.360	0.360	0.361
25055.50c	1.548	1.549	1.547	1.547	1.549
26054.60c	3.032	3.034	3.030	3.030	3.034

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
26056.60c	48.882	48.910	48.840	48.840	48.910
26057.60c	1.139	1.140	1.138	1.138	1.140
26058.60c	0.155	0.155	0.154	0.154	0.155
28058.60c	4.825	4.828	4.821	4.821	4.828
28060.60c	1.908	1.909	1.907	1.907	1.909
28061.60c	0.084	0.084	0.084	0.084	0.084
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.528	2.523	2.533	2.535	2.523
5010.50c	0.003	0.002	0.006	0.003	0.002
5011.56c	0.014	0.010	0.026	0.013	0.009
8016.50c	20.057	20.021	20.102	20.116	20.022
Density (g/cm^3)	2.5425	2.5411	2.5447	2.5447	2.5411

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.580	0.581	0.580	0.580	0.580
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.613	0.614	0.613	0.614	0.614
24052.60c	12.298	12.316	12.298	12.305	12.309
24053.60c	1.421	1.423	1.421	1.422	1.422
24054.60c	0.360	0.361	0.360	0.361	0.361
25055.50c	1.547	1.549	1.547	1.548	1.548
26054.60c	3.030	3.034	3.030	3.031	3.032
26056.60c	48.840	48.910	48.840	48.868	48.882
26057.60c	1.138	1.140	1.138	1.139	1.139
26058.60c	0.154	0.155	0.154	0.155	0.155
28058.60c	4.821	4.828	4.821	4.824	4.825
28060.60c	1.907	1.909	1.907	1.908	1.908
28061.60c	0.084	0.084	0.084	0.084	0.084

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.533	2.523	2.533	2.529	2.528
5010.50c	0.006	0.002	0.006	0.005	0.002
5011.56c	0.029	0.011	0.029	0.022	0.007
8016.50c	20.099	20.020	20.099	20.067	20.064
Density (g/cm^3)	2.5447	2.5411	2.5447	2.5432	2.5425

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.580	0.580	0.581	0.580	0.580
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.613	0.613	0.614	0.613	0.613
24052.60c	12.298	12.298	12.312	12.298	12.295
24053.60c	1.421	1.421	1.423	1.421	1.421
24054.60c	0.360	0.360	0.361	0.360	0.360
25055.50c	1.547	1.547	1.548	1.547	1.546
26054.60c	3.030	3.030	3.033	3.030	3.029
26056.60c	48.840	48.840	48.896	48.840	48.827
26057.60c	1.138	1.138	1.140	1.138	1.138
26058.60c	0.154	0.154	0.155	0.154	0.154
28058.60c	4.821	4.821	4.826	4.821	4.820
28060.60c	1.907	1.907	1.909	1.907	1.906
28061.60c	0.084	0.084	0.084	0.084	0.084
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.532	2.534	2.524	2.534	2.538
5010.50c	0.008	0.005	0.005	0.004	0.002
5011.56c	0.038	0.023	0.021	0.019	0.010
8016.50c	20.089	20.106	20.029	20.109	20.138

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
Density (g/cm^3)	2.5447	2.5447	2.5418	2.5447	2.5454

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.580	0.580	0.580	0.580	0.581
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.614	0.613	0.614	0.614	0.614
24052.60c	12.309	12.298	12.309	12.309	12.312
24053.60c	1.422	1.421	1.422	1.422	1.423
24054.60c	0.361	0.360	0.361	0.361	0.361
25055.50c	1.548	1.547	1.548	1.548	1.548
26054.60c	3.032	3.030	3.032	3.032	3.033
26056.60c	48.882	48.840	48.882	48.882	48.896
26057.60c	1.139	1.138	1.139	1.139	1.140
26058.60c	0.155	0.154	0.155	0.155	0.155
28058.60c	4.825	4.821	4.825	4.825	4.826
28060.60c	1.908	1.907	1.908	1.908	1.909
28061.60c	0.084	0.084	0.084	0.084	0.084
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.528	2.531	2.525	2.525	2.525
5010.50c	0.002	0.009	0.007	0.007	0.004
5011.56c	0.010	0.039	0.032	0.030	0.016
8016.50c	20.061	20.088	20.036	20.039	20.035
Density (g/cm^3)	2.5425	2.5447	2.5425	2.5425	2.5418

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.062	0.062	0.062	0.062	0.062

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
7014.50c	0.077	0.077	0.077	0.077	0.077
14000.50c	0.581	0.581	0.580	0.580	0.580
15031.50c	0.035	0.035	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.614	0.614	0.613	0.614	0.614
24052.60c	12.312	12.312	12.298	12.309	12.309
24053.60c	1.423	1.423	1.421	1.422	1.422
24054.60c	0.361	0.361	0.360	0.361	0.361
25055.50c	1.548	1.548	1.547	1.548	1.548
26054.60c	3.033	3.033	3.030	3.032	3.032
26056.60c	48.896	48.896	48.840	48.882	48.882
26057.60c	1.140	1.140	1.138	1.139	1.139
26058.60c	0.155	0.155	0.154	0.155	0.155
28058.60c	4.826	4.826	4.821	4.825	4.825
28060.60c	1.909	1.909	1.907	1.908	1.908
28061.60c	0.084	0.084	0.084	0.084	0.084
28062.60c	0.271	0.271	0.271	0.271	0.271
28064.60c	0.071	0.071	0.071	0.071	0.071
1001.50c	2.525	2.525	2.531	2.525	2.526
5010.50c	0.004	0.003	0.009	0.006	0.006
5011.56c	0.016	0.013	0.041	0.029	0.027
8016.50c	20.035	20.038	20.086	20.040	20.042
Density (g/cm^3)	2.5418	2.5418	2.5447	2.5425	2.5425

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.062	0.062	0.062
7014.50c	0.077	0.077	0.077
14000.50c	0.581	0.580	0.581
15031.50c	0.035	0.035	0.035
16032.50c	0.023	0.023	0.023
24050.60c	0.614	0.613	0.614
24052.60c	12.323	12.298	12.312

Table 5.3.2-16. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
24053.60c	1.424	1.421	1.423
24054.60c	0.361	0.360	0.361
25055.50c	1.550	1.547	1.548
26054.60c	3.036	3.030	3.033
26056.60c	48.938	48.840	48.896
26057.60c	1.140	1.138	1.140
26058.60c	0.155	0.154	0.155
28058.60c	4.831	4.821	4.826
28060.60c	1.910	1.907	1.909
28061.60c	0.084	0.084	0.084
28062.60c	0.272	0.271	0.271
28064.60c	0.071	0.071	0.071
1001.50c	2.517	2.531	2.526
5010.50c	0.004	0.009	0.002
5011.56c	0.018	0.043	0.010
8016.50c	19.974	20.083	20.042
Density (g/cm^3)	2.5396	2.5447	2.5418

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.599	0.599	0.600	0.599	0.599
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.634	0.634	0.634	0.634	0.634
24052.60c	12.713	12.712	12.722	12.713	12.713
24053.60c	1.469	1.469	1.470	1.469	1.469
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.599	1.598	1.600	1.599	1.599
26054.60c	3.132	3.131	3.134	3.132	3.132

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
26056.60c	50.485	50.479	50.520	50.485	50.485
26057.60c	1.177	1.176	1.177	1.177	1.177
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.983	4.982	4.986	4.983	4.983
28060.60c	1.971	1.970	1.972	1.971	1.971
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073
1001.50c	2.068	2.070	2.064	2.069	2.068
5010.50c	0.005	0.004	0.002	0.004	0.005
5011.56c	0.021	0.017	0.007	0.020	0.022
8016.50c	16.416	16.429	16.380	16.417	16.415
40000.60c	1.531	1.531	1.532	1.531	1.531
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9027	2.9031	2.9007	2.9027	2.9027

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.600	0.600	0.599	0.599	0.600
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.634	0.635	0.634	0.634	0.635
24052.60c	12.722	12.728	12.713	12.713	12.728
24053.60c	1.470	1.471	1.469	1.469	1.471
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.600	1.601	1.599	1.599	1.601
26054.60c	3.134	3.135	3.132	3.132	3.135
26056.60c	50.520	50.544	50.485	50.485	50.544
26057.60c	1.177	1.178	1.177	1.177	1.178
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.986	4.989	4.983	4.983	4.989

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28060.60c	1.972	1.973	1.971	1.971	1.973
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073
1001.50c	2.063	2.060	2.068	2.070	2.060
5010.50c	0.002	0.002	0.005	0.002	0.002
5011.56c	0.011	0.008	0.021	0.011	0.008
8016.50c	16.376	16.345	16.416	16.427	16.346
40000.60c	1.532	1.533	1.531	1.531	1.533
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9007	2.8994	2.9027	2.9027	2.8994

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.599	0.600	0.599	0.600	0.600
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.634	0.635	0.634	0.634	0.634
24052.60c	12.713	12.728	12.713	12.719	12.722
24053.60c	1.469	1.471	1.469	1.470	1.470
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.599	1.601	1.599	1.599	1.600
26054.60c	3.132	3.135	3.132	3.133	3.134
26056.60c	50.485	50.544	50.485	50.508	50.520
26057.60c	1.177	1.178	1.177	1.177	1.177
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.983	4.989	4.983	4.985	4.986
28060.60c	1.971	1.973	1.971	1.972	1.972
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
1001.50c	2.068	2.059	2.068	2.065	2.064
5010.50c	0.005	0.002	0.005	0.004	0.001
5011.56c	0.023	0.009	0.024	0.018	0.006
8016.50c	16.413	16.345	16.413	16.385	16.382
40000.60c	1.531	1.533	1.531	1.532	1.532
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9027	2.8994	2.9027	2.9014	2.9007

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.599	0.599	0.600	0.599	0.599
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.634	0.634	0.635	0.634	0.634
24052.60c	12.713	12.713	12.725	12.713	12.710
24053.60c	1.469	1.469	1.471	1.469	1.469
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.599	1.599	1.600	1.599	1.598
26054.60c	3.132	3.132	3.134	3.132	3.131
26056.60c	50.485	50.485	50.532	50.485	50.473
26057.60c	1.177	1.177	1.178	1.177	1.176
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.983	4.983	4.988	4.983	4.982
28060.60c	1.971	1.971	1.972	1.971	1.970
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073
1001.50c	2.067	2.069	2.060	2.069	2.072
5010.50c	0.007	0.004	0.004	0.003	0.002
5011.56c	0.031	0.019	0.017	0.016	0.009
8016.50c	16.405	16.419	16.353	16.422	16.446

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
40000.60c	1.531	1.531	1.532	1.531	1.531
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9027	2.9027	2.9000	2.9027	2.9034

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.600	0.599	0.600	0.600	0.600
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.634	0.634	0.634	0.634	0.635
24052.60c	12.722	12.713	12.722	12.722	12.725
24053.60c	1.470	1.469	1.470	1.470	1.471
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.600	1.599	1.600	1.600	1.600
26054.60c	3.134	3.132	3.134	3.134	3.134
26056.60c	50.520	50.485	50.520	50.520	50.532
26057.60c	1.177	1.177	1.177	1.177	1.178
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.986	4.983	4.986	4.986	4.988
28060.60c	1.972	1.971	1.972	1.972	1.972
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073
1001.50c	2.064	2.067	2.061	2.062	2.061
5010.50c	0.002	0.007	0.006	0.005	0.003
5011.56c	0.008	0.032	0.027	0.024	0.013
8016.50c	16.380	16.404	16.360	16.362	16.357
40000.60c	1.532	1.531	1.532	1.532	1.532
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9007	2.9027	2.9007	2.9007	2.9000

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.600	0.600	0.599	0.600	0.600
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.635	0.635	0.634	0.634	0.634
24052.60c	12.725	12.725	12.713	12.722	12.722
24053.60c	1.471	1.471	1.469	1.470	1.470
24054.60c	0.373	0.373	0.373	0.373	0.373
25055.50c	1.600	1.600	1.599	1.600	1.600
26054.60c	3.134	3.134	3.132	3.134	3.134
26056.60c	50.532	50.532	50.485	50.520	50.520
26057.60c	1.178	1.178	1.177	1.177	1.177
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	4.988	4.988	4.983	4.986	4.986
28060.60c	1.972	1.972	1.971	1.972	1.972
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.280	0.280	0.280	0.280	0.280
28064.60c	0.073	0.073	0.073	0.073	0.073
1001.50c	2.061	2.061	2.067	2.062	2.062
5010.50c	0.003	0.002	0.007	0.005	0.005
5011.56c	0.013	0.010	0.034	0.024	0.022
8016.50c	16.357	16.360	16.402	16.363	16.364
40000.60c	1.532	1.532	1.531	1.532	1.532
50000.35c	0.022	0.022	0.022	0.022	0.022
Density (g/cm^3)	2.9000	2.9000	2.9027	2.9007	2.9007

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080
14000.50c	0.600	0.599	0.600
15031.50c	0.036	0.036	0.036

Table 5.3.2-17. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
16032.50c	0.024	0.024	0.024
24050.60c	0.635	0.634	0.635
24052.60c	12.734	12.713	12.725
24053.60c	1.472	1.469	1.471
24054.60c	0.373	0.373	0.373
25055.50c	1.601	1.599	1.600
26054.60c	3.137	3.132	3.134
26056.60c	50.567	50.485	50.532
26057.60c	1.178	1.177	1.178
26058.60c	0.160	0.160	0.160
28058.60c	4.991	4.983	4.988
28060.60c	1.974	1.971	1.972
28061.60c	0.087	0.087	0.087
28062.60c	0.281	0.280	0.280
28064.60c	0.073	0.073	0.073
1001.50c	2.055	2.067	2.062
5010.50c	0.003	0.008	0.002
5011.56c	0.015	0.035	0.008
8016.50c	16.305	16.401	16.363
40000.60c	1.533	1.531	1.532
50000.35c	0.022	0.022	0.022
Density (g/cm^3)	2.8980	2.9027	2.9000

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.634	0.634	0.635	0.634	0.634
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
24052.60c	13.453	13.452	13.461	13.453	13.453
24053.60c	1.555	1.555	1.556	1.555	1.555
24054.60c	0.394	0.394	0.395	0.394	0.394
25055.50c	1.692	1.692	1.693	1.692	1.692
26054.60c	3.314	3.314	3.316	3.314	3.314
26056.60c	53.427	53.422	53.458	53.427	53.427
26057.60c	1.245	1.245	1.246	1.245	1.245
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.274	5.273	5.277	5.274	5.274
28060.60c	2.086	2.085	2.087	2.086	2.086
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.296	0.296	0.297	0.296	0.296
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.722	1.723	1.718	1.722	1.722
5010.50c	0.004	0.003	0.001	0.004	0.004
5011.56c	0.018	0.014	0.006	0.016	0.018
8016.50c	13.661	13.672	13.630	13.663	13.661
Density (g/cm^3)	3.2507	3.2511	3.2489	3.2507	3.2507

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.635	0.635	0.634	0.634	0.635
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671
24052.60c	13.461	13.466	13.453	13.453	13.466
24053.60c	1.556	1.556	1.555	1.555	1.556
24054.60c	0.395	0.395	0.394	0.394	0.395
25055.50c	1.693	1.694	1.692	1.692	1.694
26054.60c	3.316	3.317	3.314	3.314	3.317
26056.60c	53.458	53.479	53.427	53.427	53.479

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
26057.60c	1.246	1.246	1.245	1.245	1.246
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.277	5.279	5.274	5.274	5.279
28060.60c	2.087	2.088	2.086	2.086	2.088
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.297	0.297	0.296	0.296	0.297
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.717	1.714	1.722	1.723	1.714
5010.50c	0.002	0.002	0.004	0.002	0.001
5011.56c	0.009	0.007	0.017	0.009	0.006
8016.50c	13.627	13.600	13.661	13.671	13.601
Density (g/cm^3)	3.2489	3.2476	3.2507	3.2507	3.2476

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.634	0.635	0.634	0.635	0.635
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671
24052.60c	13.453	13.466	13.453	13.459	13.461
24053.60c	1.555	1.556	1.555	1.555	1.556
24054.60c	0.394	0.395	0.394	0.394	0.395
25055.50c	1.692	1.694	1.692	1.693	1.693
26054.60c	3.314	3.317	3.314	3.315	3.316
26056.60c	53.427	53.479	53.427	53.448	53.458
26057.60c	1.245	1.246	1.245	1.246	1.246
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.274	5.279	5.274	5.276	5.277
28060.60c	2.086	2.088	2.086	2.086	2.087
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.296	0.297	0.296	0.297	0.297

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.721	1.714	1.721	1.718	1.718
5010.50c	0.004	0.002	0.004	0.003	0.001
5011.56c	0.019	0.008	0.020	0.015	0.005
8016.50c	13.659	13.599	13.659	13.635	13.632
Density (g/cm^3)	3.2507	3.2476	3.2507	3.2495	3.2489

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.634	0.634	0.635	0.634	0.634
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671
24052.60c	13.453	13.453	13.464	13.453	13.451
24053.60c	1.555	1.555	1.556	1.555	1.554
24054.60c	0.394	0.394	0.395	0.394	0.394
25055.50c	1.692	1.692	1.693	1.692	1.692
26054.60c	3.314	3.314	3.317	3.314	3.313
26056.60c	53.427	53.427	53.469	53.427	53.417
26057.60c	1.245	1.245	1.246	1.245	1.245
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.274	5.274	5.278	5.274	5.273
28060.60c	2.086	2.086	2.087	2.086	2.085
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.296	0.296	0.297	0.296	0.296
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.720	1.722	1.715	1.722	1.725
5010.50c	0.006	0.003	0.003	0.003	0.002
5011.56c	0.026	0.015	0.014	0.013	0.007
8016.50c	13.653	13.664	13.607	13.666	13.687

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
Density (g/cm^3)	3.2507	3.2507	3.2482	3.2507	3.2514
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.635	0.634	0.635	0.635	0.635
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671
24052.60c	13.461	13.453	13.461	13.461	13.464
24053.60c	1.556	1.555	1.556	1.556	1.556
24054.60c	0.395	0.394	0.395	0.395	0.395
25055.50c	1.693	1.692	1.693	1.693	1.693
26054.60c	3.316	3.314	3.316	3.316	3.317
26056.60c	53.458	53.427	53.458	53.458	53.469
26057.60c	1.246	1.245	1.246	1.246	1.246
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.277	5.274	5.277	5.277	5.278
28060.60c	2.087	2.086	2.087	2.087	2.087
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.297	0.296	0.297	0.297	0.297
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.718	1.720	1.715	1.716	1.715
5010.50c	0.001	0.006	0.005	0.004	0.002
5011.56c	0.007	0.027	0.022	0.020	0.011
8016.50c	13.630	13.652	13.613	13.615	13.610
Density (g/cm^3)	3.2489	3.2507	3.2489	3.2489	3.2482
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.635	0.635	0.634	0.635	0.635
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.671	0.671	0.671	0.671	0.671
24052.60c	13.464	13.464	13.453	13.461	13.461
24053.60c	1.556	1.556	1.555	1.556	1.556
24054.60c	0.395	0.395	0.394	0.395	0.395
25055.50c	1.693	1.693	1.692	1.693	1.693
26054.60c	3.317	3.317	3.314	3.316	3.316
26056.60c	53.469	53.469	53.427	53.458	53.458
26057.60c	1.246	1.246	1.245	1.246	1.246
26058.60c	0.169	0.169	0.169	0.169	0.169
28058.60c	5.278	5.278	5.274	5.277	5.277
28060.60c	2.087	2.087	2.086	2.087	2.087
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.297	0.297	0.296	0.297	0.297
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.715	1.715	1.720	1.716	1.716
5010.50c	0.002	0.002	0.006	0.004	0.004
5011.56c	0.011	0.008	0.028	0.020	0.019
8016.50c	13.610	13.613	13.650	13.615	13.617
Density (g/cm^3)	3.2482	3.2482	3.2507	3.2489	3.2489

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085
14000.50c	0.635	0.634	0.635
15031.50c	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025
24050.60c	0.672	0.671	0.671
24052.60c	13.472	13.453	13.464

Table 5.3.2-18. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
24053.60c	1.557	1.555	1.556
24054.60c	0.395	0.394	0.395
25055.50c	1.694	1.692	1.693
26054.60c	3.319	3.314	3.317
26056.60c	53.500	53.427	53.469
26057.60c	1.247	1.245	1.246
26058.60c	0.169	0.169	0.169
28058.60c	5.281	5.274	5.278
28060.60c	2.088	2.086	2.087
28061.60c	0.092	0.092	0.092
28062.60c	0.297	0.296	0.297
28064.60c	0.078	0.078	0.078
1001.50c	1.710	1.720	1.716
5010.50c	0.003	0.006	0.001
5011.56c	0.012	0.029	0.006
8016.50c	13.566	13.649	13.615
Density (g/cm^3)	3.2463	3.2507	3.2482

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.602
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.636	0.636	0.637	0.636	0.636
24052.60c	12.757	12.756	12.767	12.757	12.757
24053.60c	1.474	1.474	1.475	1.474	1.474
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.604	1.604	1.606	1.604	1.604
26054.60c	3.143	3.142	3.145	3.143	3.143

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
26056.60c	50.663	50.657	50.701	50.663	50.663
26057.60c	1.181	1.181	1.182	1.181	1.181
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.001	5.000	5.005	5.001	5.001
28060.60c	1.978	1.977	1.979	1.978	1.978
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.211	2.212	2.206	2.211	2.211
5010.50c	0.005	0.004	0.002	0.005	0.005
5011.56c	0.023	0.018	0.008	0.021	0.023
8016.50c	17.543	17.557	17.506	17.545	17.542
Density (g/cm^3)	2.7850	2.7854	2.7830	2.7850	2.7850

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.602
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.637	0.636	0.636	0.637
24052.60c	12.767	12.773	12.757	12.757	12.773
24053.60c	1.475	1.476	1.474	1.474	1.476
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.606	1.606	1.604	1.604	1.606
26054.60c	3.145	3.147	3.143	3.143	3.147
26056.60c	50.701	50.726	50.663	50.663	50.726
26057.60c	1.182	1.182	1.181	1.181	1.182
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.005	5.007	5.001	5.001	5.007
28060.60c	1.979	1.980	1.978	1.978	1.980
28061.60c	0.087	0.087	0.087	0.087	0.087

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.206	2.201	2.211	2.212	2.202
5010.50c	0.003	0.002	0.005	0.003	0.002
5011.56c	0.012	0.009	0.022	0.011	0.008
8016.50c	17.502	17.469	17.543	17.555	17.470
Density (g/cm^3)	2.7830	2.7816	2.7850	2.7850	2.7816

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.602
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.636	0.637	0.636	0.636	0.637
24052.60c	12.757	12.773	12.757	12.764	12.767
24053.60c	1.474	1.476	1.474	1.475	1.475
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.604	1.606	1.604	1.605	1.606
26054.60c	3.143	3.147	3.143	3.144	3.145
26056.60c	50.663	50.726	50.663	50.688	50.701
26057.60c	1.181	1.182	1.181	1.181	1.182
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.001	5.007	5.001	5.003	5.005
28060.60c	1.978	1.980	1.978	1.979	1.979
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.210	2.201	2.210	2.207	2.206
5010.50c	0.005	0.002	0.006	0.004	0.001
5011.56c	0.025	0.010	0.026	0.020	0.006
8016.50c	17.540	17.468	17.540	17.511	17.508

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Density (g/cm^3)	2.7850	2.7816	2.7850	2.7837	2.7830
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.601
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.636	0.636	0.637	0.636	0.636
24052.60c	12.757	12.757	12.770	12.757	12.754
24053.60c	1.474	1.474	1.476	1.474	1.474
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.604	1.604	1.606	1.604	1.604
26054.60c	3.143	3.143	3.146	3.143	3.142
26056.60c	50.663	50.663	50.713	50.663	50.650
26057.60c	1.181	1.181	1.182	1.181	1.180
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.001	5.001	5.006	5.001	5.000
28060.60c	1.978	1.978	1.980	1.978	1.977
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.209	2.211	2.202	2.212	2.215
5010.50c	0.007	0.004	0.004	0.004	0.002
5011.56c	0.033	0.020	0.019	0.017	0.009
8016.50c	17.532	17.546	17.477	17.549	17.575
Density (g/cm^3)	2.7850	2.7850	2.7823	2.7850	2.7857
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.602
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.636	0.637	0.637	0.637
24052.60c	12.767	12.757	12.767	12.767	12.770
24053.60c	1.475	1.474	1.475	1.475	1.476
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.606	1.604	1.606	1.606	1.606
26054.60c	3.145	3.143	3.145	3.145	3.146
26056.60c	50.701	50.663	50.701	50.701	50.713
26057.60c	1.182	1.181	1.182	1.182	1.182
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.005	5.001	5.005	5.005	5.006
28060.60c	1.979	1.978	1.979	1.979	1.980
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.206	2.209	2.203	2.204	2.203
5010.50c	0.002	0.007	0.006	0.006	0.003
5011.56c	0.008	0.034	0.028	0.026	0.014
8016.50c	17.505	17.531	17.484	17.486	17.482
Density (g/cm^3)	2.7830	2.7850	2.7830	2.7830	2.7823

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.602	0.602	0.602	0.602	0.602
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.637	0.636	0.637	0.637
24052.60c	12.770	12.770	12.757	12.767	12.767

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
24053.60c	1.476	1.476	1.474	1.475	1.475
24054.60c	0.374	0.374	0.374	0.374	0.374
25055.50c	1.606	1.606	1.604	1.606	1.606
26054.60c	3.146	3.146	3.143	3.145	3.145
26056.60c	50.713	50.713	50.663	50.701	50.701
26057.60c	1.182	1.182	1.181	1.182	1.182
26058.60c	0.160	0.160	0.160	0.160	0.160
28058.60c	5.006	5.006	5.001	5.005	5.005
28060.60c	1.980	1.980	1.978	1.979	1.979
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.281	0.281	0.281	0.281	0.281
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.203	2.203	2.209	2.204	2.204
5010.50c	0.003	0.002	0.008	0.006	0.005
5011.56c	0.014	0.011	0.036	0.025	0.024
8016.50c	17.482	17.485	17.529	17.487	17.489
Density (g/cm^3)	2.7823	2.7823	2.7850	2.7830	2.7830

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080
14000.50c	0.603	0.602	0.602
15031.50c	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024
24050.60c	0.637	0.636	0.637
24052.60c	12.779	12.757	12.770
24053.60c	1.477	1.474	1.476
24054.60c	0.375	0.374	0.374
25055.50c	1.607	1.604	1.606
26054.60c	3.148	3.143	3.146
26056.60c	50.751	50.663	50.713
26057.60c	1.183	1.181	1.182

Table 5.3.2-19. Homogenized Composition for Upper Core Grid Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26058.60c	0.160	0.160	0.160
28058.60c	5.010	5.001	5.006
28060.60c	1.981	1.978	1.980
28061.60c	0.087	0.087	0.087
28062.60c	0.282	0.281	0.281
28064.60c	0.074	0.074	0.074
1001.50c	2.196	2.209	2.204
5010.50c	0.003	0.008	0.002
5011.56c	0.016	0.038	0.008
8016.50c	17.427	17.527	17.488
Density (g/cm^3)	2.7802	2.7850	2.7823

Table 5.3.2-20. Upper Pad Sub-Region Material Volume Fractions

Insertion Assembly	Material Volume Fractions		
	SS304	Zircaloy-4	Borated Water
None (p. 10, Ref. 7.11)	0.3418	0.0000	0.6582
BPRA (p. 24, Ref. 7.11)	0.3890	0.0120	0.5990
RCCA (p. 16, Ref. 7.11)	0.3748	0.0000	0.6252
APSRA (p. 20, 22, Ref. 7.11)	0.3748	0.0000	0.6252

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.668	0.668	0.668	0.668
24052.60c	13.395	13.394	13.403	13.395	13.395
24053.60c	1.548	1.548	1.549	1.548	1.548
24054.60c	0.393	0.393	0.393	0.393	0.393

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
25055.50c	1.685	1.684	1.686	1.685	1.685
26054.60c	3.300	3.299	3.302	3.300	3.300
26056.60c	53.195	53.190	53.227	53.195	53.195
26057.60c	1.240	1.240	1.240	1.240	1.240
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.251	5.250	5.254	5.251	5.251
28060.60c	2.077	2.076	2.078	2.077	2.077
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.763	1.764	1.759	1.763	1.763
5010.50c	0.004	0.003	0.001	0.004	0.004
5011.56c	0.018	0.014	0.006	0.017	0.018
8016.50c	13.987	13.998	13.955	13.988	13.986
Density (g/cm^3)	3.2058	3.2061	3.2039	3.2058	3.2058

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.669	0.668	0.668	0.669
24052.60c	13.403	13.408	13.395	13.395	13.408
24053.60c	1.549	1.549	1.548	1.548	1.549
24054.60c	0.393	0.393	0.393	0.393	0.393
25055.50c	1.686	1.686	1.685	1.685	1.686
26054.60c	3.302	3.303	3.300	3.300	3.303
26056.60c	53.227	53.248	53.195	53.195	53.248
26057.60c	1.240	1.241	1.240	1.240	1.241
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.254	5.256	5.251	5.251	5.256

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28060.60c	2.078	2.079	2.077	2.077	2.079
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.758	1.755	1.763	1.764	1.755
5010.50c	0.002	0.002	0.004	0.002	0.001
5011.56c	0.010	0.007	0.018	0.009	0.006
8016.50c	13.951	13.924	13.987	13.996	13.925
Density (g/cm^3)	3.2039	3.2026	3.2058	3.2058	3.2026

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.669	0.668	0.668	0.668
24052.60c	13.395	13.408	13.395	13.400	13.403
24053.60c	1.548	1.549	1.548	1.549	1.549
24054.60c	0.393	0.393	0.393	0.393	0.393
25055.50c	1.685	1.686	1.685	1.685	1.686
26054.60c	3.300	3.303	3.300	3.301	3.302
26056.60c	53.195	53.248	53.195	53.217	53.227
26057.60c	1.240	1.241	1.240	1.240	1.240
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.251	5.256	5.251	5.253	5.254
28060.60c	2.077	2.079	2.077	2.077	2.078
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.762	1.755	1.762	1.759	1.759
5010.50c	0.004	0.002	0.004	0.003	0.001

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
5011.56c	0.020	0.008	0.020	0.016	0.005
8016.50c	13.985	13.924	13.984	13.960	13.956
Density (g/cm^3)	3.2058	3.2026	3.2058	3.2045	3.2039

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.668	0.668	0.668	0.668
24052.60c	13.395	13.395	13.406	13.395	13.392
24053.60c	1.548	1.548	1.549	1.548	1.548
24054.60c	0.393	0.393	0.393	0.393	0.393
25055.50c	1.685	1.685	1.686	1.685	1.684
26054.60c	3.300	3.300	3.302	3.300	3.299
26056.60c	53.195	53.195	53.238	53.195	53.185
26057.60c	1.240	1.240	1.241	1.240	1.239
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.251	5.251	5.255	5.251	5.250
28060.60c	2.077	2.077	2.078	2.077	2.076
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.761	1.763	1.756	1.763	1.766
5010.50c	0.006	0.003	0.003	0.003	0.002
5011.56c	0.026	0.016	0.015	0.014	0.007
8016.50c	13.978	13.989	13.931	13.992	14.013
Density (g/cm^3)	3.2058	3.2058	3.2033	3.2058	3.2065

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.668	0.668	0.668	0.668
24052.60c	13.403	13.395	13.403	13.403	13.406
24053.60c	1.549	1.548	1.549	1.549	1.549
24054.60c	0.393	0.393	0.393	0.393	0.393
25055.50c	1.686	1.685	1.686	1.686	1.686
26054.60c	3.302	3.300	3.302	3.302	3.302
26056.60c	53.227	53.195	53.227	53.227	53.238
26057.60c	1.240	1.240	1.240	1.240	1.241
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.254	5.251	5.254	5.254	5.255
28060.60c	2.078	2.077	2.078	2.078	2.078
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.759	1.761	1.756	1.757	1.756
5010.50c	0.001	0.006	0.005	0.005	0.002
5011.56c	0.007	0.027	0.023	0.021	0.011
8016.50c	13.955	13.977	13.937	13.939	13.935
Density (g/cm^3)	3.2039	3.2058	3.2039	3.2039	3.2033

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.067	0.067	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084	0.084	0.084
14000.50c	0.632	0.632	0.632	0.632	0.632
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025	0.025	0.025
24050.60c	0.668	0.668	0.668	0.668	0.668

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
24052.60c	13.406	13.406	13.395	13.403	13.403
24053.60c	1.549	1.549	1.548	1.549	1.549
24054.60c	0.393	0.393	0.393	0.393	0.393
25055.50c	1.686	1.686	1.685	1.686	1.686
26054.60c	3.302	3.302	3.300	3.302	3.302
26056.60c	53.238	53.238	53.195	53.227	53.227
26057.60c	1.241	1.241	1.240	1.240	1.240
26058.60c	0.168	0.168	0.168	0.168	0.168
28058.60c	5.255	5.255	5.251	5.254	5.254
28060.60c	2.078	2.078	2.077	2.078	2.078
28061.60c	0.091	0.091	0.091	0.091	0.091
28062.60c	0.295	0.295	0.295	0.295	0.295
28064.60c	0.077	0.077	0.077	0.077	0.077
1001.50c	1.756	1.756	1.761	1.757	1.757
5010.50c	0.002	0.002	0.006	0.004	0.004
5011.56c	0.011	0.009	0.029	0.020	0.019
8016.50c	13.935	13.938	13.975	13.940	13.941
Density (g/cm^3)	3.2033	3.2033	3.2058	3.2039	3.2039

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.067	0.067	0.067
7014.50c	0.084	0.084	0.084
14000.50c	0.633	0.632	0.632
15031.50c	0.038	0.038	0.038
16032.50c	0.025	0.025	0.025
24050.60c	0.669	0.668	0.668
24052.60c	13.414	13.395	13.406
24053.60c	1.550	1.548	1.549
24054.60c	0.393	0.393	0.393
25055.50c	1.687	1.685	1.686
26054.60c	3.304	3.300	3.302
26056.60c	53.269	53.195	53.238

Table 5.3.2-21. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26057.60c	1.241	1.240	1.241
26058.60c	0.168	0.168	0.168
28058.60c	5.258	5.251	5.255
28060.60c	2.079	2.077	2.078
28061.60c	0.092	0.091	0.091
28062.60c	0.296	0.295	0.295
28064.60c	0.077	0.077	0.077
1001.50c	1.750	1.761	1.757
5010.50c	0.003	0.007	0.001
5011.56c	0.012	0.030	0.007
8016.50c	13.889	13.974	13.940
Density (g/cm^3)	3.2014	3.2058	3.2033

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.638	0.638	0.638	0.638	0.638
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.532	13.531	13.539	13.532	13.532
24053.60c	1.564	1.564	1.565	1.564	1.564
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.702	1.701	1.702	1.702	1.702
26054.60c	3.333	3.333	3.335	3.333	3.333
26056.60c	53.738	53.734	53.764	53.738	53.738
26057.60c	1.252	1.252	1.253	1.252	1.252
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.304	5.304	5.307	5.304	5.304
28060.60c	2.098	2.097	2.099	2.098	2.098

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.424	1.425	1.420	1.424	1.424
5010.50c	0.003	0.003	0.001	0.003	0.003
5011.56c	0.015	0.012	0.005	0.014	0.015
8016.50c	11.300	11.309	11.273	11.301	11.300
40000.60c	2.140	2.140	2.141	2.140	2.140
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6119	3.6122	3.6102	3.6119	3.6119

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.638	0.639	0.638	0.638	0.639
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.539	13.543	13.532	13.532	13.543
24053.60c	1.565	1.565	1.564	1.564	1.565
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.702	1.703	1.702	1.702	1.703
26054.60c	3.335	3.336	3.333	3.333	3.336
26056.60c	53.764	53.781	53.738	53.738	53.781
26057.60c	1.253	1.253	1.252	1.252	1.253
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.307	5.308	5.304	5.304	5.308
28060.60c	2.099	2.099	2.098	2.098	2.099
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.420	1.417	1.424	1.425	1.417

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
5010.50c	0.002	0.001	0.003	0.002	0.001
5011.56c	0.008	0.006	0.014	0.007	0.005
8016.50c	11.270	11.248	11.300	11.308	11.248
40000.60c	2.141	2.141	2.140	2.140	2.141
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6102	3.6091	3.6119	3.6119	3.6091

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.638	0.639	0.638	0.638	0.638
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.532	13.543	13.532	13.537	13.539
24053.60c	1.564	1.565	1.564	1.564	1.565
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.702	1.703	1.702	1.702	1.702
26054.60c	3.333	3.336	3.333	3.334	3.335
26056.60c	53.738	53.781	53.738	53.755	53.764
26057.60c	1.252	1.253	1.252	1.253	1.253
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.304	5.308	5.304	5.306	5.307
28060.60c	2.098	2.099	2.098	2.098	2.099
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.423	1.417	1.423	1.421	1.420
5010.50c	0.004	0.001	0.004	0.003	0.001
5011.56c	0.016	0.006	0.016	0.013	0.004
8016.50c	11.298	11.247	11.298	11.277	11.274
40000.60c	2.140	2.141	2.140	2.140	2.141

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6119	3.6091	3.6119	3.6108	3.6102
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.638	0.638	0.639	0.638	0.638
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.532	13.532	13.541	13.532	13.530
24053.60c	1.564	1.564	1.565	1.564	1.564
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.702	1.702	1.703	1.702	1.701
26054.60c	3.333	3.333	3.335	3.333	3.333
26056.60c	53.738	53.738	53.773	53.738	53.730
26057.60c	1.252	1.252	1.253	1.252	1.252
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.304	5.304	5.307	5.304	5.303
28060.60c	2.098	2.098	2.099	2.098	2.097
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.423	1.424	1.418	1.424	1.426
5010.50c	0.005	0.003	0.003	0.002	0.001
5011.56c	0.021	0.013	0.012	0.011	0.006
8016.50c	11.293	11.302	11.253	11.304	11.322
40000.60c	2.140	2.140	2.141	2.140	2.139
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6119	3.6119	3.6096	3.6119	3.6125

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.638	0.638	0.638	0.638	0.639
15031.50c	0.038	0.038	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.539	13.532	13.539	13.539	13.541
24053.60c	1.565	1.564	1.565	1.565	1.565
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.702	1.702	1.702	1.702	1.703
26054.60c	3.335	3.333	3.335	3.335	3.335
26056.60c	53.764	53.738	53.764	53.764	53.773
26057.60c	1.253	1.252	1.253	1.253	1.253
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.307	5.304	5.307	5.307	5.307
28060.60c	2.099	2.098	2.099	2.099	2.099
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.420	1.423	1.419	1.419	1.418
5010.50c	0.001	0.005	0.004	0.004	0.002
5011.56c	0.005	0.022	0.018	0.017	0.009
8016.50c	11.273	11.292	11.259	11.261	11.257
40000.60c	2.141	2.140	2.141	2.141	2.141
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6102	3.6119	3.6102	3.6102	3.6096

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.068	0.068	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085	0.085	0.085
14000.50c	0.639	0.639	0.638	0.638	0.638
15031.50c	0.038	0.038	0.038	0.038	0.038

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.675	0.675	0.675	0.675	0.675
24052.60c	13.541	13.541	13.532	13.539	13.539
24053.60c	1.565	1.565	1.564	1.565	1.565
24054.60c	0.397	0.397	0.397	0.397	0.397
25055.50c	1.703	1.703	1.702	1.702	1.702
26054.60c	3.335	3.335	3.333	3.335	3.335
26056.60c	53.773	53.773	53.738	53.764	53.764
26057.60c	1.253	1.253	1.252	1.253	1.253
26058.60c	0.170	0.170	0.170	0.170	0.170
28058.60c	5.307	5.307	5.304	5.307	5.307
28060.60c	2.099	2.099	2.098	2.099	2.099
28061.60c	0.092	0.092	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078	0.078	0.078
1001.50c	1.418	1.418	1.423	1.419	1.419
5010.50c	0.002	0.002	0.005	0.004	0.003
5011.56c	0.009	0.007	0.023	0.016	0.015
8016.50c	11.257	11.259	11.291	11.261	11.262
40000.60c	2.141	2.141	2.140	2.141	2.141
50000.35c	0.031	0.031	0.031	0.031	0.031
Density (g/cm^3)	3.6096	3.6096	3.6119	3.6102	3.6102

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.068	0.068	0.068
7014.50c	0.085	0.085	0.085
14000.50c	0.639	0.638	0.639
15031.50c	0.038	0.038	0.038
16032.50c	0.026	0.026	0.026
24050.60c	0.676	0.675	0.675
24052.60c	13.548	13.532	13.541
24053.60c	1.566	1.564	1.565

Table 5.3.2-22. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
24054.60c	0.397	0.397	0.397
25055.50c	1.704	1.702	1.703
26054.60c	3.337	3.333	3.335
26056.60c	53.798	53.738	53.773
26057.60c	1.254	1.252	1.253
26058.60c	0.170	0.170	0.170
28058.60c	5.310	5.304	5.307
28060.60c	2.100	2.098	2.099
28061.60c	0.092	0.092	0.092
28062.60c	0.298	0.298	0.298
28064.60c	0.078	0.078	0.078
1001.50c	1.413	1.422	1.419
5010.50c	0.002	0.005	0.001
5011.56c	0.010	0.024	0.005
8016.50c	11.218	11.290	11.260
40000.60c	2.142	2.140	2.141
50000.35c	0.031	0.031	0.031
Density (g/cm^3)	3.6079	3.6119	3.6096

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.645	0.646	0.645	0.645
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.682	0.683	0.682	0.682
24052.60c	13.684	13.683	13.691	13.684	13.684
24053.60c	1.581	1.581	1.582	1.581	1.581
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.721	1.722	1.721	1.721

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
26054.60c	3.371	3.371	3.373	3.371	3.371
26056.60c	54.342	54.337	54.370	54.342	54.342
26057.60c	1.266	1.266	1.267	1.266	1.266
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.364	5.367	5.364	5.364
28060.60c	2.121	2.121	2.122	2.121	2.121
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.301	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.560	1.561	1.556	1.560	1.560
5010.50c	0.004	0.003	0.001	0.003	0.004
5011.56c	0.016	0.013	0.006	0.015	0.016
8016.50c	12.377	12.387	12.348	12.378	12.376
Density (g/cm^3)	3.4412	3.4415	3.4394	3.4412	3.4412

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.646	0.645	0.645	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.683	0.682	0.682	0.683
24052.60c	13.691	13.696	13.684	13.684	13.696
24053.60c	1.582	1.583	1.581	1.581	1.583
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.722	1.721	1.721	1.722
26054.60c	3.373	3.374	3.371	3.371	3.374
26056.60c	54.370	54.390	54.342	54.342	54.390
26057.60c	1.267	1.268	1.266	1.266	1.268
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.367	5.369	5.364	5.364	5.369
28060.60c	2.122	2.123	2.121	2.121	2.123

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.556	1.553	1.560	1.561	1.553
5010.50c	0.002	0.001	0.003	0.002	0.001
5011.56c	0.008	0.006	0.016	0.008	0.006
8016.50c	12.345	12.320	12.377	12.385	12.321
Density (g/cm^3)	3.4394	3.4382	3.4412	3.4412	3.4382

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.646	0.645	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.683	0.682	0.683	0.683
24052.60c	13.684	13.696	13.684	13.688	13.691
24053.60c	1.581	1.583	1.581	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.722	1.721	1.721	1.722
26054.60c	3.371	3.374	3.371	3.372	3.373
26056.60c	54.342	54.390	54.342	54.361	54.370
26057.60c	1.266	1.268	1.266	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.369	5.364	5.366	5.367
28060.60c	2.121	2.123	2.121	2.122	2.122
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.559	1.553	1.559	1.557	1.556
5010.50c	0.004	0.002	0.004	0.003	0.001
5011.56c	0.018	0.007	0.018	0.014	0.004

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
8016.50c	12.375	12.320	12.375	12.352	12.349
Density (g/cm^3)	3.4412	3.4382	3.4412	3.4400	3.4394

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.645	0.646	0.645	0.645
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.682	0.683	0.682	0.682
24052.60c	13.684	13.684	13.693	13.684	13.681
24053.60c	1.581	1.581	1.582	1.581	1.581
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.721	1.722	1.721	1.721
26054.60c	3.371	3.371	3.373	3.371	3.370
26056.60c	54.342	54.342	54.380	54.342	54.332
26057.60c	1.266	1.266	1.267	1.266	1.266
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.364	5.368	5.364	5.363
28060.60c	2.121	2.121	2.123	2.121	2.121
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.301
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.559	1.560	1.553	1.560	1.563
5010.50c	0.005	0.003	0.003	0.003	0.001
5011.56c	0.023	0.014	0.013	0.012	0.006
8016.50c	12.369	12.379	12.326	12.381	12.400
Density (g/cm^3)	3.4412	3.4412	3.4388	3.4412	3.4418

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.645	0.646	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.682	0.683	0.683	0.683
24052.60c	13.691	13.684	13.691	13.691	13.693
24053.60c	1.582	1.581	1.582	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.721	1.722	1.722	1.722
26054.60c	3.373	3.371	3.373	3.373	3.373
26056.60c	54.370	54.342	54.370	54.370	54.380
26057.60c	1.267	1.266	1.267	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.367	5.364	5.367	5.367	5.368
28060.60c	2.122	2.121	2.122	2.122	2.123
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.556	1.559	1.554	1.554	1.554
5010.50c	0.001	0.005	0.004	0.004	0.002
5011.56c	0.006	0.024	0.020	0.018	0.010
8016.50c	12.347	12.368	12.332	12.334	12.330
Density (g/cm^3)	3.4394	3.4412	3.4394	3.4394	3.4388

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.646	0.645	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.683	0.682	0.683	0.683

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
24052.60c	13.693	13.693	13.684	13.691	13.691
24053.60c	1.582	1.582	1.581	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.722	1.721	1.722	1.722
26054.60c	3.373	3.373	3.371	3.373	3.373
26056.60c	54.380	54.380	54.342	54.370	54.370
26057.60c	1.267	1.267	1.266	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.368	5.368	5.364	5.367	5.367
28060.60c	2.123	2.123	2.121	2.122	2.122
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.554	1.554	1.558	1.554	1.555
5010.50c	0.002	0.002	0.006	0.004	0.004
5011.56c	0.010	0.008	0.025	0.018	0.017
8016.50c	12.330	12.332	12.367	12.335	12.336
Density (g/cm^3)	3.4388	3.4388	3.4412	3.4394	3.4394

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086
14000.50c	0.646	0.645	0.646
15031.50c	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026
24050.60c	0.683	0.682	0.683
24052.60c	13.700	13.684	13.693
24053.60c	1.583	1.581	1.582
24054.60c	0.402	0.401	0.401
25055.50c	1.723	1.721	1.722
26054.60c	3.375	3.371	3.373
26056.60c	54.409	54.342	54.380

Table 5.3.2-23. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26057.60c	1.268	1.266	1.267
26058.60c	0.172	0.172	0.172
28058.60c	5.371	5.364	5.368
28060.60c	2.124	2.121	2.123
28061.60c	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079
1001.50c	1.549	1.558	1.554
5010.50c	0.002	0.006	0.001
5011.56c	0.011	0.027	0.006
8016.50c	12.288	12.365	12.334
Density (g/cm^3)	3.4369	3.4412	3.4388

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.645	0.646	0.645	0.645
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.682	0.683	0.682	0.682
24052.60c	13.684	13.683	13.691	13.684	13.684
24053.60c	1.581	1.581	1.582	1.581	1.581
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.721	1.722	1.721	1.721
26054.60c	3.371	3.371	3.373	3.371	3.371
26056.60c	54.342	54.337	54.370	54.342	54.342
26057.60c	1.266	1.266	1.267	1.266	1.266
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.364	5.367	5.364	5.364
28060.60c	2.121	2.121	2.122	2.121	2.121

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.301	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.560	1.561	1.556	1.560	1.560
5010.50c	0.004	0.003	0.001	0.003	0.004
5011.56c	0.016	0.013	0.006	0.015	0.016
8016.50c	12.377	12.387	12.348	12.378	12.376
Density (g/cm^3)	3.4412	3.4415	3.4394	3.4412	3.4412

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.646	0.645	0.645	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.683	0.682	0.682	0.683
24052.60c	13.691	13.696	13.684	13.684	13.696
24053.60c	1.582	1.583	1.581	1.581	1.583
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.722	1.721	1.721	1.722
26054.60c	3.373	3.374	3.371	3.371	3.374
26056.60c	54.370	54.390	54.342	54.342	54.390
26057.60c	1.267	1.268	1.266	1.266	1.268
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.367	5.369	5.364	5.364	5.369
28060.60c	2.122	2.123	2.121	2.121	2.123
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.556	1.553	1.560	1.561	1.553
5010.50c	0.002	0.001	0.003	0.002	0.001
5011.56c	0.008	0.006	0.016	0.008	0.006

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
8016.50c	12.345	12.320	12.377	12.385	12.321
Density (g/cm^3)	3.4394	3.4382	3.4412	3.4412	3.4382

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.646	0.645	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.683	0.682	0.683	0.683
24052.60c	13.684	13.696	13.684	13.688	13.691
24053.60c	1.581	1.583	1.581	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.722	1.721	1.721	1.722
26054.60c	3.371	3.374	3.371	3.372	3.373
26056.60c	54.342	54.390	54.342	54.361	54.370
26057.60c	1.266	1.268	1.266	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.369	5.364	5.366	5.367
28060.60c	2.121	2.123	2.121	2.122	2.122
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.559	1.553	1.559	1.557	1.556
5010.50c	0.004	0.002	0.004	0.003	0.001
5011.56c	0.018	0.007	0.018	0.014	0.004
8016.50c	12.375	12.320	12.375	12.352	12.349
Density (g/cm^3)	3.4412	3.4382	3.4412	3.4400	3.4394

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.645	0.645	0.646	0.645	0.645
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.682	0.682	0.683	0.682	0.682
24052.60c	13.684	13.684	13.693	13.684	13.681
24053.60c	1.581	1.581	1.582	1.581	1.581
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.721	1.721	1.722	1.721	1.721
26054.60c	3.371	3.371	3.373	3.371	3.370
26056.60c	54.342	54.342	54.380	54.342	54.332
26057.60c	1.266	1.266	1.267	1.266	1.266
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.364	5.364	5.368	5.364	5.363
28060.60c	2.121	2.121	2.123	2.121	2.121
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.301
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.559	1.560	1.553	1.560	1.563
5010.50c	0.005	0.003	0.003	0.003	0.001
5011.56c	0.023	0.014	0.013	0.012	0.006
8016.50c	12.369	12.379	12.326	12.381	12.400
Density (g/cm^3)	3.4412	3.4412	3.4388	3.4412	3.4418

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.645	0.646	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.682	0.683	0.683	0.683

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
24052.60c	13.691	13.684	13.691	13.691	13.693
24053.60c	1.582	1.581	1.582	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.721	1.722	1.722	1.722
26054.60c	3.373	3.371	3.373	3.373	3.373
26056.60c	54.370	54.342	54.370	54.370	54.380
26057.60c	1.267	1.266	1.267	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.367	5.364	5.367	5.367	5.368
28060.60c	2.122	2.121	2.122	2.122	2.123
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.556	1.559	1.554	1.554	1.554
5010.50c	0.001	0.005	0.004	0.004	0.002
5011.56c	0.006	0.024	0.020	0.018	0.010
8016.50c	12.347	12.368	12.332	12.334	12.330
Density (g/cm^3)	3.4394	3.4412	3.4394	3.4394	3.4388

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.069	0.069	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086	0.086	0.086
14000.50c	0.646	0.646	0.645	0.646	0.646
15031.50c	0.039	0.039	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026	0.026	0.026
24050.60c	0.683	0.683	0.682	0.683	0.683
24052.60c	13.693	13.693	13.684	13.691	13.691
24053.60c	1.582	1.582	1.581	1.582	1.582
24054.60c	0.401	0.401	0.401	0.401	0.401
25055.50c	1.722	1.722	1.721	1.722	1.722
26054.60c	3.373	3.373	3.371	3.373	3.373
26056.60c	54.380	54.380	54.342	54.370	54.370

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
26057.60c	1.267	1.267	1.266	1.267	1.267
26058.60c	0.172	0.172	0.172	0.172	0.172
28058.60c	5.368	5.368	5.364	5.367	5.367
28060.60c	2.123	2.123	2.121	2.122	2.122
28061.60c	0.093	0.093	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302	0.302	0.302
28064.60c	0.079	0.079	0.079	0.079	0.079
1001.50c	1.554	1.554	1.558	1.554	1.555
5010.50c	0.002	0.002	0.006	0.004	0.004
5011.56c	0.010	0.008	0.025	0.018	0.017
8016.50c	12.330	12.332	12.367	12.335	12.336
Density (g/cm^3)	3.4388	3.4388	3.4412	3.4394	3.4394

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.069	0.069	0.069
7014.50c	0.086	0.086	0.086
14000.50c	0.646	0.645	0.646
15031.50c	0.039	0.039	0.039
16032.50c	0.026	0.026	0.026
24050.60c	0.683	0.682	0.683
24052.60c	13.700	13.684	13.693
24053.60c	1.583	1.581	1.582
24054.60c	0.402	0.401	0.401
25055.50c	1.723	1.721	1.722
26054.60c	3.375	3.371	3.373
26056.60c	54.409	54.342	54.380
26057.60c	1.268	1.266	1.267
26058.60c	0.172	0.172	0.172
28058.60c	5.371	5.364	5.368
28060.60c	2.124	2.121	2.123
28061.60c	0.093	0.093	0.093
28062.60c	0.302	0.302	0.302

Table 5.3.2-24. Homogenized Composition for Upper Pad Sub-Region Above a Fuel Assembly Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
28064.60c	0.079	0.079	0.079
1001.50c	1.549	1.558	1.554
5010.50c	0.002	0.006	0.001
5011.56c	0.011	0.027	0.006
8016.50c	12.288	12.365	12.334
Density (g/cm^3)	3.4369	3.4412	3.4388

Table 5.3.2-25. Lower Core Pad Region Material Volume Fractions (p. 10, Ref. 7.11)

SS304	Borated Water
0.2848	0.7152

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.603	0.603	0.603	0.603
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.637	0.638	0.637	0.637
24052.60c	12.782	12.780	12.791	12.782	12.782
24053.60c	1.477	1.477	1.478	1.477	1.477
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.607	1.607	1.609	1.607	1.607
26054.60c	3.149	3.148	3.151	3.149	3.149
26056.60c	50.761	50.755	50.799	50.761	50.761
26057.60c	1.183	1.183	1.184	1.183	1.183
26058.60c	0.160	0.160	0.161	0.160	0.160
28058.60c	5.011	5.010	5.014	5.011	5.011
28060.60c	1.982	1.981	1.983	1.982	1.982
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.193	2.195	2.189	2.194	2.193
5010.50c	0.005	0.004	0.002	0.005	0.005
5011.56c	0.023	0.018	0.008	0.021	0.023
8016.50c	17.405	17.419	17.368	17.407	17.404
Density (g/cm^3)	2.7993	2.7996	2.7972	2.7993	2.7993

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.604	0.603	0.603	0.604
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.638	0.638	0.637	0.637	0.638
24052.60c	12.791	12.798	12.782	12.782	12.798
24053.60c	1.478	1.479	1.477	1.477	1.479
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.609	1.609	1.607	1.607	1.609
26054.60c	3.151	3.153	3.149	3.149	3.153
26056.60c	50.799	50.824	50.761	50.761	50.824
26057.60c	1.184	1.184	1.183	1.183	1.184
26058.60c	0.161	0.161	0.160	0.160	0.161
28058.60c	5.014	5.017	5.011	5.011	5.017
28060.60c	1.983	1.984	1.982	1.982	1.984
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.188	2.184	2.193	2.195	2.184
5010.50c	0.003	0.002	0.005	0.002	0.002
5011.56c	0.012	0.009	0.022	0.011	0.008
8016.50c	17.364	17.332	17.405	17.417	17.333
Density (g/cm^3)	2.7972	2.7959	2.7993	2.7993	2.7959

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.604	0.603	0.603	0.603
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.638	0.637	0.638	0.638
24052.60c	12.782	12.798	12.782	12.788	12.791
24053.60c	1.477	1.479	1.477	1.478	1.478
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.607	1.609	1.607	1.608	1.609
26054.60c	3.149	3.153	3.149	3.150	3.151
26056.60c	50.761	50.824	50.761	50.786	50.799
26057.60c	1.183	1.184	1.183	1.184	1.184
26058.60c	0.160	0.161	0.160	0.161	0.161
28058.60c	5.011	5.017	5.011	5.013	5.014
28060.60c	1.982	1.984	1.982	1.983	1.983
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.193	2.184	2.193	2.189	2.189
5010.50c	0.005	0.002	0.006	0.004	0.001
5011.56c	0.025	0.010	0.025	0.019	0.006
8016.50c	17.402	17.331	17.402	17.373	17.370
Density (g/cm^3)	2.7993	2.7959	2.7993	2.7979	2.7972

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.603	0.603	0.603	0.603
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.637	0.637	0.638	0.637	0.637
24052.60c	12.782	12.782	12.795	12.782	12.779

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
24053.60c	1.477	1.477	1.479	1.477	1.477
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.607	1.607	1.609	1.607	1.607
26054.60c	3.149	3.149	3.152	3.149	3.148
26056.60c	50.761	50.761	50.811	50.761	50.749
26057.60c	1.183	1.183	1.184	1.183	1.183
26058.60c	0.160	0.160	0.161	0.160	0.160
28058.60c	5.011	5.011	5.015	5.011	5.009
28060.60c	1.982	1.982	1.983	1.982	1.981
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.192	2.194	2.185	2.194	2.197
5010.50c	0.007	0.004	0.004	0.004	0.002
5011.56c	0.033	0.020	0.018	0.017	0.009
8016.50c	17.394	17.408	17.339	17.411	17.437
Density (g/cm^3)	2.7993	2.7993	2.7965	2.7993	2.8000

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.603	0.603	0.603	0.603
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.638	0.637	0.638	0.638	0.638
24052.60c	12.791	12.782	12.791	12.791	12.795
24053.60c	1.478	1.477	1.478	1.478	1.479
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.609	1.607	1.609	1.609	1.609
26054.60c	3.151	3.149	3.151	3.151	3.152
26056.60c	50.799	50.761	50.799	50.799	50.811
26057.60c	1.184	1.183	1.184	1.184	1.184
26058.60c	0.161	0.160	0.161	0.161	0.161

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
28058.60c	5.014	5.011	5.014	5.014	5.015
28060.60c	1.983	1.982	1.983	1.983	1.983
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.189	2.192	2.186	2.186	2.186
5010.50c	0.002	0.007	0.006	0.006	0.003
5011.56c	0.008	0.034	0.028	0.026	0.014
8016.50c	17.367	17.393	17.346	17.348	17.344
Density (g/cm^3)	2.7972	2.7993	2.7972	2.7972	2.7965

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.064	0.064	0.064	0.064	0.064
7014.50c	0.080	0.080	0.080	0.080	0.080
14000.50c	0.603	0.603	0.603	0.603	0.603
15031.50c	0.036	0.036	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024	0.024	0.024
24050.60c	0.638	0.638	0.637	0.638	0.638
24052.60c	12.795	12.795	12.782	12.791	12.791
24053.60c	1.479	1.479	1.477	1.478	1.478
24054.60c	0.375	0.375	0.375	0.375	0.375
25055.50c	1.609	1.609	1.607	1.609	1.609
26054.60c	3.152	3.152	3.149	3.151	3.151
26056.60c	50.811	50.811	50.761	50.799	50.799
26057.60c	1.184	1.184	1.183	1.184	1.184
26058.60c	0.161	0.161	0.160	0.161	0.161
28058.60c	5.015	5.015	5.011	5.014	5.014
28060.60c	1.983	1.983	1.982	1.983	1.983
28061.60c	0.087	0.087	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074	0.074	0.074
1001.50c	2.186	2.186	2.192	2.186	2.187
5010.50c	0.003	0.002	0.008	0.006	0.005

Table 5.3.2-26. Homogenized Composition for Lower Core Pad Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
5011.56c	0.014	0.011	0.036	0.025	0.024
8016.50c	17.344	17.347	17.391	17.349	17.351
Density (g/cm^3)	2.7965	2.7965	2.7993	2.7972	2.7972

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.064	0.064	0.064
7014.50c	0.081	0.080	0.080
14000.50c	0.604	0.603	0.603
15031.50c	0.036	0.036	0.036
16032.50c	0.024	0.024	0.024
24050.60c	0.638	0.637	0.638
24052.60c	12.804	12.782	12.795
24053.60c	1.480	1.477	1.479
24054.60c	0.375	0.375	0.375
25055.50c	1.610	1.607	1.609
26054.60c	3.154	3.149	3.152
26056.60c	50.849	50.761	50.811
26057.60c	1.185	1.183	1.184
26058.60c	0.161	0.160	0.161
28058.60c	5.019	5.011	5.015
28060.60c	1.985	1.982	1.983
28061.60c	0.087	0.087	0.087
28062.60c	0.282	0.282	0.282
28064.60c	0.074	0.074	0.074
1001.50c	2.179	2.191	2.186
5010.50c	0.003	0.008	0.002
5011.56c	0.015	0.037	0.008
8016.50c	17.289	17.389	17.350
Density (g/cm^3)	2.7945	2.7993	2.7965

Table 5.3.2-27. Lower Core Grid Region Material Volume Fractions (p. 10, Ref. 7.11)

SS304	Borated Water
0.2400	0.7600

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061
7014.50c	0.076	0.076	0.077	0.076	0.076
14000.50c	0.573	0.573	0.574	0.573	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.606	0.606	0.607	0.606	0.606
24052.60c	12.159	12.157	12.170	12.159	12.159
24053.60c	1.405	1.405	1.406	1.405	1.405
24054.60c	0.356	0.356	0.357	0.356	0.356
25055.50c	1.529	1.529	1.531	1.529	1.529
26054.60c	2.995	2.995	2.998	2.995	2.995
26056.60c	48.288	48.281	48.331	48.288	48.288
26057.60c	1.125	1.125	1.126	1.125	1.125
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.766	4.766	4.771	4.766	4.766
28060.60c	1.885	1.885	1.887	1.885	1.885
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.631	2.633	2.626	2.631	2.631
5010.50c	0.006	0.005	0.002	0.005	0.006
5011.56c	0.027	0.021	0.009	0.025	0.028
8016.50c	20.878	20.894	20.837	20.880	20.878
Density (g/cm^3)	2.4798	2.4802	2.4776	2.4798	2.4798

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
7014.50c	0.077	0.077	0.076	0.076	0.077
14000.50c	0.574	0.574	0.573	0.573	0.574
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.607	0.607	0.606	0.606	0.607
24052.60c	12.170	12.177	12.159	12.159	12.177
24053.60c	1.406	1.407	1.405	1.405	1.407
24054.60c	0.357	0.357	0.356	0.356	0.357
25055.50c	1.531	1.531	1.529	1.529	1.531
26054.60c	2.998	3.000	2.995	2.995	3.000
26056.60c	48.331	48.359	48.288	48.288	48.359
26057.60c	1.126	1.127	1.125	1.125	1.127
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.771	4.773	4.766	4.766	4.773
28060.60c	1.887	1.888	1.885	1.885	1.888
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.625	2.621	2.631	2.633	2.621
5010.50c	0.003	0.002	0.006	0.003	0.002
5011.56c	0.014	0.011	0.027	0.014	0.010
8016.50c	20.832	20.795	20.878	20.893	20.796
Density (g/cm^3)	2.4776	2.4761	2.4798	2.4798	2.4761

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061
7014.50c	0.076	0.077	0.076	0.077	0.077
14000.50c	0.573	0.574	0.573	0.574	0.574
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.606	0.607	0.606	0.607	0.607
24052.60c	12.159	12.177	12.159	12.166	12.170
24053.60c	1.405	1.407	1.405	1.406	1.406

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
24054.60c	0.356	0.357	0.356	0.357	0.357
25055.50c	1.529	1.531	1.529	1.530	1.531
26054.60c	2.995	3.000	2.995	2.997	2.998
26056.60c	48.288	48.359	48.288	48.316	48.331
26057.60c	1.125	1.127	1.125	1.126	1.126
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.766	4.773	4.766	4.769	4.771
28060.60c	1.885	1.888	1.885	1.886	1.887
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.631	2.620	2.631	2.626	2.626
5010.50c	0.007	0.003	0.007	0.005	0.002
5011.56c	0.030	0.012	0.030	0.023	0.008
8016.50c	20.875	20.794	20.874	20.842	20.839
Density (g/cm^3)	2.4798	2.4761	2.4798	2.4783	2.4776

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061
7014.50c	0.076	0.076	0.077	0.076	0.076
14000.50c	0.573	0.573	0.574	0.573	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.606	0.606	0.607	0.606	0.606
24052.60c	12.159	12.159	12.174	12.159	12.156
24053.60c	1.405	1.405	1.407	1.405	1.405
24054.60c	0.356	0.356	0.357	0.356	0.356
25055.50c	1.529	1.529	1.531	1.529	1.529
26054.60c	2.995	2.995	2.999	2.995	2.994
26056.60c	48.288	48.288	48.345	48.288	48.273
26057.60c	1.125	1.125	1.127	1.125	1.125
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.766	4.766	4.772	4.766	4.765

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
28060.60c	1.885	1.885	1.887	1.885	1.884
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.629	2.631	2.622	2.632	2.636
5010.50c	0.009	0.005	0.005	0.004	0.002
5011.56c	0.039	0.024	0.022	0.020	0.011
8016.50c	20.865	20.882	20.803	20.885	20.916
Density (g/cm^3)	2.4798	2.4798	2.4769	2.4798	2.4805

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061
7014.50c	0.077	0.076	0.077	0.077	0.077
14000.50c	0.574	0.573	0.574	0.574	0.574
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.607	0.606	0.607	0.607	0.607
24052.60c	12.170	12.159	12.170	12.170	12.174
24053.60c	1.406	1.405	1.406	1.406	1.407
24054.60c	0.357	0.356	0.357	0.357	0.357
25055.50c	1.531	1.529	1.531	1.531	1.531
26054.60c	2.998	2.995	2.998	2.998	2.999
26056.60c	48.331	48.288	48.331	48.331	48.345
26057.60c	1.126	1.125	1.126	1.126	1.127
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.771	4.766	4.771	4.771	4.772
28060.60c	1.887	1.885	1.887	1.887	1.887
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.626	2.629	2.623	2.623	2.622
5010.50c	0.002	0.009	0.007	0.007	0.004
5011.56c	0.010	0.041	0.034	0.031	0.017

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
8016.50c	20.836	20.863	20.811	20.814	20.809
Density (g/cm^3)	2.4776	2.4798	2.4776	2.4776	2.4769
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.061	0.061	0.061	0.061	0.061
7014.50c	0.077	0.077	0.076	0.077	0.077
14000.50c	0.574	0.574	0.573	0.574	0.574
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.607	0.607	0.606	0.607	0.607
24052.60c	12.174	12.174	12.159	12.170	12.170
24053.60c	1.407	1.407	1.405	1.406	1.406
24054.60c	0.357	0.357	0.356	0.357	0.357
25055.50c	1.531	1.531	1.529	1.531	1.531
26054.60c	2.999	2.999	2.995	2.998	2.998
26056.60c	48.345	48.345	48.288	48.331	48.331
26057.60c	1.127	1.127	1.125	1.126	1.126
26058.60c	0.153	0.153	0.153	0.153	0.153
28058.60c	4.772	4.772	4.766	4.771	4.771
28060.60c	1.887	1.887	1.885	1.887	1.887
28061.60c	0.083	0.083	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070	0.070	0.070
1001.50c	2.622	2.623	2.629	2.623	2.623
5010.50c	0.004	0.003	0.009	0.007	0.006
5011.56c	0.017	0.013	0.043	0.030	0.029
8016.50c	20.809	20.813	20.861	20.814	20.816
Density (g/cm^3)	2.4769	2.4769	2.4798	2.4776	2.4776

Table 5.3.2-28. Homogenized Composition for Lower Core Grid Region

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.061	0.061	0.061
7014.50c	0.077	0.076	0.077
14000.50c	0.575	0.573	0.574
15031.50c	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023
24050.60c	0.608	0.606	0.607
24052.60c	12.184	12.159	12.174
24053.60c	1.408	1.405	1.407
24054.60c	0.357	0.356	0.357
25055.50c	1.532	1.529	1.531
26054.60c	3.001	2.995	2.999
26056.60c	48.388	48.288	48.345
26057.60c	1.128	1.125	1.127
26058.60c	0.153	0.153	0.153
28058.60c	4.776	4.766	4.772
28060.60c	1.889	1.885	1.887
28061.60c	0.083	0.083	0.083
28062.60c	0.268	0.268	0.268
28064.60c	0.070	0.070	0.070
1001.50c	2.614	2.629	2.623
5010.50c	0.004	0.010	0.002
5011.56c	0.018	0.045	0.010
8016.50c	20.747	20.859	20.816
Density (g/cm^3)	2.4747	2.4798	2.4769

Table 5.3.2-29. Region Between Lower Core Grid and Vessel Plate Material Volume Fractions (p. 10, Ref. 7.11)

SS304	Borated Water
0.0300	0.9700

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.181	0.181	0.182	0.181	0.181
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.191	0.191	0.192	0.191	0.191
24052.60c	3.838	3.836	3.849	3.838	3.838
24053.60c	0.443	0.443	0.445	0.443	0.443
24054.60c	0.112	0.112	0.113	0.112	0.112
25055.50c	0.483	0.482	0.484	0.483	0.483
26054.60c	0.945	0.945	0.948	0.945	0.945
26056.60c	15.241	15.233	15.284	15.241	15.241
26057.60c	0.355	0.355	0.356	0.355	0.355
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.504	1.504	1.509	1.504	1.504
28060.60c	0.595	0.595	0.597	0.595	0.595
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.479	8.483	8.479	8.480	8.479
5010.50c	0.019	0.015	0.007	0.018	0.019
5011.56c	0.087	0.069	0.031	0.081	0.089
8016.50c	67.283	67.313	67.283	67.290	67.281
Density (g/cm^3)	0.9821	0.9826	0.9793	0.9821	0.9821

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.182	0.182	0.181	0.181	0.182
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.192	0.192	0.191	0.191	0.192

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
24052.60c	3.849	3.856	3.838	3.838	3.856
24053.60c	0.445	0.446	0.443	0.443	0.446
24054.60c	0.113	0.113	0.112	0.112	0.113
25055.50c	0.484	0.485	0.483	0.483	0.485
26054.60c	0.948	0.950	0.945	0.945	0.950
26056.60c	15.284	15.314	15.241	15.241	15.314
26057.60c	0.356	0.357	0.355	0.355	0.357
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.509	1.512	1.504	1.504	1.512
28060.60c	0.597	0.598	0.595	0.595	0.598
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.477	8.473	8.479	8.485	8.474
5010.50c	0.010	0.008	0.019	0.010	0.007
5011.56c	0.046	0.035	0.086	0.044	0.031
8016.50c	67.266	67.237	67.284	67.330	67.241
Density (g/cm^3)	0.9793	0.9774	0.9821	0.9821	0.9774

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.181	0.182	0.181	0.181	0.182
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.191	0.192	0.191	0.192	0.192
24052.60c	3.838	3.856	3.838	3.845	3.849
24053.60c	0.443	0.446	0.443	0.444	0.445
24054.60c	0.112	0.113	0.112	0.113	0.113
25055.50c	0.483	0.485	0.483	0.484	0.484
26054.60c	0.945	0.950	0.945	0.947	0.948
26056.60c	15.241	15.314	15.241	15.270	15.284

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
26057.60c	0.355	0.357	0.355	0.356	0.356
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.504	1.512	1.504	1.507	1.509
28060.60c	0.595	0.598	0.595	0.596	0.597
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.478	8.473	8.477	8.475	8.480
5010.50c	0.021	0.008	0.021	0.016	0.005
5011.56c	0.096	0.038	0.098	0.075	0.024
8016.50c	67.274	67.234	67.271	67.255	67.290
Density (g/cm^3)	0.9821	0.9774	0.9821	0.9802	0.9793

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.181	0.181	0.182	0.181	0.181
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.191	0.191	0.192	0.191	0.191
24052.60c	3.838	3.838	3.852	3.838	3.834
24053.60c	0.443	0.443	0.445	0.443	0.443
24054.60c	0.112	0.112	0.113	0.112	0.112
25055.50c	0.483	0.483	0.484	0.483	0.482
26054.60c	0.945	0.945	0.949	0.945	0.944
26056.60c	15.241	15.241	15.299	15.241	15.226
26057.60c	0.355	0.355	0.357	0.355	0.355
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.504	1.504	1.510	1.504	1.503
28060.60c	0.595	0.595	0.597	0.595	0.594
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.084

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.474	8.480	8.471	8.482	8.489
5010.50c	0.028	0.017	0.016	0.014	0.008
5011.56c	0.127	0.076	0.071	0.065	0.035
8016.50c	67.240	67.295	67.218	67.307	67.360
Density (g/cm^3)	0.9821	0.9821	0.9784	0.9821	0.9830

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.182	0.181	0.182	0.182	0.182
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.192	0.191	0.192	0.192	0.192
24052.60c	3.849	3.838	3.849	3.849	3.852
24053.60c	0.445	0.443	0.445	0.445	0.445
24054.60c	0.113	0.112	0.113	0.113	0.113
25055.50c	0.484	0.483	0.484	0.484	0.484
26054.60c	0.948	0.945	0.948	0.948	0.949
26056.60c	15.284	15.241	15.284	15.284	15.299
26057.60c	0.356	0.355	0.356	0.356	0.357
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.509	1.504	1.509	1.509	1.510
28060.60c	0.597	0.595	0.597	0.597	0.597
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.479	8.473	8.468	8.469	8.473
5010.50c	0.007	0.029	0.024	0.022	0.012
5011.56c	0.032	0.131	0.109	0.100	0.054
8016.50c	67.281	67.236	67.198	67.208	67.237

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Density (g/cm^3)	0.9793	0.9821	0.9793	0.9793	0.9784
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.019	0.019	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024	0.024	0.024
14000.50c	0.182	0.182	0.181	0.182	0.182
15031.50c	0.011	0.011	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007	0.007	0.007
24050.60c	0.192	0.192	0.191	0.192	0.192
24052.60c	3.852	3.852	3.838	3.849	3.849
24053.60c	0.445	0.445	0.443	0.445	0.445
24054.60c	0.113	0.113	0.112	0.113	0.113
25055.50c	0.484	0.484	0.483	0.484	0.484
26054.60c	0.949	0.949	0.945	0.948	0.948
26056.60c	15.299	15.299	15.241	15.284	15.284
26057.60c	0.357	0.357	0.355	0.356	0.356
26058.60c	0.048	0.048	0.048	0.048	0.048
28058.60c	1.510	1.510	1.504	1.509	1.509
28060.60c	0.597	0.597	0.595	0.597	0.597
28061.60c	0.026	0.026	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022	0.022	0.022
1001.50c	8.473	8.475	8.472	8.470	8.470
5010.50c	0.012	0.009	0.030	0.021	0.020
5011.56c	0.054	0.042	0.138	0.098	0.092
8016.50c	67.237	67.250	67.228	67.210	67.216
Density (g/cm^3)	0.9784	0.9784	0.9821	0.9793	0.9793

Table 5.3.2-30. Homogenized Composition for Region Between Lower Core Grid and Vessel Plate

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.019	0.019	0.019
7014.50c	0.024	0.024	0.024
14000.50c	0.182	0.181	0.182
15031.50c	0.011	0.011	0.011
16032.50c	0.007	0.007	0.007
24050.60c	0.193	0.191	0.192
24052.60c	3.863	3.838	3.852
24053.60c	0.446	0.443	0.445
24054.60c	0.113	0.112	0.113
25055.50c	0.486	0.483	0.484
26054.60c	0.952	0.945	0.949
26056.60c	15.343	15.241	15.299
26057.60c	0.358	0.355	0.357
26058.60c	0.049	0.048	0.048
28058.60c	1.514	1.504	1.510
28060.60c	0.599	0.595	0.597
28061.60c	0.026	0.026	0.026
28062.60c	0.085	0.085	0.085
28064.60c	0.022	0.022	0.022
1001.50c	8.465	8.471	8.476
5010.50c	0.013	0.032	0.007
5011.56c	0.060	0.145	0.032
8016.50c	67.169	67.221	67.261
Density (g/cm^3)	0.9756	0.9821	0.9784

5.3.3. Fuel Assembly Materials

The fuel assembly materials listed in this section refer to the upper and lower end-fitting materials and the spacer grid materials. The upper end-fitting material compositions vary within a given fuel assembly design depending upon whether the assembly contains no insertion assembly, a BPRA, a RCCA, or an APSRA at the critical statepoint. Both the upper and lower end-fitting homogenized material compositions vary between critical statepoint configurations due to the different moderator conditions. The primary material components in the upper and lower end-fitting regions are SS304, Inconel, Zircaloy-4, and borated moderator (p. 10, Ref. 7.11). Both the upper and lower end-fitting regions are modeled with material compositions that represent the homogenization of all of the components in the

regions. Table 5.3.2-1 presents the material composition of SS304. Table 5.3.2-3 presents the material compositions for the borated moderator in CRC statepoint configuration. Table 5.3.3.1 presents the material composition of Inconel. Table 5.3.2-15 presents the material composition of Zircaloy-4. Table 5.3.3-2 presents the component material volume fractions for the upper end-fitting region for each assembly design. Table 5.3.3-3 presents the component material volume fractions for the lower end-fitting region for each assembly design. Tables 5.3.3-4 through 5.3.3-7 present the upper end-fitting homogenized material compositions for each CRC statepoint configuration for the assemblies containing no insertion assembly, a BPRA, a RCCA, and an APSRA, respectively. Table 5.3.3-8 presents the lower end-fitting homogenized material compositions for each CRC statepoint configuration for the assemblies regardless of their insertion assembly condition. The homogenized material compositions presented in this section were calculated using the method described in Section 5.3.2.

The upper end spacer grid region is composed of Inconel, Zircaloy-4, and borated moderator (p. 10, Ref. 7.11). The upper end spacer grid region is located directly below the upper end-fitting, and covers a height of 8.573 cm along the length of the fuel assembly (pp. 8, 9, Ref. 7.11). The materials of the upper end spacer grid are homogenized and modeled in the region between the fuel rods, guide tubes, and instrument tube. The volume fractions of Inconel, Zircaloy-4, and borated moderator in the upper end spacer grid composition are 0.0457, 0.0069, and 0.9474, respectively (p. 10, Ref. 7.11). MACE Version 3 does not allow the specification of an Inconel/Zircaloy-4 spacer grid material combination. Therefore, the Zircaloy-4 volume fraction was neglected in the homogenized composition. This modeling approximation has an insignificant effect on the system reactivity. The homogenized material composition for each upper spacer grid for a given fuel assembly design will be different between the CRC statepoint configurations due to the different moderator conditions. Table 5.3.3.9 presents the homogenized material compositions for the upper end spacer grid of the assemblies in each CRC statepoint configuration.

The six spacer grids below the upper end spacer grid are called the intermediate spacer grids. These intermediate spacer grids are composed of Inconel for batches 1 through 8 and Zircaloy-4 for batches 9 through 12 (p. 26, Ref. 7.11). The intermediate spacer grid height is 3.81 cm for the Inconel grids, and 5.08 cm for the Zircaloy-4 grids (p. 5, Ref. 7.11). The individual intermediate spacer grid volume is 88.676 cm^3 and 125.758 cm^3 for the Inconel and Zircaloy-4 grids, respectively (p. 5, Ref. 7.11). The volume between the fuel rods, guide tubes, and instrument tube that is occupied by an explicit intermediate spacer grid and borated moderator is 977.531 cm^3 and 1303.375 cm^3 for the Inconel and Zircaloy-4 grids, respectively. These values are obtained by taking the square of the assembly pitch minus the area of the fuel rods, guide tubes, and instrument tube, and then multiplying by the spacer grid height. Therefore, the volume fraction of Inconel in the intermediate spacer grid homogenized region is 0.0907 for the Inconel grids, and the volume fraction of Zircaloy-4 in the intermediate spacer grid homogenized region is 0.0965 for the Zircaloy-4 grids. The intermediate spacer grid materials and borated moderator are homogenized and modeled in the region between the fuel rods, guide tubes, and instrument tube over the explicit height of each spacer grid. The homogenized material composition for the intermediate spacer grid of each fuel assembly design will be different between the CRC statepoint configurations due to the different moderator conditions. Table 5.3.3.10 presents the homogenized material compositions for the intermediate spacer grid of the assemblies in each CRC statepoint configuration.

Table 5.3.3-1. Inconel 718 Composition (pp. 1, 2, Ref. 7.8)

Ele./Iso.	MCNP ZAID	Wt. %	Ele./Iso.	MCNP ZAID	Wt. %
C-nat	6000.50c	0.080	Ni-60	28060.60c	13.993
Si-nat	14000.50c	0.350	Ni-61	28061.60c	0.616
P-31	15031.50c	0.015	Ni-62	28062.60c	1.989
S-nat	16032.50c	0.015	Ni-64	28064.60c	0.520
Cr-50	24050.60c	0.793	B-10	5010.50c	1.078E-03
Cr-52	24052.60c	15.903	B-11	5011.56c	4.925E-03
Cr-53	24053.60c	1.838	Ti-nat	22000.50c	0.900
Cr-54	24054.60c	0.466	Al-27	13027.50c	0.500
Mn-55	25055.50c	0.350	Co-59	27059.50c	1.000
Fe-54	26054.60c	0.958	Cu-63	29063.60c	0.205
Fe-56	26056.60c	15.442	Cu-65	29065.60c	0.095
Fe-57	26057.60c	0.360	Nb-93	41093.50c	2.563
Fe-58	26058.60c	0.049	Mo-nat	42000.50c	3.050
Ni-58	28058.60c	35.382	Ta-181	73181.50c	2.563
Density = 8.19 g/cm^3					

Table 5.3.3-2. Upper End-Fitting Component Material Volume Fractions for Each Assembly Design

Insertion Assembly Specification	Volume Fractions in Upper End-Fitting Region			
	SS304	Inconel	Zircaloy-4	Borated Moderator
No Insertion Assembly (p. 10, Ref. 7.11)	0.2756	0.0441	0.0081	0.6722
BPRA Inserted (p. 24, Ref. 7.11)	0.2874	0.0450	0.0083	0.6593
RCCA Inserted (p. 16, Ref. 7.11)	0.2981	0.0441	0.0081	0.6497
APSRA Inserted (p. 20, 22, Ref. 7.11)	0.2960	0.0441	0.0081	0.6518

Table 5.3.3-3. Lower End-Fitting Component Material Volume Fractions for Each Assembly Design

SS304	Inconel	Zircaloy-4	Borated Moderator
0.1656	0.0306	0.0125	0.7913

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.566	0.566	0.566	0.566	0.566
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	12.991	12.989	12.999	12.990	12.990
24053.60c	1.501	1.501	1.502	1.501	1.501
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.442	1.442	1.443	1.442	1.442
26054.60c	2.856	2.856	2.858	2.856	2.856
26056.60c	46.042	46.037	46.070	46.042	46.042
26057.60c	1.073	1.073	1.074	1.073	1.073
26058.60c	0.146	0.146	0.146	0.146	0.146
28058.60c	8.479	8.478	8.484	8.479	8.479
28060.60c	3.353	3.353	3.355	3.353	3.353
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.857	1.858	1.853	1.857	1.857
5010.50c	0.004	0.003	0.002	0.004	0.004
5011.56c	0.020	0.016	0.007	0.018	0.020
8016.50c	14.736	14.748	14.703	14.738	14.736
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.354	0.354	0.355	0.354	0.354
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.679	1.678	1.680	1.679	1.679
50000.35c	0.024	0.024	0.024	0.024	0.024

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Density (g/cm^3)	3.1079	3.1082	3.1060	3.1079	3.1079
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.566	0.567	0.566	0.566	0.567
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	12.999	13.004	12.990	12.990	13.004
24053.60c	1.502	1.503	1.501	1.501	1.503
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.443	1.443	1.442	1.442	1.443
26054.60c	2.858	2.859	2.856	2.856	2.859
26056.60c	46.070	46.090	46.042	46.042	46.090
26057.60c	1.074	1.074	1.073	1.073	1.074
26058.60c	0.146	0.146	0.146	0.146	0.146
28058.60c	8.484	8.488	8.479	8.479	8.488
28060.60c	3.355	3.357	3.353	3.353	3.357
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.852	1.849	1.857	1.858	1.849
5010.50c	0.002	0.002	0.004	0.002	0.002
5011.56c	0.011	0.008	0.019	0.010	0.007
8016.50c	14.700	14.671	14.736	14.746	14.672
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.355	0.355	0.354	0.354	0.355

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.680	1.680	1.679	1.679	1.680
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1060	3.1047	3.1079	3.1079	3.1047

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.566	0.567	0.566	0.566	0.566
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	12.990	13.004	12.990	12.996	12.999
24053.60c	1.501	1.503	1.501	1.502	1.502
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.442	1.443	1.442	1.442	1.443
26054.60c	2.856	2.859	2.856	2.857	2.858
26056.60c	46.042	46.090	46.042	46.061	46.070
26057.60c	1.073	1.074	1.073	1.073	1.074
26058.60c	0.146	0.146	0.146	0.146	0.146
28058.60c	8.479	8.488	8.479	8.483	8.484
28060.60c	3.353	3.357	3.353	3.355	3.355
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.857	1.849	1.856	1.853	1.853
5010.50c	0.005	0.002	0.005	0.004	0.001
5011.56c	0.022	0.009	0.022	0.017	0.006
8016.50c	14.734	14.671	14.734	14.708	14.705
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.354	0.355	0.354	0.355	0.355
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.679	1.680	1.679	1.679	1.680
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1079	3.1047	3.1079	3.1066	3.1060

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.566	0.566	0.567	0.566	0.566
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	12.990	12.990	13.001	12.990	12.988
24053.60c	1.501	1.501	1.502	1.501	1.501
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.442	1.442	1.443	1.442	1.441
26054.60c	2.856	2.856	2.858	2.856	2.855
26056.60c	46.042	46.042	46.080	46.042	46.032
26057.60c	1.073	1.073	1.074	1.073	1.073
26058.60c	0.146	0.146	0.146	0.146	0.146
28058.60c	8.479	8.479	8.486	8.479	8.477
28060.60c	3.353	3.353	3.356	3.353	3.353
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.856	1.857	1.849	1.857	1.860
5010.50c	0.006	0.004	0.004	0.003	0.002
5011.56c	0.028	0.017	0.016	0.015	0.008

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
8016.50c	14.727	14.739	14.678	14.741	14.764
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.354	0.354	0.355	0.354	0.354
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.679	1.679	1.680	1.679	1.678
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1079	3.1079	3.1053	3.1079	3.1086

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.566	0.566	0.566	0.566	0.567
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	12.999	12.990	12.999	12.999	13.001
24053.60c	1.502	1.501	1.502	1.502	1.502
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.443	1.442	1.443	1.443	1.443
26054.60c	2.858	2.856	2.858	2.858	2.858
26056.60c	46.070	46.042	46.070	46.070	46.080
26057.60c	1.074	1.073	1.074	1.074	1.074
26058.60c	0.146	0.146	0.146	0.146	0.146
28058.60c	8.484	8.479	8.484	8.484	8.486
28060.60c	3.355	3.353	3.355	3.355	3.356
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.853	1.855	1.850	1.851	1.850
5010.50c	0.002	0.006	0.005	0.005	0.003
5011.56c	0.008	0.029	0.024	0.022	0.012
8016.50c	14.703	14.726	14.685	14.687	14.682
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.355	0.354	0.355	0.355	0.355
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.680	1.679	1.680	1.680	1.680
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1060	3.1079	3.1060	3.1060	3.1053

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.065	0.065	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070	0.070	0.070
14000.50c	0.567	0.567	0.566	0.566	0.566
15031.50c	0.033	0.033	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.648	0.648	0.648	0.648	0.648
24052.60c	13.001	13.001	12.990	12.999	12.999
24053.60c	1.502	1.502	1.501	1.502	1.502
24054.60c	0.381	0.381	0.381	0.381	0.381
25055.50c	1.443	1.443	1.442	1.443	1.443
26054.60c	2.858	2.858	2.856	2.858	2.858
26056.60c	46.080	46.080	46.042	46.070	46.070
26057.60c	1.074	1.074	1.073	1.074	1.074
26058.60c	0.146	0.146	0.146	0.146	0.146

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
28058.60c	8.486	8.486	8.479	8.484	8.484
28060.60c	3.356	3.356	3.353	3.355	3.355
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.850	1.850	1.855	1.851	1.851
5010.50c	0.003	0.002	0.007	0.005	0.005
5011.56c	0.012	0.010	0.031	0.022	0.021
8016.50c	14.682	14.685	14.724	14.687	14.689
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298	0.298	0.298
42000.50c	0.355	0.355	0.354	0.355	0.355
73181.50c	0.298	0.298	0.298	0.298	0.298
40000.60c	1.680	1.680	1.679	1.680	1.680
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1053	3.1053	3.1079	3.1060	3.1060

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.065	0.065	0.065
7014.50c	0.070	0.070	0.070
14000.50c	0.567	0.566	0.567
15031.50c	0.033	0.033	0.033
16032.50c	0.023	0.023	0.023
24050.60c	0.649	0.648	0.648
24052.60c	13.009	12.990	13.001
24053.60c	1.503	1.501	1.502
24054.60c	0.381	0.381	0.381
25055.50c	1.444	1.442	1.443

Table 5.3.3-4. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing No Insertion Assembly

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26054.60c	2.860	2.856	2.858
26056.60c	46.109	46.042	46.080
26057.60c	1.075	1.073	1.074
26058.60c	0.146	0.146	0.146
28058.60c	8.491	8.479	8.486
28060.60c	3.358	3.353	3.356
28061.60c	0.148	0.148	0.148
28062.60c	0.477	0.477	0.477
28064.60c	0.125	0.125	0.125
1001.50c	1.844	1.855	1.851
5010.50c	0.003	0.007	0.002
5011.56c	0.014	0.032	0.008
8016.50c	14.634	14.722	14.687
13027.50c	0.058	0.058	0.058
22000.50c	0.105	0.105	0.105
27059.50c	0.116	0.116	0.116
29063.60c	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011
41093.50c	0.298	0.298	0.298
42000.50c	0.355	0.354	0.355
73181.50c	0.298	0.298	0.298
40000.60c	1.681	1.679	1.680
50000.35c	0.024	0.024	0.024
Density (g/cm^3)	3.1034	3.1079	3.1053

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.572	0.572	0.573	0.572	0.572
15031.50c	0.034	0.034	0.034	0.034	0.034

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.654	0.654	0.654	0.654	0.654
24052.60c	13.117	13.116	13.125	13.117	13.117
24053.60c	1.516	1.516	1.517	1.516	1.516
24054.60c	0.384	0.384	0.385	0.384	0.384
25055.50c	1.459	1.459	1.460	1.459	1.459
26054.60c	2.890	2.890	2.892	2.890	2.890
26056.60c	46.593	46.589	46.621	46.593	46.593
26057.60c	1.086	1.086	1.086	1.086	1.086
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.498	8.498	8.503	8.498	8.498
28060.60c	3.361	3.361	3.363	3.361	3.361
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.769	1.770	1.765	1.769	1.769
5010.50c	0.004	0.003	0.002	0.004	0.004
5011.56c	0.019	0.015	0.007	0.017	0.019
8016.50c	14.038	14.049	14.006	14.039	14.038
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.351	0.351	0.351	0.351	0.351
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.671	1.670	1.672	1.671	1.671
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1999	3.2002	3.1980	3.1999	3.1999

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.573	0.573	0.572	0.572	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.654	0.655	0.654	0.654	0.655
24052.60c	13.125	13.130	13.117	13.117	13.130
24053.60c	1.517	1.517	1.516	1.516	1.517
24054.60c	0.385	0.385	0.384	0.384	0.385
25055.50c	1.460	1.461	1.459	1.459	1.461
26054.60c	2.892	2.893	2.890	2.890	2.893
26056.60c	46.621	46.640	46.593	46.593	46.640
26057.60c	1.086	1.087	1.086	1.086	1.087
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.503	8.507	8.498	8.498	8.507
28060.60c	3.363	3.364	3.361	3.361	3.364
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.764	1.761	1.769	1.770	1.761
5010.50c	0.002	0.002	0.004	0.002	0.002
5011.56c	0.010	0.008	0.019	0.010	0.007
8016.50c	14.003	13.975	14.038	14.048	13.976
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.351	0.352	0.351	0.351	0.352
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.672	1.672	1.671	1.671	1.672
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1980	3.1967	3.1999	3.1999	3.1967

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.572	0.573	0.572	0.573	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.654	0.655	0.654	0.654	0.654
24052.60c	13.117	13.130	13.117	13.122	13.125
24053.60c	1.516	1.517	1.516	1.516	1.517
24054.60c	0.384	0.385	0.384	0.385	0.385
25055.50c	1.459	1.461	1.459	1.460	1.460
26054.60c	2.890	2.893	2.890	2.891	2.892
26056.60c	46.593	46.640	46.593	46.612	46.621
26057.60c	1.086	1.087	1.086	1.086	1.086
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.498	8.507	8.498	8.502	8.503
28060.60c	3.361	3.364	3.361	3.362	3.363
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.769	1.761	1.768	1.765	1.765
5010.50c	0.005	0.002	0.005	0.004	0.001
5011.56c	0.021	0.008	0.021	0.016	0.006
8016.50c	14.036	13.975	14.035	14.011	14.008
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.351	0.352	0.351	0.351	0.351
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.671	1.672	1.671	1.671	1.672
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1999	3.1967	3.1999	3.1986	3.1980

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.572	0.572	0.573	0.572	0.572
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.654	0.654	0.655	0.654	0.654
24052.60c	13.117	13.117	13.127	13.117	13.114
24053.60c	1.516	1.516	1.517	1.516	1.516
24054.60c	0.384	0.384	0.385	0.384	0.384
25055.50c	1.459	1.459	1.461	1.459	1.459
26054.60c	2.890	2.890	2.892	2.890	2.890
26056.60c	46.593	46.593	46.630	46.593	46.584
26057.60c	1.086	1.086	1.087	1.086	1.086
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.498	8.498	8.505	8.498	8.497
28060.60c	3.361	3.361	3.364	3.361	3.360
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.768	1.769	1.762	1.769	1.772
5010.50c	0.006	0.004	0.003	0.003	0.002
5011.56c	0.027	0.016	0.015	0.014	0.008
8016.50c	14.029	14.040	13.982	14.043	14.065
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.351	0.351	0.352	0.351	0.351
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.671	1.671	1.672	1.671	1.670
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1999	3.1999	3.1974	3.1999	3.2005

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.573	0.572	0.573	0.573	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.654	0.654	0.654	0.654	0.655
24052.60c	13.125	13.117	13.125	13.125	13.127
24053.60c	1.517	1.516	1.517	1.517	1.517
24054.60c	0.385	0.384	0.385	0.385	0.385
25055.50c	1.460	1.459	1.460	1.460	1.461
26054.60c	2.892	2.890	2.892	2.892	2.892
26056.60c	46.621	46.593	46.621	46.621	46.630
26057.60c	1.086	1.086	1.086	1.086	1.087
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.503	8.498	8.503	8.503	8.505
28060.60c	3.363	3.361	3.363	3.363	3.364
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.765	1.768	1.763	1.763	1.762
5010.50c	0.002	0.006	0.005	0.005	0.003
5011.56c	0.007	0.028	0.023	0.021	0.012
8016.50c	14.006	14.028	13.989	13.990	13.986
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.351	0.351	0.351	0.351	0.352
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.672	1.671	1.672	1.672	1.672
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1980	3.1999	3.1980	3.1980	3.1974

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071	0.071	0.071
14000.50c	0.573	0.573	0.572	0.573	0.573
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.655	0.655	0.654	0.654	0.654
24052.60c	13.127	13.127	13.117	13.125	13.125
24053.60c	1.517	1.517	1.516	1.517	1.517
24054.60c	0.385	0.385	0.384	0.385	0.385
25055.50c	1.461	1.461	1.459	1.460	1.460
26054.60c	2.892	2.892	2.890	2.892	2.892
26056.60c	46.630	46.630	46.593	46.621	46.621
26057.60c	1.087	1.087	1.086	1.086	1.086
26058.60c	0.147	0.147	0.147	0.147	0.147
28058.60c	8.505	8.505	8.498	8.503	8.503
28060.60c	3.364	3.364	3.361	3.363	3.363
28061.60c	0.148	0.148	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125	0.125	0.125
1001.50c	1.762	1.763	1.767	1.763	1.763
5010.50c	0.003	0.002	0.006	0.005	0.004
5011.56c	0.012	0.009	0.029	0.021	0.020
8016.50c	13.986	13.989	14.027	13.991	13.992
13027.50c	0.058	0.058	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.295	0.295	0.295	0.295	0.295
42000.50c	0.352	0.352	0.351	0.351	0.351
73181.50c	0.295	0.295	0.295	0.295	0.295
40000.60c	1.672	1.672	1.671	1.672	1.672
50000.35c	0.024	0.024	0.024	0.024	0.024
Density (g/cm^3)	3.1974	3.1974	3.1999	3.1980	3.1980

Table 5.3.3-5. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a BPRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.066	0.066	0.066
7014.50c	0.071	0.071	0.071
14000.50c	0.573	0.572	0.573
15031.50c	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023
24050.60c	0.655	0.654	0.655
24052.60c	13.135	13.117	13.127
24053.60c	1.518	1.516	1.517
24054.60c	0.385	0.384	0.385
25055.50c	1.461	1.459	1.461
26054.60c	2.894	2.890	2.892
26056.60c	46.658	46.593	46.630
26057.60c	1.087	1.086	1.087
26058.60c	0.148	0.147	0.147
28058.60c	8.510	8.498	8.505
28060.60c	3.366	3.361	3.364
28061.60c	0.148	0.148	0.148
28062.60c	0.478	0.478	0.478
28064.60c	0.125	0.125	0.125
1001.50c	1.756	1.767	1.763
5010.50c	0.003	0.007	0.002
5011.56c	0.013	0.031	0.007
8016.50c	13.940	14.025	13.991
13027.50c	0.058	0.058	0.058
22000.50c	0.104	0.104	0.104
27059.50c	0.115	0.115	0.115
29063.60c	0.024	0.024	0.024
29065.60c	0.011	0.011	0.011
41093.50c	0.296	0.295	0.295
42000.50c	0.352	0.351	0.352
73181.50c	0.296	0.295	0.295
40000.60c	1.673	1.671	1.672
50000.35c	0.024	0.024	0.024
Density (g/cm^3)	3.1955	3.1999	3.1974

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.066	0.066	0.067	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.579	0.579	0.579	0.579	0.579
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.659	0.659	0.659	0.659
24052.60c	13.218	13.216	13.225	13.218	13.218
24053.60c	1.527	1.527	1.528	1.527	1.527
24054.60c	0.387	0.387	0.388	0.387	0.387
25055.50c	1.480	1.480	1.481	1.480	1.480
26054.60c	2.929	2.929	2.930	2.929	2.929
26056.60c	47.216	47.211	47.243	47.216	47.216
26057.60c	1.100	1.100	1.101	1.100	1.100
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.402	8.401	8.407	8.402	8.402
28060.60c	3.323	3.322	3.325	3.323	3.323
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.472	0.472	0.473	0.472	0.472
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.706	1.708	1.703	1.707	1.706
5010.50c	0.004	0.003	0.001	0.004	0.004
5011.56c	0.018	0.014	0.007	0.017	0.018
8016.50c	13.544	13.555	13.513	13.545	13.543
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.099	0.099	0.100	0.099	0.099
27059.50c	0.111	0.110	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.596	1.596	1.597	1.596	1.596
50000.35c	0.023	0.023	0.023	0.023	0.023

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Density (g/cm^3)	3.2684	3.2687	3.2665	3.2684	3.2684
MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.067	0.067	0.066	0.066	0.067
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.579	0.580	0.579	0.579	0.580
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.660	0.659	0.659	0.660
24052.60c	13.225	13.230	13.218	13.218	13.230
24053.60c	1.528	1.529	1.527	1.527	1.529
24054.60c	0.388	0.388	0.387	0.387	0.388
25055.50c	1.481	1.481	1.480	1.480	1.481
26054.60c	2.930	2.932	2.929	2.929	2.932
26056.60c	47.243	47.261	47.216	47.216	47.261
26057.60c	1.101	1.101	1.100	1.100	1.101
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.407	8.410	8.402	8.402	8.410
28060.60c	3.325	3.326	3.323	3.323	3.326
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.472	0.472	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.702	1.699	1.707	1.708	1.699
5010.50c	0.002	0.002	0.004	0.002	0.001
5011.56c	0.010	0.008	0.018	0.009	0.007
8016.50c	13.509	13.483	13.544	13.553	13.484
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.100	0.100	0.099	0.099	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.597	1.598	1.596	1.596	1.598
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2665	3.2652	3.2684	3.2684	3.2652

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.066	0.067	0.066	0.067	0.067
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.579	0.580	0.579	0.579	0.579
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.660	0.659	0.659	0.659
24052.60c	13.218	13.230	13.218	13.223	13.225
24053.60c	1.527	1.529	1.527	1.528	1.528
24054.60c	0.387	0.388	0.387	0.388	0.388
25055.50c	1.480	1.481	1.480	1.480	1.481
26054.60c	2.929	2.932	2.929	2.930	2.930
26056.60c	47.216	47.261	47.216	47.234	47.243
26057.60c	1.100	1.101	1.100	1.101	1.101
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.402	8.410	8.402	8.405	8.407
28060.60c	3.323	3.326	3.323	3.324	3.325
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.472	0.473	0.472	0.472	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.706	1.699	1.706	1.703	1.703
5010.50c	0.004	0.002	0.004	0.003	0.001
5011.56c	0.020	0.008	0.020	0.016	0.005
8016.50c	13.542	13.482	13.541	13.517	13.514
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.099	0.100	0.099	0.099	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.596	1.598	1.596	1.597	1.597
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2684	3.2652	3.2684	3.2671	3.2665

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.066	0.066	0.067	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.579	0.579	0.580	0.579	0.579
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.659	0.660	0.659	0.659
24052.60c	13.218	13.218	13.228	13.218	13.215
24053.60c	1.527	1.527	1.529	1.527	1.527
24054.60c	0.387	0.387	0.388	0.387	0.387
25055.50c	1.480	1.480	1.481	1.480	1.479
26054.60c	2.929	2.929	2.931	2.929	2.928
26056.60c	47.216	47.216	47.252	47.216	47.207
26057.60c	1.100	1.100	1.101	1.100	1.100
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.402	8.402	8.408	8.402	8.400
28060.60c	3.323	3.323	3.325	3.323	3.322
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.472	0.472	0.473	0.472	0.472
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.705	1.707	1.700	1.707	1.710
5010.50c	0.006	0.003	0.003	0.003	0.002
5011.56c	0.026	0.016	0.015	0.014	0.008

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
8016.50c	13.535	13.546	13.489	13.548	13.569
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.099	0.099	0.100	0.099	0.099
27059.50c	0.111	0.111	0.111	0.111	0.110
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.596	1.596	1.597	1.596	1.596
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2684	3.2684	3.2659	3.2684	3.2690

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.067	0.066	0.067	0.067	0.067
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.579	0.579	0.579	0.579	0.580
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.659	0.659	0.659	0.660
24052.60c	13.225	13.218	13.225	13.225	13.228
24053.60c	1.528	1.527	1.528	1.528	1.529
24054.60c	0.388	0.387	0.388	0.388	0.388
25055.50c	1.481	1.480	1.481	1.481	1.481
26054.60c	2.930	2.929	2.930	2.930	2.931
26056.60c	47.243	47.216	47.243	47.243	47.252
26057.60c	1.101	1.100	1.101	1.101	1.101
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.407	8.402	8.407	8.407	8.408
28060.60c	3.325	3.323	3.325	3.325	3.325
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.472	0.473	0.473	0.473

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.703	1.705	1.700	1.701	1.700
5010.50c	0.002	0.006	0.005	0.005	0.002
5011.56c	0.007	0.027	0.022	0.021	0.011
8016.50c	13.512	13.534	13.496	13.498	13.493
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.100	0.099	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.597	1.596	1.597	1.597	1.597
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2665	3.2684	3.2665	3.2665	3.2659

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.067	0.067	0.066	0.067	0.067
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.580	0.580	0.579	0.579	0.579
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.660	0.660	0.659	0.659	0.659
24052.60c	13.228	13.228	13.218	13.225	13.225
24053.60c	1.529	1.529	1.527	1.528	1.528
24054.60c	0.388	0.388	0.387	0.388	0.388
25055.50c	1.481	1.481	1.480	1.481	1.481
26054.60c	2.931	2.931	2.929	2.930	2.930
26056.60c	47.252	47.252	47.216	47.243	47.243
26057.60c	1.101	1.101	1.100	1.101	1.101
26058.60c	0.149	0.149	0.149	0.149	0.149

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
28058.60c	8.408	8.408	8.402	8.407	8.407
28060.60c	3.325	3.325	3.323	3.325	3.325
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.472	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.700	1.700	1.705	1.701	1.701
5010.50c	0.002	0.002	0.006	0.004	0.004
5011.56c	0.011	0.009	0.028	0.020	0.019
8016.50c	13.493	13.496	13.533	13.498	13.499
13027.50c	0.055	0.055	0.055	0.055	0.055
22000.50c	0.100	0.100	0.099	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.283	0.283	0.283	0.283	0.283
42000.50c	0.337	0.337	0.337	0.337	0.337
73181.50c	0.283	0.283	0.283	0.283	0.283
40000.60c	1.597	1.597	1.596	1.597	1.597
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2659	3.2659	3.2684	3.2665	3.2665

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.067	0.066	0.067
7014.50c	0.072	0.072	0.072
14000.50c	0.580	0.579	0.580
15031.50c	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023
24050.60c	0.660	0.659	0.660
24052.60c	13.235	13.218	13.228
24053.60c	1.530	1.527	1.529
24054.60c	0.388	0.387	0.388
25055.50c	1.482	1.480	1.481

Table 5.3.3-6. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing a RCCA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26054.60c	2.933	2.929	2.931
26056.60c	47.279	47.216	47.252
26057.60c	1.102	1.100	1.101
26058.60c	0.149	0.149	0.149
28058.60c	8.413	8.402	8.408
28060.60c	3.327	3.323	3.325
28061.60c	0.146	0.146	0.146
28062.60c	0.473	0.472	0.473
28064.60c	0.124	0.124	0.124
1001.50c	1.695	1.705	1.701
5010.50c	0.003	0.007	0.002
5011.56c	0.013	0.030	0.007
8016.50c	13.449	13.531	13.498
13027.50c	0.055	0.055	0.055
22000.50c	0.100	0.099	0.100
27059.50c	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010
41093.50c	0.284	0.283	0.283
42000.50c	0.337	0.337	0.337
73181.50c	0.284	0.283	0.283
40000.60c	1.598	1.596	1.597
50000.35c	0.023	0.023	0.023
Density (g/cm^3)	3.2640	3.2684	3.2659

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.658	0.658	0.658	0.658	0.658
24052.60c	13.197	13.196	13.205	13.197	13.197
24053.60c	1.525	1.525	1.526	1.525	1.525
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.476	1.476	1.477	1.476	1.476
26054.60c	2.922	2.922	2.924	2.922	2.922
26056.60c	47.111	47.107	47.138	47.111	47.111
26057.60c	1.098	1.098	1.099	1.098	1.098
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.409	8.408	8.414	8.409	8.409
28060.60c	3.325	3.325	3.327	3.325	3.325
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.720	1.721	1.716	1.720	1.720
5010.50c	0.004	0.003	0.001	0.004	0.004
5011.56c	0.018	0.015	0.007	0.017	0.019
8016.50c	13.650	13.661	13.619	13.651	13.650
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.284	0.284	0.285	0.284	0.284
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.284	0.284	0.285	0.284	0.284
40000.60c	1.604	1.603	1.604	1.604	1.604
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2534	3.2537	3.2515	3.2534	3.2534

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.658	0.659	0.658	0.658	0.659
24052.60c	13.205	13.210	13.197	13.197	13.210
24053.60c	1.526	1.527	1.525	1.525	1.527
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.477	1.478	1.476	1.476	1.478
26054.60c	2.924	2.925	2.922	2.922	2.925
26056.60c	47.138	47.157	47.111	47.111	47.157
26057.60c	1.099	1.099	1.098	1.098	1.099
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.414	8.417	8.409	8.409	8.417
28060.60c	3.327	3.329	3.325	3.325	3.329
28061.60c	0.146	0.147	0.146	0.146	0.147
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.716	1.712	1.720	1.721	1.712
5010.50c	0.002	0.002	0.004	0.002	0.002
5011.56c	0.010	0.008	0.018	0.009	0.007
8016.50c	13.616	13.589	13.650	13.660	13.590
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.011	0.010	0.010	0.011
41093.50c	0.285	0.285	0.284	0.284	0.285
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.285	0.285	0.284	0.284	0.285
40000.60c	1.604	1.605	1.604	1.604	1.605
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2515	3.2503	3.2534	3.2534	3.2503

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.658	0.659	0.658	0.658	0.658
24052.60c	13.197	13.210	13.197	13.202	13.205
24053.60c	1.525	1.527	1.525	1.526	1.526
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.476	1.478	1.476	1.477	1.477
26054.60c	2.922	2.925	2.922	2.923	2.924
26056.60c	47.111	47.157	47.111	47.129	47.138
26057.60c	1.098	1.099	1.098	1.098	1.099
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.409	8.417	8.409	8.412	8.414
28060.60c	3.325	3.329	3.325	3.327	3.327
28061.60c	0.146	0.147	0.146	0.146	0.146
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.720	1.712	1.720	1.717	1.716
5010.50c	0.004	0.002	0.004	0.003	0.001
5011.56c	0.020	0.008	0.020	0.016	0.005
8016.50c	13.648	13.588	13.648	13.624	13.620
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.011	0.010	0.010	0.010
41093.50c	0.284	0.285	0.284	0.285	0.285
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.284	0.285	0.284	0.285	0.285
40000.60c	1.604	1.605	1.604	1.604	1.604
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2534	3.2503	3.2534	3.2521	3.2515

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.658	0.658	0.659	0.658	0.658
24052.60c	13.197	13.197	13.208	13.197	13.195
24053.60c	1.525	1.525	1.526	1.525	1.525
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.476	1.476	1.478	1.476	1.476
26054.60c	2.922	2.922	2.925	2.922	2.922
26056.60c	47.111	47.111	47.148	47.111	47.102
26057.60c	1.098	1.098	1.099	1.098	1.098
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.409	8.409	8.415	8.409	8.407
28060.60c	3.325	3.325	3.328	3.325	3.325
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.719	1.720	1.713	1.721	1.723
5010.50c	0.006	0.004	0.003	0.003	0.002
5011.56c	0.026	0.016	0.015	0.014	0.008
8016.50c	13.641	13.652	13.595	13.655	13.676
13027.50c	0.056	0.056	0.056	0.056	0.055
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.284	0.284	0.285	0.284	0.284
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.284	0.284	0.285	0.284	0.284
40000.60c	1.604	1.604	1.605	1.604	1.603
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2534	3.2534	3.2509	3.2534	3.2540

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.658	0.658	0.658	0.658	0.659
24052.60c	13.205	13.197	13.205	13.205	13.208
24053.60c	1.526	1.525	1.526	1.526	1.526
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.477	1.476	1.477	1.477	1.478
26054.60c	2.924	2.922	2.924	2.924	2.925
26056.60c	47.138	47.111	47.138	47.138	47.148
26057.60c	1.099	1.098	1.099	1.099	1.099
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.414	8.409	8.414	8.414	8.415
28060.60c	3.327	3.325	3.327	3.327	3.328
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.716	1.719	1.714	1.714	1.714
5010.50c	0.002	0.006	0.005	0.005	0.003
5011.56c	0.007	0.027	0.023	0.021	0.011
8016.50c	13.619	13.640	13.602	13.604	13.599
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.285	0.284	0.285	0.285	0.285
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.285	0.284	0.285	0.285	0.285
40000.60c	1.604	1.604	1.604	1.604	1.605
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2515	3.2534	3.2515	3.2515	3.2509

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.066	0.066	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072	0.072	0.072
14000.50c	0.578	0.578	0.578	0.578	0.578
15031.50c	0.034	0.034	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023	0.023	0.023
24050.60c	0.659	0.659	0.658	0.658	0.658
24052.60c	13.208	13.208	13.197	13.205	13.205
24053.60c	1.526	1.526	1.525	1.526	1.526
24054.60c	0.387	0.387	0.387	0.387	0.387
25055.50c	1.478	1.478	1.476	1.477	1.477
26054.60c	2.925	2.925	2.922	2.924	2.924
26056.60c	47.148	47.148	47.111	47.138	47.138
26057.60c	1.099	1.099	1.098	1.099	1.099
26058.60c	0.149	0.149	0.149	0.149	0.149
28058.60c	8.415	8.415	8.409	8.414	8.414
28060.60c	3.328	3.328	3.325	3.327	3.327
28061.60c	0.146	0.146	0.146	0.146	0.146
28062.60c	0.473	0.473	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124	0.124	0.124
1001.50c	1.714	1.714	1.719	1.714	1.714
5010.50c	0.003	0.002	0.006	0.004	0.004
5011.56c	0.011	0.009	0.028	0.020	0.019
8016.50c	13.599	13.602	13.639	13.604	13.605
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.010	0.010	0.010	0.010	0.010
41093.50c	0.285	0.285	0.284	0.285	0.285
42000.50c	0.339	0.339	0.339	0.339	0.339
73181.50c	0.285	0.285	0.284	0.285	0.285
40000.60c	1.605	1.605	1.604	1.604	1.604
50000.35c	0.023	0.023	0.023	0.023	0.023
Density (g/cm^3)	3.2509	3.2509	3.2534	3.2515	3.2515

Table 5.3.3-7. Homogenized Composition for the Upper End-Fitting of the Fuel Assemblies Containing an APSRA

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.066	0.066	0.066
7014.50c	0.072	0.072	0.072
14000.50c	0.579	0.578	0.578
15031.50c	0.034	0.034	0.034
16032.50c	0.023	0.023	0.023
24050.60c	0.659	0.658	0.659
24052.60c	13.215	13.197	13.208
24053.60c	1.527	1.525	1.526
24054.60c	0.387	0.387	0.387
25055.50c	1.478	1.476	1.478
26054.60c	2.926	2.922	2.925
26056.60c	47.175	47.111	47.148
26057.60c	1.099	1.098	1.099
26058.60c	0.149	0.149	0.149
28058.60c	8.420	8.409	8.415
28060.60c	3.330	3.325	3.328
28061.60c	0.147	0.146	0.146
28062.60c	0.473	0.473	0.473
28064.60c	0.124	0.124	0.124
1001.50c	1.708	1.718	1.714
5010.50c	0.003	0.007	0.002
5011.56c	0.013	0.030	0.007
8016.50c	13.554	13.637	13.604
13027.50c	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100
27059.50c	0.111	0.111	0.111
29063.60c	0.023	0.023	0.023
29065.60c	0.011	0.010	0.010
41093.50c	0.285	0.284	0.285
42000.50c	0.339	0.339	0.339
73181.50c	0.285	0.284	0.285
40000.60c	1.606	1.604	1.605
50000.35c	0.023	0.023	0.023
Density (g/cm^3)	3.2490	3.2534	3.2509

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
6000.50c	0.055	0.055	0.056	0.055	0.055
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.475	0.475	0.476	0.475	0.475
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.550	0.550	0.550	0.550	0.550
24052.60c	11.028	11.026	11.039	11.028	11.028
24053.60c	1.274	1.274	1.276	1.274	1.274
24054.60c	0.323	0.323	0.324	0.323	0.323
25055.50c	1.203	1.202	1.204	1.203	1.203
26054.60c	2.386	2.386	2.389	2.386	2.386
26056.60c	38.471	38.464	38.510	38.470	38.470
26057.60c	0.897	0.896	0.897	0.897	0.897
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.570	7.569	7.578	7.570	7.570
28060.60c	2.994	2.993	2.997	2.994	2.994
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.425	0.426	0.426	0.426
28064.60c	0.111	0.111	0.111	0.111	0.111
1001.50c	3.021	3.023	3.015	3.021	3.021
5010.50c	0.007	0.005	0.003	0.006	0.007
5011.56c	0.032	0.025	0.011	0.029	0.032
8016.50c	23.976	23.994	23.932	23.979	23.976
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.112	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.286
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.286
40000.60c	3.580	3.580	3.584	3.580	3.580
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2487	2.2491	2.2464	2.2487	2.2487

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
6000.50c	0.056	0.056	0.055	0.055	0.056
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.476	0.476	0.475	0.475	0.476
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.550	0.551	0.550	0.550	0.551
24052.60c	11.039	11.046	11.028	11.028	11.046
24053.60c	1.276	1.277	1.274	1.274	1.277
24054.60c	0.324	0.324	0.323	0.323	0.324
25055.50c	1.204	1.205	1.203	1.203	1.205
26054.60c	2.389	2.390	2.386	2.386	2.390
26056.60c	38.510	38.536	38.470	38.470	38.536
26057.60c	0.897	0.898	0.897	0.897	0.898
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.578	7.583	7.570	7.570	7.583
28060.60c	2.997	2.999	2.994	2.994	2.999
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.426	0.426	0.426	0.426
28064.60c	0.111	0.112	0.111	0.111	0.112
1001.50c	3.015	3.010	3.021	3.023	3.010
5010.50c	0.004	0.003	0.007	0.004	0.003
5011.56c	0.017	0.013	0.031	0.016	0.012
8016.50c	23.926	23.886	23.977	23.993	23.888
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.112	0.112	0.111	0.111	0.112
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.286
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.286
40000.60c	3.584	3.586	3.580	3.580	3.586
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2464	2.2449	2.2487	2.2487	2.2449

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
6000.50c	0.055	0.056	0.055	0.055	0.056
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.475	0.476	0.475	0.476	0.476
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.550	0.551	0.550	0.550	0.550
24052.60c	11.028	11.046	11.028	11.035	11.039
24053.60c	1.274	1.277	1.274	1.275	1.276
24054.60c	0.323	0.324	0.323	0.323	0.324
25055.50c	1.203	1.205	1.203	1.203	1.204
26054.60c	2.386	2.390	2.386	2.388	2.389
26056.60c	38.470	38.536	38.470	38.497	38.510
26057.60c	0.897	0.898	0.897	0.897	0.897
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.570	7.583	7.570	7.575	7.578
28060.60c	2.994	2.999	2.994	2.996	2.997
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.426	0.426	0.426	0.426
28064.60c	0.111	0.112	0.111	0.111	0.111
1001.50c	3.020	3.009	3.020	3.016	3.016
5010.50c	0.008	0.003	0.008	0.006	0.002
5011.56c	0.035	0.014	0.035	0.027	0.009
8016.50c	23.973	23.885	23.972	23.937	23.935
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.112	0.111	0.112	0.112
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.286
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.286
40000.60c	3.580	3.586	3.580	3.583	3.584
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2487	2.2449	2.2487	2.2472	2.2464

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
6000.50c	0.055	0.055	0.056	0.055	0.055
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.475	0.475	0.476	0.475	0.475
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.550	0.550	0.551	0.550	0.550
24052.60c	11.028	11.028	11.043	11.028	11.024
24053.60c	1.274	1.274	1.276	1.274	1.274
24054.60c	0.323	0.323	0.324	0.323	0.323
25055.50c	1.203	1.203	1.204	1.203	1.202
26054.60c	2.386	2.386	2.390	2.386	2.386
26056.60c	38.470	38.470	38.523	38.470	38.457
26057.60c	0.897	0.897	0.898	0.897	0.896
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.570	7.570	7.580	7.570	7.568
28060.60c	2.994	2.994	2.998	2.994	2.993
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.426	0.426	0.426	0.425
28064.60c	0.111	0.111	0.111	0.111	0.111
1001.50c	3.019	3.021	3.011	3.022	3.026
5010.50c	0.010	0.006	0.006	0.005	0.003
5011.56c	0.046	0.028	0.026	0.024	0.013
8016.50c	23.961	23.981	23.894	23.985	24.018
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.111	0.111	0.112	0.111	0.111
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.285
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.285
40000.60c	3.580	3.580	3.585	3.580	3.579
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2487	2.2487	2.2456	2.2487	2.2495

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
6000.50c	0.056	0.055	0.056	0.056	0.056
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.476	0.475	0.476	0.476	0.476
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.550	0.550	0.550	0.550	0.551
24052.60c	11.039	11.028	11.039	11.039	11.043
24053.60c	1.276	1.274	1.276	1.276	1.276
24054.60c	0.324	0.323	0.324	0.324	0.324
25055.50c	1.204	1.203	1.204	1.204	1.204
26054.60c	2.389	2.386	2.389	2.389	2.390
26056.60c	38.510	38.470	38.510	38.510	38.523
26057.60c	0.897	0.897	0.897	0.897	0.898
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.578	7.570	7.578	7.578	7.580
28060.60c	2.997	2.994	2.997	2.997	2.998
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.426	0.426	0.426	0.426
28064.60c	0.111	0.111	0.111	0.111	0.111
1001.50c	3.015	3.019	3.012	3.012	3.011
5010.50c	0.003	0.010	0.009	0.008	0.004
5011.56c	0.012	0.047	0.039	0.036	0.020
8016.50c	23.932	23.960	23.902	23.905	23.901
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.112	0.111	0.112	0.112	0.112
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.286
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.286
40000.60c	3.584	3.580	3.584	3.584	3.585
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2464	2.2487	2.2464	2.2464	2.2456

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
6000.50c	0.056	0.056	0.055	0.056	0.056
7014.50c	0.058	0.058	0.058	0.058	0.058
14000.50c	0.476	0.476	0.475	0.476	0.476
15031.50c	0.028	0.028	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019	0.019	0.019
24050.60c	0.551	0.551	0.550	0.550	0.550
24052.60c	11.043	11.043	11.028	11.039	11.039
24053.60c	1.276	1.276	1.274	1.276	1.276
24054.60c	0.324	0.324	0.323	0.324	0.324
25055.50c	1.204	1.204	1.203	1.204	1.204
26054.60c	2.390	2.390	2.386	2.389	2.389
26056.60c	38.523	38.523	38.470	38.510	38.510
26057.60c	0.898	0.898	0.897	0.897	0.897
26058.60c	0.122	0.122	0.122	0.122	0.122
28058.60c	7.580	7.580	7.570	7.578	7.578
28060.60c	2.998	2.998	2.994	2.997	2.997
28061.60c	0.132	0.132	0.132	0.132	0.132
28062.60c	0.426	0.426	0.426	0.426	0.426
28064.60c	0.111	0.111	0.111	0.111	0.111
1001.50c	3.011	3.012	3.018	3.012	3.012
5010.50c	0.004	0.003	0.011	0.008	0.007
5011.56c	0.020	0.015	0.050	0.035	0.033
8016.50c	23.901	23.906	23.957	23.906	23.909
13027.50c	0.056	0.056	0.056	0.056	0.056
22000.50c	0.100	0.100	0.100	0.100	0.100
27059.50c	0.112	0.112	0.111	0.112	0.112
29063.60c	0.023	0.023	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286	0.286	0.286
42000.50c	0.340	0.340	0.340	0.340	0.340
73181.50c	0.286	0.286	0.286	0.286	0.286
40000.60c	3.585	3.585	3.580	3.584	3.584
50000.35c	0.051	0.051	0.051	0.051	0.051
Density (g/cm^3)	2.2456	2.2456	2.2487	2.2464	2.2464

Table 5.3.3-8. Homogenized Composition for the Lower End-Fitting of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
6000.50c	0.056	0.055	0.056
7014.50c	0.058	0.058	0.058
14000.50c	0.476	0.475	0.476
15031.50c	0.028	0.028	0.028
16032.50c	0.019	0.019	0.019
24050.60c	0.551	0.550	0.551
24052.60c	11.054	11.028	11.043
24053.60c	1.277	1.274	1.276
24054.60c	0.324	0.323	0.324
25055.50c	1.205	1.203	1.204
26054.60c	2.392	2.386	2.390
26056.60c	38.562	38.470	38.523
26057.60c	0.899	0.897	0.898
26058.60c	0.122	0.122	0.122
28058.60c	7.588	7.570	7.580
28060.60c	3.001	2.994	2.998
28061.60c	0.132	0.132	0.132
28062.60c	0.427	0.426	0.426
28064.60c	0.112	0.111	0.111
1001.50c	3.003	3.018	3.012
5010.50c	0.005	0.011	0.003
5011.56c	0.022	0.052	0.012
8016.50c	23.833	23.954	23.910
13027.50c	0.056	0.056	0.056
22000.50c	0.101	0.100	0.100
27059.50c	0.112	0.111	0.112
29063.60c	0.023	0.023	0.023
29065.60c	0.011	0.011	0.011
41093.50c	0.286	0.286	0.286
42000.50c	0.341	0.340	0.340
73181.50c	0.286	0.286	0.286
40000.60c	3.589	3.580	3.585
50000.35c	0.051	0.051	0.051
Density (g/cm^3)	2.2434	2.2487	2.2456

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
1001.50c	7.02016	7.02388	7.01669	7.02093	7.01999
8016.50c	55.70756	55.73708	55.67998	55.71362	55.70617
5010.50c	0.01621	0.01287	0.00595	0.01498	0.01649
5011.56c	0.07403	0.05878	0.02719	0.06843	0.07532
6000.50c	0.02975	0.02974	0.02982	0.02975	0.02975
14000.50c	0.13014	0.13009	0.13045	0.13014	0.13014
15031.50c	0.00558	0.00558	0.00559	0.00558	0.00558
16032.50c	0.00558	0.00558	0.00559	0.00558	0.00558
24050.60c	0.29487	0.29476	0.29557	0.29487	0.29487
24052.60c	5.91341	5.91108	5.92743	5.91341	5.91341
24053.60c	0.68345	0.68318	0.68507	0.68345	0.68345
24054.60c	0.17328	0.17321	0.17369	0.17328	0.17328
25055.50c	0.13014	0.13009	0.13045	0.13014	0.13014
26054.60c	0.35623	0.35608	0.35707	0.35623	0.35623
26056.60c	5.74206	5.73980	5.75567	5.74206	5.74206
26057.60c	0.13383	0.13378	0.13415	0.13383	0.13383
26058.60c	0.01818	0.01818	0.01823	0.01818	0.01818
28058.60c	13.15660	13.15142	13.18779	13.15660	13.15660
28060.60c	5.20228	5.20023	5.21461	5.20228	5.20228
28061.60c	0.23004	0.22995	0.23059	0.23004	0.23004
28062.60c	0.73866	0.73837	0.74041	0.73866	0.73866
28064.60c	0.19416	0.19409	0.19462	0.19416	0.19416
13027.50c	0.18592	0.18585	0.18636	0.18592	0.18592
22000.50c	0.33466	0.33453	0.33545	0.33466	0.33466
27059.50c	0.37184	0.37170	0.37272	0.37184	0.37184
29063.60c	0.07619	0.07616	0.07637	0.07619	0.07619
29065.60c	0.03536	0.03535	0.03545	0.03536	0.03536
41093.50c	0.95285	0.95247	0.95511	0.95285	0.95285
42000.50c	1.13412	1.13367	1.13681	1.13412	1.13412
73181.50c	0.95285	0.95247	0.95511	0.95285	0.95285
Density (g/cm^3)	1.15854	1.15900	1.15580	1.15854	1.15854

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
1001.50c	7.01498	7.00961	7.02030	7.02506	7.01003
8016.50c	55.66641	55.62378	55.70862	55.74642	55.62712
5010.50c	0.00870	0.00672	0.01599	0.00835	0.00605
5011.56c	0.03973	0.03072	0.07306	0.03814	0.02763
6000.50c	0.02982	0.02987	0.02975	0.02975	0.02987
14000.50c	0.13045	0.13066	0.13014	0.13014	0.13066
15031.50c	0.00559	0.00560	0.00558	0.00558	0.00560
16032.50c	0.00559	0.00560	0.00558	0.00558	0.00560
24050.60c	0.29557	0.29604	0.29487	0.29487	0.29604
24052.60c	5.92743	5.93681	5.91341	5.91341	5.93681
24053.60c	0.68507	0.68615	0.68345	0.68345	0.68615
24054.60c	0.17369	0.17396	0.17328	0.17328	0.17396
25055.50c	0.13045	0.13066	0.13014	0.13014	0.13066
26054.60c	0.35707	0.35763	0.35623	0.35623	0.35763
26056.60c	5.75567	5.76478	5.74206	5.74206	5.76478
26057.60c	0.13415	0.13436	0.13383	0.13383	0.13436
26058.60c	0.01823	0.01826	0.01818	0.01818	0.01826
28058.60c	13.18779	13.20866	13.15660	13.15660	13.20866
28060.60c	5.21461	5.22287	5.20228	5.20228	5.22287
28061.60c	0.23059	0.23095	0.23004	0.23004	0.23095
28062.60c	0.74041	0.74158	0.73866	0.73866	0.74158
28064.60c	0.19462	0.19493	0.19416	0.19416	0.19493
13027.50c	0.18636	0.18666	0.18592	0.18592	0.18666
22000.50c	0.33545	0.33598	0.33466	0.33466	0.33598
27059.50c	0.37272	0.37331	0.37184	0.37184	0.37331
29063.60c	0.07637	0.07649	0.07619	0.07619	0.07649
29065.60c	0.03545	0.03550	0.03536	0.03536	0.03550
41093.50c	0.95511	0.95662	0.95285	0.95285	0.95662
42000.50c	1.13681	1.13861	1.13412	1.13412	1.13861
73181.50c	0.95511	0.95662	0.95285	0.95285	0.95662
Density (g/cm^3)	1.15580	1.15398	1.15854	1.15854	1.15398

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
1001.50c	7.01920	7.00930	7.01896	7.01495	7.01741
8016.50c	55.69994	55.62139	55.69805	55.66616	55.68572
5010.50c	0.01775	0.00721	0.01813	0.01403	0.00479
5011.56c	0.08107	0.03292	0.08282	0.06411	0.02190
6000.50c	0.02975	0.02987	0.02975	0.02979	0.02982
14000.50c	0.13014	0.13066	0.13014	0.13035	0.13045
15031.50c	0.00558	0.00560	0.00558	0.00559	0.00559
16032.50c	0.00558	0.00560	0.00558	0.00559	0.00559
24050.60c	0.29487	0.29604	0.29487	0.29534	0.29557
24052.60c	5.91341	5.93681	5.91341	5.92275	5.92743
24053.60c	0.68345	0.68615	0.68345	0.68453	0.68507
24054.60c	0.17328	0.17396	0.17328	0.17355	0.17369
25055.50c	0.13014	0.13066	0.13014	0.13035	0.13045
26054.60c	0.35623	0.35763	0.35623	0.35679	0.35707
26056.60c	5.74206	5.76478	5.74206	5.75113	5.75567
26057.60c	0.13383	0.13436	0.13383	0.13405	0.13415
26058.60c	0.01818	0.01826	0.01818	0.01821	0.01823
28058.60c	13.15660	13.20866	13.15660	13.17737	13.18779
28060.60c	5.20228	5.22287	5.20228	5.21050	5.21461
28061.60c	0.23004	0.23095	0.23004	0.23040	0.23059
28062.60c	0.73866	0.74158	0.73866	0.73983	0.74041
28064.60c	0.19416	0.19493	0.19416	0.19447	0.19462
13027.50c	0.18592	0.18666	0.18592	0.18621	0.18636
22000.50c	0.33466	0.33598	0.33466	0.33519	0.33545
27059.50c	0.37184	0.37331	0.37184	0.37243	0.37272
29063.60c	0.07619	0.07649	0.07619	0.07631	0.07637
29065.60c	0.03536	0.03550	0.03536	0.03542	0.03545
41093.50c	0.95285	0.95662	0.95285	0.95435	0.95511
42000.50c	1.13412	1.13861	1.13412	1.13591	1.13681
73181.50c	0.95285	0.95662	0.95285	0.95435	0.95511
Density (g/cm^3)	1.15854	1.15398	1.15854	1.15672	1.15580

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
1001.50c	7.01575	7.02143	7.00880	7.02265	7.02933
8016.50c	55.67253	55.71757	55.61735	55.72731	55.78032
5010.50c	0.02329	0.01418	0.01333	0.01221	0.00675
5011.56c	0.10639	0.06478	0.06087	0.05578	0.03084
6000.50c	0.02975	0.02975	0.02984	0.02975	0.02972
14000.50c	0.13014	0.13014	0.13056	0.13014	0.13004
15031.50c	0.00558	0.00558	0.00560	0.00558	0.00557
16032.50c	0.00558	0.00558	0.00560	0.00558	0.00557
24050.60c	0.29487	0.29487	0.29580	0.29487	0.29464
24052.60c	5.91341	5.91341	5.93212	5.91341	5.90876
24053.60c	0.68345	0.68345	0.68561	0.68345	0.68291
24054.60c	0.17328	0.17328	0.17383	0.17328	0.17314
25055.50c	0.13014	0.13014	0.13056	0.13014	0.13004
26054.60c	0.35623	0.35623	0.35735	0.35623	0.35594
26056.60c	5.74206	5.74206	5.76022	5.74206	5.73754
26057.60c	0.13383	0.13383	0.13426	0.13383	0.13373
26058.60c	0.01818	0.01818	0.01824	0.01818	0.01817
28058.60c	13.15660	13.15660	13.19822	13.15660	13.14624
28060.60c	5.20228	5.20228	5.21874	5.20228	5.19818
28061.60c	0.23004	0.23004	0.23077	0.23004	0.22986
28062.60c	0.73866	0.73866	0.74100	0.73866	0.73808
28064.60c	0.19416	0.19416	0.19478	0.19416	0.19401
13027.50c	0.18592	0.18592	0.18651	0.18592	0.18577
22000.50c	0.33466	0.33466	0.33572	0.33466	0.33439
27059.50c	0.37184	0.37184	0.37302	0.37184	0.37155
29063.60c	0.07619	0.07619	0.07643	0.07619	0.07613
29065.60c	0.03536	0.03536	0.03547	0.03536	0.03533
41093.50c	0.95285	0.95285	0.95586	0.95285	0.95210
42000.50c	1.13412	1.13412	1.13771	1.13412	1.13323
73181.50c	0.95285	0.95285	0.95586	0.95285	0.95210
Density (g/cm^3)	1.15854	1.15854	1.15489	1.15854	1.15946

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
1001.50c	7.01650	7.01527	7.00788	7.00885	7.01078
8016.50c	55.67848	55.66876	55.61006	55.61778	55.63314
5010.50c	0.00626	0.02405	0.02009	0.01853	0.01013
5011.56c	0.02858	0.10988	0.09179	0.08466	0.04629
6000.50c	0.02982	0.02975	0.02982	0.02982	0.02984
14000.50c	0.13045	0.13014	0.13045	0.13045	0.13056
15031.50c	0.00559	0.00558	0.00559	0.00559	0.00560
16032.50c	0.00559	0.00558	0.00559	0.00559	0.00560
24050.60c	0.29557	0.29487	0.29557	0.29557	0.29580
24052.60c	5.92743	5.91341	5.92743	5.92743	5.93212
24053.60c	0.68507	0.68345	0.68507	0.68507	0.68561
24054.60c	0.17369	0.17328	0.17369	0.17369	0.17383
25055.50c	0.13045	0.13014	0.13045	0.13045	0.13056
26054.60c	0.35707	0.35623	0.35707	0.35707	0.35735
26056.60c	5.75567	5.74206	5.75567	5.75567	5.76022
26057.60c	0.13415	0.13383	0.13415	0.13415	0.13426
26058.60c	0.01823	0.01818	0.01823	0.01823	0.01824
28058.60c	13.18779	13.15660	13.18779	13.18779	13.19822
28060.60c	5.21461	5.20228	5.21461	5.21461	5.21874
28061.60c	0.23059	0.23004	0.23059	0.23059	0.23077
28062.60c	0.74041	0.73866	0.74041	0.74041	0.74100
28064.60c	0.19462	0.19416	0.19462	0.19462	0.19478
13027.50c	0.18636	0.18592	0.18636	0.18636	0.18651
22000.50c	0.33545	0.33466	0.33545	0.33545	0.33572
27059.50c	0.37272	0.37184	0.37272	0.37272	0.37302
29063.60c	0.07637	0.07619	0.07637	0.07637	0.07643
29065.60c	0.03545	0.03536	0.03545	0.03545	0.03547
41093.50c	0.95511	0.95285	0.95511	0.95511	0.95586
42000.50c	1.13681	1.13412	1.13681	1.13681	1.13771
73181.50c	0.95511	0.95285	0.95511	0.95511	0.95586
Density (g/cm^3)	1.15580	1.15854	1.15580	1.15580	1.15489

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
1001.50c	7.01078	7.01212	7.01450	7.00913	7.00977
8016.50c	55.63314	55.64370	55.66259	55.62000	55.62505
5010.50c	0.01013	0.00800	0.02530	0.01808	0.01706
5011.56c	0.04629	0.03653	0.11557	0.08261	0.07794
6000.50c	0.02984	0.02984	0.02975	0.02982	0.02982
14000.50c	0.13056	0.13056	0.13014	0.13045	0.13045
15031.50c	0.00560	0.00560	0.00558	0.00559	0.00559
16032.50c	0.00560	0.00560	0.00558	0.00559	0.00559
24050.60c	0.29580	0.29580	0.29487	0.29557	0.29557
24052.60c	5.93212	5.93212	5.91341	5.92743	5.92743
24053.60c	0.68561	0.68561	0.68345	0.68507	0.68507
24054.60c	0.17383	0.17383	0.17328	0.17369	0.17369
25055.50c	0.13056	0.13056	0.13014	0.13045	0.13045
26054.60c	0.35735	0.35735	0.35623	0.35707	0.35707
26056.60c	5.76022	5.76022	5.74206	5.75567	5.75567
26057.60c	0.13426	0.13426	0.13383	0.13415	0.13415
26058.60c	0.01824	0.01824	0.01818	0.01823	0.01823
28058.60c	13.19822	13.19822	13.15660	13.18779	13.18779
28060.60c	5.21874	5.21874	5.20228	5.21461	5.21461
28061.60c	0.23077	0.23077	0.23004	0.23059	0.23059
28062.60c	0.74100	0.74100	0.73866	0.74041	0.74041
28064.60c	0.19478	0.19478	0.19416	0.19462	0.19462
13027.50c	0.18651	0.18651	0.18592	0.18636	0.18636
22000.50c	0.33572	0.33572	0.33466	0.33545	0.33545
27059.50c	0.37302	0.37302	0.37184	0.37272	0.37272
29063.60c	0.07643	0.07643	0.07619	0.07637	0.07637
29065.60c	0.03547	0.03547	0.03536	0.03545	0.03545
41093.50c	0.95586	0.95586	0.95285	0.95511	0.95511
42000.50c	1.13771	1.13771	1.13412	1.13681	1.13681
73181.50c	0.95586	0.95586	0.95285	0.95511	0.95511
Density (g/cm^3)	1.15489	1.15489	1.15854	1.15580	1.15580

Table 5.3.3-9. Homogenized Composition for the Upper End Spacer Grid of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
1001.50c	7.00018	7.01370	7.01323
8016.50c	55.54899	55.65626	55.65254
5010.50c	0.01122	0.02658	0.00621
5011.56c	0.05126	0.12142	0.02836
6000.50c	0.02991	0.02975	0.02984
14000.50c	0.13087	0.13014	0.13056
15031.50c	0.00561	0.00558	0.00560
16032.50c	0.00561	0.00558	0.00560
24050.60c	0.29651	0.29487	0.29580
24052.60c	5.94623	5.91341	5.93212
24053.60c	0.68724	0.68345	0.68561
24054.60c	0.17424	0.17328	0.17383
25055.50c	0.13087	0.13014	0.13056
26054.60c	0.35820	0.35623	0.35735
26056.60c	5.77392	5.74206	5.76022
26057.60c	0.13458	0.13383	0.13426
26058.60c	0.01828	0.01818	0.01824
28058.60c	13.22960	13.15660	13.19822
28060.60c	5.23115	5.20228	5.21874
28061.60c	0.23132	0.23004	0.23077
28062.60c	0.74276	0.73866	0.74100
28064.60c	0.19524	0.19416	0.19478
13027.50c	0.18695	0.18592	0.18651
22000.50c	0.33652	0.33466	0.33572
27059.50c	0.37391	0.37184	0.37302
29063.60c	0.07661	0.07619	0.07643
29065.60c	0.03556	0.03536	0.03547
41093.50c	0.95813	0.95285	0.95586
42000.50c	1.14041	1.13412	1.13771
73181.50c	0.95813	0.95285	0.95586
Density (g/cm^3)	1.15215	1.15854	1.15489

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
1001.50c	5.41547	5.41882	5.40985	5.41605	5.41533
8016.50c	42.97370	43.00034	42.92916	42.97837	42.97262
5010.50c	0.01275	0.01017	0.00484	0.01180	0.01297
5011.56c	0.05823	0.04647	0.02209	0.05391	0.05923
6000.50c	0.04123	0.04122	0.04131	0.04123	0.04123
14000.50c	0.18040	0.18035	0.18073	0.18040	0.18040
15031.50c	0.00773	0.00773	0.00775	0.00773	0.00773
16032.50c	0.00773	0.00773	0.00775	0.00773	0.00773
24050.60c	0.40874	0.40861	0.40948	0.40874	0.40874
24052.60c	8.19688	8.19438	8.21186	8.19688	8.19688
24053.60c	0.94736	0.94707	0.94909	0.94736	0.94736
24054.60c	0.24019	0.24012	0.24063	0.24019	0.24019
25055.50c	0.18040	0.18035	0.18073	0.18040	0.18040
26054.60c	0.49378	0.49363	0.49468	0.49378	0.49378
26056.60c	7.95935	7.95693	7.97390	7.95935	7.95935
26057.60c	0.18551	0.18546	0.18585	0.18551	0.18551
26058.60c	0.02521	0.02520	0.02525	0.02521	0.02521
28058.60c	18.23701	18.23147	18.27034	18.23701	18.23701
28060.60c	7.21114	7.20895	7.22432	7.21114	7.21114
28061.60c	0.31887	0.31877	0.31945	0.31887	0.31887
28062.60c	1.02389	1.02358	1.02577	1.02389	1.02389
28064.60c	0.26914	0.26906	0.26963	0.26914	0.26914
13027.50c	0.25771	0.25764	0.25819	0.25771	0.25771
22000.50c	0.46389	0.46375	0.46473	0.46389	0.46389
27059.50c	0.51543	0.51527	0.51637	0.51543	0.51543
29063.60c	0.10561	0.10558	0.10580	0.10561	0.10561
29065.60c	0.04902	0.04900	0.04911	0.04902	0.04902
41093.50c	1.32079	1.32039	1.32320	1.32079	1.32079
42000.50c	1.57206	1.57158	1.57493	1.57206	1.57206
73181.50c	1.32079	1.32039	1.32320	1.32079	1.32079
Density (g/cm^3)	1.44142	1.44186	1.43879	1.44142	1.44142

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
1001.50c	5.40853	5.40243	5.41557	5.41924	5.40276
8016.50c	42.91870	42.87029	42.97451	43.00367	42.87286
5010.50c	0.00695	0.00543	0.01258	0.00669	0.00491
5011.56c	0.03176	0.02480	0.05748	0.03054	0.02243
6000.50c	0.04131	0.04136	0.04123	0.04123	0.04136
14000.50c	0.18073	0.18095	0.18040	0.18040	0.18095
15031.50c	0.00775	0.00776	0.00773	0.00773	0.00776
16032.50c	0.00775	0.00776	0.00773	0.00773	0.00776
24050.60c	0.40948	0.40998	0.40874	0.40874	0.40998
24052.60c	8.21186	8.22187	8.19688	8.19688	8.22187
24053.60c	0.94909	0.95025	0.94736	0.94736	0.95025
24054.60c	0.24063	0.24092	0.24019	0.24019	0.24092
25055.50c	0.18073	0.18095	0.18040	0.18040	0.18095
26054.60c	0.49468	0.49529	0.49378	0.49378	0.49529
26056.60c	7.97390	7.98363	7.95935	7.95935	7.98363
26057.60c	0.18585	0.18608	0.18551	0.18551	0.18608
26058.60c	0.02525	0.02528	0.02521	0.02521	0.02528
28058.60c	18.27034	18.29263	18.23701	18.23701	18.29263
28060.60c	7.22432	7.23313	7.21114	7.21114	7.23313
28061.60c	0.31945	0.31984	0.31887	0.31887	0.31984
28062.60c	1.02577	1.02702	1.02389	1.02389	1.02702
28064.60c	0.26963	0.26996	0.26914	0.26914	0.26996
13027.50c	0.25819	0.25850	0.25771	0.25771	0.25850
22000.50c	0.46473	0.46530	0.46389	0.46389	0.46530
27059.50c	0.51637	0.51700	0.51543	0.51543	0.51700
29063.60c	0.10580	0.10593	0.10561	0.10561	0.10593
29065.60c	0.04911	0.04917	0.04902	0.04902	0.04917
41093.50c	1.32320	1.32482	1.32079	1.32079	1.32482
42000.50c	1.57493	1.57685	1.57206	1.57206	1.57685
73181.50c	1.32320	1.32482	1.32079	1.32079	1.32482
Density (g/cm^3)	1.43879	1.43704	1.44142	1.44142	1.43704

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
1001.50c	5.41472	5.40220	5.41454	5.40949	5.41041
8016.50c	42.96782	42.86845	42.96636	42.92626	42.93358
5010.50c	0.01394	0.00580	0.01423	0.01107	0.00394
5011.56c	0.06366	0.02650	0.06501	0.05056	0.01801
6000.50c	0.04123	0.04136	0.04123	0.04128	0.04131
14000.50c	0.18040	0.18095	0.18040	0.18062	0.18073
15031.50c	0.00773	0.00776	0.00773	0.00774	0.00775
16032.50c	0.00773	0.00776	0.00773	0.00774	0.00775
24050.60c	0.40874	0.40998	0.40874	0.40923	0.40948
24052.60c	8.19688	8.22187	8.19688	8.20686	8.21186
24053.60c	0.94736	0.95025	0.94736	0.94851	0.94909
24054.60c	0.24019	0.24092	0.24019	0.24048	0.24063
25055.50c	0.18040	0.18095	0.18040	0.18062	0.18073
26054.60c	0.49378	0.49529	0.49378	0.49438	0.49468
26056.60c	7.95935	7.98363	7.95935	7.96905	7.97390
26057.60c	0.18551	0.18608	0.18551	0.18574	0.18585
26058.60c	0.02521	0.02528	0.02521	0.02524	0.02525
28058.60c	18.23701	18.29263	18.23701	18.25922	18.27034
28060.60c	7.21114	7.23313	7.21114	7.21992	7.22432
28061.60c	0.31887	0.31984	0.31887	0.31926	0.31945
28062.60c	1.02389	1.02702	1.02389	1.02514	1.02577
28064.60c	0.26914	0.26996	0.26914	0.26947	0.26963
13027.50c	0.25771	0.25850	0.25771	0.25803	0.25819
22000.50c	0.46389	0.46530	0.46389	0.46445	0.46473
27059.50c	0.51543	0.51700	0.51543	0.51606	0.51637
29063.60c	0.10561	0.10593	0.10561	0.10574	0.10580
29065.60c	0.04902	0.04917	0.04902	0.04908	0.04911
41093.50c	1.32079	1.32482	1.32079	1.32240	1.32320
42000.50c	1.57206	1.57685	1.57206	1.57397	1.57493
73181.50c	1.32079	1.32482	1.32079	1.32240	1.32320
Density (g/cm^3)	1.44142	1.43704	1.44142	1.43967	1.43879

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
1001.50c	5.41206	5.41644	5.40279	5.41739	5.42352
8016.50c	42.94668	42.98142	42.87311	42.98894	43.03758
5010.50c	0.01821	0.01119	0.01052	0.00967	0.00546
5011.56c	0.08319	0.05110	0.04805	0.04416	0.02492
6000.50c	0.04123	0.04123	0.04133	0.04123	0.04121
14000.50c	0.18040	0.18040	0.18084	0.18040	0.18029
15031.50c	0.00773	0.00773	0.00775	0.00773	0.00773
16032.50c	0.00773	0.00773	0.00775	0.00773	0.00773
24050.60c	0.40874	0.40874	0.40973	0.40874	0.40849
24052.60c	8.19688	8.19688	8.21686	8.19688	8.19189
24053.60c	0.94736	0.94736	0.94967	0.94736	0.94678
24054.60c	0.24019	0.24019	0.24078	0.24019	0.24004
25055.50c	0.18040	0.18040	0.18084	0.18040	0.18029
26054.60c	0.49378	0.49378	0.49499	0.49378	0.49348
26056.60c	7.95935	7.95935	7.97876	7.95935	7.95452
26057.60c	0.18551	0.18551	0.18597	0.18551	0.18540
26058.60c	0.02521	0.02521	0.02527	0.02521	0.02519
28058.60c	18.23701	18.23701	18.28148	18.23701	18.22593
28060.60c	7.21114	7.21114	7.22872	7.21114	7.20675
28061.60c	0.31887	0.31887	0.31965	0.31887	0.31868
28062.60c	1.02389	1.02389	1.02639	1.02389	1.02327
28064.60c	0.26914	0.26914	0.26979	0.26914	0.26897
13027.50c	0.25771	0.25771	0.25834	0.25771	0.25756
22000.50c	0.46389	0.46389	0.46502	0.46389	0.46360
27059.50c	0.51543	0.51543	0.51669	0.51543	0.51512
29063.60c	0.10561	0.10561	0.10587	0.10561	0.10555
29065.60c	0.04902	0.04902	0.04914	0.04902	0.04899
41093.50c	1.32079	1.32079	1.32401	1.32079	1.31999
42000.50c	1.57206	1.57206	1.57589	1.57206	1.57110
73181.50c	1.32079	1.32079	1.32401	1.32079	1.31999
Density (g/cm^3)	1.44142	1.44142	1.43791	1.44142	1.44230

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
1001.50c	5.40971	5.41169	5.40306	5.40381	5.40432
8016.50c	42.92800	42.94376	42.87525	42.88120	42.88528
5010.50c	0.00507	0.01880	0.01574	0.01454	0.00806
5011.56c	0.02316	0.08589	0.07189	0.06640	0.03681
6000.50c	0.04131	0.04123	0.04131	0.04131	0.04133
14000.50c	0.18073	0.18040	0.18073	0.18073	0.18084
15031.50c	0.00775	0.00773	0.00775	0.00775	0.00775
16032.50c	0.00775	0.00773	0.00775	0.00775	0.00775
24050.60c	0.40948	0.40874	0.40948	0.40948	0.40973
24052.60c	8.21186	8.19688	8.21186	8.21186	8.21686
24053.60c	0.94909	0.94736	0.94909	0.94909	0.94967
24054.60c	0.24063	0.24019	0.24063	0.24063	0.24078
25055.50c	0.18073	0.18040	0.18073	0.18073	0.18084
26054.60c	0.49468	0.49378	0.49468	0.49468	0.49499
26056.60c	7.97390	7.95935	7.97390	7.97390	7.97876
26057.60c	0.18585	0.18551	0.18585	0.18585	0.18597
26058.60c	0.02525	0.02521	0.02525	0.02525	0.02527
28058.60c	18.27034	18.23701	18.27034	18.27034	18.28148
28060.60c	7.22432	7.21114	7.22432	7.22432	7.22872
28061.60c	0.31945	0.31887	0.31945	0.31945	0.31965
28062.60c	1.02577	1.02389	1.02577	1.02577	1.02639
28064.60c	0.26963	0.26914	0.26963	0.26963	0.26979
13027.50c	0.25819	0.25771	0.25819	0.25819	0.25834
22000.50c	0.46473	0.46389	0.46473	0.46473	0.46502
27059.50c	0.51637	0.51543	0.51637	0.51637	0.51669
29063.60c	0.10580	0.10561	0.10580	0.10580	0.10587
29065.60c	0.04911	0.04902	0.04911	0.04911	0.04914
41093.50c	1.32320	1.32079	1.32320	1.32320	1.32401
42000.50c	1.57493	1.57206	1.57493	1.57493	1.57589
73181.50c	1.32320	1.32079	1.32320	1.32320	1.32401
Density (g/cm3)	1.43879	1.44142	1.43879	1.43879	1.43791

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
1001.50c	5.40432	5.40535	5.41109	5.40403	5.40452
8016.50c	42.88528	42.89342	42.93901	42.88291	42.88681
5010.50c	0.00806	0.00641	0.01976	0.01419	0.01340
5011.56c	0.03681	0.02929	0.09028	0.06482	0.06122
6000.50c	0.04133	0.04133	0.04123	0.04131	0.04131
14000.50c	0.18084	0.18084	0.18040	0.18073	0.18073
15031.50c	0.00775	0.00775	0.00773	0.00775	0.00775
16032.50c	0.00775	0.00775	0.00773	0.00775	0.00775
24050.60c	0.40973	0.40973	0.40874	0.40948	0.40948
24052.60c	8.21686	8.21686	8.19688	8.21186	8.21186
24053.60c	0.94967	0.94967	0.94736	0.94909	0.94909
24054.60c	0.24078	0.24078	0.24019	0.24063	0.24063
25055.50c	0.18084	0.18084	0.18040	0.18073	0.18073
26054.60c	0.49499	0.49499	0.49378	0.49468	0.49468
26056.60c	7.97876	7.97876	7.95935	7.97390	7.97390
26057.60c	0.18597	0.18597	0.18551	0.18585	0.18585
26058.60c	0.02527	0.02527	0.02521	0.02525	0.02525
28058.60c	18.28148	18.28148	18.23701	18.27034	18.27034
28060.60c	7.22872	7.22872	7.21114	7.22432	7.22432
28061.60c	0.31965	0.31965	0.31887	0.31945	0.31945
28062.60c	1.02639	1.02639	1.02389	1.02577	1.02577
28064.60c	0.26979	0.26979	0.26914	0.26963	0.26963
13027.50c	0.25834	0.25834	0.25771	0.25819	0.25819
22000.50c	0.46502	0.46502	0.46389	0.46473	0.46473
27059.50c	0.51669	0.51669	0.51543	0.51637	0.51637
29063.60c	0.10587	0.10587	0.10561	0.10580	0.10580
29065.60c	0.04914	0.04914	0.04902	0.04911	0.04911
41093.50c	1.32401	1.32401	1.32079	1.32320	1.32320
42000.50c	1.57589	1.57589	1.57206	1.57493	1.57493
73181.50c	1.32401	1.32401	1.32079	1.32320	1.32320
Density (g/cm^3)	1.43791	1.43791	1.44142	1.43879	1.43879

Table 5.3.3-10. Homogenized Composition for the Inconel Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
1001.50c	5.39321	5.41048	5.40621
8016.50c	42.79709	42.93412	42.90023
5010.50c	0.00889	0.02075	0.00503
5011.56c	0.04062	0.09479	0.02299
6000.50c	0.04141	0.04123	0.04133
14000.50c	0.18117	0.18040	0.18084
15031.50c	0.00776	0.00773	0.00775
16032.50c	0.00776	0.00773	0.00775
24050.60c	0.41048	0.40874	0.40973
24052.60c	8.23192	8.19688	8.21686
24053.60c	0.95141	0.94736	0.94967
24054.60c	0.24122	0.24019	0.24078
25055.50c	0.18117	0.18040	0.18084
26054.60c	0.49589	0.49378	0.49499
26056.60c	7.99338	7.95935	7.97876
26057.60c	0.18631	0.18551	0.18597
26058.60c	0.02531	0.02521	0.02527
28058.60c	18.31497	18.23701	18.28148
28060.60c	7.24197	7.21114	7.22872
28061.60c	0.32023	0.31887	0.31965
28062.60c	1.02827	1.02389	1.02639
28064.60c	0.27029	0.26914	0.26979
13027.50c	0.25882	0.25771	0.25834
22000.50c	0.46587	0.46389	0.46502
27059.50c	0.51763	0.51543	0.51669
29063.60c	0.10606	0.10561	0.10587
29065.60c	0.04923	0.04902	0.04914
41093.50c	1.32643	1.32079	1.32401
42000.50c	1.57878	1.57206	1.57589
73181.50c	1.32643	1.32079	1.32401
Density (g/cm^3)	1.43528	1.44142	1.43791

Table 5.3.3-11. Homogenized Composition for the Zircaloy-4 Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
1001.50c	5.84146	5.84619	5.83259	5.84721	5.85355
8016.50c	46.41138	46.44889	46.34109	46.45700	46.50722
5010.50c	0.01906	0.01147	0.01075	0.00983	0.00529
5011.56c	0.08706	0.05241	0.04913	0.04492	0.02416
24050.60c	0.00199	0.00199	0.00200	0.00199	0.00199
24052.60c	0.03992	0.03992	0.04003	0.03992	0.03990
24053.60c	0.00461	0.00461	0.00463	0.00461	0.00461
24054.60c	0.00117	0.00117	0.00117	0.00117	0.00117
26054.60c	0.00544	0.00544	0.00545	0.00544	0.00543
26056.60c	0.08764	0.08764	0.08787	0.08764	0.08758
26057.60c	0.00204	0.00204	0.00205	0.00204	0.00204
26058.60c	0.00028	0.00028	0.00028	0.00028	0.00028
40000.60c	46.83017	46.83017	46.95344	46.83017	46.79945
50000.35c	0.66778	0.66778	0.66953	0.66778	0.66734
Density (g/cm^3)	1.32698	1.32698	1.32350	1.32698	1.32786

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
1001.50c	5.83977	5.84107	5.83259	5.83340	5.83424
8016.50c	46.39806	46.40824	46.34112	46.34754	46.35422
5010.50c	0.00487	0.01969	0.01639	0.01509	0.00810
5011.56c	0.02226	0.08996	0.07487	0.06893	0.03699
24050.60c	0.00199	0.00199	0.00199	0.00199	0.00200
24052.60c	0.04000	0.03992	0.04000	0.04000	0.04003
24053.60c	0.00462	0.00461	0.00462	0.00462	0.00463
24054.60c	0.00117	0.00117	0.00117	0.00117	0.00117
26054.60c	0.00545	0.00544	0.00545	0.00545	0.00545
26056.60c	0.08781	0.08764	0.08781	0.08781	0.08787
26057.60c	0.00205	0.00204	0.00205	0.00205	0.00205
26058.60c	0.00028	0.00028	0.00028	0.00028	0.00028
40000.60c	46.92256	46.83017	46.92256	46.92256	46.95344
50000.35c	0.66909	0.66778	0.66909	0.66909	0.66953

Table 5.3.3-11. Homogenized Composition for the Zircaloy-4 Intermediate Spacer Grids of the Fuel Assemblies

	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Density (g/cm^3)	1.32437	1.32698	1.32437	1.32437	1.32350

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
1001.50c	5.83424	5.83535	5.84042	5.83364	5.83417
8016.50c	46.35422	46.36301	46.40311	46.34939	46.35360
5010.50c	0.00810	0.00632	0.02073	0.01472	0.01387
5011.56c	0.03699	0.02887	0.09470	0.06723	0.06334
24050.60c	0.00200	0.00200	0.00199	0.00199	0.00199
24052.60c	0.04003	0.04003	0.03992	0.04000	0.04000
24053.60c	0.00463	0.00463	0.00461	0.00462	0.00462
24054.60c	0.00117	0.00117	0.00117	0.00117	0.00117
26054.60c	0.00545	0.00545	0.00544	0.00545	0.00545
26056.60c	0.08787	0.08787	0.08764	0.08781	0.08781
26057.60c	0.00205	0.00205	0.00204	0.00205	0.00205
26058.60c	0.00028	0.00028	0.00028	0.00028	0.00028
40000.60c	46.95344	46.95344	46.83017	46.92256	46.92256
50000.35c	0.66953	0.66953	0.66778	0.66909	0.66909
Density (g/cm^3)	1.32350	1.32350	1.32698	1.32437	1.32437

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
1001.50c	5.82309	5.83976	5.83628
8016.50c	46.26586	46.39783	46.37037
5010.50c	0.00900	0.02180	0.00483
5011.56c	0.04111	0.09957	0.02208
24050.60c	0.00200	0.00199	0.00200
24052.60c	0.04011	0.03992	0.04003
24053.60c	0.00464	0.00461	0.00463
24054.60c	0.00118	0.00117	0.00117
26054.60c	0.00546	0.00544	0.00545
26056.60c	0.08804	0.08764	0.08787

Table 5.3.3-11. Homogenized Composition for the Zircaloy-4 Intermediate Spacer Grids of the Fuel Assemblies

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
26057.60c	0.00205	0.00204	0.00205
26058.60c	0.00028	0.00028	0.00028
40000.60c	47.04632	46.83017	46.95344
50000.35c	0.67086	0.66778	0.66953
Density (g/cm^3)	1.32089	1.32698	1.32350

5.3.4. Fuel Rod Materials

The fuel rod components include the fuel rod cladding, the upper and lower fuel rod plenums (including end-caps), and the fuel. The fuel rod cladding is modeled as Zircaloy-4 (p. 26, Ref. 7.11) as presented in Table 5.3.2-15. The upper and lower fuel rod plenum regions are modeled as a homogenous mixture of SS304 and Zircaloy-4, which represent the end caps, spacers, and springs (p. 14, Ref. 7.11). Fission gases present in the upper and lower fuel rod plenum region are modeled as void in the homogenization. Table 5.3.4-1 contains the component material volume fractions for the fuel rod plenum regions (with end-caps included). These component material volume fractions were calculated as follows:

1. The fuel rod upper plenum region includes a homogenization of regions 6 and 7 as presented on page 14 of Reference 7.11. Region 9 is the lower fuel rod plenum. The cladding is not included in the homogenization volume.

2. The volume fraction data as presented on page 14 of Reference 7.11 is as follows:

Region	SS304	Zircaloy-4	Cladding	Gas
6	0.0	0.3344	0.1940	0.4716
7	0.0810	0.0439	0.2313	0.6438
9	0.1230	0.1926	0.2163	0.4681

This data was renormalized to exclude the cladding volume fractions as follows:

Region	SS304	Zircaloy-4	Cladding	Gas
6	0.0	0.4149	0.0	0.5851 (balance)
7	0.1054	0.0571	0.0	0.8375 (balance)
9	0.1569	0.2458	0.0	0.5973 (balance)

3. According to the data provided on pages 8, 9, 13, and 26 of Reference 7.11, the volume fraction of region 6 to the combination of regions 6 and 7 is equal to 4.42/19.161 which equals 0.2307, and 7.4807/22.2217 which equals 0.3366 for cycles 1 through 9 and cycle 10, respectively.

4. The volume fractions of 0.2307 and 0.3366 for region 6 were used to calculate the following volume fractions for the combination of regions 6 and 7:

	SS304	Zircaloy-4	Cladding	Gas
Cycles 1 through 9	0.0811	0.1396	0.0	0.7793 (balance)
Cycle 10	0.0699	0.1775	0.0	0.7526 (balance)

These values were obtained by taking 0.2307 or 0.3366 and multiplying it by the volume fraction in region 7 and adding the product to 1-(0.2307 or 0.3366) multiplied by the volume fraction in region 6.

Table 5.3.4-2 contains the homogenized material compositions for the upper and lower fuel rod plenum regions. The helium-filled gap between the fuel rod cladding and the fuel is modeled as void. The fresh fuel composition is uniform along the axial length of the fuel rod. The weight percent (wt%) enrichment of U-235 in the uranium of the fabricated UO_2 is presented in Table 5.3.4-3 for each fuel batch. The mass loading of uranium in the entire fuel assembly is also presented in Table 5.3.4-3. The compositions of the fresh fuel are presented in Table 5.3.4-4. The isotopic weight percentages in the fresh fuel composition are calculated using the following equations.

Equation 5.3.4-1. Uranium Isotope Weight Percents in Fabricated UO_2 (p. 20, Ref. 7.10)

$$U^{234}\ wt\% = (0.007731) * (U^{235}\ wt\%)^{1.0837}$$

$$U^{236}\ wt\% = (0.0046) * (U^{235}\ wt\%)$$

$$U^{238}\ wt\% = 100 - U^{234}\ wt\% - U^{235}\ wt\% - U^{236}\ wt\%$$

Equation 5.3.4-2. Uranium Mass per mol of UO_2

$$\frac{U\ Mass}{mol\ UO_2} = (1.008664904)\left[\begin{matrix}(232.030)(U^{234}wt\%)+(233.025)(U^{235}wt\%)+\\(234.018)(U^{236}wt\%)+(236.006)(U^{238}wt\%)\end{matrix}\right](0.01)$$

where the weight percentages of the uranium isotopes (U^{234}, U^{235}, U^{236}, and U^{238}) in uranium are calculated using Equation 5.3.4-1.

Equation 5.3.4-3. Oxygen Mass per mol of UO_2

$$\frac{O\ Mass}{mol\ UO_2} = (2)(1.008664904)(15.858)$$

Equation 5.3.4-4. Oxygen Mass in UO_2

$$O\ Mass\ in\ UO_2 = \left(\frac{O\ Mass / mol\ UO_2}{U\ Mass / mol\ UO_2} \right) (U\ Mass\ in\ UO_2)$$

The wt% of each uranium isotope in the fresh UO_2 composition is determined by multiplying the wt% of each uranium isotope in the enriched uranium by the weight fraction of uranium in the UO_2. The wt% of oxygen in the UO_2 is the weight fraction of oxygen in UO_2 multiplied by 100.

The burned fuel is delineated into eighteen axial regions (p. 61, Ref. 7.11) each having a unique material composition. The height of top node is 17.7800 cm for cycles 1 through 9, and 17.4777 cm for cycle 10 (p. 61, Ref. 7.11). The height of the bottom node is 22.3520 cm for cycles 1 through 9, 19.5936 cm for cycle 10 (p. 61, Ref. 7.11). The height of the other axial nodes is 20.0025 cm (p. 61, Ref. 7.11). These nodal heights correspond directly to the nodal heights utilized in the fuel depletion calculations. Each nodal depleted fuel composition is obtained from SAS2H depletion calculations documented throughout Reference 7.3. The depleted fuel compositions for the best-estimate reactivity calculations may contain up to 85 isotopes from the list presented in Table 5.3.4-5. The depleted fuel compositions for the principal isotope reactivity calculations may contain up to 30 isotopes from the list presented in Table 5.3.4-6. The depleted fuel compositions for the principal actinide reactivity calculations may contain up to 15 isotopes from the list presented in Table 5.3.4-7. The depleted fuel compositions for the principal actinide reactivity calculations may contain up to 11 isotopes from the list presented in Table 5.3.4-8. Each depleted fuel composition is modeled in terms of isotopic weight percents and an overall nodal fuel density. The weight percent of each isotope in the nodal depleted fuel composition is calculated based on the total mass of all isotopes in the nodal composition. The mass of oxygen in each nodal depleted fuel composition is calculated based on the fresh fuel characteristics as described in Equations 5.3.4-1 through 5.3.4-4. This mass of oxygen is combined with the total isotopic fuel mass obtained from the depletion calculations to determine an overall total depleted fuel mass upon which the various isotopic weight percents are based. The MCNP output files for each CRC reactivity calculation are contained in Attachment III (moved to Reference 7.15). These output files contain an echo of the MCNP input decks for each CRC statepoint reactivity calculation. The nodal fuel isotopic compositions are listed in the input decks in terms of ZAID's, weight percents, and density (g/cm^3). Each nodal fuel composition is identified by assembly and node in the material specification section of the input decks. The nodal fuel densities are shown on the geometric cell specifications for each fuel node. The nodal fuel densities are based on the fuel mass and fuel volume in each nodal region. The fuel volume is calculated using the number of fuel rods, nodal height, and pellet diameter. Therefore, dishing and chamfering of the fresh fuel pellets are accounted for on a mass basis by a slightly adjusted fuel density. However, the geometrical features of the fresh fuel pellet dishing and chamfering are not captured in the MCNP models. The purpose of the pellet dishing and chamfering is to enhance fuel performance. These geometrical features have no significant impact on system reactivity. The most important concern in determining system reactivity is to assure that fuel mass preservation is maintained. The fuel densities used in the MCNP models ensure preservation of mass.

Table 5.3.4-1. Fuel Rod Plenum Material Volume Fractions

Plenum Location	Type 304 Stainless Steel	Gas (modeled as void)	Zircaloy-4
Upper (Cycles 1 through 9)	0.0811	0.7793	0.1396

Table 5.3.4-1. Fuel Rod Plenum Material Volume Fractions

Plenum Location	Type 304 Stainless Steel	Gas (modeled as void)	Zircaloy-4
Upper (Cycle 10)	0.0699	0.7526	0.1775
Lower	0.1569	0.5973	0.2458

Table 5.3.4-2. Fuel Rod Plenum Homogenized Material Compositions

MCNP ZAID	Wt. % of Element/Isotope in Material Composition		
	Upper Fuel Rod Plenum (Cycles 1 through 9)	Upper Fuel Rod Plenum (Cycle 10)	Lower Fuel Rod Plenum
6000.50c	0.033	0.026	0.035
7014.50c	0.041	0.032	0.043
14000.50c	0.309	0.241	0.326
15031.50c	0.019	0.014	0.020
16032.50c	0.012	0.010	0.013
24050.60c	0.329	0.258	0.347
24052.60c	6.595	5.172	6.961
24053.60c	0.762	0.598	0.804
24054.60c	0.193	0.152	0.204
25055.50c	0.823	0.643	0.869
26054.60c	1.619	1.268	1.710
26056.60c	26.105	20.438	27.560
26057.60c	0.608	0.476	0.642
26058.60c	0.083	0.065	0.087
28058.60c	2.566	2.005	2.710
28060.60c	1.015	0.793	1.072
28061.60c	0.045	0.035	0.047
28062.60c	0.144	0.113	0.152
28064.60c	0.038	0.029	0.040
8016.50c	0.071	0.081	0.068
40000.60c	57.766	66.602	55.498
50000.35c	0.824	0.950	0.791
Density (g/cm^3)	1.5565	1.7169	2.8521

Table 5.3.4-3. Fuel Batch Enrichment and Uranium Mass Loading (p. 26, Ref. 7.11)

Fuel Batch Identifier	U-235 wt. % in Uranium	Mass of Uranium per Fuel Assembly (kg)
1	1.93	463.63

Table 5.3.4-3. Fuel Batch Enrichment and Uranium Mass Loading (p. 26, Ref. 7.11)

Fuel Batch Identifier	U-235 wt. % in Uranium	Mass of Uranium per Fuel Assembly (kg)
2	2.54	463.63
3	2.83	463.63
1X	2.00	468.62
4	2.64	468.62
5	2.62	463.63
6A	2.62	463.63
6B	2.95	463.63
7A	3.29	463.63
7B	2.95	463.63
8	3.49	463.63
9	3.84	463.63
10	3.94	463.63
11	3.90	463.605
12	4.167	463.66

Table 5.3.4-4. Fresh Fuel Material Composition for Each Fuel Batch

Fuel Batch Identifier	Wt. % of Element/Isotope in Material Composition					
	U-234	U-235	U-236	U-238	Oxygen	Density (g/cm^3)[1]
1	0.01390	1.70131	0.00783	86.42777	11.84920	10.12071
2	0.01871	2.23901	0.01030	85.88196	11.85002	10.12081
3	0.02104	2.49463	0.01148	85.62245	11.85040	10.12085
1X[2]	0.01444	1.76301	0.00811	86.36514	11.84929	10.22965
4	0.01951	2.32716	0.01070	85.79247	11.85015	10.24636
5	0.01935	2.30953	0.01062	85.81037	11.85012	10.19785
6A	0.01935	2.30953	0.01062	85.81037	11.85012	10.19785
6B	0.02201	2.60041	0.01196	85.51506	11.85057	10.19790
7A	0.02477	2.90010	0.01334	85.21077	11.85102	10.19795
7B	0.02201	2.60041	0.01196	85.51506	11.85057	10.19790
8	0.02641	3.07639	0.01415	85.03176	11.85129	10.19798
9	0.02929	3.38489	0.01557	84.71849	11.85176	10.19804
10	0.03012	3.47304	0.01598	84.62898	11.85189	10.19805
11	0.02978	3.43778	0.01581	84.66478	11.85184	10.12047
12	0.03200	3.67312	0.01690	84.42579	11.85220	10.12171

[1] This density is the fresh fuel density based on preservation of mass using the mass loading of uranium in the assembly, the initial enrichment, and the pellet stack height dimensions.

[2] The fresh fuel composition for fuel batch 1X was not used in any of the CRC statepoint calculations, but is shown here for illustrative purposes.

Table 5.3.4-5. Isotope Set from which Best-Estimate MCNP Depleted Fuel Compositions are Developed

Isotope	MCNP ZAID	Isotope	MCNP ZAID	Isotope	MCNP ZAID
H-3	1003.50c	Cs-135	55135.50c	Pa-233	91233.50c
He-4	2004.50c	Ba-138	56138.50c	U-233	92233.50c
Li-6	3006.50c	Pr-141	59141.50c	U-234	92234.50c
Li-7	3007.55c	Nd-143	60143.50c	U-235	92235.53c
Be-9	4009.50c	Nd-145	60145.50c	U-236	92236.50c
O-16	8016.50c	Nd-147	60147.50c	U-237	92237.50c
As-75	33075.35c	Nd-148	60148.50c	U-238	92238.53c
Kr-80	36080.50c	Pm-147	61147.50c	Np-235	93235.35c
Kr-82	36082.50c	Pm-148	61148.50c	Np-236	93236.35c
Kr-83	36083.50c	Pm-149	61149.50c	Np-237	93237.50c
Kr-84	36084.50c	Sm-147	62147.50c	Np-238	93238.35c
Kr-86	36086.50c	Sm-149	62149.50c	Pu-237	94237.35c
Y-89	39089.50c	Sm-150	62150.50c	Pu-238	94238.50c
Zr-93	40093.50c	Sm-151	62151.50c	Pu-239	94239.55c
Nb-93	41093.50c	Sm-152	62152.50c	Pu-240	94240.50c
Mo-95	42095.50c	Eu-151	63151.55c	Pu-241	94241.50c
Tc-99	43099.50c	Eu-152	63152.50c	Pu-242	94242.50c
Ru-101	44101.50c	Eu-153	63153.55c	Am-241	95241.50c
Ru-103	44103.50c	Eu-154	63154.50c	Am-242	95242.50c
Rh-103	45103.50c	Eu-155	63155.50c	Am-243	95243.50c
Rh-105	45105.50c	Gd-152	64152.50c	Cm-242	96242.50c
Pd-105	46105.50c	Gd-154	64154.50c	Cm-243	96243.35c
Pd-108	46108.50c	Gd-155	64155.50c	Cm-244	96244.50c
Ag-107	47107.50c	Gd-156	64156.50c	Cm-245	96245.35c
Ag-109	47109.50c	Gd-157	64157.50c	Cm-246	96246.35c
Xe-131	54131.50c	Gd-158	64158.50c	Cm-247	96247.35c
Xe-134	54134.35c	Gd-160	64160.50c	Cm-248	96248.35c

Table 5.3.4-5. Isotope Set from which Best-Estimate MCNP Depleted Fuel Compositions are Developed

Isotope	MCNP ZAID	Isotope	MCNP ZAID	Isotope	MCNP ZAID
Xe-135	54135.53c	Ho-165	67165.55c	--	--
Cs-133	55133.50c	Th-232	90232.50c	--	--

Table 5.3.4-6. Isotope Set from which Principal Isotope MCNP Depleted Fuel Compositions are Developed

Isotope	MCNP ZAID	Isotope	MCNP ZAID	Isotope	MCNP ZAID
O-16	8016.50c	Sm-150	62150.50c	U-238	92238.53c
Mo-95	42095.50c	Sm-151	62151.50c	Np-237	93237.50c
Tc-99	43099.50c	Sm-152	62152.50c	Pu-238	94238.50c
Ru-101	44101.50c	Eu-151	63151.55c	Pu-239	94239.55c
Ru-103	44103.50c	Eu-153	63153.55c	Pu-240	94240.50c
Ag-109	47109.50c	Gd-155	64155.50c	Pu-241	94241.50c
Nd-143	60143.50c	U-233	92233.50c	Pu-242	94242.50c
Nd-145	60145.50c	U-234	92234.50c	Am-241	95241.50c
Sm-147	62147.50c	U-235	92235.53c	Am-242	95242.50c
Sm-149	62149.50c	U-236	92236.50c	Am-243	95243.50c

Table 5.3.4-7. Isotope Set from which Principal Actinide MCNP Depleted Fuel Compositions are Developed

Isotope	MCNP ZAID	Isotope	MCNP ZAID	Isotope	MCNP ZAID
O-16	8016.50c	U-238	92238.53c	Pu-241	94241.50c
U-233	92233.50c	Np-237	93237.50c	Pu-242	94242.50c
U-234	92234.50c	Pu-238	94238.50c	Am-241	95241.50c
U-235	92235.53c	Pu-239	94239.55c	Am-242	95242.50c
U-236	92236.50c	Pu-240	94240.50c	Am-243	95243.50c

Table 5.3.4-8. Isotope Set from which Actinide-Only MCNP Depleted Fuel Compositions are Developed

Isotope	MCNP ZAID	Isotope	MCNP ZAID	Isotope	MCNP ZAID
O-16	8016.50c	U-238	92238.53c	Pu-241	94241.50c
U-234	92234.50c	Pu-238	94238.50c	Pu-242	94242.50c
U-235	92235.53c	Pu-239	94239.55c	Am-241	95241.50c
U-236	92236.50c	Pu-240	94240.50c		

5.3.5. Guide Tube and Instrument Tube Materials

The guide tubes and instrument tubes are composed of Zircaloy-4 (p. 26, Ref. 7.11). The Zircaloy-4 material composition is presented in Table 5.3.2-15. The guide tubes and instrument tubes contain borated moderator as presented in Table 5.3.2-3.

5.3.6. BPRA Materials

Each BPRA contains sixteen BPRs (one BPR per guide tube). The BPR components include cladding, upper plenum, and lower end-plug, and burnable poison (BP). The cladding of the BPRs is Zircaloy-4 as presented in Table 5.3.2-15 (p. 26, Ref. 7.11). The upper plenum region is modeled as SS304 with a volume fraction of 0.2090 inside of the cladding (p. 24, Ref. 7.11). The Zircaloy-4 end-cap was modeled as being the same size as the APSR and RCCA end plugs making up a volume fraction of 0.0127. The remaining volume fraction of the upper plenum was modeled as void. The SS304 and Zircaloy-4 homogenized composition is presented in Table 5.3.6-2. The lower end-plug region is modeled as Zircaloy-4 inside of the cladding (p. 24, Ref. 7.11). The Zircaloy-4 material composition is presented in Table 5.3.2-15.

The fresh BP is uniform along the axial length of the BPR. The BP material is Al_2O_3-B_4C with an initial density of 3.7 g/cm^3 (p. 26, Ref. 7.11). The weight percent of B_4C in the Al_2O_3-B_4C ranges from 0.00 to 2.10 (pp. 30 - 40, Ref. 7.11). Table 5.3.6-1 presents the fresh BP compositions. The placement of the various BPRAs in the reactor core statepoint configurations is presented in Section 5.4.
During the depletion calculations, the BP material is delineated axially along with the burned fuel, as described in Section 5.3.4, with the exception that the bottom axial fuel node does not have a corresponding BP node. In the MCNP calculations, the BP is positioned axially as shown in Figure 5.2.6-2. The B-10 and B-11 isotopic concentrations in the depleted BP are obtained from the SAS2H depletion calculations documented throughout Reference 7.3. The masses of aluminum, oxygen, silicon, and carbon in the depleted BP are modeled with the same masses as in the fresh BP. The SAS2H calculated B-10 and B-11 nodal BP masses are added to the aluminum, oxygen, silicon, and carbon masses to obtain a total mass for the depleted nodal BP composition. The weight percents of each element and isotope are calculated based on the total mass loading of depleted BP in a given node. The depleted BP density is calculated based on the mass of depleted BP in a given nodal volume. The MCNP output files in Attachment IV (the attachment tapes have been moved to Reference 7.15) contain an echo of the input decks for each CRC statepoint reactivity calculation. The depleted BP isotopic compositions for each node are listed in the input decks in terms of ZAID's, weight percents, and density (g/cm^3). Each nodal BP composition is identified by assembly and node in the material specification section of the input decks. The nodal BP densities are shown on the geometric cell specifications for each BP node.

A limitation in MACE was encountered during the modeling of assembly B28a in the Cycle 4, 0.0 EFPD statepoint calculation. The limitation encountered was that MACE wasn't able to use fresh BPRs in a once-burned assembly. Therefore, the MCNP input deck for the Cycle 4, 0.0 EFPD statepoint calculation was modified by hand to incorporate the fresh BPRs in assembly B28a.

Table 5.3.6-1. Fresh Burnable Poison Material Composition

MCNP ZAID	Wt. % of Element/Isotope in Material Composition				
	0.000 wt% B_4C	0.200 wt% B_4C	0.500 wt% B_4C	0.800 wt% B_4C	1.010 wt% B_4C
5010.50c	0.00000	0.02812	0.07030	0.11248	0.14200
5011.56c	0.00000	0.12845	0.32113	0.51381	0.64868
6000.50c	0.00000	0.04343	0.10857	0.17371	0.21931
8016.50c	47.06848	46.97435	46.83314	46.69194	46.59309
13027.50c	52.93152	52.82565	52.66686	52.50806	52.39691
	1.100 wt% B_4C	1.134 wt% B_4C	1.177 wt% B_4C	1.180 wt% B_4C	1.194 wt% B_4C
5010.50c	0.15466	0.15944	0.16548	0.16591	0.16787
5011.56c	0.70649	0.72832	0.75594	0.75787	0.76686
6000.50c	0.23885	0.24624	0.25557	0.25622	0.25926
8016.50c	46.55073	46.53473	46.51449	46.51308	46.50649
13027.50c	52.34927	52.33127	52.30851	52.30692	52.29951
	1.340 wt% B_4C	1.400 wt% B_4C	1.700 wt% B_4C	2.000 wt% B_4C	2.100 wt% B_4C
5010.50c	0.18840	0.19684	0.23902	0.28120	0.29526
5011.56c	0.86063	0.89917	1.09185	1.28452	1.34875
6000.50c	0.29097	0.30400	0.36914	0.43428	0.45599
8016.50c	46.43777	46.40953	46.26832	46.12711	46.08005
13027.50c	52.22223	52.19047	52.03168	51.87289	51.81995

Table 5.3.6-2. BPR Upper Plenum Homogenized Material Compositions

Ele./Iso.	MCNP ZAID	Wt%	Ele./Iso.	MCNP ZAID	Wt%
C-nat	6000.50c	0.076	Fe-57	26057.60c	1.401
N-14	7014.50c	0.095	Fe-58	26058.60c	0.190
Si-nat	14000.50c	0.714	Ni-58	28058.60c	5.934
P-31	15031.50c	0.043	Ni-60	28060.60c	2.347
S-nat	16032.50c	0.029	Ni-61	28061.60c	0.103
Cr-50	24050.60c	0.755	Ni-62	28062.60c	0.334
Cr-52	24052.60c	15.141	Ni-64	28064.60c	0.087
Cr-53	24053.60c	1.750	O-16	8016.50c	0.006
Cr-54	24054.60c	0.444	Zr-nat	40000.60c	4.732
Mn-55	25055.50c	1.904	Sn-nat	50000.35c	6.748E-02
Fe-54	26054.60c	3.729	Density (g/cm^3)	1.7347	
Fe-56	26056.60c	60.121			

5.3.7. RCCA Materials

Each RCCA contains sixteen identical control rods (CRs). The CR components include cladding, upper plenum, lower end-plug, and absorber material. The CR cladding is modeled as SS304 as presented in Table 5.3.2-1 (p. 26, Ref. 7.11). The CR upper plenum is not modeled in any of the CRC statepoint

configurations due to the partial insertion of the RCCAs. The CR lower end-plug is modeled as SS304 as presented in Table 5.3.2-1 (p. 16, Ref. 7.11). The CR absorber material is Ag-In-Cd with a density of 10.17 g/cm^3 (p. 26, Ref. 7.11). Table 5.3.7-1 presents the Ag-In-Cd material composition.

Table 5.3.7-1. Ag-In-Cd Material Composition

Element / Isotope	MCNP ZAID	Wt. %
Ag-107	47107.60c	40.998
Ag-109	47109.60c	38.802
Cd	48000.50c	5.000
In	49000.60c	15.000
Al	13027.50c	0.200

5.3.8. Black APSRA Materials

Each APSRA contains 16 identical APSR's. The Crystal River Unit 3 reactor cycles containing CRC statepoints (Cycles 1A through 5) used only black APSRAs (p. 26, Ref. 7.11). The black APSR contains Ag-In-Cd as the absorber material (p.26, Ref. 7.11). The components of the black APSR include cladding, intermediate-plug, upper plenum, lower end-plug, absorber material, and lower spacer. Refer to Figure 5.2.8-1 for the black APSR geometrical modeling specifications. The APSR cladding is modeled as SS304 as presented in Table 5.3.2-1. From the information provided on page 20 of Reference 7.11, the intermediate plug volume is 16.15 cm^3/16 which equals 1.0094 cm^3. According to the dimensions on pages 19 and 26 of Reference 7.11, the volume occupied by the intermediate plug is 1.0194 cm^3. This results in an intermediate plug volume fraction of 1.0094 cm^3/1.0194 cm^3 which equals 0.9902. The upper plenum region is modeled as a gap filled with helium at an arbitrary density of 0.001 g/cm^3. The black APSR type contains a lower annular Zircaloy-4 spacer and a lower SS304 end-plug (p. 20, Ref. 7.11). The material of the lower plenum region in the MCNP model of the APSR was modeled as Zircaloy-4 as presented in Table 5.3.2-15. The composition of the Ag-In-Cd absorber material in the black APSR is presented in Table 5.3.7-1.

5.3.9. Gray APSRA Materials

Each APSRA contains 16 identical APSR's. The Crystal River Unit 3 reactor cycles containing CRC statepoints (Cycles 6 through 10) used only gray APSRAs (p. 26, Ref. 7.11). The gray APSR contains Inconel as the absorber material (p. 26, Ref. 7.11). The components of the gray APSR include cladding, intermediate-plug, upper plenum, lower end-plug, and absorber material. Refer to Figure 5.2.8-2 for the gray APSR geometrical modeling specifications. The APSR cladding is modeled as SS304 as presented in Table 5.3.2-1. From the information provided on page 22 of Reference 7.11, the intermediate plug volume is 22.71 cm^3/16 which equals 1.4194 cm^3. According to the dimensions on pages 21 and 26 of Reference 7.11, the volume occupied by the intermediate plug is 1.4382 cm^3. This results in an intermediate plug volume fraction of 1.4194 cm^3/1.4382 cm^3 which equals 0.9869. The upper plenum region is modeled as a gap filled with helium at an arbitrary density of 0.001 g/cm^3. The gray APSR type contains a lower SS304 end-plug (p. 22, Ref. 7.11). The lower plenum region in the MCNP model of the APSR was modeled as a gap filled with helium at an arbitrary density of 0.001 g/cm^3. The composition of the Inconel absorber material in the gray APSR is presented in Table 5.3.3-1.

5.4. Core Loading Descriptions

The core loading description for each CRC statepoint reactivity calculation includes the specification of the various fuel assembly locations, BPRA locations, RCCA locations, and APSRA locations. A core loading description is provided for a particular cycle. All CRC statepoint reactivity calculations in the same reactor cycle use the same core loading description. Figures 5.4-1 through 5.4-11 present the core loading descriptions for cycles 1A through 10 of Crystal River Unit 3. Each fuel assembly has a unique identifier corresponding to the identifiers used in the SAS2H depletion analyses. The fuel assembly placements in each core loading description are presented in Figures 5.4-12 and 5.4-22. The fuel assembly identifiers shown in Figures 5.4-12 through 5.4-22 refer to the assembly identifiers used in the depletion analyses documented throughout Reference 7.3.

	08	09	10	11	12	13	14	15
H	F (1A) 2	F (1A) 2	F (1A) 1	F (1A) 2	F (1A) 1	F (1A) 2	F (1A) 3	F (1A) 3
K		F (1A) 1	F (1A) 2	F (1A) 1	F (1A) 2	F (1A) 1	F (1A) 2	F (1A) 3
L			F (1A) 1	F (1A) 2	F (1A) 1	F (1A) 2	F (1A) 3	F (1A) 3
M				F (1A) 1	F (1A) 2	F (1A) 1	F (1A) 3	
N					F (1A) 1	F (1A) 3	F (1A) 3	
O						F (1A) 3		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

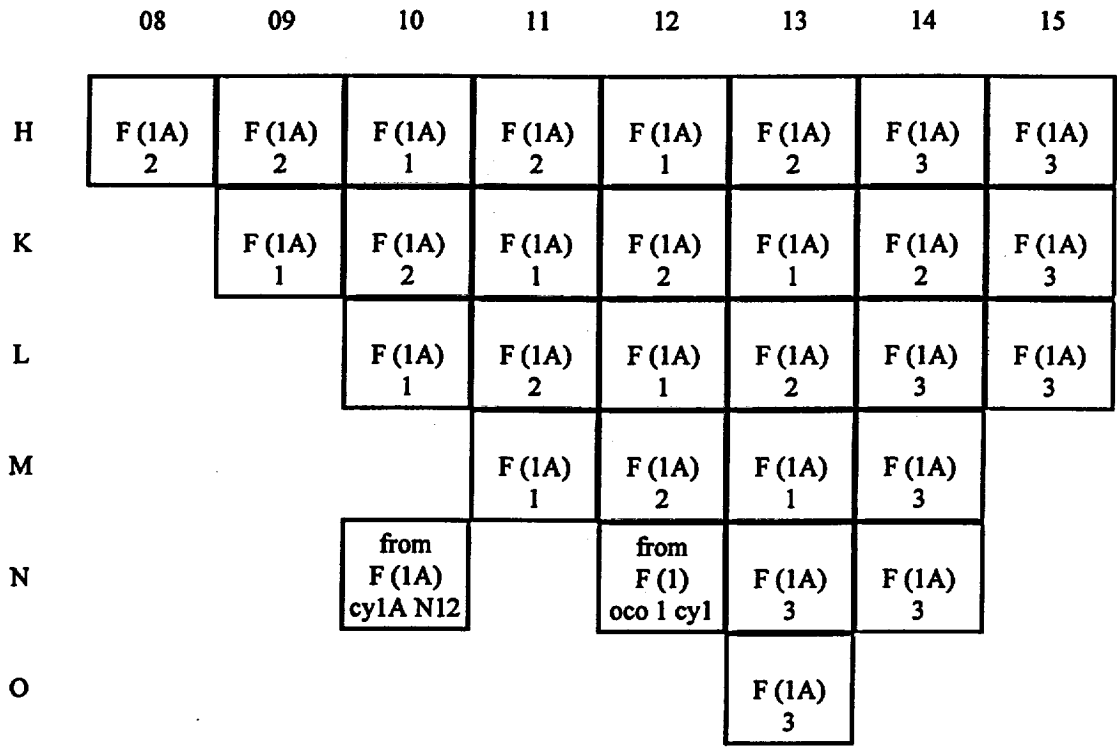
Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
1A	1	1.93
	2	2.54
	3	2.83

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
1. 01	L11, M12
1.18	H11, H13, K12, L13, N13
1.34	H09, K10, K14

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K09, M13	Bank 7	H08, L14
Bank 6	H12, M11	Bank 8 (Black Axial Power Shaping Rod)	L12

Note: Control Rod Bank 7 was changed near the end of cycle 1A from location L14 to H14 and N12

Figure 5.4-1. Core Loading Description for Cycle 1A of Crystal River Unit 3 (pp. 26, 30, Ref. 7.11)



RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
1B	1	1.93
	2	2.54
	3	2.83
Oconee 1	1X	2.00

No BPRAs Required

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K09, M13	Bank 7	H08, H14, N12
Bank 6	H12, M11	Bank 8 (Black Axial Power Shaping Rod)	L12

Note: Four Oconee 1, Cycle 1, FAs inserted into Crystal River Unit 3 Cycle 1B

Figure 5.4-2. Core Loading Description for Cycle 1B of Crystal River Unit 3 (pp. 26, 31, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	H08 F (1A) 2	H09 F (1A) 2	H14 F (1A) 3	K12 F (1A) 2	H15 F (1A) 3	H13 F (1A) 2	M12 F (1A) 2	F (2) 4
K		K12 F (1A) 2	K15 F (1A) 3	L15 F (1A) 3	N13 F (1A) 3	M14 F (1A) 3	K14 F (1A) 2	F (2) 4
L			M12 F (1A) 2	L11 F (1A) 2	N14 F (1A) 3	L13 F (1A) 2	F (2) 4	F (2) 4
M				O13 F (1A) 3	L14 F (1A) 3	K10 F (1A) 2	F (2) 4	
N					H11 F (1A) 2	F (2) 4	F (2) 4	
O						F (2) 4		

RC F(c) B	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core} = Cycle (c) in which the Fuel Assembly was Fresh (F) = Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
2	2	2.54
	3	2.83
	4	2.64

No BPRAs Required

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13	Bank 7	H14, L10
Bank 6	H10, N12	Bank 8 (Black Axial Power Shaping Rod)	L12

Figure 5.4-3. Core Loading Description for Cycle 2 of Crystal River Unit 3 (p. 32, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	H08 F (1A) 2	H12 F (1A) 3	L14 F (2) 4	H10 F (1A) 3	H15 F (2) 4	H14 F (1A) 2	K13 F (1A) 3	F (3) 5
K		L14 F (2) 4	L12 F (1A) 3	K15 F (2) 4	M12 F (1A) 3	L15 F (2) 4	K10 F (1A) 3	F (3) 5
L			M11 F (1A) 3	K11 F (1A) 3	M14 F (2) 4	N13 F (2) 4	F (3) 5	F (3) 5
M				L10 F (1A) 2	N14 F (2) 4	K12 F (1A) 3	F (3) 5	
N			O13 F (2) 4		K13 F (1A) 3	F (3) 5	F (3) 5	
O						F (3) 5		

RC F(c) B	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core} = Cycle (c) in which the Fuel Assembly was Fresh (F) = Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
3	2	2.54
	3	2.83
	4	2.64
	5	2.62

No BPRAs Required

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13	Bank 7	H14, L10
Bank 6	H10, N12	Bank 8 (Black Axial Power Shaping Rod)	L12

Figure 5.4-4. Core Loading Description for Cycle 3 of Crystal River Unit 3 (pp. 26, 33, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	K09 F (2) 4	N13 F (3) 5	H12 F (2) 4	N14 F (2) 4	H10 F (2) 4	F (4) 6B	K13 F (2) 4	H15 F (3) 5
K		N13 F (3) 5	F (4) 6A	L12 F (2) 4	F (4) 6A	K11 F (2) 4	F (4) 6A	N14 F (3) 5
L			M12 F (2) 4	F (4) 6A	L13 F (2) 4	F (4) 6A	L15 F (3) 5	K15 F (3) 5
M				K13 F (2) 4	F (4) 6A	L14 F (3) 5	F (4) 6A	
N					M12 F (2) 4	F (4) 6B	M14 F (3) 5	
O						O13 F (3) 5		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
4	4	2.64
	5	2.62
	6A	2.62
	6B	2.95

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.20	H11, K14, L11, L13, N13
0.50	H13, K10, K12, M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13	Bank 7	H14, L10
Bank 6	H10, N12	Bank 8 (Black Axial Power Shaping Rod)	L12

Figure 5.4-5. Core Loading Description for Cycle 4 of Crystal River Unit 3 (p. 34, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	K09 F (2) 4	L13 F (4) 6A	L14 F (3) 5	F (5) 7A	O13 F (3) 5	F (5) 7A	L15 F (3) 5	F (5) 7A
K		N14 F (3) 5	F (5) 7B	K10 F (4) 6A	F (5) 7A	M12 F (4) 6A	F (5) 7A	K14 F (4) 6A
L			N14 F (3) 5	F (5) 7A	K12 F (4) 6A	F (5) 7A	M14 F (4) 6A	N13 F (4) 6B
M				L13 F (4) 6A	F (5) 7A	K15 F (3) 5	F (5) 7A	
N					L15 F (3) 5	F (5) 7A	L11 F (4) 6A	
O						H13 F (4) 6B		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
5	4	2.64
	5	2.62
	6A	2.62
	6B	2.95
	7A	3.29
	7B	2.95

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.20	K14
0.50	K10
1.40	H11, H13, K12, L11, L13, M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	H12, M11	Bank 7	H10, H14, N12
Bank 6	K13	Bank 8 (Black Axial Power Shaping Rod)	L12

Figure 5.4-6. Core Loading Description for Cycle 5 of Crystal River Unit 3 (p. 35, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	K09 F (2) 4	K14 F (5) 7A	H11 F (2) 4	H15 F (5) 7A	O13 F (4) 6B	F (6) 8	L14 F (4) 6A	H11 F (5) 7A
K		H13 F (5) 7A	F (6) 8	K10 F (5) 7B	F (6) 8	K12 F (5) 7A	F (6) 8	M12 F (5) 7A
L			L15 F (4) 6A	F (6) 8	L11 F (5) 7A	F (6) 8	M14 F (5) 7A	N14 F (4) 6A
M				L14 F (4) 6A	F (6) 8	L13 F (5) 7A	N13 F (5) 7A	
N					K14 F (5) 7A	F (6) 8	K15 F (4) 6A	
O						L15 F (4) 6B		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
6	4	2.64
	6A	2.62
	6B	2.95
	7A	3.29
	7B	2.95
	8	3.49

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.80	L13
1.10	H13
1.40	K10, K12, L11, M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13, M11	Bank 7	H12, N12
Bank 6	H14, L10	Bank 8 (Gray Axial Power Shaping Rod)	L12

Figure 5.4-7. Core Loading Description for Cycle 6 of Crystal River Unit 3 (pp. 26, 36, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	K09 F (2) 4	F (7) 9	M14 F (5) 7A	F (7) 9	K14 F (1A) 2	F (7) 9	H13 F (6) 8	F (7) 9
K		M14 F (5) 7A	F (7) 9	K15 F (5) 7A	F (7) 9	K12 F (6) 8	F (7) 9	K10 F (6) 8
L			K14 F (1A) 2	F (7) 9	L14 F (5) 7A	F (7) 9	N13 F (6) 8	M12 F (6) 8
M				L11 F (6) 8	F (7) 9	K14 F (6) 8	F (7) 9	
N					L11 F (6) 8	F (7) 9	L13 F (6) 8	
O						H15 F (3) 5		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
7	2	2.54
	4	2.64
	5	2.62
	7A	3.29
	8	3.49
	9	3.84

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.000	N13
0.200	K14
0.800	H09, H11, K10, K12, L13
1.134	L11
1.177	H13
1.194	M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13, M11	Bank 7	H12, N12
Bank 6	H14, L10	Bank 8 (Gray Axial Power Shaping Rod)	L12

Figure 5.4-8. Core Loading Description for Cycle 7 of Crystal River Unit 3 (pp. 26, 37, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	L12 F (1A) 1	N13 F (7) 9	H11/H13 F (7) 9	F (8) 10	M13 F (3) 5	F (8) 10	H09 F (7) 9	N14 F (6) 8
K		L13 F (7) 9	F (8) 10	K10 F (7) 9	F (8) 10	K12 F (7) 9	F (8) 10	L14 F (6) 8
L	H11/H13 F (7) 9		M13 F (3) 5	F (8) 10	L11 F (7) 9	F (8) 10	K14 F (7) 9	L15 F (6) 8
M				L13 F (7) 9	F (8) 10	M14 F (7) 9	F (8) 10	
N					N14 F (6) 8	F (8) 10	M12 F (7) 9	
O						M13 F (5) 7A		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
8	1	1.93
	5	2.62
	7A	3.29
	8	3.49
	9	3.84
	10	3.94

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
1.70	H13, K10
2.00	H11, K12, L11, L13, M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13, M11	Bank 7	H12, N12
Bank 6	H14, L10	Bank 8 (Gray Axial Power Shaping Rod)	L12

Figure 5.4-9. Core Loading Description for Cycle 8 of Crystal River Unit 3 (pp. 26, 38, Ref. 7.11)

	08	09	10	11	12	13	14	15
		H13 F (7) 9						
H	L12 F (1A) 1	H15 F (7) 9	N13 F (8) 10	F (9) 11	N13 F (8) 10	F (9) 11	H11 F (8) 10	H14 F (7) 9
K		H11 F (7) 9	F (9) 11	N14 F (7) 9	F (9) 11	K14 F (8) 10	F (9) 11	L11 F (8) 10
L			M12 F (8) 10	F (9) 11	K12 F (8) 10	F (9) 11	L13 F (8) 10	M13 F (7) 9
M				H13 F (8) 10	F (9) 11	M14 F (8) 10	K10 F (8) 10	
N					N13 F (7) 9	F (9) 11	L14 F (7) 9	
O						M12 F (8) 10		

RC F(c) B	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core} = Cycle (c) in which the Fuel Assembly was Fresh (F) = Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
9	1	1.93
	9	3.84
	10	3.94
	11	3.90

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.50	L13
1.40	H13
2.00	H11, K12, L11
2.10	K10, M12

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13, M11	Bank 7	H12, N12
Bank 6	H14, L10	Bank 8 (Gray Axial Power Shaping Rod)	L12

Figure 5.4-10. Core Loading Description for Cycle 9 of Crystal River Unit 3 (pp. 26, 39, Ref. 7.11)

	08	09	10	11	12	13	14	15
H	N12 F (7) 9	N13 F (9) 11	K12 F (9) 11	F (10) 12	K12 F (9) 11	F (10) 12	H13 F (9) 11	H09 F (7) 9
K		K10 F (9) 11	F (10) 12	L11 F (9) 11	F (10) 12	L13 F (9) 11	F (10) 12	M14 F (8) 10
L			H11 F (9) 11	F (10) 12	M12 F (9) 11	F (10) 12	F (10) 12	M13 F (8) 10
M				K10 F (9) 11	F (10) 12	K14 F (9) 11	K15 F (8) 10	
N					N13 F (9) 11	F (10) 12	L14 F (8) 10	
O						O13 F (8) 10		

RC	= Previous Fuel Assembly Position, Row (R), Column (C), {normalized to 1/8 core}
F(c)	= Cycle (c) in which the Fuel Assembly was Fresh (F)
B	= Fuel Batch Identifier (B)

Wt. % U-235 Enrichments		
Fresh Cycle	Batch	Wt. %
10	9	3.84
	10	3.94
	11	3.90
	12	4.167*

Burnable Poison Rod Assembly (BPRA) Locations	
Wt. % B_4C in BPRA	1/8 Core Row & Column
0.50	K14
1.10	H13, L13, M12
1.40	K10
1.70	H11
2.00	K12, L11

Rod Cluster Control Assembly (RCCA) Locations			
RCCA Bank Identifier	1/8 Core Row & Column	RCCA Bank Identifier	1/8 Core Row & Column
Bank 5	K13, M11	Bank 7	H12, N12
Bank 6	H14, L10	Bank 8 (Gray Axial Power Shaping Rod)	L12

* Assembly contains 192 rods at 4.19 wt% U^{235} and 16 rods at a reduced enrichment of 3.89 wt% U^{235}, for an average enrichment of 4.167 wt% U^{235}.

Figure 5.4-11. Core Loading Description for Cycle 10 of Crystal River Unit 3 (pp. 26, 40, Ref. 7.11)

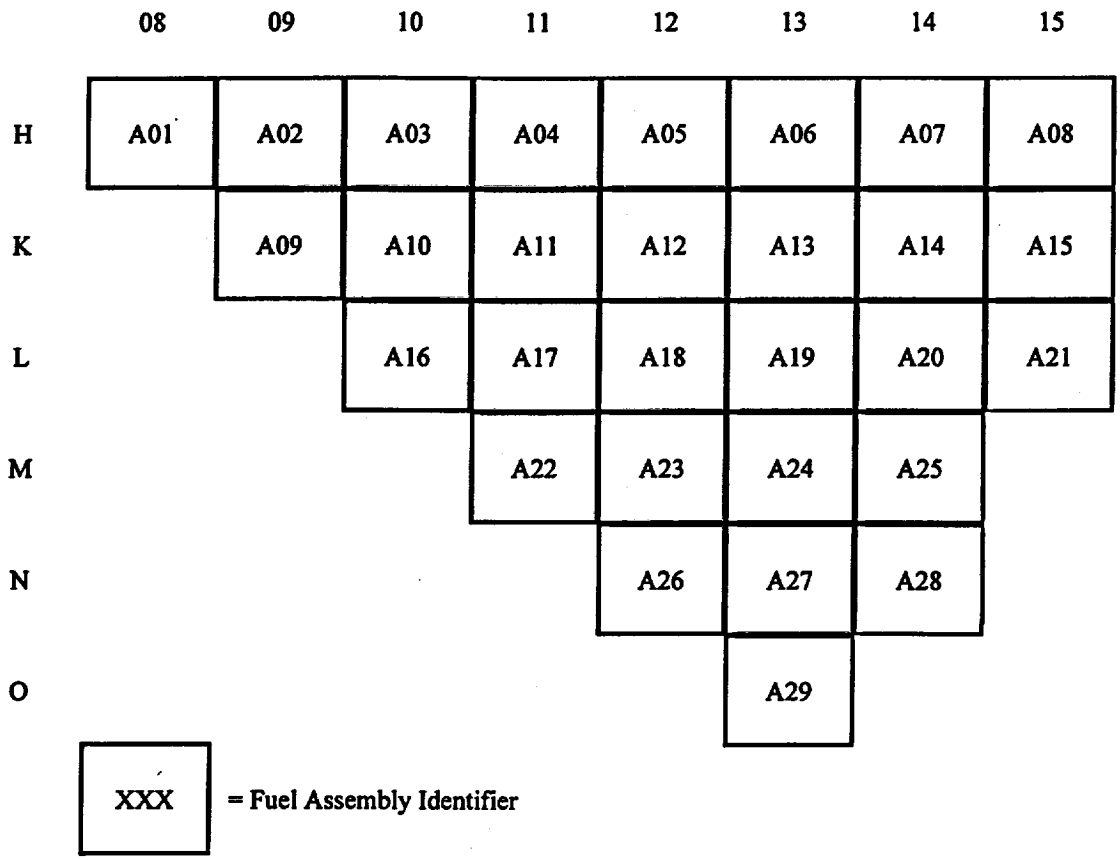


Figure 5.4-12. Fuel Assembly Placement in Cycle 1A of Crystal River Unit 3 (p. 41, Ref. 7.11)

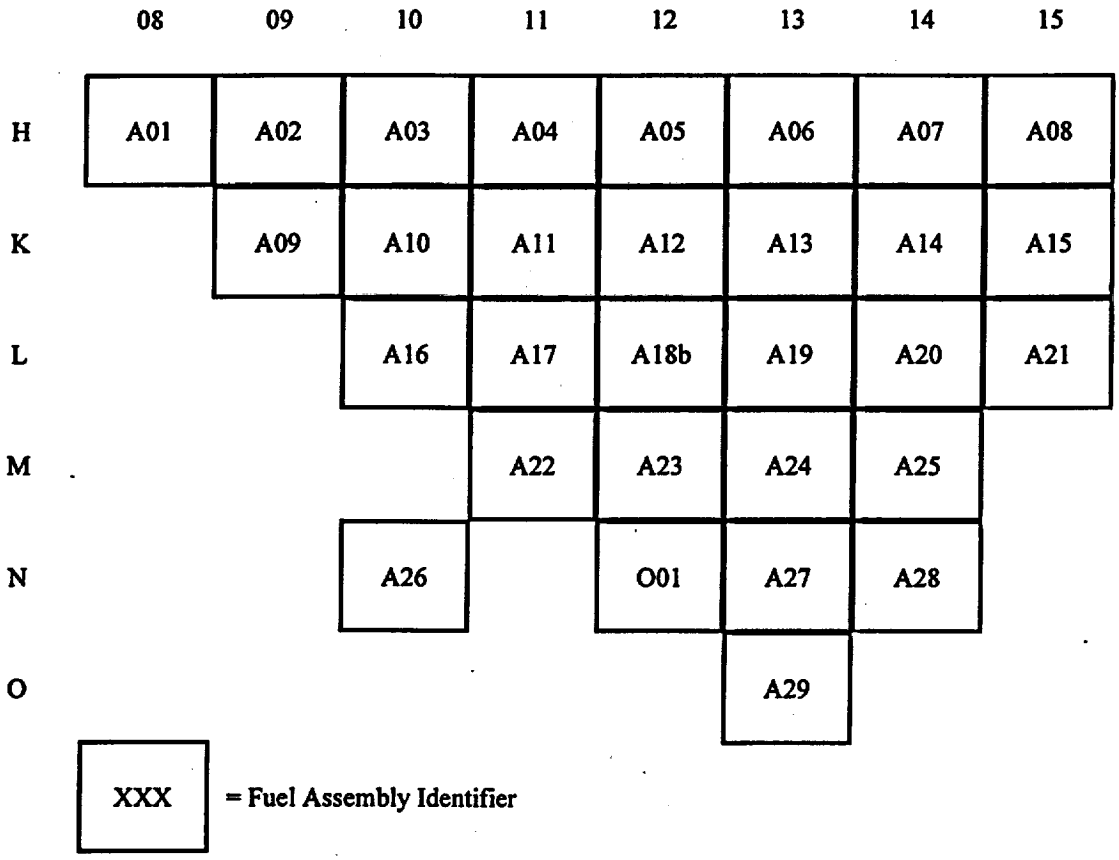


Figure 5.4-13. Fuel Assembly Placement in Cycle 1B of Crystal River Unit 3 (pp. 42, 43, Ref. 7.11)

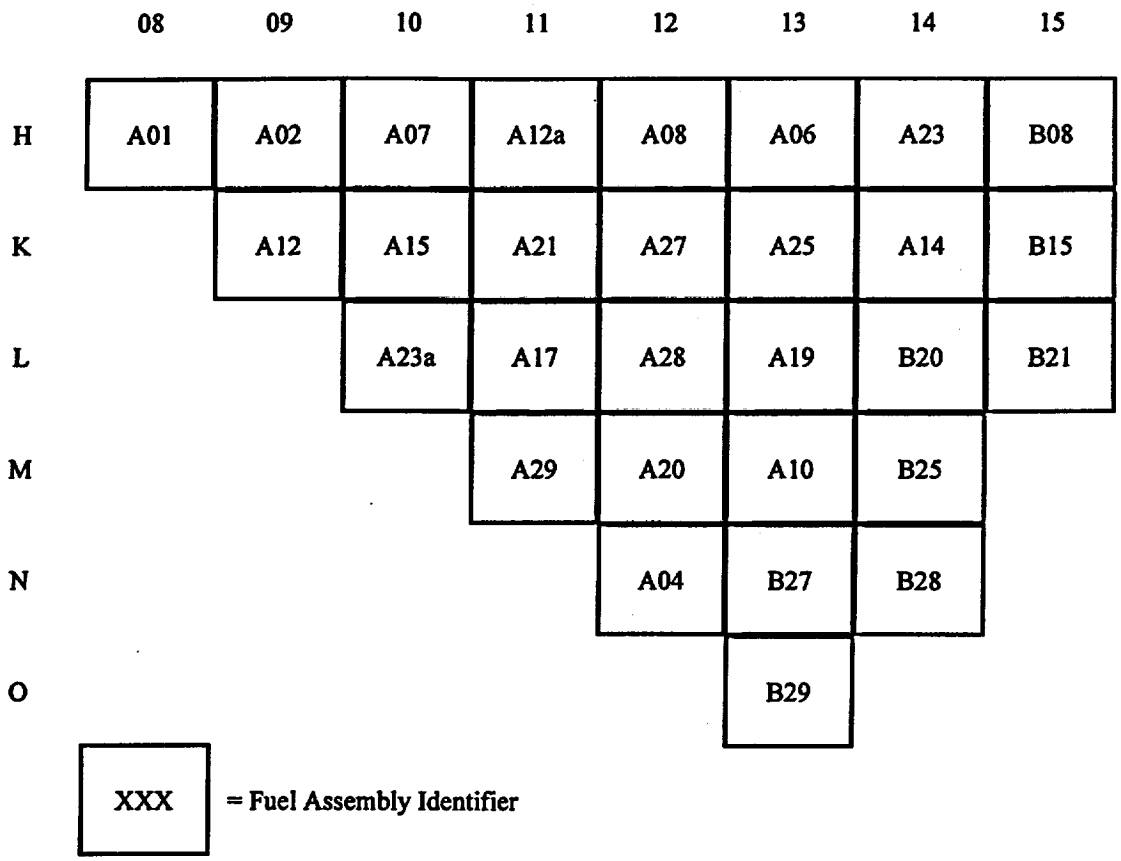


Figure 5.4-14. Fuel Assembly Placement in Cycle 2 of Crystal River Unit 3 (p. 44, Ref. 7.11)

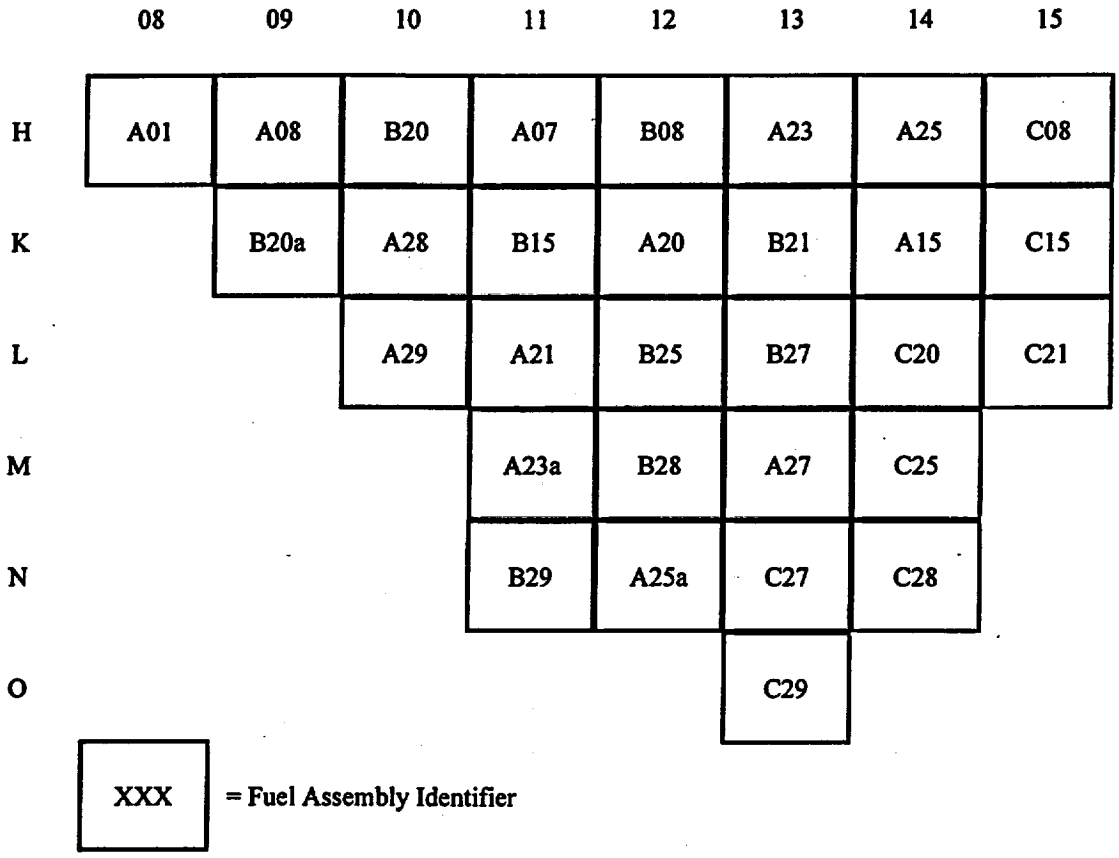


Figure 5.4-15. Fuel Assembly Placement in Cycle 3 of Crystal River Unit 3 (p. 45, Ref. 7.11)

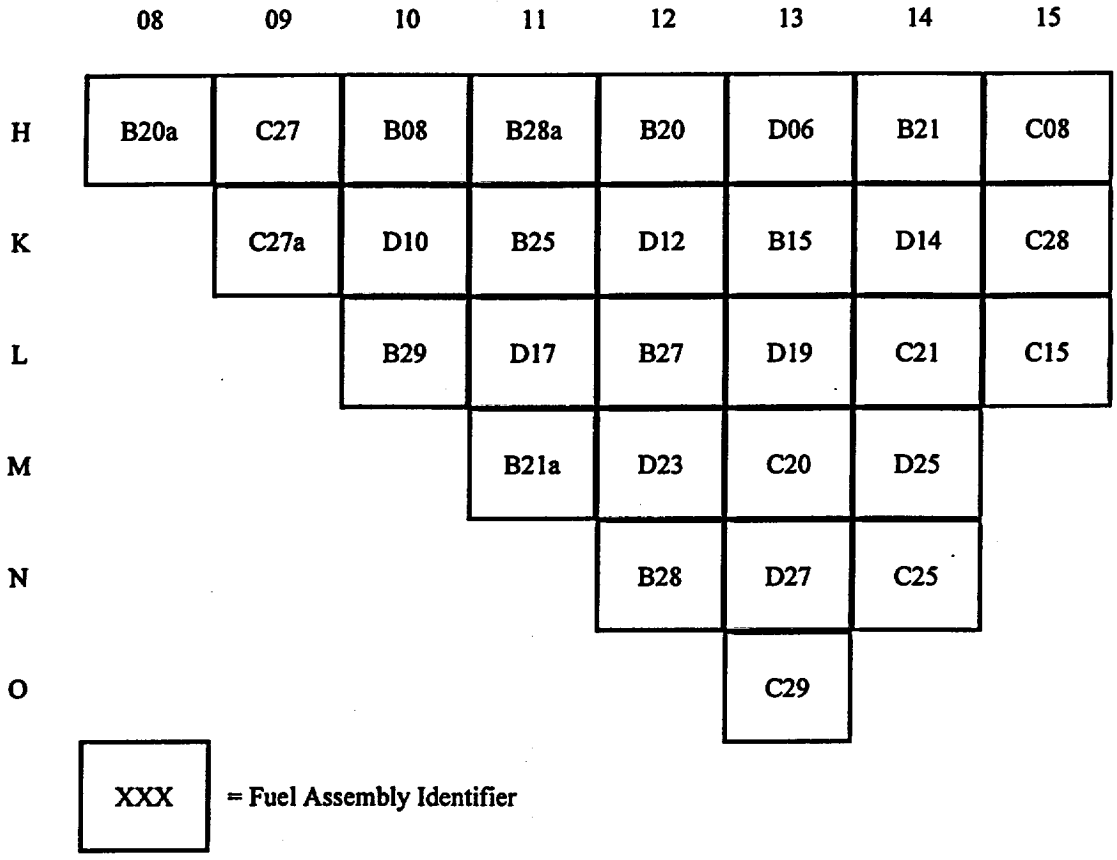


Figure 5.4-16. Fuel Assembly Placement in Cycle 4 of Crystal River Unit 3 (p. 46, Ref. 7.11)

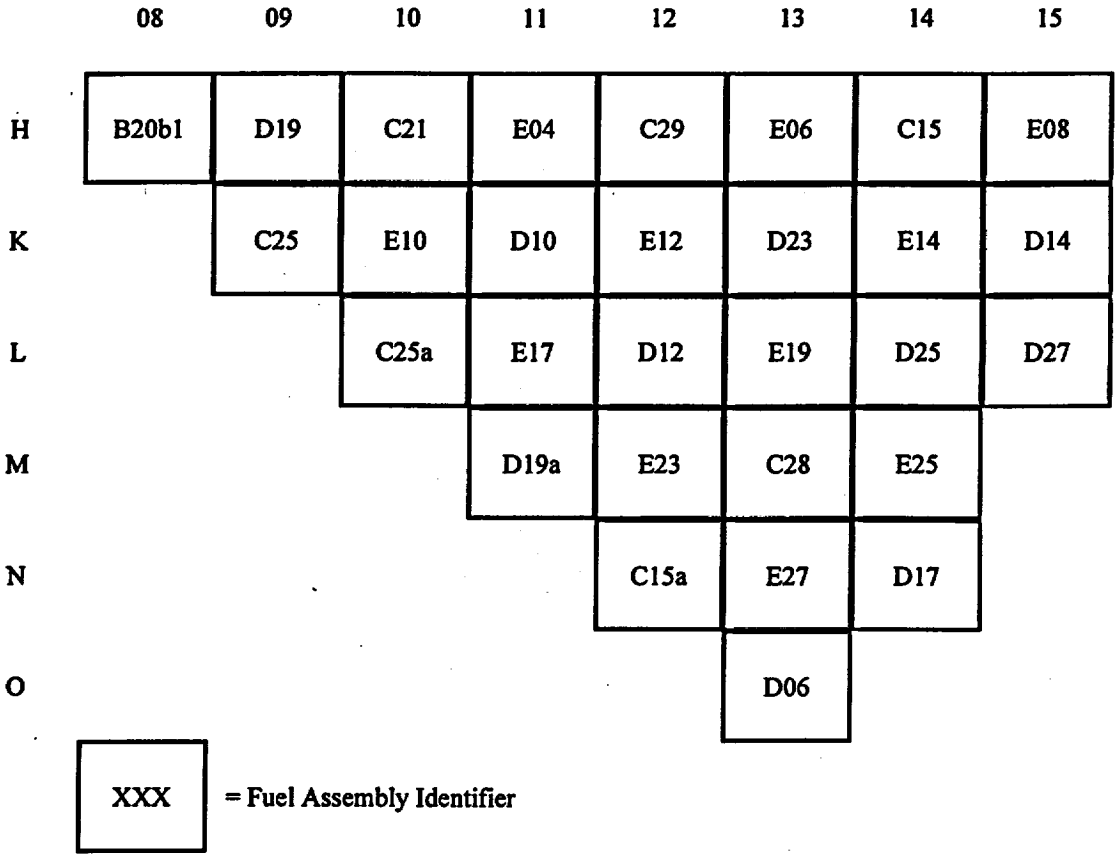


Figure 5.4-17. Fuel Assembly Placement in Cycle 5 of Crystal River Unit 3 (p. 47, Ref. 7.11)

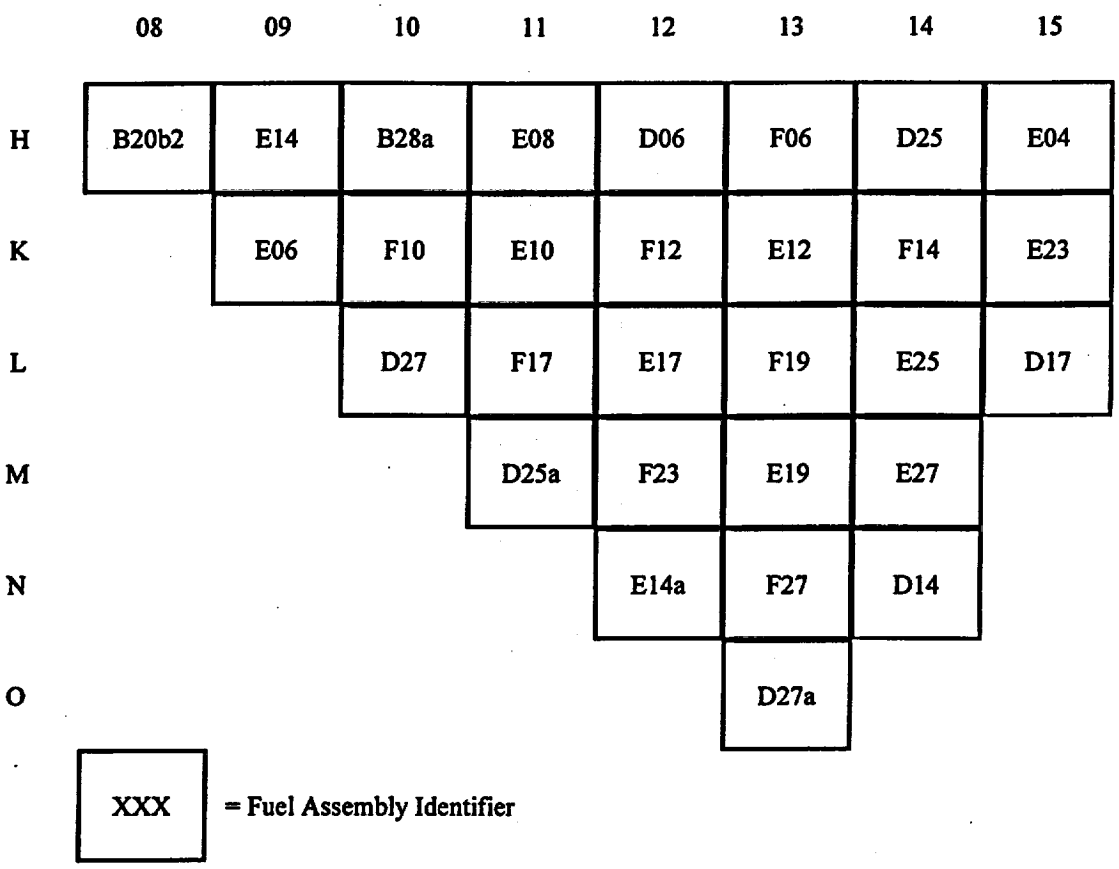


Figure 5.4-18. Fuel Assembly Placement in Cycle 6 of Crystal River Unit 3 (p. 48, Ref. 7.11)

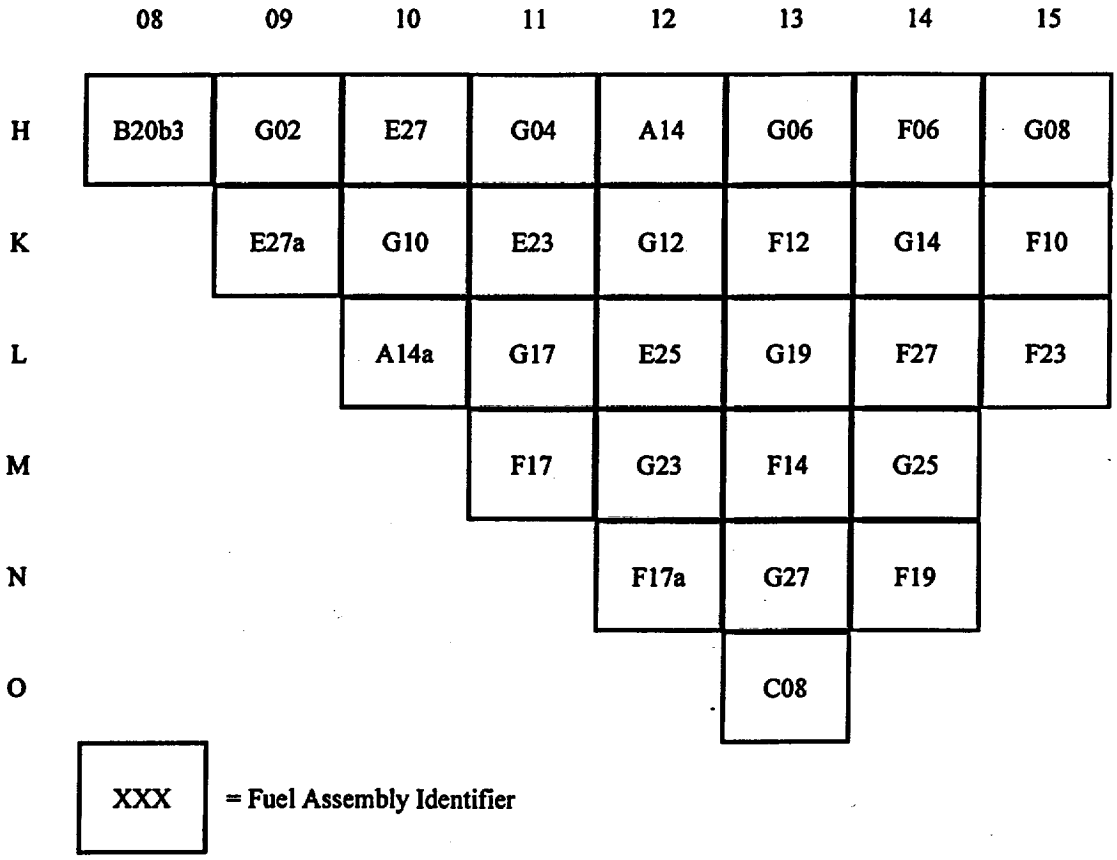


Figure 5.4-19. Fuel Assembly Placement in Cycle 7 of Crystal River Unit 3 (p. 49, Ref. 7.11)

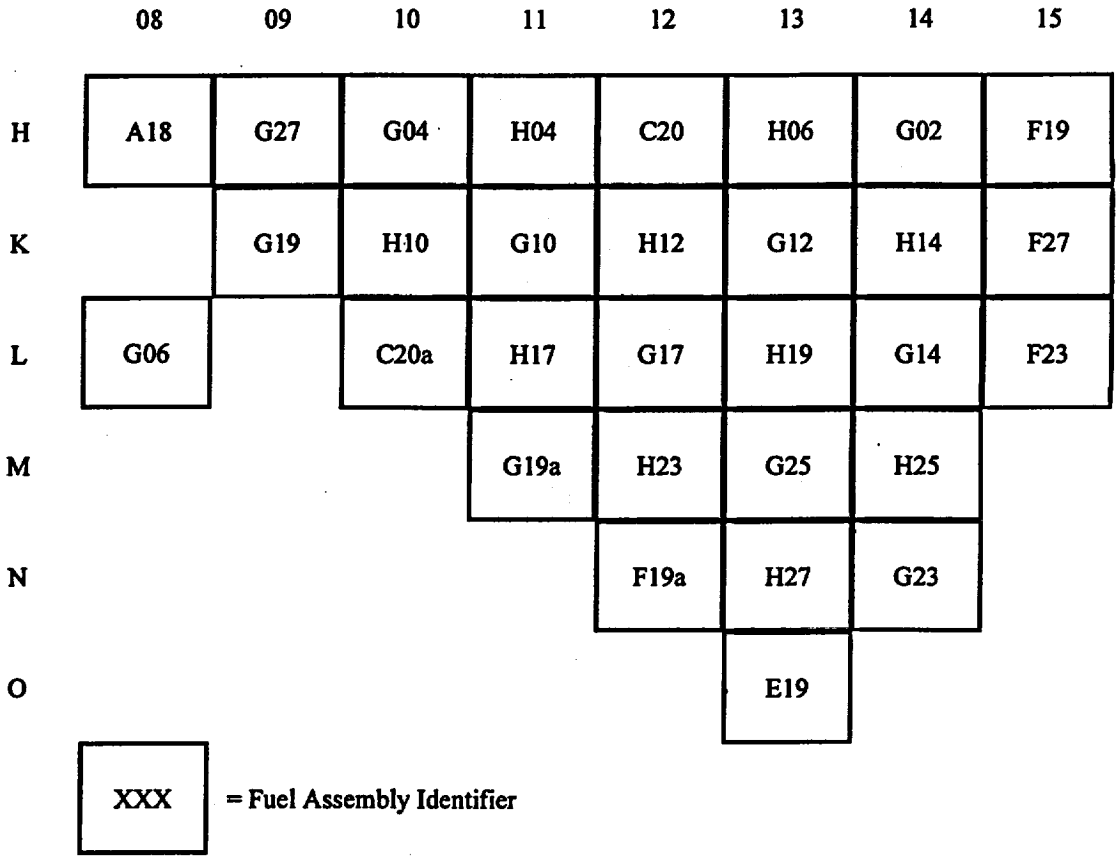


Figure 5.4-20. Fuel Assembly Placement in Cycle 8 of Crystal River Unit 3 (p. 50, Ref. 7.11)

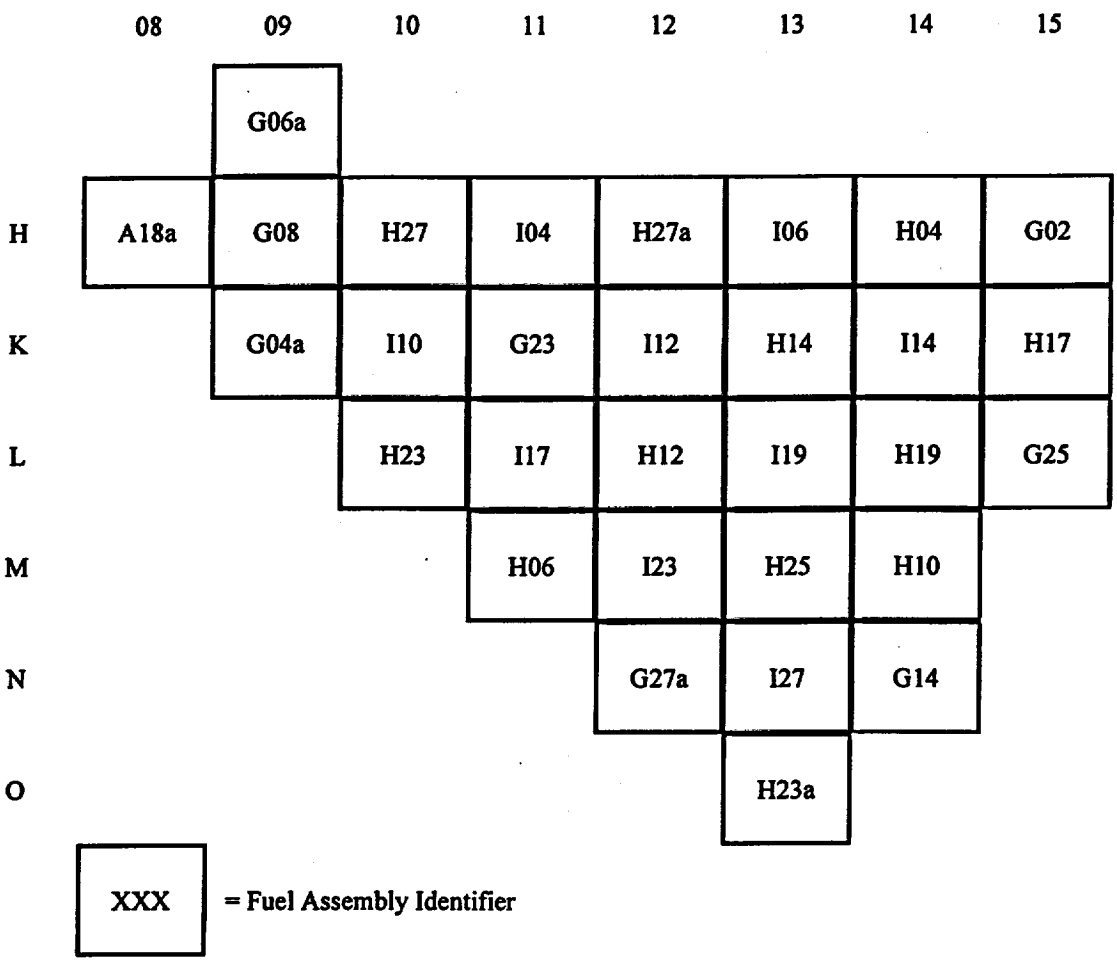


Figure 5.4-21. Fuel Assembly Placement in Cycle 9 of Crystal River Unit 3 (p. 51, Ref. 7.11)

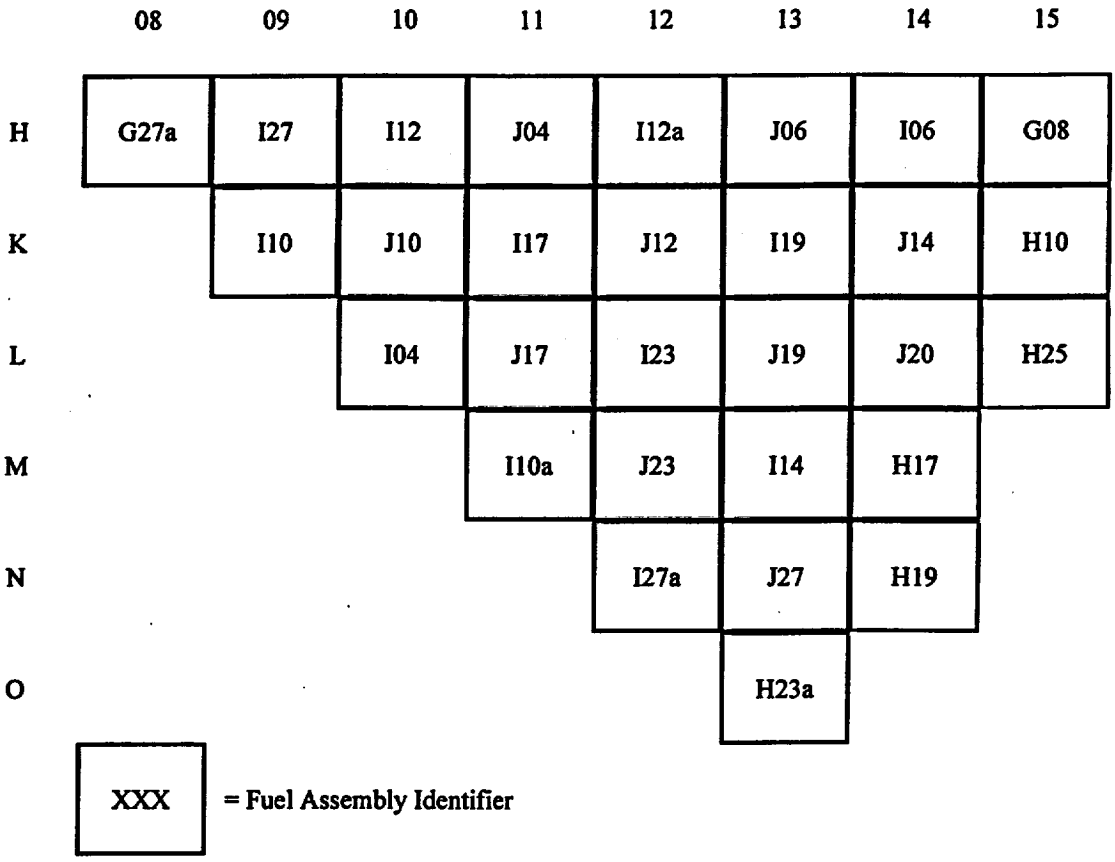


Figure 5.4-22. Fuel Assembly Placement in Cycle 10 of Crystal River Unit 3 (p. 52, Ref. 7.11)

6. Results

This calculation file documents the CRC reactivity evaluations that were performed for 33 statepoints from Crystal River Unit 3. Four reactivity calculations were performed for each of the statepoints other than the beginning-of-life of the reactor (Cycle 1A, 0.0 EFPD). Each of these four calculations for each statepoint used a different depleted fuel composition. The four sets of depleted fuel isotopes shown in Tables 5.3.4-5 through 5.3.4-8 were used for the "Best-Estimate", "Principal Isotope", "Principal Actinide", and "Actinide-Only" calculations. Table 6-1 presents the k_{eff} results for each of the Crystal River Unit 3 CRC evaluations. The k_{eff} results represent the average combined collision, absorption, and track-length estimator from the MCNP calculations. The standard deviation represents the standard deviation of k_{eff} about the average combined collision, absorption, and track-length estimate due to the Monte Carlo calculation statistics.

Table 6-1. k_{eff} Results for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Best-Estimate	0.99601 / 0.00043	0.99285 / 0.00040	0.99502 / 0.00046	0.99282 / 0.00044	0.99408 / 0.00045
Principal Isotope	Not Applicable	1.00156 / 0.00043	1.00867 / 0.00042	1.00305 / 0.00044	1.00267 / 0.00046
Principal Actinide	Not Applicable	1.03798 / 0.00045	1.05566 / 0.00043	1.03870 / 0.00046	1.03623 / 0.00041
Actinide-Only	Not Applicable	1.03938 / 0.00047	1.05747 / 0.00045	1.04030 / 0.00046	1.03857 / 0.00045

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
Best-Estimate	0.99304 / 0.00045	0.99073 / 0.00045	0.99134 / 0.00047	0.99152 / 0.00046	0.99603 / 0.00047
Principal Isotope	1.00662 / 0.00044	1.00686 / 0.00044	0.99922 / 0.00045	1.00481 / 0.00045	1.01265 / 0.00043
Principal Actinide	1.05296 / 0.00048	1.05823 / 0.00045	1.02417 / 0.00045	1.05470 / 0.00044	1.06342 / 0.00044
Actinide-Only	1.05471 / 0.00044	1.06013 / 0.00046	1.02594 / 0.00043	1.05781 / 0.00043	1.06662 / 0.00048

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Best-Estimate	0.99479 / 0.00047	0.99805/ 0.00045	0.99561 / 0.00043	0.99579 / 0.00047	0.99273 / 0.00044

Table 6-1. k_{eff} Results for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Principal Isotope	1.00096 / 0.00044	1.01730 / 0.00044	1.00423 / 0.00039	1.00784/ 0.00048	1.01418 / 0.00041
Principal Actinide	1.02244 / 0.00046	1.07724 / 0.00047	1.03381 / 0.00046	1.05189 / 0.00048	1.08174 / 0.00044
Actinide-Only	1.02335 / 0.00045	1.08115 / 0.00043	1.03525 / 0.00047	1.05342 / 0.00044	1.08777 / 0.00044

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
Best-Estimate	0.99324 / 0.00052	0.99083 / 0.00045	0.99222 / 0.00049	0.98993 / 0.00047	0.99321 / 0.00042
Principal Isotope	1.00008 / 0.00043	1.00750 / 0.00044	1.00819 / 0.00045	1.00824 / 0.00046	1.01973 / 0.00047
Principal Actinide	1.02339 / 0.00047	1.05652 / 0.00050	1.06102 / 0.00046	1.06279 / 0.00047	1.08088 / 0.00045
Actinide-Only	1.02541 / 0.00051	1.05964 / 0.00044	1.06363 / 0.00042	1.06471 / 0.00048	1.08834 / 0.00045

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Best-Estimate	0.99247 / 0.00046	0.99039 / 0.00043	0.99021 / 0.00046	0.99063 / 0.00049	0.99054 / 0.00042
Principal Isotope	1.01584 / 0.00044	0.99788 / 0.00044	1.00108 / 0.00045	1.00331 / 0.00047	1.01073 / 0.00048
Principal Actinide	1.08063 / 0.00047	1.02540 / 0.00046	1.04021 / 0.00046	1.04377 / 0.00047	1.07206 / 0.00046
Actinide-Only	1.08730 / 0.00044	1.02677 / 0.00047	1.04016 / 0.00047	1.04589 / 0.00048	1.07723 / 0.00046

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
Best-Estimate	0.99067 / 0.00047	0.98772 / 0.00044	0.99208 / 0.00044	0.99311 / 0.00050	0.99078 / 0.00048
Principal Isotope	1.01154 / 0.00044	1.01113 / 0.00048	1.00055 / 0.00044	1.01222 / 0.00048	1.00534 / 0.00049
Principal Actinide	1.07188 / 0.00049	1.08122 / 0.00044	1.02577 / 0.00049	1.05266 / 0.00056	1.05564 / 0.00047

Table 6-1. k_{eff} Results for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
Actinide-Only	1.07583 / 0.00049	1.08735 / 0.00046	1.02711 / 0.00046	1.05526 / 0.00046	1.05930 / 0.00047

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (k_{eff} / standard deviation)		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
Best-Estimate	0.98837 / 0.00048	0.99164 / 0.00052	0.98725 / 0.00048
Principal Isotope	1.01968 / 0.00046	1.00108 / 0.00048	1.01232 / 0.00053
Principal Actinide	1.07823 / 0.00047	1.02682 / 0.00049	1.08862 / 0.00047
Actinide-Only	1.08359 / 0.00049	1.02773 / 0.00052	1.09621 / 0.00050

The corresponding MCNP input and output filenames for the cases shown in Table 6-1, are presented in Table 6-2. The MACE input decks used to generate the MCNP input decks are presented in Attachment I. The MACE generated MCNP input decks are presented in Attachment II. MACE uses the ZAID for Ru-103 instead of the ZAID for Rh-103 in the "Principle Isotope" fuel materials cases. The MCNP input decks were corrected by hand for these cases by replacing ZAID 44103.50c with 45103.50c. The MCNP output files are presented in Attachment III. Verification cases of the effect of spacer grids being offset by 16.723 cm as discussed in Section 5.2.2 are presented in Attachment IV. Cycle 10 CRC statepoint calculations were reran in order to make the upper fuel rod plenum heights and homogenized compositions for the assemblies that had BOL before cycle 10 the same as those used in cycle 10. This was due to a difference in axial node heights between cycles 1 through 9 and cycle 10. The MACE input files, MACE generated MCNP input files, and MCNP outputs for these runs are presented in Attachment V (the attachment tapes have been moved to Reference 7.15). These results in Attachment V supersede the previous results for cycle 10.

Table 6-2. MCNP Input and Output Filenames for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Best-Estimate	cr3i1a / cr3i2a.O	cr3i2a / cr3i2a.O	cr3i3a / cr3i3a.O	cr3i4a / cr3i4a.O	cr3i5a / cr3i5a.O
Principal Isotope	Not Applicable	cr3i2b / cr3i2b.O	cr3i3b / cr3i3b.O	cr3i4b / cr3i4b.O	cr3i5b / cr3i5b.O
Principal Actinide	Not Applicable	cr3i2c / cr3i2c.O	cr3i3c / cr3i3c.O	cr3i4c / cr3i4c.O	cr3i5c / cr3i5c.O

Table 6-2. MCNP Input and Output Filenames for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 1A 0.0 EFPD	Cycle 1B 268.8 EFPD	Cycle 1B 411.0 EFPD	Cycle 2 0.0 EFPD	Cycle 3 0.0 EFPD
Actinide-Only	Not Applicable	cr3i2d / cr3i2d.O	cr3i3d / cr3i3d.O	cr3i4d / cr3i4d.O	cr3i5d / cr3i5d.O

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 3 168.5 EFPD	Cycle 3 250.0 EFPD	Cycle 4 0.0 EFPD	Cycle 4 228.1 EFPD	Cycle 4 253.0 EFPD
Best-Estimate	cr3i6a / cr3i6a.O	cr3i7a / cr3i7a.O	cr3i8a / cr3i8a.O	cr3i9a / cr3i9a.O	cr3i10a / cr3i10a.O
Principal Isotope	cr3i6b / cr3i6b.O	cr3i7b / cr3i7b.O	cr3i8b / cr3i8b.O	cr3i9b / cr3i9b.O	cr3i10b / cr3i10b.O
Principal Actinide	cr3i6c / cr3i6c.O	cr3i7c / cr3i7c.O	cr3i8c / cr3i8c.O	cr3i9c / cr3i9c.O	cr3i10c / cr3i10c.O
Actinide-Only	cr3i6d / cr3i6d.O	cr3i7d / cr3i7d.O	cr3i8d / cr3i8d.O	cr3i9d / cr3i9d.O	cr3i10d / cr3i10d.O

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 5 0.0 EFPD	Cycle 5 388.5 EFPD	Cycle 6 0.0 EFPD	Cycle 6 96.0 EFPD	Cycle 6 400.0 EFPD
Best-Estimate	cr3i11a / cr3i11a.O	cr3i12a / cr312a.O	cr3i13a / cr313a.O	cr3i14a / cr314a.O	cr3i15a / cr315a.O
Principal Isotope	cr3i11b / cr3i11b.O	cr3i12b / cr3i12b.O	cr3i13b / cr3i13b.O	cr3i14b / cr3i14b.O	cr3i15b / cr3i15b.O
Principal Actinide	cr3i11c / cr3i11c.O	cr3i12c / cr312c.O	cr3i13c / cr313c.O	cr3i14c / cr314c.O	cr3i15c / cr315c.O
Actinide-Only	cr3i11d / cr3i11d.O	cr3i12d / cr312d.O	cr3i13d / cr313d.O	cr3i14d / cr314d.O	cr3i15d / cr315d.O

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 7 0.0 EFPD	Cycle 7 260.3 EFPD	Cycle 7 291.0 EFPD	Cycle 7 319.0 EFPD	Cycle 7 462.3 EFPD
Best-Estimate	cr3i16a / cr3i16a.O	cr3i17a / cr3i17a.O	cr3i18a / cr3i18a.O	cr3i19a / cr3i19a.O	cr3i20a / cr320a.O
Principal Isotope	cr3i16b / cr3i16b.O	cr3i17b / cr3i17b.O	cr3i18b / cr3i18b.O	cr3i19b / cr3i19b.O	cr3i20b / cr3i20b.O
Principal Actinide	cr3i16c / cr3i16c.O	cr3i17c / cr3i17c.O	cr3i18c / cr3i18c.O	cr3i19c / cr3i19c.O	cr3i20c / cr320c.O
Actinide-Only	cr3i16d / cr3i16d.O	cr3i17d / cr3i17d.O	cr3i18d / cr3i18d.O	cr3i19d / cr3i19d.O	cr3i20d / cr320d.O

Table 6-2. MCNP Input and Output Filenames for the Crystal River Unit 3 CRC Evaluations

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 7 479.0 EFPD	Cycle 8 0.0 EFPD	Cycle 8 97.6 EFPD	Cycle 8 139.8 EFPD	Cycle 8 404.0 EFPD
Best-Estimate	cr3i21a / cr321a.O	cr3i22a / cr322a.O	cr3i23a / cr3i23a.O	cr3i24a / cr3i24a.O	cr3i25a / cr3i25a.O
Principal Isotope	cr3i21b / cr3i21b.O	cr3i22b / cr3i22b.O	cr3i23b / cr3i23b.O	cr3i24b / cr3i24b.O	cr3i25b / cr3i25b.O
Principal Actinide	cr3i21c / cr321c.O	cr3i22c / cr322c.O	cr3i23c / cr3i23c.O	cr3i24c / cr3i24c.O	cr3i25c / cr3i25c.O
Actinide-Only	cr3i21d / cr321d.O	cr3i22d / cr322d.O	cr3i23d / cr3i23d.O	cr3i24d / cr3i24d.O	cr3i25d / cr3i25d.O

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)				
	Cycle 8 409.6 EFPD	Cycle 8 515.5 EFPD	Cycle 9 0.0 EFPD	Cycle 9 158.8 EFPD	Cycle 9 219.0 EFPD
Best-Estimate	cr3i26a / cr3i26a.O	cr3i27a / cr3i27a.O	cr3i28a / cr328a.O	cr3i29a / cr329a.O	cr3i30a / cr330a.O
Principal Isotope	cr3i26b / cr3i26b.O	cr3i27b / cr3i27b.O	cr3i28b / cr3i28b.O	cr3i29b / cr3i29b.O	cr3i30b / cr330b.O
Principal Actinide	cr3i26c / cr3i26c.O	cr3i27c / cr3i27c.O	cr3i28c / cr328c.O	cr3i29c / cr329c.O	cr3i30c / cr330c.O
Actinide-Only	cr3i26d / cr3i26d.O	cr3i27d / cr3i27d.O	cr3i28d / cr328d.O	cr3i29d / cr329d.O	cr3i30d / cr330d.O

Fuel Isotope Set	Crystal River Unit 3 CRC Statepoint (input filename / output filename)		
	Cycle 9 363.1 EFPD	Cycle 10 0.0 EFPD	Cycle 10 573.7 EFPD
Best-Estimate	cr3i31a / cr331a.O	cr3i32a / cr332a.O	cr3i33a / cr333a.O
Principal Isotope	cr3i31b / cr331b.O	cr3i32b / cr332b.O	cr3i33b / cr333b.O
Principal Actinide	cr3i31c / cr331c.O	cr3i32c / cr332c.O	cr3i33c / cr333c.O
Actinide-Only	cr3i31d / cr331d.O	cr3i32d / cr332d.O	cr3i33d / cr333d.O

7. References

7.1 *MCNP 4B: Monte Carlo N-Particle Transport Code System.* User manual. Los Alamos National Laboratory, Los Alamos, NM. Document Number: LA-12625-M.

7.2 *SCALE 4.3: Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation.* User Manual Volumes 0 through 3, Oak Ridge National Laboratory, Document Number: CCC-545.

7.3 *CRC Depletion Calculations for Crystal River Unit 3.* Document Identifier Number (DI#): B00000000-01717-0210-00001 Rev 00, Civilian Radioactive Waste Management System (CRWMS) Management and Operating Contractor (M&O).

7.4 *Software Qualification Report for MCNP Version 4B2, A General Monte Carlo N-Particle Transport Code.* DI#: 30033-2003 REV 00, CRWMS M&O.

7.5 *Nuclide and Isotopes, Chart of the Nuclides, Fourteenth Edition.* General Electric Company, 1989.

7.6 *Radiological Health Handbook, January 1970 Revision.* Bureau of Radiological Health; U. S. Department of Health, Education, and Welfare; Public Health Service; Food and Drug Administration.

7.7 *Material Compositions and Number Densities for Neutronics Calculations.* DI#: BBA000000-01717-0200-00002 REV 00, CRWMS M&O.

7.8 *Huntington Alloys: Inconel Alloy 718*, Third Edition, 1978.

7.9 This reference is intentionally left blank.

7.10 *Scale-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 2-Sequoyah Unit 2 Cycle 3.* Document Number: ORNL/TM-12294/V2. Oak Ridge National Laboratory, March 1995.

7.11 *Summary Report of Commercial Reactor Criticality Data for Crystal River Unit 3.* DI#: B00000000-01717-5705-00060 REV 01, CRWMS M&O.

7.12 *Addendum to Software Qualification Report for MCNP4A Covering Addition of ENDF/B-VI Cross Sections.* DI#: 30006-2005 REV 00, CRWMS M&O.

7.13 This reference is intentionally left blank.

7.14 *CRC Reactivity Calculations for Sequoyah Unit 2.* DI#: B00000000-01717-0210-00006 REV 00, CRWMS M&O.

7.15 *CRC Reactivity Calculations for Crystal River Unit 3. (DI#: B00000000-01717-0210-00002 REV 00, CRWMS M&O) Attachments I through IV – 3 Data Cartridges.* Batch Number: MOY-980615-05.

8. Attachments

Table 8-1 presents the attachment specifications for this calculation file.

Table 8-1. Attachment Listing

Attachment #	# of Pages	Creation Date	Description
I	4 (Hard-Copy Listing of Tape Content)	5/15/98 (Tape Written)	MACE input decks for the Crystal River Unit 3 reactivity calculations (attachment tapes moved to Reference 7.15)
II	4 (Hard-Copy Listing of Tape Content)	5/15/98 (Tape Written)	MACE generated MCNP input decks for the Crystal River Unit 3 reactivity calculations (attachment tapes moved to Reference 7.15)
III	4 (Hard-Copy Listing of Tape Content)	5/18/98 (Tape Written)	MCNP output files for the Crystal River Unit 3 reactivity calculations (attachment tapes moved to Reference 7.15)
IV	1 (Hard-Copy Listing of Tape Content)	5/15/98 (Tape Written)	Revised MCNP input decks and output files for spacer grid repositioning effect on system reactivity (attachment tapes moved to Reference 7.15)
V	1 (Hard-Copy Listing of Tape Content)	6/15/98 6/17/98 (Tape Written)	Revised MACE input decks, MACE generated MCNP inputs, and MCNP output files for different fuel rod upper plenum dimensions in cycle 10 (attachment tapes moved to Reference 7.15)

This attachment contains the MACE input decks for the reactivity calculations for Crystal River Unit 3. The input decks are contained on a set of attachment tapes of this calculation file (the attachment tapes have been moved to Reference 7.15). The information contained in this hard-copy representation of Attachment I is a listing of the various MACE input deck files and their attributes. The file sizes listed in the following table are the file sizes as they appear on the Hewlett Packard (HP) Series 9000 workstation. The HP file sizes differ from the file sizes on the attachment tape due to the difference in the block sizes between the HP and the personal computer. The tape containing Attachment I was written using the Colorado Model T1000e External Parallel Port Backup System for personal computers.

In the following MACE input decks, certain assemblies are identified with a "c" at the end of their names, which is a product of the depletion calculations. The "c" was used in the depletion calculations to identify which assemblies were being depleted in a continuation from a previous cycle. Also, in cr3i2(a, b, c, and d).txt, due to a requirement by MACE, it was necessary to model assembly A24 as A24x in one position in the core to compensate for an uncoupled RCCA rod bank in that location as discussed in Section 5.2.7.

Filename	File Type	File Size (bytes)	Date File Copied to Tape
cr3i10a.txt	ASCII	78,722	5/14/98
cr3i10b.txt	ASCII	78,722	5/14/98
cr3i10c.txt	ASCII	78,722	5/14/98
cr3i10d.txt	ASCII	78,722	5/14/98
cr3i11a.txt	ASCII	80,449	5/14/98
cr3i11b.txt	ASCII	80,449	5/14/98
cr3i11c.txt	ASCII	80,449	5/14/98
cr3i11d.txt	ASCII	80,449	5/14/98
cr3i12a.txt	ASCII	80,457	5/14/98
cr3i12b.txt	ASCII	80,457	5/14/98
cr3i12c.txt	ASCII	80,457	5/14/98
cr3i12d.txt	ASCII	80,457	5/14/98
cr3i13a.txt	ASCII	94,739	5/14/98
cr3i13b.txt	ASCII	94,739	5/14/98
cr3i13c.txt	ASCII	94,739	5/14/98
cr3i13d.txt	ASCII	94,739	5/14/98
cr3i14a.txt	ASCII	100,454	5/14/98
cr3i14b.txt	ASCII	100,454	5/14/98
cr3i14c.txt	ASCII	100,454	5/14/98
cr3i14d.txt	ASCII	100,454	5/14/98
cr3i15a.txt	ASCII	100,452	5/14/98
cr3i15b.txt	ASCII	100,452	5/14/98
cr3i15c.txt	ASCII	100,452	5/14/98
cr3i15d.txt	ASCII	100,452	5/14/98
cr3i16a.txt	ASCII	97,441	5/14/98
cr3i16b.txt	ASCII	97,441	5/14/98
cr3i16c.txt	ASCII	97,441	5/14/98
cr3i16d.txt	ASCII	97,441	5/14/98

Filename	File Type	File Size (bytes)	Date File Copied to Tape
cr3i17a.txt	ASCII	113,547	5/14/98
cr3i17b.txt	ASCII	113,547	5/14/98
cr3i17c.txt	ASCII	113,547	5/14/98
cr3i17d.txt	ASCII	113,547	5/14/98
cr3i18a.txt	ASCII	113,548	5/14/98
cr3i18b.txt	ASCII	113,548	5/14/98
cr3i18c.txt	ASCII	113,548	5/14/98
cr3i18d.txt	ASCII	113,548	5/14/98
cr3i19a.txt	ASCII	113,547	5/14/98
cr3i19b.txt	ASCII	113,547	5/14/98
cr3i19c.txt	ASCII	113,547	5/14/98
cr3i19d.txt	ASCII	113,547	5/14/98
cr3i1a.txt	ASCII	69,991	5/14/98
cr3i20a.txt	ASCII	113,544	5/14/98
cr3i20b.txt	ASCII	113,544	5/14/98
cr3i20c.txt	ASCII	113,544	5/14/98
cr3i20d.txt	ASCII	113,544	5/14/98
cr3i21a.txt	ASCII	113,544	5/14/98
cr3i21b.txt	ASCII	113,544	5/14/98
cr3i21c.txt	ASCII	113,544	5/14/98
cr3i21d.txt	ASCII	113,544	5/14/98
cr3i22a.txt	ASCII	72,455	5/14/98
cr3i22b.txt	ASCII	72,455	5/14/98
cr3i22c.txt	ASCII	72,455	5/14/98
cr3i22d.txt	ASCII	72,455	5/14/98
cr3i23a.txt	ASCII	83,882	5/14/98
cr3i23b.txt	ASCII	83,882	5/14/98
cr3i23c.txt	ASCII	83,882	5/14/98
cr3i23d.txt	ASCII	83,882	5/14/98
cr3i24a.txt	ASCII	83,883	5/14/98
cr3i24b.txt	ASCII	83,883	5/14/98
cr3i24c.txt	ASCII	83,883	5/14/98
cr3i24d.txt	ASCII	83,883	5/14/98
cr3i25a.txt	ASCII	83,880	5/14/98
cr3i25b.txt	ASCII	83,880	5/14/98
cr3i25c.txt	ASCII	83,880	5/14/98
cr3i25d.txt	ASCII	83,880	5/14/98
cr3i26a.txt	ASCII	83,880	5/14/98
cr3i26b.txt	ASCII	83,880	5/14/98
cr3i26c.txt	ASCII	83,880	5/14/98
cr3i26d.txt	ASCII	83,880	5/14/98
cr3i27a.txt	ASCII	83,882	5/14/98
cr3i27b.txt	ASCII	83,882	5/14/98

Filename	File Type	File Size (bytes)	Date File Copied to Tape
cr3i27c.txt	ASCII	83,882	5/14/98
cr3i27d.txt	ASCII	83,882	5/14/98
cr3i28a.txt	ASCII	90,194	5/14/98
cr3i28b.txt	ASCII	90,194	5/14/98
cr3i28c.txt	ASCII	90,194	5/14/98
cr3i28d.txt	ASCII	90,194	5/14/98
cr3i29a.txt	ASCII	92,269	5/14/98
cr3i29b.txt	ASCII	92,269	5/14/98
cr3i29c.txt	ASCII	92,269	5/14/98
cr3i29d.txt	ASCII	92,269	5/14/98
cr3i2a.txt	ASCII	66,057	5/14/98
cr3i2b.txt	ASCII	66,057	5/14/98
cr3i2c.txt	ASCII	66,057	5/14/98
cr3i2d.txt	ASCII	66,057	5/14/98
cr3i30a.txt	ASCII	92,269	5/14/98
cr3i30b.txt	ASCII	92,269	5/14/98
cr3i30c.txt	ASCII	92,269	5/14/98
cr3i30d.txt	ASCII	92,269	5/14/98
cr3i31a.txt	ASCII	92,266	5/14/98
cr3i31b.txt	ASCII	92,266	5/14/98
cr3i31c.txt	ASCII	92,266	5/14/98
cr3i31d.txt	ASCII	92,266	5/14/98
cr3i32a.txt	ASCII	91,084	5/14/98
cr3i32b.txt	ASCII	91,084	5/14/98
cr3i32c.txt	ASCII	91,084	5/14/98
cr3i32d.txt	ASCII	91,084	5/14/98
cr3i33a.txt	ASCII	92,114	5/14/98
cr3i33b.txt	ASCII	92,114	5/14/98
cr3i33c.txt	ASCII	92,114	5/14/98
cr3i33d.txt	ASCII	92,114	5/14/98
cr3i3a.txt	ASCII	60,319	5/14/98
cr3i3b.txt	ASCII	60,319	5/14/98
cr3i3c.txt	ASCII	60,319	5/14/98
cr3i3d.txt	ASCII	60,319	5/14/98
cr3i4a.txt	ASCII	41,072	5/14/98
cr3i4b.txt	ASCII	41,072	5/14/98
cr3i4c.txt	ASCII	41,072	5/14/98
cr3i4d.txt	ASCII	41,072	5/14/98
cr3i5a.txt	ASCII	51,641	5/14/98
cr3i5b.txt	ASCII	51,641	5/14/98
cr3i5c.txt	ASCII	51,641	5/14/98
cr3i5d.txt	ASCII	51,641	5/14/98
cr3i6a.txt	ASCII	57,346	5/14/98

Filename	File Type	File Size (bytes)	Date File Copied to Tape
cr3i6b.txt	ASCII	57,346	5/14/98
cr3i6c.txt	ASCII	57,346	5/14/98
cr3i6d.txt	ASCII	57,346	5/14/98
cr3i7a.txt	ASCII	57,346	5/14/98
cr3i7b.txt	ASCII	57,346	5/14/98
cr3i7c.txt	ASCII	57,346	5/14/98
cr3i7d.txt	ASCII	57,346	5/14/98
cr3i8a.txt	ASCII	73,006	5/14/98
cr3i8b.txt	ASCII	73,006	5/14/98
cr3i8c.txt	ASCII	73,006	5/14/98
cr3i8d.txt	ASCII	73,006	5/14/98
cr3i9a.txt	ASCII	78,721	5/14/98
cr3i9b.txt	ASCII	78,721	5/14/98
cr3i9c.txt	ASCII	78,721	5/14/98
cr3i9d.txt	ASCII	78,721	5/14/98

This attachment contains the MCNP input decks for the reactivity calculations for Crystal River Unit 3 that were generated by MACE. The files listed with a "b" at the end of their name are for the Princple Isotope fuel set. These MCNP inputs were modified to replace ZAID 44103.50c with 45103,50c as discussed in Section 6. The input decks are contained on a set of attachment tapes of this calculation file (the attachment tapes have been moved to Reference 7.15). The information contained in this hard-copy representation of Attachment II is a listing of the various MCNP input deck files and their attributes. The file sizes listed in the following table are the file sizes as they appear on the Hewlett Packard (HP) Series 9000 workstation. The HP file sizes differ from the file sizes on the attachment tape due to the difference in the block sizes between the HP and the personal computer. The tape containing Attachment II was written using the Colorado Model T1000e External Parallel Port Backup System for personal computers.

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i10a	ASCII	1,742,102	5/14/98
cr3i10b	ASCII	1,033,109	5/14/98
cr3i10c	ASCII	772,671	5/14/98
cr3i10d	ASCII	703,912	5/14/98
cr3i11a	ASCII	1,283,559	5/14/98
cr3i11b	ASCII	863,621	5/14/98
cr3i11c	ASCII	701,945	5/14/98
cr3i11d	ASCII	659,177	5/14/98
cr3i12a	ASCII	1,827,767	5/14/98
cr3i12b	ASCII	1,027,423	5/14/98
cr3i12c	ASCII	766,945	5/14/98
cr3i12d	ASCII	698,041	5/14/98
cr3i13a	ASCII	1,441,524	5/14/98
cr3i13b	ASCII	948,277	5/14/98
cr3i13c	ASCII	759,655	5/14/98
cr3i13d	ASCII	709,759	5/14/98
cr3i14a	ASCII	1,755,284	5/14/98
cr3i14b	ASCII	1,088,931	5/14/98
cr3i14c	ASCII	828,469	5/14/98
cr3i14d	ASCII	759,623	5/14/98
cr3i15a	ASCII	1,877,060	5/14/98
cr3i15b	ASCII	1,087,699	5/14/98
cr3i15c	ASCII	827,221	5/14/98
cr3i15d	ASCII	758,317	5/14/98
cr3i16a	ASCII	1,263,948	5/14/98
cr3i16b	ASCII	873,502	5/14/98
cr3i16c	ASCII	720,856	5/14/98
cr3i16d	ASCII	680,638	5/14/98
cr3i17a	ASCII	1,874,966	5/14/98
cr3i17b	ASCII	1,112,930	5/14/98
cr3i17c	ASCII	852,452	5/14/98
cr3i17d	ASCII	783,548	5/14/98

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i18a	ASCII	1,800,330	5/14/98
cr3i18b	ASCII	1,112,856	5/14/98
cr3i18c	ASCII	852,394	5/14/98
cr3i18d	ASCII	783,548	5/14/98
cr3i19a	ASCII	1,792,819	5/14/98
cr3i19b	ASCII	1,112,893	5/14/98
cr3i19c	ASCII	852,423	5/14/98
cr3i19d	ASCII	783,548	5/14/98
cr3i1a	ASCII	571,133	5/14/98
cr3i20a	ASCII	1,908,309	5/14/98
cr3i20b	ASCII	1,112,930	5/14/98
cr3i20c	ASCII	852,452	5/14/98
cr3i20d	ASCII	783,548	5/14/98
cr3i21a	ASCII	1,856,775	5/14/98
cr3i21b	ASCII	1,111,635	5/14/98
cr3i21c	ASCII	851,437	5/14/98
cr3i21d	ASCII	783,548	5/14/98
cr3i22a	ASCII	1,331,977	5/14/98
cr3i22b	ASCII	868,273	5/14/98
cr3i22c	ASCII	688,657	5/14/98
cr3i22d	ASCII	641,224	5/14/98
cr3i23a	ASCII	1,813,586	5/14/98
cr3i23b	ASCII	1,055,148	5/14/98
cr3i23c	ASCII	785,720	5/14/98
cr3i23d	ASCII	714,622	5/14/98
cr3i24a	ASCII	1,815,537	5/14/98
cr3i24b	ASCII	1,055,288	5/14/98
cr3i24c	ASCII	785,844	5/14/98
cr3i24d	ASCII	714,622	5/14/98
cr3i25a	ASCII	1,813,011	5/14/98
cr3i25b	ASCII	1,055,362	5/14/98
cr3i25c	ASCII	785,902	5/14/98
cr3i25d	ASCII	714,622	5/14/98
cr3i26a	ASCII	1,805,388	5/14/98
cr3i26b	ASCII	1,039,711	5/14/98
cr3i26c	ASCII	773,635	5/14/98
cr3i26d	ASCII	714,622	5/14/98
cr3i27a	ASCII	1,862,048	5/14/98
cr3i27b	ASCII	1,054,032	5/14/98
cr3i27c	ASCII	784,572	5/14/98
cr3i27d	ASCII	713,292	5/14/98
cr3i28a	ASCII	1,451,693	5/14/98
cr3i28b	ASCII	973,514	5/14/98

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i28c	ASCII	784,892	5/14/98
cr3i28d	ASCII	734,996	5/14/98
cr3i29a	ASCII	1,893,863	5/14/98
cr3i29b	ASCII	1,097,242	5/14/98
cr3i29c	ASCII	827,782	5/14/98
cr3i29d	ASCII	756,502	5/14/98
cr3i2a	ASCII	1,768,477	5/14/98
cr3i2b	ASCII	1,061,591	5/14/98
cr3i2c	ASCII	783,149	5/14/98
cr3i2d	ASCII	709,493	5/14/98
cr3i30a	ASCII	1,817,003	5/14/98
cr3i30b	ASCII	1,097,242	5/14/98
cr3i30c	ASCII	827,782	5/14/98
cr3i30d	ASCII	756,502	5/14/98
cr3i31a	ASCII	1,918,825	5/14/98
cr3i31b	ASCII	1,097,242	5/14/98
cr3i31c	ASCII	827,782	5/14/98
cr3i31d	ASCII	756,502	5/14/98
cr3i32a	ASCII	1,330,866	5/14/98
cr3i32b	ASCII	852,526	5/14/98
cr3i32c	ASCII	681,868	5/14/98
cr3i32d	ASCII	636,725	5/14/98
cr3i33a	ASCII	1,795,130	5/14/98
cr3i33b	ASCII	1,002,976	5/14/98
cr3i33c	ASCII	742,498	5/14/98
cr3i33d	ASCII	673,594	5/14/98
cr3i3a	ASCII	1,785,527	5/14/98
cr3i3b	ASCII	1,019,762	5/14/98
cr3i3c	ASCII	750,302	5/14/98
cr3i3d	ASCII	679,022	5/14/98
cr3i4a	ASCII	1,197,222	5/14/98
cr3i4b	ASCII	729,715	5/14/98
cr3i4c	ASCII	541,117	5/14/98
cr3i4d	ASCII	491,308	5/14/98
cr3i5a	ASCII	1,302,043	5/14/98
cr3i5b	ASCII	803,273	5/14/98
cr3i5c	ASCII	605,669	5/14/98
cr3i5d	ASCII	553,397	5/14/98
cr3i6a	ASCII	1,707,910	5/14/98
cr3i6b	ASCII	944,688	5/14/98
cr3i6c	ASCII	675,252	5/14/98
cr3i6d	ASCII	604,059	5/14/98
cr3i7a	ASCII	1,702,345	5/14/98

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i7b	ASCII	943,849	5/14/98
cr3i7c	ASCII	674,389	5/14/98
cr3i7d	ASCII	603,109	5/14/98
cr3i8a	ASCII	1,332,310	5/14/98
cr3i8b	ASCII	877,642	5/14/98
cr3i8c	ASCII	698,002	5/14/98
cr3i8d	ASCII	650,482	5/14/98
cr3i9a	ASCII	1,785,058	5/14/98
cr3i9b	ASCII	1,033,294	5/14/98
cr3i9c	ASCII	772,816	5/14/98
cr3i9d	ASCII	703,912	5/14/98

This attachment contains the MCNP input decks for the reactivity calculations for Crystal River Unit 3 that were generated by MACE. The input decks are contained on a set of attachment tapes of this calculation file (the attachment tapes have been moved to Reference 7.15). The information contained in this hard-copy representation of Attachment III is a listing of the various MCNP input deck files and their attributes. The file sizes listed in the following table are the file sizes as they appear on the Hewlett Packard (HP) Series 9000 workstation. The HP file sizes differ from the file sizes on the attachment tape due to the difference in the block sizes between the HP and the personal computer. The tape containing Attachment III was written using the Colorado Model T1000e External Parallel Port Backup System for personal computers.

File Name	File Type	File Size (bytes)	Date File Copied Copied to Tape
cr312a.O	ASCII	15,066,836	5/18/98
cr312c.O	ASCII	8,256,126	5/18/98
cr312d.O	ASCII	7,814,480	5/18/98
cr313a.O	ASCII	12,754,900	5/18/98
cr313c.O	ASCII	8,377,250	5/18/98
cr313d.O	ASCII	8,056,488	5/18/98
cr314a.O	ASCII	14,829,534	5/18/98
cr314c.O	ASCII	8,879,392	5/18/98
cr314d.O	ASCII	8,437,575	5/18/98
cr315a.O	ASCII	15,605,376	5/18/98
cr315c.O	ASCII	8,875,834	5/18/98
cr315d.O	ASCII	8,432,666	5/18/98
cr320a.O	ASCII	15,694,339	5/18/98
cr320c.O	ASCII	8,915,341	5/18/98
cr320d.O	ASCII	8,473,225	5/18/98
cr321a.O	ASCII	15,360,966	5/18/98
cr321c.O	ASCII	8,909,629	5/18/98
cr321d.O	ASCII	8,472,427	5/18/98
cr322a.O	ASCII	11,491,119	5/18/98
cr322c.O	ASCII	7,355,383	5/18/98
cr322d.O	ASCII	7,051,477	5/18/98
cr328a.O	ASCII	11,836,488	5/18/98
cr328c.O	ASCII	7,553,512	5/18/98
cr328d.O	ASCII	7,233,128	5/18/98
cr329a.O	ASCII	14,639,509	5/18/98
cr329c.O	ASCII	7,799,941	5/18/98
cr329d.O	ASCII	7,342,731	5/18/98
cr330a.O	ASCII	14,147,414	5/18/98
cr330b.O	ASCII	9,540,555	5/18/98
cr330c.O	ASCII	7,799,743	5/18/98
cr330d.O	ASCII	7,341,863	5/18/98
cr331a.O	ASCII	14,797,421	5/18/98
cr331b.O	ASCII	9,538,803	5/18/98

File Name	File Type	File Size (bytes)	Date File Copied Copied to Tape
cr331c.O	ASCII	7,798,009	5/18/98
cr331d.O	ASCII	7,340,235	5/18/98
cr332a.O	ASCII	11,371,691	5/18/98
cr332b.O	ASCII	8,306,219	5/18/98
cr332c.O	ASCII	7,201,389	5/18/98
cr332d.O	ASCII	6,912,373	5/18/98
cr333a.O	ASCII	14,303,787	5/18/98
cr333b.O	ASCII	9,234,371	5/18/98
cr333c.O	ASCII	7,548,583	5/18/98
cr333d.O	ASCII	7,106,365	5/18/98
cr3i10a.O	ASCII	14,482,666	5/18/98
cr3i10b.O	ASCII	9,930,203	5/18/98
cr3i10c.O	ASCII	8,247,932	5/18/98
cr3i10d.O	ASCII	7,814,187	5/18/98
cr3i11a.O	ASCII	11,632,186	5/18/98
cr3i11b.O	ASCII	8,932,533	5/18/98
cr3i11c.O	ASCII	7,888,558	5/18/98
cr3i11d.O	ASCII	7,613,090	5/18/98
cr3i12b.O	ASCII	9,938,951	5/18/98
cr3i13b.O	ASCII	9,602,864	5/18/98
cr3i14b.O	ASCII	10,570,057	5/18/98
cr3i15b.O	ASCII	10,578,487	5/18/98
cr3i16a.O	ASCII	11,342,945	5/18/98
cr3i16b.O	ASCII	8,867,753	5/18/98
cr3i16c.O	ASCII	7,851,649	5/18/98
cr3i16d.O	ASCII	7,592,908	5/18/98
cr3i17a.O	ASCII	15,478,060	5/18/98
cr3i17b.O	ASCII	10,598,839	5/18/98
cr3i17c.O	ASCII	8,921,751	5/18/98
cr3i17d.O	ASCII	8,480,120	5/18/98
cr3i18a.O	ASCII	14,998,947	5/18/98
cr3i18b.O	ASCII	10,597,015	5/18/98
cr3i18c.O	ASCII	8,920,515	5/18/98
cr3i18d.O	ASCII	8,500,881	5/18/98
cr3i19a.O	ASCII	14,976,277	5/18/98
cr3i19b.O	ASCII	10,598,362	5/18/98
cr3i19c.O	ASCII	8,914,522	5/18/98
cr3i19d.O	ASCII	8,472,018	5/18/98
cr3i1a.O	ASCII	7,031,377	5/18/98
cr3i20b.O	ASCII	10,597,663	5/18/98
cr3i21b.O	ASCII	10,588,758	5/18/98
cr3i22b.O	ASCII	8,524,094	5/18/98
cr3i23a.O	ASCII	14,698,108	5/18/98

File Name	File Type	File Size (bytes)	Date File Copied Copied to Tape
cr3i23b.O	ASCII	9,844,702	5/18/98
cr3i23c.O	ASCII	8,103,920	5/18/98
cr3i23d.O	ASCII	7,648,761	5/18/98
cr3i24a.O	ASCII	14,715,213	5/18/98
cr3i24b.O	ASCII	9,846,079	5/18/98
cr3i24c.O	ASCII	8,104,021	5/18/98
cr3i24d.O	ASCII	7,648,976	5/18/98
cr3i25a.O	ASCII	14,697,577	5/18/98
cr3i25b.O	ASCII	9,845,522	5/18/98
cr3i25c.O	ASCII	8,104,509	5/18/98
cr3i25d.O	ASCII	7,653,784	5/18/98
cr3i26a.O	ASCII	14,649,351	5/18/98
cr3i26b.O	ASCII	9,746,765	5/18/98
cr3i26c.O	ASCII	8,036,666	5/18/98
cr3i26d.O	ASCII	7,648,020	5/18/98
cr3i27a.O	ASCII	15,007,616	5/18/98
cr3i27b.O	ASCII	9,837,118	5/18/98
cr3i27c.O	ASCII	8,102,152	5/18/98
cr3i27d.O	ASCII	7,638,003	5/18/98
cr3i28b.O	ASCII	8,780,553	5/18/98
cr3i29b.O	ASCII	9,545,088	5/18/98
cr3i2a.O	ASCII	13,972,077	5/18/98
cr3i2b.O	ASCII	9,442,825	5/18/98
cr3i2c.O	ASCII	7,651,803	5/18/98
cr3i2d.O	ASCII	7,177,541	5/18/98
cr3i3a.O	ASCII	13,945,640	5/18/98
cr3i3b.O	ASCII	9,041,610	5/18/98
cr3i3c.O	ASCII	7,299,562	5/18/98
cr3i3d.O	ASCII	6,844,768	5/18/98
cr3i4a.O	ASCII	10,251,591	5/18/98
cr3i4b.O	ASCII	7,258,863	5/18/98
cr3i4c.O	ASCII	6,039,833	5/18/98
cr3i4d.O	ASCII	5,719,011	5/18/98
cr3i5a.O	ASCII	11,101,814	5/18/98
cr3i5b.O	ASCII	7,904,944	5/18/98
cr3i5c.O	ASCII	6,626,984	5/18/98
cr3i5d.O	ASCII	6,291,570	5/18/98
cr3i6a.O	ASCII	13,767,625	5/18/98
cr3i6b.O	ASCII	8,882,477	5/18/98
cr3i6c.O	ASCII	7,141,159	5/18/98
cr3i6d.O	ASCII	6,684,409	5/18/98
cr3i7a.O	ASCII	13,720,510	5/18/98
cr3i7b.O	ASCII	8,865,068	5/18/98

File Name	File Type	File Size (bytes)	Date File Copied Copied to Tape
cr3i7c.O	ASCII	7,124,200	5/18/98
cr3i7d.O	ASCII	6,666,722	5/18/98
cr3i8a.O	ASCII	11,796,387	5/18/98
cr3i8b.O	ASCII	8,884,133	5/18/98
cr3i8c.O	ASCII	7,720,551	5/18/98
cr3i8d.O	ASCII	7,413,431	5/18/98
cr3i9a.O	ASCII	14,756,726	5/18/98
cr3i9b.O	ASCII	9,934,823	5/18/98
cr3i9c.O	ASCII	8,249,918	5/18/98
cr3i9d.O	ASCII	7,807,848	5/18/98

This attachment contains the MCNP input decks and output decks for the reactivity calculations for Crystal River Unit 3 that were reran in order to determine the effect that spacer grids offset by 16.273 cm had on the system reactivity. The decks are contained on a set of attachment tapes of this calculation file (the attachment tapes have been moved to Reference 7.15). The information contained in this hard-copy representation of Attachment IV is a listing of the MCNP input deck files, corresponding output files, and their attributes for the Cycle 4, 0.0 EFPD statepoint calculation. The file sizes listed in the following table are the file sizes as they appear on the Hewlett Packard (HP) Series 9000 workstation. The HP file sizes differ from the file sizes on the attachment tape due to the difference in the block sizes between the HP and the personal computer. The tape containing Attachment IV was written using the Colorado Model T1000e External Parallel Port Backup System for personal computers.

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i8a.O	ASCII	11,791,363	5/14/98
cr3i8a2	ASCII	1,332,310	5/14/98
cr3i8b.O	ASCII	8,878,167	5/14/98
cr3i8b2	ASCII	877,642	5/14/98
cr3i8c2	ASCII	698,002	5/14/98
cr3i8c2.O	ASCII	7,717,145	5/14/98
cr3i8d2	ASCII	650,482	5/14/98
cr3i8d2.O	ASCII	7,414,799	5/14/98

This attachment contains the MACE input decks, MACE generated MCNP input files, and MCNP output files for the reactivity calculations for Crystal River Unit 3 that were reran with cycle 10 fuel rod upper plenum dimensions. The files are contained on a set of attachment tapes of this calculation file (the attachment tapes have been moved to Reference 7.15). The information contained in this hard-copy representation of Attachment V is a listing of the MACE input decks, MACE generated MCNP input deck files, MCNP output files, and their attributes for the Cycle 10 statepoint calculations. The file sizes listed in the following table are the file sizes as they appear on the Hewlett Packard (HP) Series 9000 workstation. The HP file sizes differ from the file sizes on the attachment tape due to the difference in the block sizes between the HP and the personal computer. The tape containing Attachment V was written using the Colorado Model T1000e External Parallel Port Backup System for personal computers.

File Name	File Type	File Size (bytes)	Date File Copied to Tape
cr3i32a.txt	ASCII	91,091	6/15/98
cr3i32b.txt	ASCII	91,091	6/15/98
cr3i32c.txt	ASCII	91,091	6/15/98
cr3i32d.txt	ASCII	91,091	6/15/98
cr3i32a	ASCII	1,330,818	6/15/98
cr3i32b	ASCII	852,478	6/15/98
cr3i32c	ASCII	681,820	6/15/98
cr3i32d	ASCII	636,676	6/15/98
cr332a.O	ASCII	11,368,285	6/15/98
cr332b.O	ASCII	8,302,885	6/15/98
cr332c.O	ASCII	7,199,299	6/15/98
cr332d.O	ASCII	6,907,971	6/15/98
cr3i33a.txt	ASCII	92,121	6/17/98
cr3i33b.txt	ASCII	92,121	6/17/98
cr3i33c.txt	ASCII	92,121	6/17/98
cr3i33d.txt	ASCII	92,121	6/17/98
cr3i33a	ASCII	1,795,082	6/15/98
cr3i33b	ASCII	1,002,928	6/15/98
cr3i33c	ASCII	742,450	6/17/98
cr3i33d	ASCII	673,546	6/17/98
cr333a.O	ASCII	14,300,677	6/17/98
cr333b.O	ASCII	9,231,577	6/17/98
cr333c.O	ASCII	7,547,863	6/17/98
cr333d.O	ASCII	7,107,287	6/17/98