

CRWMS/M&O

Non-Q Design Analysis Cover Sheet

Complete only applicable items.

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1. Purpose

This analysis is prepared by the Mined Geologic Disposal System (MGDS) Waste Package Development Department (WPDD) to compare the criticality potential of Westinghouse 17x17 mixed oxide (MOX) PWR fuel with the Design Basis spent nuclear fuel (SNF) analyzed previously (Ref. 5.1, 5.2). The basis of comparison will be the conceptual design Multi-Purpose Canister (MPC) PWR waste package concepts. The objectives of this evaluation are to show that the criticality potential of the MOX fuel is equal to or lower than the DBF or, if necessary, indicate what additional measures are required to make it so.

2. Quality Assurance

The QA Program does not apply to this analysis. The work reported in this document is part of the Plutonium Disposition support effort being conducted under the purview of Special Studies within the MGDS M&O Systems Engineering office. The work performed for this analysis is covered by a QAP-2-0 analysis, titled "Studies Not Supported by the Office of Civilian Radioactive Waste Management", generated by the Waste Package Development Group (Ref. 5.3). The QAP-2-0 evaluation determined such activities not to be subject to *Quality Assurance Requirements and Description* (QARD) (Ref. 5.4) requirements.

3. Method

The multiplication factor (k_{eff}) of the disposal packages is determined using the Monte Carlo neutron transport technique implemented in the MCNP (Ref. 5.5) computer program. The combined average value of k_{eff} of the three estimates, as listed in the final generation summary in the MCNP output, is reported in this document.

4. Design Inputs

4.1 Design Parameters

The fuel assembly upon which this calculation is based is the Westinghouse 17 x 17 fuel assembly. The mechanical parameters for this assembly type are shown in the Table 4.1-1.

The Westinghouse 17x17 MOX fuel compositions after 2 and 3 cycles of operation were provided by Oak Ridge National Laboratory (ORNL) (Ref. 5.8) and are included in attachment I.

Material compositions (other than fuel) are taken from Reference 5.15 which provides a single QA'ed reference for material compositions. The compositions used are included in the MCNP output.

Table 4.1-1 Mechanical Parameters of Westinghouse 17x17 Fuel Assembly

| Parameter | Value | Units | Metric | Units | Radius (cm) | Ref |
|--------------------------------|--------|---------|---------|---------|-------------|-----|
| Fuel rods | 264 | /assbly | 264 | /assbly | | 5.6 |
| Fuel rods on a lattice side | 17 | /side | 17 | /side | | 5.6 |
| Guide tubes | 24 | /assbly | 24 | /assbly | | 5.6 |
| Instrumentation tubes | 1 | /assbly | 1 | /assbly | | 5.6 |
| Total Guide + Instrument tubes | 25 | /assbly | 25 | /assbly | | - |
| Clad/tube material | ZIRC-4 | | ZIRC-4 | | | 5.7 |
| Fuel pellet OD | 0.3225 | inches | 0.81915 | cm | 0.409575 | 5.6 |
| Fuel Stack height | 144 | inches | 365.8 | cm | | 5.6 |
| Mass of U | 1023 | lb | 464 | kgm | | 5.7 |
| Percent of Theoretical Density | 94.85 | % | 94.85 | % | | 5.6 |
| Fuel clad OD | 0.374 | inches | 0.94966 | cm | 0.47483 | 5.6 |
| Clad thickness* | 0.0225 | inches | 0.0570 | cm | | - |
| Fuel clad ID | 0.329 | inches | 0.83566 | cm | 0.41783 | 5.6 |
| Fuel rod pitch | 0.496 | inches | 1.25984 | cm | | 5.6 |
| Guide tube OD | 0.482 | inches | 1.22428 | cm | 0.61214 | 5.6 |
| Guide tube thickness* | 0.016 | inches | 0.04064 | cm | | - |
| Guide tube ID | 0.45 | inches | 1.1430 | cm | 0.5715 | 5.6 |
| Burnable Poison Rod (BPR) OD | 0.336 | inches | 0.85344 | cm | 0.42672 | 5.6 |
| BPR Clad ID | 0.344 | inches | 0.87376 | cm | 0.43688 | 5.6 |
| BPR Clad OD | 0.381 | inches | 0.96774 | cm | 0.48387 | 5.6 |
| Fuel Assembly Width | 8.44 | inches | 21.4376 | cm | | 5.7 |
| Fuel assembly height | 160.1 | inches | 406.654 | cm | | 5.7 |

The thicknesses above are calculated by subtracting the ID from the OD and dividing by 2.

The waste package models for the MPC packages were taken from previous documented analyses (Ref. 5.1, 5.2).

4.2 Criteria

This design analysis provides the repository criticality control design criteria for MPCs, based upon criteria from requirement documents. The criteria cited in the EBD-RD (Ref. 5.9) that have bearing on this analysis include:

"3.2.2.6 CRITICALITY PROTECTION

A. The Engineered Barrier Segment shall be designed to ensure that a nuclear criticality

accident is not possible unless at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. Each system shall be designed for criticality safety under normal and accident conditions. The calculated effective multiplication factor must be sufficiently below unity to show at least a five percent margin, after allowance for the bias in the method of calculation and the uncertainty in the experiments used to validate the methods of calculation. [MGDS-RD 3.2.2.6.A] [10CFR60.131(b)(7)]"

"3.7.1.3 INTERNAL STRUCTURE REQUIREMENTS

- A. The internal structure shall provide separation of the waste forms such that nuclear criticality shall not be possible unless at least two unlikely, independent, and concurrent or sequential changes have occurred in the conditions essential to nuclear criticality safety. The calculated effective multiplication factor (k_{eff}) must be sufficiently below unity to show at least a five percent margin after allowance for the bias in the method of calculation and the uncertainty in the experiments used to validate the methods of calculation (TBD). [MGDS-RD 3.2.2.6.A] [10CFR60.131(b)(7)]"

4.3 Assumptions

All assumptions identified in this section will require verification (or superseding assumptions) as the waste package design proceeds and should be treated as TBV items for preliminary design.

- 4.3.1 Burnup credit is an acceptable criticality control mechanism for the waste package. (CDA Key 009) (Ref. 5.10). This assumption is based up encouraging interactions with the NRC staff through the Burnup Credit Committee, chaired by DOE headquarters. This assumption is used throughout Section 7.
- 4.3.2 The waste package models for the MPC packages were taken from previous documented analyses and the MPC shell was combined with the waste package inner barrier and assumed to be Alloy 825 (Ref. 5.1, 5.2). The modeling of the MPC shell as Alloy 825 has no significant effect on the criticality potential of the waste form. This assumption is used throughout Section 7.
- 4.3.3 For SNF, the list of "Principal Isotopes" for long-term criticality control previously established (Ref. 5.11) was used. The 30 principal isotopes are shown in Table 4.3-1. This assumption is used throughout Section 7.
- 4.3.4 The material in the basket control panels is modeled as only aluminum for base cases. The aluminum boron alloy (Al-B) is not an allowable control material for use in the MGDS because its higher relative corrosion rate compared to the other basket materials (Ref. 5.12). This assumption is used throughout Section 7.
- 4.3.5 The fresh fuel bias and uncertainty for MCNP is approximately 0.015 (Ref. 5.13).

The preliminary SNF bias and uncertainty is approximately 0.06 (Ref. 5.13). These uncertainties were used in a prior unverified analysis. This assumption is used throughout Section 7.

- 4.3.6 Flux traps are not considered acceptable for disposal criticality control due to long-term material performance concerns. Flux trap designs depend upon the structural materials to form the separative water gaps which control criticality. If the flux trap's separative gap collapses, the neutron interaction between fuel assemblies increases the criticality potential of the system. This assumption is used throughout Section 7.
- 4.3.7 The design of the 21 and 12 PWR assembly MPC is based on that reported in the Volume II.A of the MPC Conceptual Design report (Ref. 5.14). This assumption is used throughout Section 7.
- 4.3.10 The material compositions (other than fuel) are taken from Reference 5.15. This analysis was performed to provide a single QA'ed reference for material compositions. This assumption is used throughout Section 7.

Table 4.3-1 Principal Long-Term Burnup Credit Isotopes

| | | | | |
|--------|--------|--------|---------|--------|
| O-16 | Mo-95 | Ru-101 | Tc-99 | Rh-103 |
| Ag-109 | Nd-143 | Nd-145 | Sm-147 | Sm-149 |
| Sm-150 | Sm-151 | Sm-152 | Eu-151 | Eu-153 |
| Gd-155 | U-233 | U-234 | U-235 | U-236 |
| U-238 | Np-237 | Pu-238 | Pu-239 | Pu-240 |
| Pu-241 | Pu-242 | Am-241 | Am-242m | Am-243 |

4.4 Codes and Standards

American National Standard on "Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors", ANSI/ANS-8.17, 1984.

5. References

- 5.1 Davis, J. W., "12 PWR Assembly MPC Waste Package Criticality Analysis," DI# BBABA0000-01717-0200-00001 Rev 00, CRWMS M&O.
- 5.2 Davis, J. W., "21 PWR Assembly MPC Waste Package Criticality Analysis," DI# BBABA0000-01717-0200-00004 Rev 00, CRWMS M&O.

- 5.3 "Studies Not Supported by the Office of Civilian Radioactive Waste Management," Document Identifier (DI) Number: BB0000000-01717-2200-00035 REV 01, CRWMS M&O .
- 5.4 *Quality Assurance Requirements and Description (QARD)*, DOE/RW-0333P Rev 5.
- 5.5 "MCNP 4A - Monte Carlo N-Particle Transport Code System," RSIC Computer Code Collection, CCC-200, Oak Ridge National Laboratory, February, 1994.
- 5.6 Bowman, S. M., et al., "Scale-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 2 - Sequoyah Unit 2 Cycle 3," ORNL, ORNL/TM-12294/V2, page 18, March, 1995.
- 5.7 *Characteristics of Potential Repository Wastes*, DOE/RW-0184-R1, Volume 1, OCRWM, US Department of Energy, page 2A-30, July, 1992.
- 5.8 Primm, R. T.,III, Fax Transmission of Summarized ORIGEN Output for Westinghouse MOX SNF, ORNL, June 18, 1996.
- 5.9 *Yucca Mountain Site Characterization Project Engineered Barrier Design Requirements Document*, YMP/CM-0024, Rev 0, ICN 1.
- 5.10 *Controlled Design Assumptions (CDA) Document*, DI#:B00000000-01717-4600-00032 REV 03, CRWMS M&O.
- 5.11 "Disposal Criticality Analysis Technical Report," B00000000-01717-5705-00020 Rev 00.
- 5.12 CRWMS M&O IOC, from J. K. McCoy to D. A. Thomas, "Basket materials", LV.WP.JKM.01/95.038, January 25, 1995
- 5.13 *Initial Summary Report for Repository/Waste Package Advanced Conceptual Design*, DI#:B00000000-01717-5705-00015 REV 00, CRWMS M&O, pages 6-241, 6-203, August 1994.
- 5.14 *Multi-Purpose Canister (MPC) Implementation Program Conceptual Design Phase Report, Volume II A - MPC Conceptual Design Report*, DI# A20000000-00811-5705-00002 REV 00, CRWMS M&O, Pages II.A.3-35, II.A.4-56, Figures 4.2.2.1-1, -2, -3, -4.
- 5.15 Thomas, D. A., "Material Compositions and Number Densities for Neutronic Calculations," DI# BBA000000-01717-0200-00002 Rev 00, CRWMS M&O.

- 5.16 LaMarsh, J. R., Introduction to Nuclear Engineering, 2nd Edition, Addison-Wesley Publishing Company, Reading Massachusetts, 1983, page 34.

6. Use of Computer Software

6.1 Scientific and Engineering Software

MCNP 4.A CSCI 30006 V4A Rev 1. Hewlett Packard Apollo 9000, Series 735 Workstations

MCNP 4.A (Ref. 5.5) is an appropriate tool to be utilized to determine the criticality safety of fresh and spent lattices of PWR assemblies. This software has been validated, was used within the range of validation, and was previously obtained from the SCM in accordance with appropriate procedures. An associated continuous energy cross section set based on ENDF/B-V is utilized by MCNP.

The MCNP results are reported as $k_{\text{eff}} \pm 2\sigma$ which approximates the 95% confidence interval for these cases.

There are biases and uncertainties associated with a criticality calculation. How these biases and uncertainties are treated in criticality calculations is covered in the American National Standard on "Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors" (ANSI/ANS-8.17). The fresh fuel bias and uncertainty for MCNP is approximately 0.015 (Ref. 5.13). The preliminary SNF bias and uncertainty is approximately 0.06 (Ref. 5.13). The SNF bias and uncertainty is higher due to additional factors such as isotopics and axial effects.

6.2 Computational Support Software

LOTUS 1-2-3 Version 4.01 for Windows was used to calculate the fresh and spent fuel number (atom) densities.

7. Design Analysis

To better define the pre- and postclosure issues and the methodology for addressing them, a Three Phased Approach for disposal criticality control was developed. The three time phases associated with the approach are: the Preclosure/Operations Phase, the Postclosure/Containment Phase, and the Postclosure/Isolation Phase. This analysis is performed for the Preclosure/Operations Phase and for time effects on isotopic composition for intact conditions. No criticality events external to the waste package or major internal geometry changes are evaluated.

7.1 Background

One of the options for disposing of weapons plutonium inventories is to burn it in existing commercial nuclear reactors in the form of MOX fuel. The composition of this fuel at discharge is substantially different from standard commercial fuel, and, so, must be analyzed for comparison with the design basis fuel.

7.2 Design Details and Evaluation

The 21 PWR fuel assembly basket (Ref. 5.14) is formed by 21 tubes stacked in a regular array on a nominal 25.436-cm (10.014-inch) center-to-center spacing. The fuel cell opening provided is 22.352 cm (8.8 inches). The fuel cell tubes are formed from 0.635-cm (0.25-inch) thick Al-B plates sandwiched between a 0.635-cm (0.25-inch) thick stainless steel inner wall, and a 0.238-cm (0.094-inch) thick stainless steel outer wrapper.

The 12 PWR basket array (Ref. 5.14) is formed by 1.27 cm (0.5-inch) thick structural steel members and a stacked arrangement of fuel cells. The array formed includes "flux trap" criticality control design features. A symmetrical configuration of three fuel cells placed in each of the four quadrants formed by a thick structural stainless steel structural support cruciform. Water gaps are formed between the 1.27 cm (0.5-inch) thick structural steel parallel sheets by 2.54 cm (1 inch) spacer rods. The fuel cell opening provided is 22.86 cm (9.0-inch). The fuel cell tubes are formed from 0.272 cm (0.107-inch) thick Al-B plates sandwiched between a 0.238 cm (0.094-inch) thick stainless steel inner wall, and a 0.238 cm (0.094-inch) thick stainless steel outer wrapper. Water gaps are maintained between some fuel cells by 2.54 cm (1-inch) "ladder" spacers to form flux traps between adjacent fuel cells not separated by thick structural stainless steel formed water gaps.

Flux traps are not considered acceptable for disposal criticality control due to long-term material performance concerns. Flux trap designs depend upon the structural materials to form the separative water gaps which control criticality. If the flux trap's separative gap collapses, the neutron interaction between fuel assemblies increases the criticality potential of the system. The structural performance of materials is one of the first physical properties lost as the materials degrade. After the containment barriers have failed, the basket structural materials lose their structural integrity over the period of isolation, and a flux trap will be unable to provide criticality control.

For the current analysis, credit is taken for the inherent neutron absorption capability of fixed structural components within the MPC internal basket array. No credit is taken for irradiated control rods or burnable poisons; only approved fixed, full-length supplemental neutron poisons are assumed present. The Al-B is not an allowable control material for use in the MGDS because its higher relative corrosion rate compared to the other basket materials. The material is modeled as only aluminum.

7.3 Modeling and Input

7.3.2 MCNP Model

Each fuel assembly is treated as a heterogeneous system with the fuel pins, control rod guide tubes, and instrument guide tube modeled explicitly using the physical parameters from Table 4.1-1. The model consists of an array of pins and tubes placed into an assembly configuration as shown in Figure 7.3-1. An array of these assemblies including the MPC basket materials is then placed into the MPC configuration. The cross-sectional view in the X-Y plane of the physical MCNP models for the 21 assembly waste package, 12 assembly waste package (collapsed flux traps), and 4 assembly waste package are shown in Figures 7.3-2, 7.3-3, and 7.3-4, respectively. These figures were generated with the MCNP plotting capability. One-quarter of the MPC and disposal container are modeled laterally and the assemblies and container are modeled from the centerline up (reflected on the centerline) axially. The models for the 21 PWR assembly MPC and 12 PWR assembly MPC were taken from previous analyses (Ref. 5.1, 5.2). The 4 PWR assembly MPC was simply scaled from the 21 assembly design.

The "accident" condition considers the repository and waste package as being flooded with water. A waste package fully flooded with cool (high density) water is the standard waste package criticality evaluation condition.

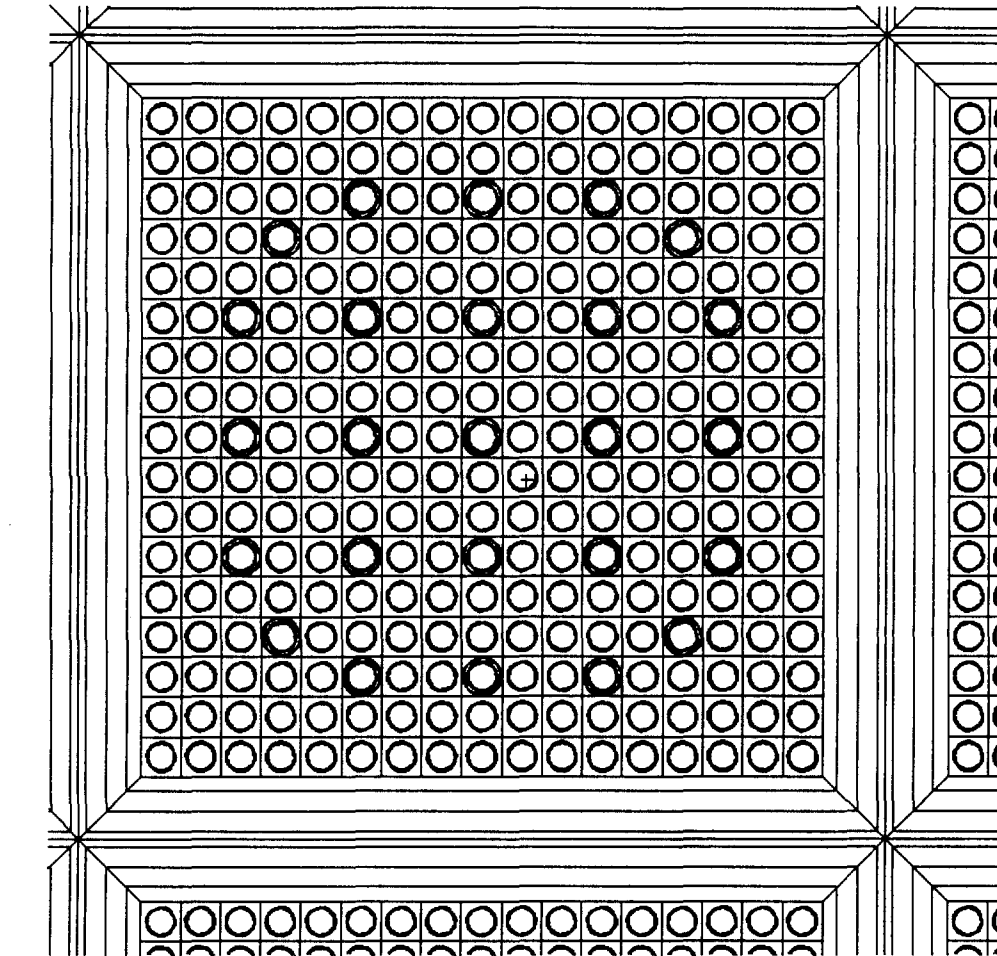
7.3.1 Number Density Calculations

The grams/Assembly compositions provided by ORNL (Ref. 5.8) for a 2 Cycle and a 3 Cycle fuel burn were used to calculate the number density of each isotope using a LOTUS 1-2-3 spreadsheet at several decay time steps. The equation for number density is shown below (Ref. 5.16).

$$N = \rho N_A / M$$

where ρ is the physical density in gm/cm³,
 N_A is Avagadro's Number: 0.602252E+24 atoms/mole,
and M is the gram atomic weight.

The units of the resulting number density is in atoms/cm³. The required units for subsequent use are atoms/b-cm where 1 barn equals 10⁻²⁴ cm². The calculations in the spreadsheet drop the E+24 from Avagadro's number to account for the conversion. The spreadsheet is printed in Attachment II.



06/19/96 10:33:42
WEST 17x17 FUEL, 21 ASSEMBLY
4.545% Pu/2 Cycles/5 year
Kichen Isotopes (m221b)
probid = 06/19/96 10:24:22
basis:
(1.000000, .000000, .000000)
(.000000, 1.000000, .000000)
origin:
(24.00, 24.00, 5.00)
extent = (15.00, 15.00)

Figure 7.3-1. MCNP Cross-Sectional View of a Westinghouse 17x17 PWR Assembly.

06/19/96 10:30:45
WEST 17x17 FUEL, 21 ASSEMBLY
4.545% Pu/23 Cycles/15 year
Richman Isotopes (wa221b)
probid = 06/19/96 10:24:22
basis:
(1.000000, .000000, .000000)
(.000000, 1.000000, .000000)
origin:
(49.00, 49.00, 5.00)
extent = (50.00, 50.00)

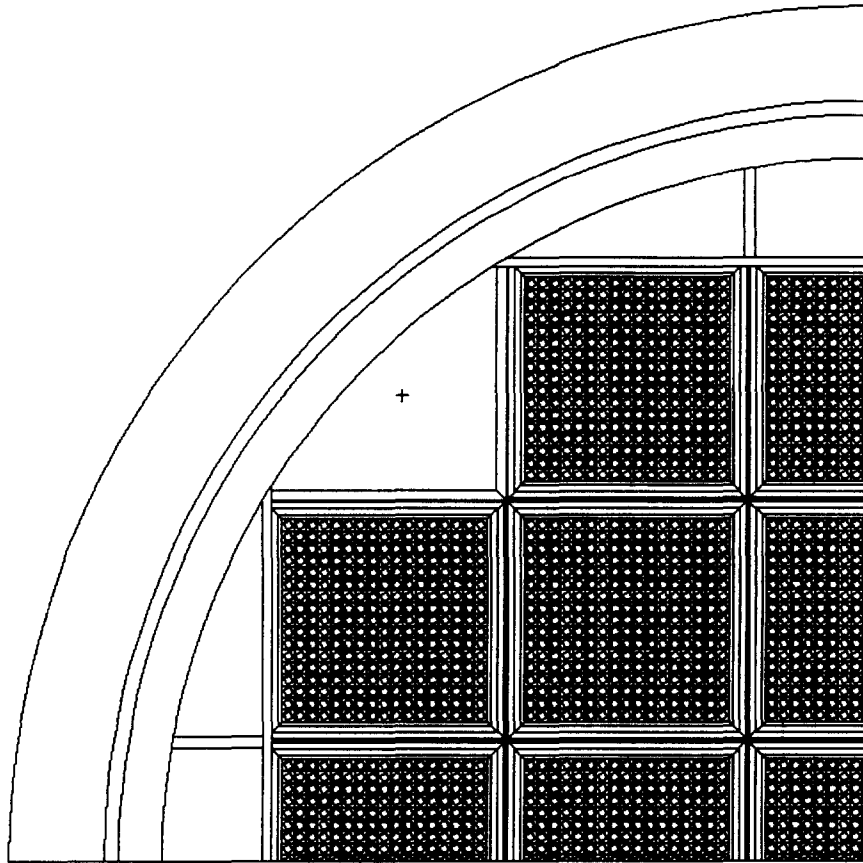


Figure 7.3-2. MCNP Cross-Sectional View of a 21 PWR Assembly MPC WP.

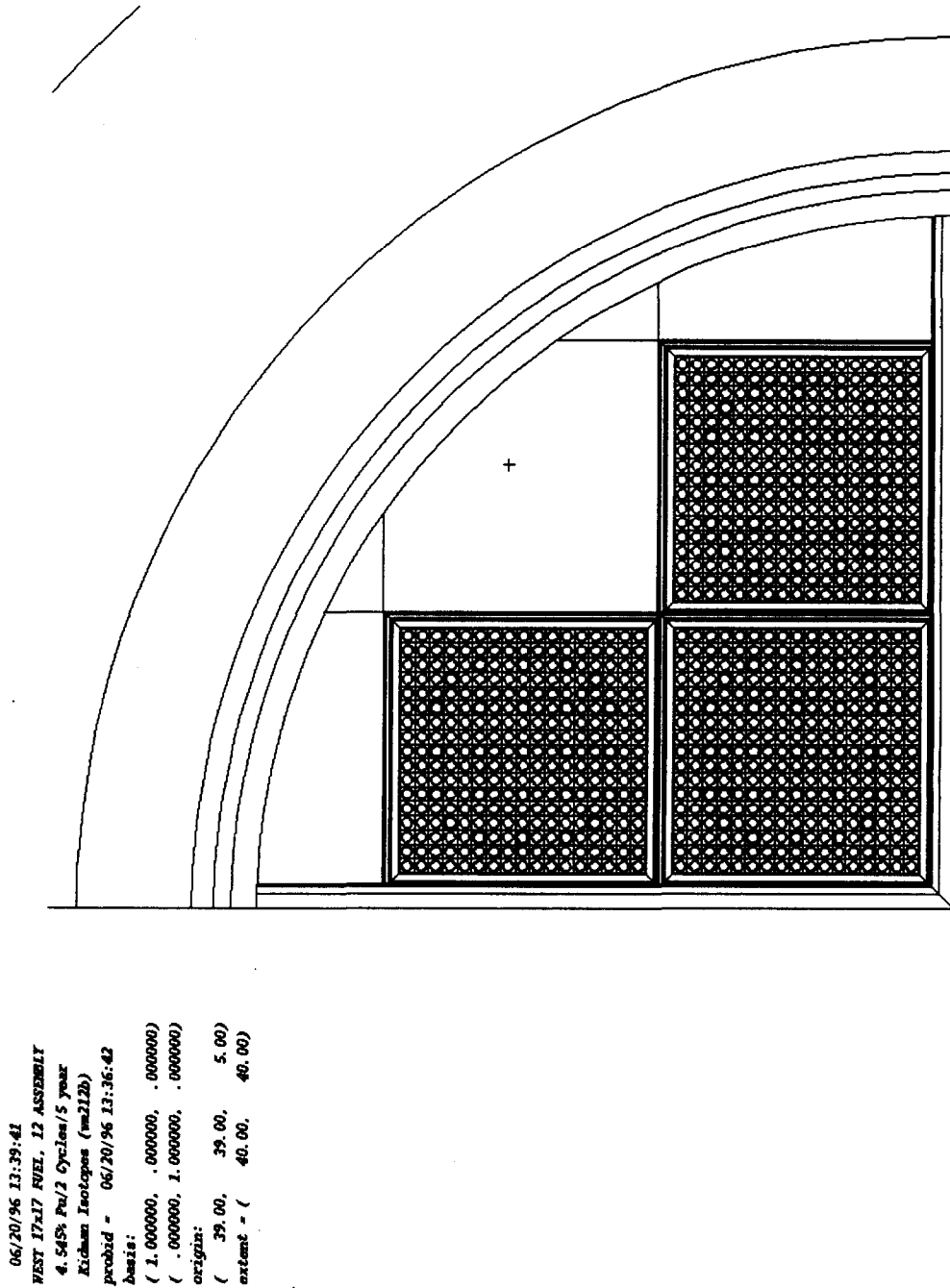


Figure 7.3-3. MCNP Cross-Sectional View of a 12 PWR Assembly MPC WP with Collapsed Flux Traps.

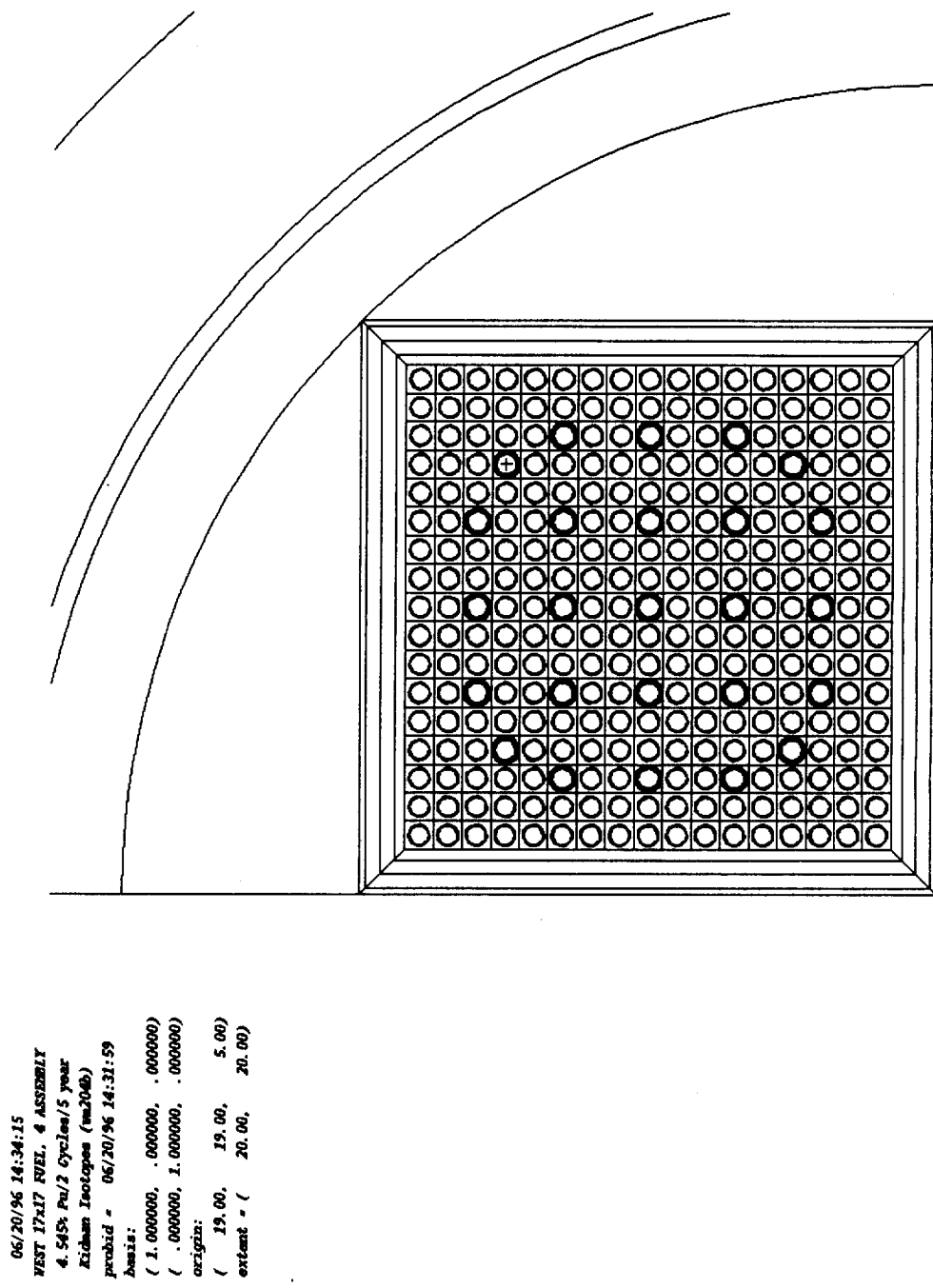


Figure 7.3-4. MCNP Cross-Sectional View of a 4 PWR Assembly MPC WP.

7.4 MCNP Calculations

Since the 2 cycle MOX fuel obviously has a lower burnup, and a corresponding higher reactivity, this comparison focuses on the 2 cycle composition. The k_{eff} results reported are the simple combined average of the track length, absorption, and collision estimates as listed in the final estimate summary box of the MCNP output.

These calculations were run for a flooded condition with the boron aluminum alloy modeled only as aluminum (1100) consistent with previous analyses. The $k_{\text{eff}} (\pm 2\sigma)$ values calculated for the different package sizes at 5 years decay are as follow:

| | | |
|---|---|----------------|
| 21 Assembly, 2 Cycle Mox, 5 year decay (Attachment III) | - | 0.9299 ± .0049 |
| 21 Assembly, 3 Cycle Mox, 5 year decay (Attachment IV) | - | 0.9003 ± .0047 |
| 12 Assembly, 2 Cycle Mox, 5 year decay (Attachment V) | - | 0.8881 ± .0057 |
| 4 Assembly, 2 Cycle Mox, 5 year decay (Attachment VI) | - | 0.8140 ± .0050 |

The corresponding result for the commercial design basis fuel is as follows (Ref. 5.1, 5.2):

| | | |
|--|---|----------------|
| 21 Assembly, 3.00% U-235, 20 GWd/MTU, 5 year decay | - | 0.9818 ± .0067 |
| 12 Assembly, 3.00% U-235, 20 GWd/MTU, 5 year decay | - | 0.9328 ± .0069 |

Note that the results for the MOX cases are lower than those for the commercial design basis fuel, and, therefore, require no additional measures to reduce reactivity over those to be employed for the commercial design basis fuel. The results for the commercial design basis fuel waste packages and the 21 MOX assembly (2 cycle composition) waste package exceeds the regulatory safety limit of 0.89 (1 - .05 safety limit -.06 bias and uncertainty) for k_{eff} . These MPC waste packages will require measures to reduce k_{eff} . This is addressed in section 7.4.2.

An additional dry (unflooded) case was run to provide the level of subcritical multiplication of the neutron decay source in the waste package. The case (Attachment XXIV) using the 21 Assembly, 2 Cycle Mox, 5 year decay model provided a k_{eff} of $0.3290 \pm .0017$

7.4.1 Time Effects

To calculate the long-term time effect on criticality, isotopic composition information at different time steps was required. The required isotopic composition information for the fuel characteristics at 8 decay time steps were obtained from the spreadsheet described in section 7.3.1. Each time step for the fuel characteristics represents an MCNP model file/input deck. The results are listed below and shown in Figure 7.4.1-1 for the 2 cycle and 3 cycle compositions in a 21 PWR assembly MPC waste package. The attachment number for the

output is shown in parenthesis below each result.

Table 7.4.1-1 Time Effects on Criticality Potential for 21 Assembly PWR WP with MOX SNF.

| TIME STEP (Years) | 2 Cycle Composition | 3 Cycle Composition |
|-------------------|--------------------------|---------------------------|
| 5 | 0.9299 ± .0049 (VII) | 0.8255 ± .0048 (XV) |
| 15 | 0.9003 ± .0047 (VIII) | 0.7869 ± .0038 (XVI) |
| 100 | 0.8153 ± .0036 (IX) | 0.6759 ± .0036 (XVII) |
| 1000 | 0.8516 ± .0050 (X) | 0.7108 ± .0036 (XVIII) |
| 10000 | 0.8840 ± .0049 (XI) | 0.7397 ± .0032 (XIX) |
| 30000 | 0.8819 ± .0044 (XII) | 0.7232 ± .0035 (XX) |
| 100000 | 0.7963 ± .0050 (XIII) | 0.6424 ± .0028 (XXI) |
| 250000 | 0.7831 ± .0032 (XIV) | 0.6220 ± .0031 (XXII) |

7.4.2 Disposal Control Rods

The use of disposal control rods is an option to reduce the criticality potential of waste packages. Three cases were run having 24, 12, and 4 disposal control rods per assembly in a 21 PWR assembly MPC waste package with the 2 cycle MOX compositions. The control material used in the disposal control rods is B₄C with natural boron. The results follow:

- 4 Disposal Control Rods/ Assembly (XXIII) - 0.8799 ± .0044
- 12 Disposal Control Rods/ Assembly (XXIV) - 0.7917 ± .0052
- 24 Disposal Control Rods/ Assembly (XXV) - 0.6717 ± .0034

8. Conclusions

The Westinghouse MOX fuel is less reactive than the commercial DBF for similar package sizes. In the conceptual design MPC (Ref. 5.14), additional measures may be required to reduce the reactivity of the 21 PWR assembly waste package with the 2 cycle MOX compositions. As few as 4 control rods are required to bring the reactivity of this package below regulatory acceptance criteria.

9. Attachments

The following attachments are case output files as listed. The name of the file is listed in parenthesis.

- I. Fax Transmission of Summarized ORIGEN Output for Westinghouse MOX SNF from ORNL, 4 pages, 6/18/96
- II. Number Density Spreadsheet, 6 pages, 6/25/96 (moxnd.wk3)
- III. 21 Assembly, 2 Cycle Mox, 5 year decay, 6 pages, 6/25/96 (wm221b.sum)
- IV. 21 Assembly, 3 Cycle Mox, 5 year decay, 6 pages, 6/25/96 (wm321b.sum)
- V. 12 Assembly, 2 Cycle Mox, 5 year decay, 7 pages, 6/25/96 (wm212b.sum)
- VI. 4 Assembly, 2 Cycle Mox, 5 year decay, 6 pages, 6/25/96 (wm204b.sum)
- VII. 21 Assembly, 2 Cycle Mox, 15 year decay, 6 pages, 6/25/96 (wm221c.sum)
- VIII. 21 Assembly, 2 Cycle Mox, 100 year decay, 6 pages, 6/25/96 (wm221d.sum)
- IX. 21 Assembly, 2 Cycle Mox, 1000 year decay, 6 pages, 6/25/96 (wm221e.sum)
- X. 21 Assembly, 2 Cycle Mox, 10000 year decay, 6 pages, 6/25/96 (wm221f.sum)
- XI. 21 Assembly, 2 Cycle Mox, 30000 year decay, 6 pages, 6/25/96 (wm221g.sum)
- XII. 21 Assembly, 2 Cycle Mox, 100000 year decay, 6 pages, 6/25/96 (wm221h.sum)
- XIII. 21 Assembly, 2 Cycle Mox, 250000 year decay, 6 pages, 6/25/96 (wm221i.sum)
- XIV. 21 Assembly, 3 Cycle Mox, 15 year decay, 6 pages, 6/25/96 (wm321c.sum)
- XV. 21 Assembly, 3 Cycle Mox, 100 year decay, 6 pages, 6/25/96 (wm321d.sum)
- XVI. 21 Assembly, 3 Cycle Mox, 1000 year decay, 6 pages, 6/25/96 (wm321e.sum)
- XVII. 21 Assembly, 3 Cycle Mox, 10000 year decay, 6 pages, 6/25/96 (wm321f.sum)
- XVIII. 21 Assembly, 3 Cycle Mox, 30000 year decay, 6 pages, 6/25/96 (wm321g.sum)
- XIX. 21 Assembly, 3 Cycle Mox, 100000 year decay, 6 pages, 6/25/96 (wm321h.sum)
- XX. 21 Assembly, 3 Cycle Mox, 250000 year decay, 6 pages, 6/25/96 (wm321i.sum)
- XXI. 21 Assembly, 2 Cycle Mox, 5 year decay, 4 DCR's, 6 pages, 6/25/96 (wm221be.sum)
- XXII. 21 Assembly, 2 Cycle Mox, 5 year decay, 12 DCR's, 6 pages, 6/25/96 (wm221bd.sum)
- XXIII. 21 Assembly, 2 Cycle Mox, 5 year decay, 24 DCR's, 6 pages, 6/25/96 (wm221bc.sum)
- XXIV. 21 Assembly, 2 Cycle Mox, 5 year decay, Dry, 6 pages, 7/12/96 (wm221dr.sum)

Fission Product Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 2-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| mo 95 | 2.57E+02 | 2.57E+02 | 3.06E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 | 3.07E+02 |
| tc 99 | 3.73E+02 | 3.73E+02 | 3.75E+02 | 3.75E+02 | 3.75E+02 | 3.75E+02 | 3.75E+02 | 3.75E+02 | 3.74E+02 | 3.74E+02 | 3.63E+02 | 3.40E+02 | 2.70E+02 | 1.65E+02 |
| ru101 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 | 3.97E+02 |
| rh103 | 3.24E+02 | 3.25E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 | 3.54E+02 |
| ag109 | 9.26E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 | 9.27E+01 |
| cs133 | 5.52E+02 | 5.53E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 | 5.59E+02 |
| nd143 | 3.78E+02 | 3.79E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 | 3.89E+02 |
| nd145 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 | 2.84E+02 |
| sm147 | 3.18E+01 | 3.19E+01 | 5.21E+01 | 9.58E+01 | 1.13E+02 | 1.18E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 |
| sa149 | 3.66E+00 | 3.87E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 | 4.44E+00 |
| sa150 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 | 1.60E+02 |
| sa151 | 1.82E+01 | 1.82E+01 | 1.82E+01 | 1.76E+01 | 1.70E+01 | 1.63E+01 | 1.45E+01 | 8.48E+00 | 1.82E+00 | 8.28E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| sa152 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 | 7.44E+01 |
| eu151 | 3.06E-02 | 3.10E-02 | 1.71E-01 | 7.23E-01 | 1.39E+00 | 2.03E+00 | 3.81E+00 | 9.87E+00 | 1.65E+01 | 1.83E+01 | 1.84E+01 | 1.84E+01 | 1.84E+01 | 1.84E+01 |
| eu153 | 7.03E+01 | 7.05E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 | 7.09E+01 |
| gd155 | 2.18E-01 | 2.23E-01 | 2.05E+00 | 7.19E+00 | 1.05E+01 | 1.21E+01 | 1.34E+01 | 1.35E+01 | 1.35E+01 | 1.35E+01 | 1.35E+01 | 1.35E+01 | 1.35E+01 | 1.35E+01 |

The Light Element Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 2-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| o 16 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 |
| mo 95 | 3.39E+01 | 3.39E+01 | 3.56E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 | 3.57E+01 |

The Actinide Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 2-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| u234 | 5.77E+00 | 5.77E+00 | 6.27E+00 | 8.58E+00 | 1.14E+01 | 1.42E+01 | 2.18E+01 | 4.74E+01 | 7.57E+01 | 8.38E+01 | 8.24E+01 | 7.91E+01 | 6.91E+01 | 5.32E+01 |
| u235 | 4.53E+02 | 4.53E+02 | 4.53E+02 | 4.54E+02 | 4.56E+02 | 4.57E+02 | 4.61E+02 | 4.79E+02 | 5.31E+02 | 7.10E+02 | 2.73E+03 | 5.73E+03 | 9.09E+03 | 9.61E+03 |
| u236 | 9.42E+01 | 9.42E+01 | 9.46E+01 | 9.61E+01 | 9.81E+01 | 1.00E+02 | 1.06E+02 | 1.34E+02 | 2.11E+02 | 4.71E+02 | 2.55E+03 | 3.70E+03 | 3.85E+03 | 3.83E+03 |
| u238 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 | 4.28E+05 |
| mp237 | 8.22E+01 | 8.23E+01 | 8.39E+01 | 8.66E+01 | 9.32E+01 | 1.03E+02 | 1.42E+02 | 3.85E+02 | 9.89E+02 | 2.07E+03 | 2.58E+03 | 2.56E+03 | 2.51E+03 | 2.39E+03 |
| pu238 | 5.26E+01 | 5.28E+01 | 7.12E+01 | 7.39E+01 | 7.11E+01 | 6.84E+01 | 6.09E+01 | 3.56E+01 | 7.79E+00 | 6.00E-02 | 2.04E-21 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| pu239 | 9.17E+03 | 9.18E+03 | 9.21E+03 | 9.21E+03 | 9.21E+03 | 9.21E+03 | 9.21E+03 | 9.20E+03 | 9.19E+03 | 9.14E+03 | 8.96E+03 | 6.96E+03 | 3.94E+03 | 5.28E+02 |
| pu240 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.80E+03 | 3.79E+03 | 3.71E+03 | 3.44E+03 | 1.33E+03 | 1.61E+02 | 9.89E-02 |
| pu241 | 2.44E+03 | 2.44E+03 | 2.33E+03 | 1.92E+03 | 1.51E+03 | 1.18E+03 | 5.74E+02 | 1.95E+01 | 4.32E-03 | 2.91E-03 | 1.40E-03 | 2.74E-04 | 9.06E-07 | 4.40E-12 |
| pu242 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.13E+02 | 4.12E+02 | 4.06E+02 | 3.91E+02 | 3.43E+02 |
| am241 | 1.01E+02 | 1.01E+02 | 2.16E+02 | 6.23E+02 | 1.03E+03 | 1.34E+03 | 1.91E+03 | 2.22E+03 | 1.63E+03 | 5.29E+02 | 4.24E-02 | 8.24E-03 | 2.73E-05 | 1.40E-10 |
| am242m | 3.39E+00 | 3.39E+00 | 3.37E+00 | 3.31E+00 | 3.23E+00 | 3.15E+00 | 2.92E+00 | 2.07E+00 | 7.75E-01 | 2.44E-02 | 1.51E-21 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| am243 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.06E+02 | 1.05E+02 | 1.03E+02 | 9.64E+01 | 4.14E+01 | 6.30E+00 | 8.72E-03 |
| cm245 | 1.90E+00 | 1.90E+00 | 1.90E+00 | 1.90E+00 | 1.90E+00 | 1.90E+00 | 1.89E+00 | 1.88E+00 | 1.85E+00 | 1.75E+00 | 8.40E-01 | 1.64E-01 | 5.45E-04 | 2.65E-09 |

Fission Product Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 3-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| mo 95 | 3.92E+02 | 3.93E+02 | 4.40E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 | 4.41E+02 |
| tc 99 | 5.24E+02 | 5.25E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.26E+02 | 5.25E+02 | 5.09E+02 | 4.77E+02 | 3.79E+02 |
| ru101 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 | 5.81E+02 |
| rh103 | 4.15E+02 | 4.16E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 | 4.45E+02 |
| ag109 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 | 1.19E+02 |
| ca133 | 7.71E+02 | 7.72E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 | 7.77E+02 |
| nd143 | 5.19E+02 | 5.19E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 | 5.29E+02 |
| nd145 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 | 4.06E+02 |
| sm147 | 4.98E+01 | 4.99E+01 | 7.10E+01 | 1.17E+02 | 1.35E+02 | 1.39E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 | 1.41E+02 |
| sm149 | 3.08E+00 | 3.30E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 | 3.91E+00 |
| sm150 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 | 2.37E+02 |
| sm151 | 1.91E+01 | 1.91E+01 | 1.91E+01 | 1.85E+01 | 1.78E+01 | 1.71E+01 | 1.53E+01 | 8.90E+00 | 1.91E+00 | 8.68E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| sm152 | 9.80E+01 | 9.80E+01 | 9.80E+01 | 9.80E+01 | 9.80E+01 | 9.80E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 | 9.81E+01 |
| eu151 | 2.78E-02 | 2.82E-02 | 1.75E-01 | 7.54E-01 | 1.45E+00 | 2.12E+00 | 3.99E+00 | 1.04E+01 | 1.73E+01 | 1.92E+01 | 1.92E+01 | 1.92E+01 | 1.92E+01 | 1.92E+01 |
| eu153 | 1.06E+02 | 1.06E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 | 1.07E+02 |
| gd155 | 3.40E-01 | 3.50E-01 | 3.59E+00 | 1.27E+01 | 1.86E+01 | 2.14E+01 | 2.37E+01 | 2.40E+01 | 2.40E+01 | 2.40E+01 | 2.40E+01 | 2.40E+01 | 2.40E+01 | 2.40E+01 |

The Light Element Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 3-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| o 16 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 | 6.20E+04 |
| m 95 | 3.76E+01 | 3.76E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 | 3.95E+01 |

The Actinide Nuclide Concentrations, grams per assembly, for Isotopes Significant in Criticality Analysis

* Applying a 3-Cycle Operation Period *

| Nuclide | Cooling times following power shutdown for discharge | | | | | | | | | | | | | |
|---------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | discharge | 1 day | 1 y | 3 y | 5 y | 15 y | 30 y | 100 y | 300 y | 1000 y | 10000 y | 30000 y | 100000 y | 250000 y |
| u234 | 5.29E+00 | 5.29E+00 | 6.51E+00 | 1.20E+01 | 1.86E+01 | 2.52E+01 | 4.29E+01 | 1.03E+02 | 1.69E+02 | 1.87E+02 | 1.83E+02 | 1.74E+02 | 1.47E+02 | 1.04E+02 |
| u235 | 2.94E+02 | 2.94E+02 | 2.95E+02 | 2.95E+02 | 2.96E+02 | 2.97E+02 | 3.00E+02 | 3.13E+02 | 3.50E+02 | 4.77E+02 | 1.92E+03 | 4.12E+03 | 6.59E+03 | 6.97E+03 |
| u236 | 1.17E+02 | 1.17E+02 | 1.17E+02 | 1.19E+02 | 1.21E+02 | 1.22E+02 | 1.28E+02 | 1.56E+02 | 2.35E+02 | 4.98E+02 | 2.60E+03 | 3.76E+03 | 3.91E+03 | 3.90E+03 |
| u238 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 | 4.22E+05 |
| np237 | 1.12E+02 | 1.12E+02 | 1.14E+02 | 1.17E+02 | 1.24E+02 | 1.34E+02 | 1.77E+02 | 4.41E+02 | 1.10E+03 | 2.27E+03 | 2.83E+03 | 2.81E+03 | 2.75E+03 | 2.62E+03 |
| pu238 | 1.35E+02 | 1.36E+02 | 1.70E+02 | 1.74E+02 | 1.68E+02 | 1.61E+02 | 1.43E+02 | 8.32E+01 | 1.78E+01 | 1.13E-01 | 2.99E-21 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| pu239 | 6.49E+03 | 6.50E+03 | 6.54E+03 | 6.54E+03 | 6.54E+03 | 6.54E+03 | 6.53E+03 | 6.52E+03 | 6.49E+03 | 6.38E+03 | 5.04E+03 | 2.89E+03 | 3.90E+02 | 5.22E+00 |
| pu240 | 3.76E+03 | 3.76E+03 | 3.77E+03 | 3.78E+03 | 3.79E+03 | 3.80E+03 | 3.82E+03 | 3.83E+03 | 3.75E+03 | 3.48E+03 | 1.35E+03 | 1.63E+02 | 1.00E-01 | 1.71E-07 |
| pu241 | 2.63E+03 | 2.63E+03 | 2.50E+03 | 2.06E+03 | 1.62E+03 | 1.27E+03 | 6.17E+02 | 2.10E+01 | 1.51E-02 | 1.30E-02 | 6.23E-03 | 1.22E-03 | 4.04E-06 | 1.96E-11 |
| pu242 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 8.01E+02 | 7.88E+02 | 7.60E+02 | 6.67E+02 | 5.05E+02 |
| am241 | 1.39E+02 | 1.39E+02 | 2.62E+02 | 6.99E+02 | 1.13E+03 | 1.47E+03 | 2.08E+03 | 2.41E+03 | 1.77E+03 | 5.75E+02 | 1.88E-01 | 3.67E-02 | 1.22E-04 | 6.23E-10 |
| am242m | 4.98E+00 | 4.98E+00 | 4.95E+00 | 4.85E+00 | 4.74E+00 | 4.62E+00 | 4.29E+00 | 3.04E+00 | 1.14E+00 | 3.65E-02 | 2.22E-21 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| am243 | 2.60E+02 | 2.60E+02 | 2.60E+02 | 2.60E+02 | 2.60E+02 | 2.60E+02 | 2.59E+02 | 2.58E+02 | 2.53E+02 | 2.37E+02 | 1.01E+02 | 1.55E+01 | 2.14E-02 | 1.51E-05 |
| cm245 | 8.46E+00 | 8.46E+00 | 8.46E+00 | 8.46E+00 | 8.46E+00 | 8.45E+00 | 8.44E+00 | 8.39E+00 | 8.26E+00 | 7.80E+00 | 3.74E+00 | 7.33E-01 | 2.43E-03 | 1.18E-08 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECAy TIME: 5 YEARS
 DECAy TIME: 5 YEARS

Volume 50888.18
 $=\text{Pi} \cdot .409575^{\wedge}2 \cdot 365.76 \cdot (17^{\wedge}2 - 25)$ 2 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|------------|-----------|----------------|
| O 16 | 6.2E+04 | 12.170% | 1 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.75E+02 | 0.074% | 1 98.90628 | 43099.50C | 4.4871E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.069% | 1 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.13E+02 | 0.022% | 1 146.9149 | 62147.50C | 9.1028E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 149.9173 | 62150.50C | 1.2631E-05 |
| sm151 | 1.70E+01 | 0.003% | 1 150.9199 | 62151.50C | 1.3331E-06 |
| eu151 | 1.39E+00 | 0.000% | 1 150.9198 | 63151.55C | 1.0900E-07 |
| sm152 | 7.44E+01 | 0.015% | 1 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.05E+01 | 0.002% | 1 154.9227 | 64155.50C | 8.0211E-07 |
| u233 | 0.00E+00 | 0.000% | 1 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.14E+01 | 0.002% | 1 234.0409 | 92234.50C | 5.7647E-07 |
| u235 | 4.56E+02 | 0.090% | 1 235.0439 | 92235.50C | 2.2960E-05 |
| u236 | 9.81E+01 | 0.019% | 1 236.0456 | 92236.50C | 4.9185E-06 |
| u238 | 4.28E+05 | 84.012% | 1 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 9.32E+01 | 0.018% | 1 237.0481 | 93237.55C | 4.6531E-06 |
| pu238 | 7.11E+01 | 0.014% | 1 238.0495 | 94238.50C | 3.5348E-06 |
| pu239 | 9.21E+03 | 1.808% | 1 239.0521 | 94239.55C | 4.5596E-04 |
| pu240 | 3.80E+03 | 0.746% | 1 240.0539 | 94240.50C | 1.8734E-04 |
| pu241 | 1.51E+03 | 0.296% | 1 241.0567 | 94241.50C | 7.4134E-05 |
| pu242 | 4.13E+02 | 0.081% | 1 242.0587 | 94242.50C | 2.0193E-05 |
| am241 | 1.03E+03 | 0.202% | 1 241.0567 | 95241.50C | 5.0568E-05 |
| am242m | 3.23E+00 | 0.001% | 1 242.0595 | 95242.50C | 1.5792E-07 |
| am243 | 1.06E+02 | 0.021% | 1 243.0614 | 95243.50C | 5.1612E-06 |
| total | 509452.4 | 100.00% | | Total | 6.8254E-02 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECAy TIME: 5 YEARS
 DECAy TIME: 5 YEARS

Volume 50888.18 3 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|------------|-----------|----------------|
| O 16 | 6.2E+04 | 12.337% | 1 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 5.26E+02 | 0.105% | 1 98.90628 | 43099.50C | 6.2939E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.35E+02 | 0.027% | 1 146.9149 | 62147.50C | 1.0875E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 1.78E+01 | 0.004% | 1 150.9199 | 62151.50C | 1.3958E-06 |
| eu151 | 1.45E+00 | 0.000% | 1 150.9198 | 63151.55C | 1.1371E-07 |
| sm152 | 9.80E+01 | 0.020% | 1 151.9198 | 62152.50C | 7.6344E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 1.86E+01 | 0.004% | 1 154.9227 | 64155.50C | 1.4209E-06 |
| u233 | 0.00E+00 | 0.000% | 1 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.86E+01 | 0.004% | 1 234.0409 | 92234.50C | 9.4055E-07 |
| u235 | 2.96E+02 | 0.059% | 1 235.0439 | 92235.50C | 1.4904E-05 |
| u236 | 1.22E+02 | 0.024% | 1 236.0456 | 92236.50C | 6.1068E-06 |
| u238 | 4.22E+05 | 83.973% | 1 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 1.24E+02 | 0.025% | 1 237.0481 | 93237.55C | 6.1908E-06 |
| pu238 | 1.68E+02 | 0.033% | 1 238.0495 | 94238.50C | 8.3522E-06 |
| pu239 | 6.54E+03 | 1.301% | 1 239.0521 | 94239.55C | 3.2378E-04 |
| pu240 | 3.79E+03 | 0.754% | 1 240.0539 | 94240.50C | 1.8685E-04 |
| pu241 | 1.62E+03 | 0.322% | 1 241.0567 | 94241.50C | 7.9535E-05 |
| pu242 | 8.01E+02 | 0.159% | 1 242.0587 | 94242.50C | 3.9163E-05 |
| am241 | 1.13E+03 | 0.225% | 1 241.0567 | 95241.50C | 5.5478E-05 |
| am242m | 4.74E+00 | 0.001% | 1 242.0595 | 95242.50C | 2.3175E-07 |
| am243 | 2.60E+02 | 0.052% | 1 243.0614 | 95243.50C | 1.2660E-05 |
| total | 502539.9 | 100.00% | | Total | 6.7964E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECAy TIME: 15 YEARS
 DECAy TIME: 15 YEARS

Volume 50888.18 2 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|------------|-----------|----------------|
| O 16 | 6.2E+04 | 12.170% | 1 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.75E+02 | 0.074% | 1 98.90628 | 43099.50C | 4.4871E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.069% | 1 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.18E+02 | 0.023% | 1 146.9149 | 62147.50C | 9.5056E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 149.9173 | 62150.50C | 1.2631E-05 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECAy TIME: 15 YEARS
 DECAy TIME: 15 YEARS

Volume 50888.18 3 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|------------|-----------|----------------|
| O 16 | 6.2E+04 | 12.337% | 1 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 5.26E+02 | 0.105% | 1 98.90628 | 43099.50C | 6.2939E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.39E+02 | 0.028% | 1 146.9149 | 62147.50C | 1.1197E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 149.9173 | 62150.50C | 1.8709E-05 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| sm151 | 1.63E+01 | 0.003% | 1 | 150.9199 | 62151.50C | 1.2782E-06 |
| eu151 | 2.03E+00 | 0.000% | 1 | 150.9198 | 63151.55C | 1.5919E-07 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.21E+01 | 0.002% | 1 | 154.9227 | 64155.50C | 9.2434E-07 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.42E+01 | 0.003% | 1 | 234.0409 | 92234.50C | 7.1806E-07 |
| u235 | 4.57E+02 | 0.090% | 1 | 235.0439 | 92235.50C | 2.3011E-05 |
| u236 | 1.00E+02 | 0.020% | 1 | 236.0456 | 92236.50C | 5.0138E-06 |
| u238 | 4.28E+05 | 84.012% | 1 | 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 1.03E+02 | 0.020% | 1 | 237.0481 | 93237.55C | 5.1424E-06 |
| pu238 | 6.84E+01 | 0.013% | 1 | 238.0495 | 94238.50C | 3.4006E-06 |
| pu239 | 9.21E+03 | 1.808% | 1 | 239.0521 | 94239.55C | 4.5596E-04 |
| pu240 | 3.80E+03 | 0.746% | 1 | 240.0539 | 94240.50C | 1.8734E-04 |
| pu241 | 1.18E+03 | 0.232% | 1 | 241.0567 | 94241.50C | 5.7933E-05 |
| pu242 | 4.13E+02 | 0.081% | 1 | 242.0587 | 94242.50C | 2.0193E-05 |
| am241 | 1.34E+03 | 0.263% | 1 | 241.0567 | 95241.50C | 6.5788E-05 |
| am242m | 3.15E+00 | 0.001% | 1 | 242.0595 | 95242.50C | 1.5401E-07 |
| am243 | 1.06E+02 | 0.021% | 1 | 243.0614 | 95243.50C | 5.1612E-06 |
| total | 509451.6 | 100.00% | | | Total | 6.8255E-02 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| sm151 | 1.71E+01 | 0.003% | 1 | 150.9199 | 62151.50C | 1.3409E-06 |
| eu151 | 2.12E+00 | 0.000% | 1 | 150.9198 | 63151.55C | 1.6625E-07 |
| sm152 | 9.80E+01 | 0.020% | 1 | 151.9198 | 62152.50C | 7.6344E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 2.14E+01 | 0.004% | 1 | 154.9227 | 64155.50C | 1.6348E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 2.52E+01 | 0.005% | 1 | 234.0409 | 92234.50C | 1.2743E-06 |
| u235 | 2.97E+02 | 0.059% | 1 | 235.0439 | 92235.50C | 1.4954E-05 |
| u236 | 1.22E+02 | 0.024% | 1 | 236.0456 | 92236.50C | 6.1068E-06 |
| u238 | 4.22E+05 | 83.971% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 1.34E+02 | 0.027% | 1 | 237.0481 | 93237.55C | 6.6901E-06 |
| pu238 | 1.61E+02 | 0.032% | 1 | 238.0495 | 94238.50C | 8.0042E-06 |
| pu239 | 6.54E+03 | 1.301% | 1 | 239.0521 | 94239.55C | 3.2378E-04 |
| pu240 | 3.80E+03 | 0.756% | 1 | 240.0539 | 94240.50C | 1.8734E-04 |
| pu241 | 1.27E+03 | 0.253% | 1 | 241.0567 | 94241.50C | 6.2351E-05 |
| pu242 | 8.01E+02 | 0.159% | 1 | 242.0587 | 94242.50C | 3.9163E-05 |
| am241 | 1.47E+03 | 0.293% | 1 | 241.0567 | 95241.50C | 7.2170E-05 |
| am242m | 4.62E+00 | 0.001% | 1 | 242.0595 | 95242.50C | 2.2588E-07 |
| am243 | 2.60E+02 | 0.052% | 1 | 243.0614 | 95243.50C | 1.2660E-05 |
| total | 502557.2 | 100.00% | | | Total | 6.7966E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 100 YEARS

| ISOTOPE | GRAMS/ | % | Volume | 50888.18 | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.169% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 | 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.75E+02 | 0.074% | 1 | 98.90628 | 43099.50C | 4.4871E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.069% | 1 | 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 146.9149 | 62147.50C | 9.5861E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 149.9173 | 62150.50C | 1.2631E-05 |
| sm151 | 8.48E+00 | 0.002% | 1 | 150.9199 | 62151.50C | 6.6498E-07 |
| eu151 | 9.87E+00 | 0.002% | 1 | 150.9198 | 63151.55C | 7.7398E-07 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 154.9227 | 64155.50C | 1.0313E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 4.74E+01 | 0.009% | 1 | 234.0409 | 92234.50C | 2.3969E-06 |
| u235 | 4.79E+02 | 0.094% | 1 | 235.0439 | 92235.50C | 2.4118E-05 |
| u236 | 1.34E+02 | 0.026% | 1 | 236.0456 | 92236.50C | 6.7185E-06 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 100 YEARS

| ISOTOPE | GRAMS/ | % | Volume | 50888.18 | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.335% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 | 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 5.26E+02 | 0.105% | 1 | 98.90628 | 43099.50C | 6.2939E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 | 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 | 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 | 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 | 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 | 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.41E+02 | 0.028% | 1 | 146.9149 | 62147.50C | 1.1358E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 | 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 8.90E+00 | 0.002% | 1 | 150.9199 | 62151.50C | 6.9792E-07 |
| eu151 | 1.04E+01 | 0.002% | 1 | 150.9198 | 63151.55C | 8.1555E-07 |
| sm152 | 9.80E+01 | 0.019% | 1 | 151.9198 | 62152.50C | 7.6344E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 2.40E+01 | 0.005% | 1 | 154.9227 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.03E+02 | 0.020% | 1 | 234.0409 | 92234.50C | 5.2084E-06 |
| u235 | 3.13E+02 | 0.062% | 1 | 235.0439 | 92235.50C | 1.5760E-05 |
| u236 | 1.56E+02 | 0.031% | 1 | 236.0456 | 92236.50C | 7.8215E-06 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| u238 | 4.28E+05 | 84.007% | 1 | 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 3.85E+02 | 0.076% | 1 | 237.0481 | 93237.55C | 1.9221E-05 |
| pu238 | 3.56E+01 | 0.007% | 1 | 238.0495 | 94238.50C | 1.7699E-06 |
| pu239 | 9.19E+03 | 1.804% | 1 | 239.0521 | 94239.55C | 4.5497E-04 |
| pu240 | 3.79E+03 | 0.744% | 1 | 240.0539 | 94240.50C | 1.8685E-04 |
| pu241 | 1.95E+01 | 0.004% | 1 | 241.0567 | 94241.50C | 9.5736E-07 |
| pu242 | 4.13E+02 | 0.081% | 1 | 242.0587 | 94242.50C | 2.0193E-05 |
| am241 | 2.22E+03 | 0.436% | 1 | 241.0567 | 95241.50C | 1.0899E-04 |
| am242m | 2.07E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 1.0121E-07 |
| am243 | 1.05E+02 | 0.021% | 1 | 243.0614 | 95243.50C | 5.1125E-06 |
| total | 509479.9 | 100.00% | | | Total | 6.8256E-02 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| u238 | 4.22E+05 | 83.961% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 4.41E+02 | 0.088% | 1 | 237.0481 | 93237.55C | 2.2017E-05 |
| pu238 | 8.32E+01 | 0.017% | 1 | 238.0495 | 94238.50C | 4.1364E-06 |
| pu239 | 6.52E+03 | 1.297% | 1 | 239.0521 | 94239.55C | 3.2279E-04 |
| pu240 | 3.83E+03 | 0.762% | 1 | 240.0539 | 94240.50C | 1.8882E-04 |
| pu241 | 2.10E+01 | 0.004% | 1 | 241.0567 | 94241.50C | 1.0310E-06 |
| pu242 | 8.01E+02 | 0.159% | 1 | 242.0587 | 94242.50C | 3.9163E-05 |
| am241 | 2.41E+03 | 0.479% | 1 | 241.0567 | 95241.50C | 1.1832E-04 |
| am242m | 3.04E+00 | 0.001% | 1 | 242.0595 | 95242.50C | 1.4863E-07 |
| am243 | 2.58E+02 | 0.051% | 1 | 243.0614 | 95243.50C | 1.2562E-05 |
| total | 502616.5 | 100.00% | | | Total | 6.7969E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECA Y TIME: 1000 YEARS
 DECA Y TIME: 1000 YEARS Volume 50888.18 2 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|----|-----------|----------------|
| O 16 | 6.2E+04 | 12.170% | 1 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.74E+02 | 0.073% | 1 | 43099.50C | 4.4752E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.069% | 1 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 60145.50C | 2.3194E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 62147.50C | 9.5861E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 62150.50C | 1.2631E-05 |
| sm151 | 8.28E-03 | 0.000% | 1 | 62151.50C | 6.4930E-10 |
| eu151 | 1.83E+01 | 0.004% | 1 | 63151.55C | 1.4350E-06 |
| sm152 | 7.44E+01 | 0.015% | 1 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 63153.55C | 5.4871E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 64155.50C | 1.0313E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 92233.50C | 0.0000E+00 |
| u234 | 8.38E+01 | 0.016% | 1 | 92234.50C | 4.2375E-06 |
| u235 | 7.10E+02 | 0.139% | 1 | 92235.50C | 3.5750E-05 |
| u236 | 4.71E+02 | 0.092% | 1 | 92236.50C | 2.3615E-05 |
| u238 | 4.28E+05 | 84.015% | 1 | 92238.50C | 2.1278E-02 |
| np237 | 2.07E+03 | 0.406% | 1 | 93237.55C | 1.0335E-04 |
| pu238 | 6.00E-02 | 0.000% | 1 | 94238.50C | 2.9829E-09 |
| pu239 | 8.96E+03 | 1.759% | 1 | 94239.55C | 4.4358E-04 |
| pu240 | 3.44E+03 | 0.675% | 1 | 94240.50C | 1.6959E-04 |
| pu241 | 2.91E-03 | 0.000% | 1 | 94241.50C | 1.4287E-10 |
| pu242 | 4.12E+02 | 0.081% | 1 | 94242.50C | 2.0144E-05 |
| am241 | 5.29E+02 | 0.104% | 1 | 95241.50C | 2.5972E-05 |
| am242m | 2.48E-02 | 0.000% | 1 | 95242.50C | 1.2125E-09 |
| am243 | 9.64E+01 | 0.019% | 1 | 95243.50C | 4.6938E-06 |
| total | 509430.5 | 100.00% | | Total | 6.8256E-02 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECA Y TIME: 1000 YEARS
 DECA Y TIME: 1000 YEARS Volume 50888.18 3 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|----------|---------|----|-----------|----------------|
| O 16 | 6.2E+04 | 12.336% | 1 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 | 42095.50C | 5.4993E-05 |
| tc 99 | 5.25E+02 | 0.104% | 1 | 43099.50C | 6.2820E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 | 60145.50C | 3.3157E-05 |
| sm147 | 1.41E+02 | 0.028% | 1 | 62147.50C | 1.1358E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 | 62150.50C | 1.8709E-05 |
| sm151 | 8.68E-03 | 0.000% | 1 | 62151.50C | 6.8067E-10 |
| eu151 | 1.92E+01 | 0.004% | 1 | 63151.55C | 1.5056E-06 |
| sm152 | 9.81E+01 | 0.020% | 1 | 62152.50C | 7.6422E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 63153.55C | 8.2809E-06 |
| gd155 | 2.40E+01 | 0.005% | 1 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 92233.50C | 0.0000E+00 |
| u234 | 1.87E+02 | 0.037% | 1 | 92234.50C | 9.4561E-06 |
| u235 | 4.77E+02 | 0.095% | 1 | 92235.50C | 2.4018E-05 |
| u236 | 4.98E+02 | 0.099% | 1 | 92236.50C | 2.4969E-05 |
| u238 | 4.22E+05 | 83.967% | 1 | 92238.50C | 2.0980E-02 |
| np237 | 2.27E+03 | 0.452% | 1 | 93237.55C | 1.1333E-04 |
| pu238 | 1.13E-01 | 0.000% | 1 | 94238.50C | 5.6179E-09 |
| pu239 | 6.38E+03 | 1.269% | 1 | 94239.55C | 3.1586E-04 |
| pu240 | 3.48E+03 | 0.692% | 1 | 94240.50C | 1.7157E-04 |
| pu241 | 1.30E-02 | 0.000% | 1 | 94241.50C | 6.3824E-10 |
| pu242 | 8.01E+02 | 0.159% | 1 | 94242.50C | 3.9163E-05 |
| am241 | 5.75E+02 | 0.114% | 1 | 95241.50C | 2.8230E-05 |
| am242m | 3.65E-02 | 0.000% | 1 | 95242.50C | 1.7846E-09 |
| am243 | 2.37E+02 | 0.047% | 1 | 95243.50C | 1.1540E-05 |
| total | 502581.4 | 100.00% | | Total | 6.7969E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECA Y TIME: 1000 YEARS
 DECA Y TIME: 1000 YEARS Volume 50888.18 2 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|---------|---------|----|----------|----------------|
| O 16 | 6.2E+04 | 12.173% | 1 | 8016.50C | 4.5874E-02 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu DECA Y TIME: 1000 YEARS
 DECA Y TIME: 1000 YEARS Volume 50888.18 3 Cycles

| ISOTOPE | GRAMS/ | % | Aw | MCNP ID | Number Density |
|---------|---------|---------|----|----------|----------------|
| O 16 | 6.2E+04 | 12.339% | 1 | 8016.50C | 4.5874E-02 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| mo 95 | 3.07E+02 | 0.060% | 1 | 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.63E+02 | 0.071% | 1 | 98.90628 | 43099.50C | 4.3435E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.070% | 1 | 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 146.9149 | 62147.50C | 9.5861E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 149.9173 | 62150.50C | 1.2631E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.84E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.4429E-06 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 154.9227 | 64155.50C | 1.0313E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 8.24E+01 | 0.016% | 1 | 234.0409 | 92234.50C | 4.1667E-06 |
| u235 | 2.73E+03 | 0.536% | 1 | 235.0439 | 92235.50C | 1.3746E-04 |
| u236 | 2.55E+03 | 0.501% | 1 | 236.0456 | 92236.50C | 1.2785E-04 |
| u238 | 4.28E+05 | 84.032% | 1 | 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 2.58E+03 | 0.507% | 1 | 237.0481 | 93237.55C | 1.2881E-04 |
| pu238 | 2.04E-21 | 0.000% | 1 | 238.0495 | 94238.50C | 1.0142E-28 |
| pu239 | 6.96E+03 | 1.367% | 1 | 239.0521 | 94239.55C | 3.4457E-04 |
| pu240 | 1.33E+03 | 0.261% | 1 | 240.0539 | 94240.50C | 6.5570E-05 |
| pu241 | 1.40E-03 | 0.000% | 1 | 241.0567 | 94241.50C | 6.8734E-11 |
| pu242 | 4.06E+02 | 0.080% | 1 | 242.0587 | 94242.50C | 1.9850E-05 |
| am241 | 4.24E-02 | 0.000% | 1 | 241.0567 | 95241.50C | 2.0817E-09 |
| am242m | 1.51E-21 | 0.000% | 1 | 242.0595 | 95242.50C | 7.3827E-29 |
| am243 | 4.14E+01 | 0.008% | 1 | 243.0614 | 95243.50C | 2.0158E-06 |
| total | 509327.2 | 100.00% | | | Total | 6.8254E-02 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| mo 95 | 4.41E+02 | 0.088% | 1 | 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 5.09E+02 | 0.101% | 1 | 98.90628 | 43099.50C | 6.0905E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 | 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 | 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 | 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 | 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 | 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.41E+02 | 0.028% | 1 | 146.9149 | 62147.50C | 1.1358E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 | 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.92E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.5056E-06 |
| sm152 | 9.81E+01 | 0.020% | 1 | 151.9198 | 62152.50C | 7.6422E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 2.40E+01 | 0.005% | 1 | 154.9227 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.83E+02 | 0.036% | 1 | 234.0409 | 92234.50C | 9.2538E-06 |
| u235 | 1.92E+03 | 0.382% | 1 | 235.0439 | 92235.50C | 9.6675E-05 |
| u236 | 2.60E+03 | 0.517% | 1 | 236.0456 | 92236.50C | 1.3064E-04 |
| u238 | 4.22E+05 | 83.985% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 2.83E+03 | 0.563% | 1 | 237.0481 | 93237.55C | 1.4129E-04 |
| pu238 | 2.99E-21 | 0.000% | 1 | 238.0495 | 94238.50C | 1.4865E-28 |
| pu239 | 5.04E+03 | 1.003% | 1 | 239.0521 | 94239.55C | 2.4952E-04 |
| pu240 | 1.35E+03 | 0.269% | 1 | 240.0539 | 94240.50C | 6.6556E-05 |
| pu241 | 6.23E-03 | 0.000% | 1 | 241.0567 | 94241.50C | 3.0587E-10 |
| pu242 | 7.88E+02 | 0.157% | 1 | 242.0587 | 94242.50C | 3.8527E-05 |
| am241 | 1.88E-01 | 0.000% | 1 | 241.0567 | 95241.50C | 9.2300E-09 |
| am242m | 2.22E-21 | 0.000% | 1 | 242.0595 | 95242.50C | 1.0854E-28 |
| am243 | 1.01E+02 | 0.020% | 1 | 243.0614 | 95243.50C | 4.9178E-06 |
| total | 502472.4 | 100.00% | | | Total | 6.7966E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 30000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | 50888.18 | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.176% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 | 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 3.40E+02 | 0.067% | 1 | 98.90628 | 43099.50C | 4.0683E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.070% | 1 | 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 146.9149 | 62147.50C | 9.5861E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 149.9173 | 62150.50C | 1.2631E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.84E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.4429E-06 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 154.9227 | 64155.50C | 1.0313E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 7.91E+01 | 0.016% | 1 | 234.0409 | 92234.50C | 3.9999E-06 |
| u235 | 5.73E+03 | 1.125% | 1 | 235.0439 | 92235.50C | 2.8851E-04 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 30000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | 50888.18 | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.343% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 | 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 4.77E+02 | 0.095% | 1 | 98.90628 | 43099.50C | 5.7076E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 | 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 | 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 | 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 | 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 | 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.41E+02 | 0.028% | 1 | 146.9149 | 62147.50C | 1.1358E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 | 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.92E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.5056E-06 |
| sm152 | 9.81E+01 | 0.020% | 1 | 151.9198 | 62152.50C | 7.6422E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 2.40E+01 | 0.005% | 1 | 154.9227 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.74E+02 | 0.035% | 1 | 234.0409 | 92234.50C | 8.7987E-06 |
| u235 | 4.12E+03 | 0.820% | 1 | 235.0439 | 92235.50C | 2.0745E-04 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| u236 | 3.70E+03 | 0.727% | 1 | 236.0456 | 92236.50C | 1.8551E-04 |
| u238 | 4.28E+05 | 84.055% | 1 | 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 2.56E+03 | 0.503% | 1 | 237.0481 | 93237.55C | 1.2781E-04 |
| pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 |
| pu239 | 3.94E+03 | 0.774% | 1 | 239.0521 | 94239.55C | 1.9506E-04 |
| pu240 | 1.61E+02 | 0.032% | 1 | 240.0539 | 94240.50C | 7.9374E-06 |
| pu241 | 2.74E-04 | 0.000% | 1 | 241.0567 | 94241.50C | 1.3452E-11 |
| pu242 | 3.91E+02 | 0.077% | 1 | 242.0587 | 94242.50C | 1.9117E-05 |
| am241 | 8.24E-03 | 0.000% | 1 | 241.0567 | 95241.50C | 4.0455E-10 |
| am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 |
| am243 | 6.30E+00 | 0.001% | 1 | 243.0614 | 95243.50C | 3.0675E-07 |
| total | 509191.7 | 100.00% | | | Total | 6.8249E-02 |

| | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|
| u236 | 3.76E+03 | 0.749% | 1 | 236.0456 | 92236.50C | 1.8852E-04 |
| u238 | 4.22E+05 | 84.010% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 2.81E+03 | 0.559% | 1 | 237.0481 | 93237.55C | 1.4029E-04 |
| pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 |
| pu239 | 2.89E+03 | 0.575% | 1 | 239.0521 | 94239.55C | 1.4308E-04 |
| pu240 | 1.63E+02 | 0.032% | 1 | 240.0539 | 94240.50C | 8.0360E-06 |
| pu241 | 1.22E-03 | 0.000% | 1 | 241.0567 | 94241.50C | 5.9897E-11 |
| pu242 | 7.60E+02 | 0.151% | 1 | 242.0587 | 94242.50C | 3.7158E-05 |
| am241 | 3.67E-02 | 0.000% | 1 | 241.0567 | 95241.50C | 1.8018E-09 |
| am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 |
| am243 | 1.55E+01 | 0.003% | 1 | 243.0614 | 95243.50C | 7.5470E-07 |
| total | 502320.7 | 100.00% | | | Total | 6.7959E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 100000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | Aw | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.182% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 | 94.90584 | 42095.50C | 3.8283E-05 |
| tc 99 | 2.70E+02 | 0.053% | 1 | 98.90628 | 43099.50C | 3.2307E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 100.9056 | 44101.50C | 4.6563E-05 |
| rh103 | 3.54E+02 | 0.070% | 1 | 102.9055 | 45103.50C | 4.0712E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 108.9048 | 47109.50C | 1.0074E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 142.9098 | 60143.50C | 3.2214E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 144.9125 | 60145.50C | 2.3194E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 146.9149 | 62147.50C | 9.5861E-06 |
| sm149 | 4.44E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.5286E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 149.9173 | 62150.50C | 1.2631E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.84E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.4429E-06 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 154.9227 | 64155.50C | 1.0313E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 6.91E+01 | 0.014% | 1 | 234.0409 | 92234.50C | 3.4942E-06 |
| u235 | 9.09E+03 | 1.786% | 1 | 235.0439 | 92235.50C | 4.5770E-04 |
| u236 | 3.85E+03 | 0.756% | 1 | 236.0456 | 92236.50C | 1.9303E-04 |
| u238 | 4.28E+05 | 84.096% | 1 | 238.0508 | 92238.50C | 2.1278E-02 |
| np237 | 2.51E+03 | 0.493% | 1 | 237.0481 | 93237.55C | 1.2531E-04 |
| pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 |
| pu239 | 5.28E+02 | 0.104% | 1 | 239.0521 | 94239.55C | 2.6140E-05 |
| pu240 | 9.89E-02 | 0.000% | 1 | 240.0539 | 94240.50C | 4.8758E-09 |
| pu241 | 9.06E-07 | 0.000% | 1 | 241.0567 | 94241.50C | 4.4481E-14 |
| pu242 | 3.42E+02 | 0.067% | 1 | 242.0587 | 94242.50C | 1.6721E-05 |
| am241 | 2.73E-05 | 0.000% | 1 | 241.0567 | 95241.50C | 1.3403E-12 |
| am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 |
| am243 | 8.72E-03 | 0.000% | 1 | 243.0614 | 95243.50C | 4.2458E-10 |
| total | 508943.5 | 100.00% | | | Total | 6.8235E-02 |

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 100000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | Aw | MCNP ID | Number Density |
|---------|----------|---------|--------|----------|-----------|----------------|
| O 16 | 6.2E+04 | 12.351% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 4.41E+02 | 0.088% | 1 | 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 3.79E+02 | 0.076% | 1 | 98.90628 | 43099.50C | 4.5350E-05 |
| ru101 | 5.81E+02 | 0.116% | 1 | 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 4.45E+02 | 0.089% | 1 | 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 1.19E+02 | 0.024% | 1 | 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 5.29E+02 | 0.105% | 1 | 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 4.06E+02 | 0.081% | 1 | 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.41E+02 | 0.028% | 1 | 146.9149 | 62147.50C | 1.1358E-05 |
| sm149 | 3.91E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 2.37E+02 | 0.047% | 1 | 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.92E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.5056E-06 |
| sm152 | 9.81E+01 | 0.020% | 1 | 151.9198 | 62152.50C | 7.6422E-06 |
| eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 2.40E+01 | 0.005% | 1 | 154.9227 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 1.47E+02 | 0.029% | 1 | 234.0409 | 92234.50C | 7.4334E-06 |
| u235 | 6.59E+03 | 1.313% | 1 | 235.0439 | 92235.50C | 3.3182E-04 |
| u236 | 3.91E+03 | 0.779% | 1 | 236.0456 | 92236.50C | 1.9604E-04 |
| u238 | 4.22E+05 | 84.066% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 2.75E+03 | 0.548% | 1 | 237.0481 | 93237.55C | 1.3730E-04 |
| pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 |
| pu239 | 3.90E+02 | 0.078% | 1 | 239.0521 | 94239.55C | 1.9308E-05 |
| pu240 | 1.00E-01 | 0.000% | 1 | 240.0539 | 94240.50C | 4.9301E-09 |
| pu241 | 4.04E-06 | 0.000% | 1 | 241.0567 | 94241.50C | 1.9835E-13 |
| pu242 | 6.67E+02 | 0.133% | 1 | 242.0587 | 94242.50C | 3.2611E-05 |
| am241 | 1.22E-04 | 0.000% | 1 | 241.0567 | 95241.50C | 5.9897E-12 |
| am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 |
| am243 | 2.14E-02 | 0.000% | 1 | 243.0614 | 95243.50C | 1.0420E-09 |
| total | 501984.3 | 100.00% | | | Total | 6.7938E-02 |

BURNUP: PWR MOX 2 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 250000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | Aw | MCNP ID | Number Density |
|---------|--------|---|--------|----|---------|----------------|
|---------|--------|---|--------|----|---------|----------------|

BURNUP: PWR MOX 3 Cycles Westinghouse Existing Reactor 17x17
 ENRICHMENT: 4.545% Pu
 DECAY TIME: 250000 YEARS

| ISOTOPE | GRAMS/ | % | Volume | Aw | MCNP ID | Number Density |
|---------|--------|---|--------|----|---------|----------------|
|---------|--------|---|--------|----|---------|----------------|

| | | | | | | | | | | | | | |
|--------|----------|---------|---|----------|-----------|------------|--------|----------|---------|---|----------|-----------|------------|
| O 16 | 6.2E+04 | 12.190% | 1 | 15.99492 | 8016.50C | 4.5874E-02 | O 16 | 6.2E+04 | 12.363% | 1 | 15.99492 | 8016.50C | 4.5874E-02 |
| mo 95 | 3.07E+02 | 0.060% | 1 | 94.90584 | 42095.50C | 3.8283E-05 | mo 95 | 4.41E+02 | 0.088% | 1 | 94.90584 | 42095.50C | 5.4993E-05 |
| tc 99 | 1.65E+02 | 0.032% | 1 | 98.90628 | 43099.50C | 1.9743E-05 | tc 99 | 2.32E+02 | 0.046% | 1 | 98.90628 | 43099.50C | 2.7760E-05 |
| ru101 | 3.97E+02 | 0.078% | 1 | 100.9056 | 44101.50C | 4.6563E-05 | ru101 | 5.81E+02 | 0.116% | 1 | 100.9056 | 44101.50C | 6.8143E-05 |
| rh103 | 3.54E+02 | 0.070% | 1 | 102.9055 | 45103.50C | 4.0712E-05 | rh103 | 4.45E+02 | 0.089% | 1 | 102.9055 | 45103.50C | 5.1178E-05 |
| ag109 | 9.27E+01 | 0.018% | 1 | 108.9048 | 47109.50C | 1.0074E-05 | ag109 | 1.19E+02 | 0.024% | 1 | 108.9048 | 47109.50C | 1.2932E-05 |
| nd143 | 3.89E+02 | 0.076% | 1 | 142.9098 | 60143.50C | 3.2214E-05 | nd143 | 5.29E+02 | 0.105% | 1 | 142.9098 | 60143.50C | 4.3808E-05 |
| nd145 | 2.84E+02 | 0.056% | 1 | 144.9125 | 60145.50C | 2.3194E-05 | nd145 | 4.06E+02 | 0.081% | 1 | 144.9125 | 60145.50C | 3.3157E-05 |
| sm147 | 1.19E+02 | 0.023% | 1 | 146.9149 | 62147.50C | 9.5861E-06 | sm147 | 1.41E+02 | 0.028% | 1 | 146.9149 | 62147.50C | 1.1358E-05 |
| sm149 | 4.44E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.5286E-07 | sm149 | 3.91E+00 | 0.001% | 1 | 148.9172 | 62149.50C | 3.1074E-07 |
| sm150 | 1.60E+02 | 0.031% | 1 | 149.9173 | 62150.50C | 1.2631E-05 | sm150 | 2.37E+02 | 0.047% | 1 | 149.9173 | 62150.50C | 1.8709E-05 |
| sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 | sm151 | 0.00E+00 | 0.000% | 1 | 150.9199 | 62151.50C | 0.0000E+00 |
| eu151 | 1.84E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.4429E-06 | eu151 | 1.92E+01 | 0.004% | 1 | 150.9198 | 63151.55C | 1.5056E-06 |
| sm152 | 7.44E+01 | 0.015% | 1 | 151.9198 | 62152.50C | 5.7959E-06 | sm152 | 9.81E+01 | 0.020% | 1 | 151.9198 | 62152.50C | 7.6422E-06 |
| eu153 | 7.09E+01 | 0.014% | 1 | 152.9212 | 63153.55C | 5.4871E-06 | eu153 | 1.07E+02 | 0.021% | 1 | 152.9212 | 63153.55C | 8.2809E-06 |
| gd155 | 1.35E+01 | 0.003% | 1 | 154.9227 | 64155.50C | 1.0313E-06 | gd155 | 2.40E+01 | 0.005% | 1 | 154.9227 | 64155.50C | 1.8334E-06 |
| u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 | u233 | 0.00E+00 | 0.000% | 1 | 233.0395 | 92233.50C | 0.0000E+00 |
| u234 | 5.32E+01 | 0.010% | 1 | 234.0409 | 92234.50C | 2.6902E-06 | u234 | 1.04E+02 | 0.021% | 1 | 234.0409 | 92234.50C | 5.2590E-06 |
| u235 | 9.61E+03 | 1.890% | 1 | 235.0439 | 92235.50C | 4.8388E-04 | u235 | 6.97E+03 | 1.390% | 1 | 235.0439 | 92235.50C | 3.5095E-04 |
| u236 | 3.83E+03 | 0.753% | 1 | 236.0456 | 92236.50C | 1.9203E-04 | u236 | 3.90E+03 | 0.778% | 1 | 236.0456 | 92236.50C | 1.9554E-04 |
| u238 | 4.28E+05 | 84.153% | 1 | 238.0508 | 92238.50C | 2.1278E-02 | u238 | 4.22E+05 | 84.150% | 1 | 238.0508 | 92238.50C | 2.0980E-02 |
| np237 | 2.39E+03 | 0.470% | 1 | 237.0481 | 93237.55C | 1.1932E-04 | np237 | 2.62E+03 | 0.522% | 1 | 237.0481 | 93237.55C | 1.3081E-04 |
| pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 | pu238 | 0.00E+00 | 0.000% | 1 | 238.0495 | 94238.50C | 0.0000E+00 |
| pu239 | 7.07E+00 | 0.001% | 1 | 239.0521 | 94239.55C | 3.5002E-07 | pu239 | 5.22E+00 | 0.001% | 1 | 239.0521 | 94239.55C | 2.5843E-07 |
| pu240 | 2.28E-08 | 0.000% | 1 | 240.0539 | 94240.50C | 1.1241E-15 | pu240 | 1.71E-07 | 0.000% | 1 | 240.0539 | 94240.50C | 8.4304E-15 |
| pu241 | 4.40E-12 | 0.000% | 1 | 241.0567 | 94241.50C | 2.1602E-19 | pu241 | 1.96E-11 | 0.000% | 1 | 241.0567 | 94241.50C | 9.6227E-19 |
| pu242 | 2.60E+02 | 0.051% | 1 | 242.0587 | 94242.50C | 1.2712E-05 | pu242 | 5.05E+02 | 0.101% | 1 | 242.0587 | 94242.50C | 2.4691E-05 |
| am241 | 1.40E-10 | 0.000% | 1 | 241.0567 | 95241.50C | 6.8734E-18 | am241 | 6.23E-10 | 0.000% | 1 | 241.0567 | 95241.50C | 3.0587E-17 |
| am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 | am242m | 0.00E+00 | 0.000% | 1 | 242.0595 | 95242.50C | 0.0000E+00 |
| am243 | 1.44E-06 | 0.000% | 1 | 243.0614 | 95243.50C | 7.0115E-14 | am243 | 1.51E-05 | 0.000% | 1 | 243.0614 | 95243.50C | 7.3523E-13 |
| total | 508599.6 | 100.00% | | | Total | 6.8211E-02 | total | 501487.4 | 100.00% | | | Total | 6.7904E-02 |

1mcnp version 4a ld=10/01/93 06/20/96 16:06:07

INP=wm221b OUTP=wm221b.o

probid = 06/20/96 16:06:07

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1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221b)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 0. 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```

```

237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/5 YEAR -- U02 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.1028E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.3331E-06
254- 63151.55C 1.0900E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 8.0211E-07
258- 92234.50C 5.7647E-07
259- 92235.50C 2.2960E-05
260- 92236.50C 4.9185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 4.6531E-06
263- 94238.50C 3.5348E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 7.4134E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 5.0568E-05
269- 95242.50C 1.5792E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
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283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

```

1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221b) probid = 06/20/96 16:06:07

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14832 neutron histories and 30 active cycles with 89894 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104726 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:

79

the following cells with fissionable material had no neutron collisions:

79

the following cells with fissionable material had no fission source points:

79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

| |
|--|
| <p>the final estimated combined collision/absorption/track-length keff = .92991 with an estimated standard deviation of .00243</p> <p>the estimated 68, 95, & 99 percent keff confidence intervals are .92745 to .93237, .92493 to .93489, and .92318 to .93664</p> <p>the estimated collision/absorption neutron removal lifetime = 1.79E-05 seconds with an estimated standard deviation of 1.30E-07</p> |
|--|

1mcnp version 4a ld=10/01/93 06/20/96 22:52:43

INP=wm321b OUTP=wm321b.0

probid = 06/20/96 22:52:43

```

1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/3 Cycles/5 year Kidman Isotopes (wm321b)
2- C MULTI-PURPOSE CANISTER - Simplified Model 3 Cycles
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7964 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
 178- 45 PY -12.684125
 179- 46 PY 12.684125
 180- C
 181- 47 PZ 294.17 \$ MILD STEEL LID
 182- C BLANK PIN CELL
 183- 48 PX -0.7
 184- 49 PX 0.7
 185- 50 PY -0.7
 186- 51 PY 0.7
 187- 52 PY 0.0001
 188- 53 PY -0.0001
 189- 54 PY 0.0
 190- 55 P 1. -1. 0. 0.
 191- 56 P 1. 1. 0. 0.
 192- C EXTRA CARDS
 193- 57 PZ 203.2 \$ TOP BASKET MATERIAL
 194- 58 PX 62.54751 \$ ACTUAL 62.5475
 195- 59 PY 62.54751 \$ ACTUAL 62.5475
 196- 60 PX 63.50001 \$ ACTUAL 63.5
 197- 61 PY 63.50001 \$ ACTUAL 63.5
 198- 62 PX 11.890375
 199- 63 PY 11.890375
 200- 64 PX 13.160375
 201- 65 PY 13.160375
 202- 66 PX 38.052376 \$ ACTUAL 38.0523750
 203- 67 PY 38.052376 \$ ACTUAL 38.0523750
 204- 68 PX 39.004876 \$ ACTUAL 39.0048750
 205- 69 PY 39.004876 \$ ACTUAL 39.0048750
 206- 70 CZ 74.0409 \$ ACTUAL 74.0410
 207- 71 PZ 203.30 \$ TOP BASKET EDGE MATERIAL
 208- 72 P 1. -1. 0. 0.
 209- C RING, PLUG, AND LID CARDS
 210- 73 CZ 71.5010
 211- 74 CZ 72.7710
 212- 75 PZ 259.7150 \$ BOTTOM DU PLUG
 213- 76 PZ 264.7950 \$ TOP DU PLUG
 214- 77 PZ 271.1450 \$ TOP ALLOY 825 2" LID
 215- 78 PZ 273.6850 \$ TOP SS HONEYCOMB
 216- 79 PZ 254.0000 \$ TOP WATER GAP

217-
 218- MODE N
 219- C VOL 88J
 220- KCODE 3000 1. 5 35
 221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
 222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
 223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
 224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8.
 225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
 226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
 227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
 228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
 229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
 230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
 231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
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```

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241- C 4.545%/3 Cycle/5 YEAR -- U02 Kidman Isotopes
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245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.0875E-05
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253- 62151.50C 1.3958E-06
254- 63151.55C 1.1371E-07
255- 62152.50C 7.6344E-06
256- 63153.55C 8.2809E-06
257- 64155.50C 1.4209E-06
258- 92234.50C 9.4055E-07
259- 92235.50C 1.4904E-05
260- 92236.50C 6.1068E-06
261- 92238.50C 2.0980E-02
262- 93237.55C 6.1908E-06
263- 94238.50C 8.3522E-06
264- 94239.55C 3.2378E-04
265- 94240.50C 1.8685E-04
266- 94241.50C 7.9535E-05
267- 94242.50C 3.9163E-05
268- 95241.50C 5.5478E-05
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273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

```


1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/3 Cycles/5 year Kidman Isotopes (wm321b) probid = 06/20/96 22:52:43

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14430 neutron histories and 30 active cycles with 90021 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104451 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

 the final estimated combined collision/absorption/track-length keff = .82552 with an estimated standard deviation of .00240
 the estimated 68, 95, & 99 percent keff confidence intervals are .82309 to .82795, .82060 to .83044, and .81888 to .83217
 the estimated collision/absorption neutron removal lifetime = 1.90E-05 seconds with an estimated standard deviation of 1.59E-07

1mcnp version 4a ld=10/01/93 06/21/96 07:22:12

inp=wm212b outp=wm212b.o

probid = 06/21/96 07:22:12

1- WEST 17x17 FUEL, 12 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm212b)
2- C MULTI-PURPOSE CANISTER WITH COLLAPSED FLUX TRAPS
3- C CELL SPECIFICATIONS
4- C 1 0 57 58 3 -6 -9 FILL=12 IMP:N=1
5- 1 0 57 58 3 -6 -9 FILL=1 IMP:N=1
6- C ASSEMBLY LATTICE DESCRIPTION
7- C 2 1 -1.0000 -40 42 -39 41 TRCL=(11.668759 11.668759 0.)
8- 2 1 -1.0000 -40 42 -39 41 TRCL=(13.812519 13.812519 0.) \$ SHIFTED EXTRA
9- IMP:N=1 LAT=1 U=1
10- FILL=0:3 0:3 0:0 11 11 1 1 11 1 1 1 1 1 1 1 1 1 1 1 1 1
11- C ALLOY 825 SPACERS WELDED TO MPC SHELL
12- C 3 1 -1.0000 -27 28 -29 30 IMP:N=1 FILL=10 U=12
13- C TRCL=(16.22300 66.42356 0) \$ TOP - .00001 ADDED TO ACTUAL
14- C 4 LIKE 3 BUT TRCL=(40.70607 40.70607 0) \$ MIDDLE
15- C 5 LIKE 3 BUT TRCL=(66.42356 16.22300 0) \$ SIDE
16- C FULL ASSEMBLY LATTICE POSITION
17- C 6 1 -1.000 64 -66 65 -67 #3 #4 #5 FILL=1 U=12 IMP:N=1
18- C ASSEMBLY CELL
19- 8 1 -1.0000 -32 34 -31 33 IMP:N=1 FILL=9 U=11
20- C TOP OF ASSEMBLY OUTSIDE LATTICE
21- 10 1 -1.0000 -55 56 31 IMP:N=1 FILL=5 U=11
22- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
23- 11 1 -1.0000 32 55 56 IMP:N=1 FILL=6 U=11
24- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
25- 12 1 -1.0000 55 -56 -33 IMP:N=1 FILL=7 U=11
26- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
27- 13 1 -1.0000 -34 -55 -56 IMP:N=1 FILL=8 U=11
28- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
29- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
30- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
31- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
32- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
33- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
34- 9 2 16R 9 9 2 16R 9
35- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
36- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
37- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
38- 9 18R
39- C FUEL ROD
40- 33 2 6.8254-2 -17 -4 IMP:N=1 U=2
41- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
42- 35 1 -1.0000 -17 5 IMP:N=1 U=2
43- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
44- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
45- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
46- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
47- 40 1 -1.0000 19 IMP:N=1 U=2
48- C CONTROL ROD/GUIDE TUBE
49- 41 1 -1.0000 -21 -5 IMP:N=1 U=3
50- 42 1 -1.0000 -21 5 IMP:N=1 U=3
51- 43 4 -6.6000 21 -22 IMP:N=1 U=3
52- 44 1 -1.0000 22 -23 IMP:N=1 U=3
53- 45 4 -6.6000 23 -24 IMP:N=1 U=3
54- 46 1 -1.0000 24 IMP:N=1 U=3
55- C INSTRUMENTATION TUBE
56- C 47 1 -1.0000 -25 IMP:N=1 U=4

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57- C 48 4 -6.6000 25 -26 IMP:N=1 U=4
58- C 49 1 -1.0000 26 IMP:N=1 U=4
59- C WATER GAP - ASSEMBLY TOP
60- 50 1 -1.0000 -35 -4 IMP:N=1 U=5
61- C SS TUBE WALL - ASSEMBLY TOP
62- 51 8 -8.2380 35 -44 -4 IMP:N=1 U=5
63- C AL-B WALL -ASSEMBLY TOP
64- 52 6 -2.700 44 -46 -4 IMP:N=1 U=5
65- C SS WALL - ASSEMBLY TOP
66- 53 8 -8.2380 46 -4 IMP:N=1 U=5
67- C WATER ABOVE BASKET
68- 54 1 -1.000 4 IMP:N=1 U=5
69- C WATER GAP - ASSEMBLY RIGHT
70- 55 1 -1.0000 -36 -4 IMP:N=1 U=6
71- C SS TUBE WALL - ASSEMBLY RIGHT
72- 56 8 -8.2380 36 -43 -4 IMP:N=1 U=6
73- C AL-B WALL - ASSEMBLY RIGHT
74- 57 6 -2.7000 43 -45 -4 IMP:N=1 U=6
75- C SS WALL - ASSEMBLY RIGHT
76- 58 8 -8.2380 45 -4 IMP:N=1 U=6
77- C WATER ABOVE BASKET
78- 59 1 -1.000 4 IMP:N=1 U=6
79- C WATER GAP - ASSEMBLY BOTTOM
80- 60 1 -1.0000 37 -4 IMP:N=1 U=7
81- C SS TUBE WALL - ASSEMBLY BOTTOM
82- 61 8 -8.2380 -37 -4 IMP:N=1 U=7
83- C WATER ABOVE BASKET
84- 62 1 -1.000 4 IMP:N=1 U=7
85- C WATER GAP - ASSEMBLY LEFT
86- 63 1 -1.0000 38 -4 IMP:N=1 U=8
87- C LOWER ST COMB - ASSEMBLY LEFT
88- 64 8 -8.2380 -38 -4 IMP:N=1 U=8
89- C WATER ABOVE BASKET
90- 65 1 -1.000 4 IMP:N=1 U=8
91- C SS316L SPACER DIMENSIONS- UPPER RIGHT QUADRANT
92- 66 1 -1.0000 74 75 IMP:N=1 U=10
93- 67 8 -8.2380 -75 55 IMP:N=1 U=10 $ BOTTOM
94- 68 8 -8.2380 -74 -55 IMP:N=1 U=10 $ LEFT
95- C AXIS MATERIALS
96- 70 8 -8.2380 -57 59 -55 -9 3 -4 IMP:N=1 $ LEFT
97- 71 6 -2.70000 -59 61 -55 -9 3 -4 IMP:N=1
98- 72 8 -8.2380 -61 1 -55 -9 3 -4 IMP:N=1
99- 73 8 -8.2380 -58 60 55 -9 3 -4 IMP:N=1 $ BOTTOM
100- 74 6 -2.7000 -60 62 55 -9 3 -4 IMP:N=1
101- 75 8 -8.2380 -62 2 55 -9 3 -4 IMP:N=1
102- 76 1 -1.0000 -57 1 -55 4 -6 -9 3 IMP:N=1 $ WATER ABOVE BASKET
103- 77 1 -1.0000 -58 2 55 4 -6 -9 3 IMP:N=1 $ WATER ABOVE BASKET
104- C ALLOY 825 MPC LID
105- 80 5 -8.1400 1 2 -9 6 -7 IMP:N=1
106- C ALLOY 825 MPC LINER
107- 81 5 -8.1400 9 -10 1 2 3 -7 IMP:N=1
108- C GAP MPC/INNER 825 BARRIER
109- 82 1 -1.0000 10 -11 1 2 3 -71 IMP:N=1
110- C GAP BETWEEN MPC LID AND INNER BARRIER LID
111- 83 1 -1.0000 -10 1 2 7 -71 IMP:N=1
112- C INNER BARRIER LID - ALLOY 825
113- 84 5 -8.1400 1 2 -11 71 -8 IMP:N=1
114- C INNER BARRIER - ALLOY 825
115- 85 5 -8.1400 11 -12 1 2 3 -8 IMP:N=1
116- C GAP BETWEEN INNER BARRIER LID AND OUTER BARRIER LID

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117- 86 1 -1.0000 8 -72 -12 1 2 IMP:N=1
118- C OUTER BARRIER LID A516 CARBON STEEL
119- 87 7 -7.832 -12 72 -73 1 2 IMP:N=1
120- C OUTER BARRIER - A516 CARBON STEEL
121- 88 7 -7.832 1 2 3 -73 12 -70 IMP:N=1
122- C WATER, ENDS
123- 89 1 -1.0000 1 2 73 -80 -81 IMP:N=1
124- C WATER, SIDE
125- 90 1 -1.0000 1 2 3 70 -73 -81 IMP:N=1
126- C OUTSIDE WORLD
127- 91 0 -1:-2:-3:80:81 IMP:N=0
128-
129- C SURFACE SPECIFICATIONS
130- 1* PX 0.0
131- 2* PY 0.00
132- 3* PZ 0.00
133- 4 PZ 182.8800 $ TOP ACTIVE FUEL
134- 5 PZ 203.327 $ TOP FUEL HARDWARE
135- 6 PZ 229.2500 $ TOP FUEL REGION
136- 7 PZ 231.7500 $ TOP ALLOY 825 LID
137- 8 PZ 248.8500 $ TOP INNER BARRIER ALLOY 825 LID
138- 9 CZ 60.7949 $ ID OF WASTE CONTAINER
139- 10 CZ 63.0174 $ OD OF ALLOY 825 CONTAINER
140- 11 CZ 64.5250 $ ID OF INNER BARRIER ALLOY 825
141- 12 CZ 66.5250 $ OD OF INNER BARRIER ALLOY 825
142- C PIN LATTICE BOUNDS
143- 13 PX 0.62992
144- 14 PX -0.62992
145- 15 PY 0.62992
146- 16 PY -0.62992
147- C FUEL ROD
148- 17 CZ 0.409575
149- 18 CZ 0.41783
150- 19 CZ 0.47483
151- C CONTROL ROD/GUIDE TUBE
152- 20 CZ 0.42672
153- 21 CZ 0.43688
154- 22 CZ 0.48387
155- 23 CZ 0.57150
156- 24 CZ 0.61214
157- C INSTRUMENTATION TUBE
158- C 25 CZ 0.56007
159- C 26 CZ 0.62611
160- C CELL FOR ALLOY 825 SPACERS WELDED TO MPC SHELL
161- 27 PX 12.80923
162- 28 PX -12.80923
163- 29 PY 12.80923
164- 30 PY -12.80923
165- C ASSEMBLY LATTICE BOUNDS
166- 31 PY 10.82024 $ ACTUAL 10.82025
167- 32 PX 10.82024 $ ACTUAL 10.82025
168- 33 PY -10.82024 $ ACTUAL -10.82025
169- 34 PX -10.82024 $ ACTUAL -10.82025
170- 35 PY 11.4300
171- 36 PX 11.4300
172- 37 PY -11.4300
173- 38 PX -11.4300
174- 39 PY 12.17930
175- 40 PX 12.17930
176- 41 PY -11.66876

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177- 42 PX -11.66876
178- 43 PX 11.66876
179- 44 PY 11.66876
180- 45 PX 11.94054
181- 46 PY 11.94054
182- C BLANK PIN CELL
183- 48 PX -0.7213
184- 49 PX 0.7213
185- 50 PY -0.7213
186- 51 PY 0.7213
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0. $ 24.35
192- C EXTRA CARDS
193- 57 PX 2.14376 $ OFFSET DUE TO COLLAPSED CENTRAL AXIS FLUX TRAP
194- 58 PY 2.14376
195- 59 PX 1.9050
196- 60 PY 1.9050
197- 61 PX 1.270
198- 62 PY 1.270050
199- 64 PX -.0000005
200- 65 PY -.0000005
201- 66 PX 95.
202- 67 PY 95.
203- C OUTER BARRIER
204- 70 CZ 76.5250 $OD OF OUTER BARRIER - A516 CARBON STEEL
205- 71 PZ 246.3500 $ GAP BETWEEN MPC AND INNER BARRIER LIDS
206- 72 PZ 271.3500 $ GAP BETWEEN INNER AND OUTER BARRIER LIDS
207- 73 PZ 282.3500 $TOP OF OUTER BARRIER
208- 74 PX -11.85672 $ INNER DIMENSION OF ALLOY 825 SPACES
209- 75 PY -11.85672 $ INNER DIMENSION OF ALLOY 825 SPACES
210- 80 PZ 312.3500 $ WET TUFF OVERPACK, END
211- 81 CZ 106.5250 $ WET TUFF OVERPACK, SIDE
212-
213- MODE N
214- C VOL 88J
215- KCODE 3000 1. 5 35
216- C KSRC 4.87 4.87 10. 4.87 9.20 10. 4.87 13.53 10.
217- C 4.87 17.86 10. 4.87 22.19 10. 9.20 4.87 10.
218- C 9.20 9.20 10. 9.20 13.53 10. 9.20 17.86 10.
219- C 9.20 22.19 10. 13.53 4.87 10. 13.53 9.20 10.
220- C 13.53 17.86 10. 13.53 22.19 10. 17.86 4.87 10.
221- C 17.86 9.20 10. 17.86 13.53 10. 17.86 17.86 10.
222- C 17.86 22.19 10. 22.19 4.87 10. 22.19 9.20 10.
223- C 22.19 13.53 10. 22.19 17.86 10. 22.19 22.19 10.
224- C 4.87 4.87 75. 4.87 9.20 75. 4.87 13.53 75.
225- C 4.87 17.86 75. 4.87 22.19 75. 9.20 4.87 75.
226- C 9.20 9.20 75. 9.20 13.53 75. 9.20 17.86 75.
227- C 9.20 22.19 75. 13.53 4.87 75. 13.53 9.20 75.
228- C 13.53 17.86 75. 13.53 22.19 75. 17.86 4.87 75.
229- C 17.86 9.20 75. 17.86 13.53 75. 17.86 17.86 75.
230- C 17.86 22.19 75. 22.19 4.87 75. 22.19 9.20 75.
231- C 22.19 13.53 75. 22.19 17.86 75. 22.19 22.19 75.
232- C 4.87 4.87 150. 4.87 9.20 150. 4.87 13.53 150.
233- C 4.87 17.86 150. 4.87 22.19 150. 9.20 4.87 150.
234- C 9.20 9.20 150. 9.20 13.53 150. 9.20 17.86 150.
235- C 9.20 22.19 150. 13.53 4.87 150. 13.53 9.20 150.
236- C 13.53 17.86 150. 13.53 22.19 150. 17.86 4.87 150.

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| | | | | | | | | | | |
|------|---|-------|-------|------|-------|-------|------|-------|-------|------|
| 237- | C | 17.86 | 9.20 | 150. | 17.86 | 13.53 | 150. | 17.86 | 17.86 | 150. |
| 238- | C | 17.86 | 22.19 | 150. | 22.19 | 4.87 | 150. | 22.19 | 9.20 | 150. |
| 239- | C | 22.19 | 13.53 | 150. | 22.19 | 17.86 | 150. | 22.19 | 22.19 | 150. |
| 240- | C | 4.87 | 4.87 | 200. | 4.87 | 9.20 | 200. | 4.87 | 13.53 | 200. |
| 241- | C | 4.87 | 17.86 | 200. | 4.87 | 22.19 | 200. | 9.20 | 4.87 | 200. |
| 242- | C | 9.20 | 9.20 | 200. | 9.20 | 13.53 | 200. | 9.20 | 17.86 | 200. |
| 243- | C | 9.20 | 22.19 | 200. | 13.53 | 4.87 | 200. | 13.53 | 9.20 | 200. |
| 244- | C | 13.53 | 17.86 | 200. | 13.53 | 22.19 | 200. | 17.86 | 4.87 | 200. |
| 245- | C | 17.86 | 9.20 | 200. | 17.86 | 13.53 | 200. | 17.86 | 17.86 | 200. |
| 246- | C | 17.86 | 22.19 | 200. | 22.19 | 4.87 | 200. | 22.19 | 9.20 | 200. |
| 247- | C | 22.19 | 13.53 | 200. | 22.19 | 17.86 | 200. | 22.19 | 22.19 | 200. |
| 248- | C | 4.87 | 30.24 | 10. | 4.87 | 34.57 | 10. | 4.87 | 38.90 | 10. |
| 249- | C | 4.87 | 43.23 | 10. | 4.87 | 47.55 | 10. | 9.20 | 30.24 | 10. |
| 250- | C | 9.20 | 34.57 | 10. | 9.20 | 38.90 | 10. | 9.20 | 43.23 | 10. |
| 251- | C | 9.20 | 47.55 | 10. | 13.53 | 30.24 | 10. | 13.53 | 34.57 | 10. |
| 252- | C | 13.53 | 38.90 | 10. | 13.53 | 43.23 | 10. | 17.86 | 30.24 | 10. |
| 253- | C | 17.86 | 34.57 | 10. | 17.86 | 38.90 | 10. | 17.86 | 43.23 | 10. |
| 254- | C | 17.86 | 47.55 | 10. | 22.19 | 30.24 | 10. | 22.19 | 34.57 | 10. |
| 255- | C | 22.19 | 38.90 | 10. | 22.19 | 43.23 | 10. | 22.19 | 47.55 | 10. |
| 256- | C | 4.87 | 30.24 | 75. | 4.87 | 34.57 | 75. | 4.87 | 38.90 | 75. |
| 257- | C | 4.87 | 43.23 | 75. | 4.87 | 47.55 | 75. | 9.20 | 30.24 | 75. |
| 258- | C | 9.20 | 34.57 | 75. | 9.20 | 38.90 | 75. | 9.20 | 43.23 | 75. |
| 259- | C | 9.20 | 47.55 | 75. | 13.53 | 30.24 | 75. | 13.53 | 34.57 | 75. |
| 260- | C | 13.53 | 38.90 | 75. | 13.53 | 43.23 | 75. | 17.86 | 30.24 | 75. |
| 261- | C | 17.86 | 34.57 | 75. | 17.86 | 38.90 | 75. | 17.86 | 43.23 | 75. |
| 262- | C | 17.86 | 47.55 | 75. | 22.19 | 30.24 | 75. | 22.19 | 34.57 | 75. |
| 263- | C | 22.19 | 38.90 | 75. | 22.19 | 43.23 | 75. | 22.19 | 47.55 | 75. |
| 264- | C | 4.87 | 30.24 | 150. | 4.87 | 34.57 | 150. | 4.87 | 38.90 | 150. |
| 265- | C | 4.87 | 43.23 | 150. | 4.87 | 47.55 | 150. | 9.20 | 30.24 | 150. |
| 266- | C | 9.20 | 34.57 | 150. | 9.20 | 38.90 | 150. | 9.20 | 43.23 | 150. |
| 267- | C | 9.20 | 47.55 | 150. | 13.53 | 30.24 | 150. | 13.53 | 34.57 | 150. |
| 268- | C | 13.53 | 38.90 | 150. | 13.53 | 43.23 | 150. | 17.86 | 30.24 | 150. |
| 269- | C | 17.86 | 34.57 | 150. | 17.86 | 38.90 | 150. | 17.86 | 43.23 | 150. |
| 270- | C | 17.86 | 47.55 | 150. | 22.19 | 30.24 | 150. | 22.19 | 34.57 | 150. |
| 271- | C | 22.19 | 38.90 | 150. | 22.19 | 43.23 | 150. | 22.19 | 47.55 | 150. |
| 272- | C | 4.87 | 30.24 | 200. | 4.87 | 34.57 | 200. | 4.87 | 38.90 | 200. |
| 273- | C | 4.87 | 43.23 | 200. | 4.87 | 47.55 | 200. | 9.20 | 30.24 | 200. |
| 274- | C | 9.20 | 34.57 | 200. | 9.20 | 38.90 | 200. | 9.20 | 43.23 | 200. |
| 275- | C | 9.20 | 47.55 | 200. | 13.53 | 30.24 | 200. | 13.53 | 34.57 | 200. |
| 276- | C | 13.53 | 38.90 | 200. | 13.53 | 43.23 | 200. | 17.86 | 30.24 | 200. |
| 277- | C | 17.86 | 34.57 | 200. | 17.86 | 38.90 | 200. | 17.86 | 43.23 | 200. |
| 278- | C | 17.86 | 47.55 | 200. | 22.19 | 30.24 | 200. | 22.19 | 34.57 | 200. |
| 279- | C | 22.19 | 38.90 | 200. | 22.19 | 43.23 | 200. | 22.19 | 47.55 | 200. |
| 280- | C | 30.24 | 4.87 | 10. | 30.24 | 9.20 | 10. | 30.24 | 13.53 | 10. |
| 281- | C | 30.24 | 17.86 | 10. | 30.24 | 22.19 | 10. | 34.57 | 4.87 | 10. |
| 282- | C | 34.57 | 9.20 | 10. | 34.57 | 13.53 | 10. | 34.57 | 17.86 | 10. |
| 283- | C | 34.57 | 22.19 | 10. | 38.90 | 4.87 | 10. | 38.90 | 9.20 | 10. |
| 284- | C | 38.90 | 17.86 | 10. | 38.90 | 22.19 | 10. | 43.23 | 4.87 | 10. |
| 285- | C | 43.23 | 9.20 | 10. | 43.23 | 13.53 | 10. | 43.23 | 17.86 | 10. |
| 286- | C | 43.23 | 22.19 | 10. | 47.55 | 4.87 | 10. | 47.55 | 9.20 | 10. |
| 287- | C | 47.55 | 13.53 | 10. | 47.55 | 17.86 | 10. | 47.55 | 22.19 | 10. |
| 288- | C | 30.24 | 4.87 | 75. | 30.24 | 9.20 | 75. | 30.24 | 13.53 | 75. |
| 289- | C | 30.24 | 17.86 | 75. | 30.24 | 22.19 | 75. | 34.57 | 4.87 | 75. |
| 290- | C | 34.57 | 9.20 | 75. | 34.57 | 13.53 | 75. | 34.57 | 17.86 | 75. |
| 291- | C | 34.57 | 22.19 | 75. | 38.90 | 4.87 | 75. | 38.90 | 9.20 | 75. |
| 292- | C | 38.90 | 17.86 | 75. | 38.90 | 22.19 | 75. | 43.23 | 4.87 | 75. |
| 293- | C | 43.23 | 9.20 | 75. | 43.23 | 13.53 | 75. | 43.23 | 17.86 | 75. |
| 294- | C | 43.23 | 22.19 | 75. | 47.55 | 4.87 | 75. | 47.55 | 9.20 | 75. |
| 295- | C | 47.55 | 13.53 | 75. | 47.55 | 17.86 | 75. | 47.55 | 22.19 | 75. |
| 296- | C | 30.24 | 4.87 | 150. | 30.24 | 9.20 | 150. | 30.24 | 13.53 | 150. |

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297- C      30.24 17.86 150.  30.24 22.19 150.  34.57 4.87 150.
298- C      34.57 9.20 150.  34.57 13.53 150.  34.57 17.86 150.
299- C      34.57 22.19 150.  38.90 4.87 150.  38.90 9.20 150.
300- C      38.90 17.86 150.  38.90 22.19 150.  43.23 4.87 150.
301- C      43.23 9.20 150.  43.23 13.53 150.  43.23 17.86 150.
302- C      43.23 22.19 150.  47.55 4.87 150.  47.55 9.20 150.
303- C      47.55 13.53 150.  47.55 17.86 150.  47.55 22.19 150.
304- C      30.24 4.87 200.  30.24 9.20 200.  30.24 13.53 200.
305- C      30.24 17.86 200.  30.24 22.19 200.  34.57 4.87 200.
306- C      34.57 9.20 200.  34.57 13.53 200.  34.57 17.86 200.
307- C      34.57 22.19 200.  38.90 4.87 200.  38.90 9.20 200.
308- C      38.90 17.86 200.  38.90 22.19 200.  43.23 4.87 200.
309- C      43.23 9.20 200.  43.23 13.53 200.  43.23 17.86 200.
310- C      43.23 22.19 200.  47.55 4.87 200.  47.55 9.20 200.
311- C      47.55 13.53 200.  47.55 17.86 200.  47.55 22.19 200.
312- C      MATERIAL SPECIFICATIONS
313- C      WATER AT 300 K
314- M1     1001.50C 6.6878-2      8016.50C 3.3439-2
315- MT1    LWTR.01T
316- C      4.545% Pu/2 cycle/5 YEAR -- UO2 Kidman Isotopes
317- M2     8016.50C 4.5874E-02
318-      42095.50C 3.8283E-05
319-      43099.50C 4.4871E-05
320-      44101.50C 4.6563E-05
321-      45103.50C 4.0712E-05
322-      47109.50C 1.0074E-05
323-      60143.50C 3.2214E-05
324-      60145.50C 2.3194E-05
325-      62147.50C 9.1028E-06
326-      62149.50C 3.5286E-07
327-      62150.50C 1.2631E-05
328-      62151.50C 1.3331E-06
329-      63151.55C 1.0900E-07
330-      62152.50C 5.7959E-06
331-      63153.55C 5.4871E-06
332-      64155.50C 8.0211E-07
333-      92234.50C 5.7647E-07
334-      92235.50C 2.2960E-05
335-      92236.50C 4.9185E-06
336-      92238.50C 2.1278E-02
337-      93237.55C 4.6531E-06
338-      94238.50C 3.5348E-06
339-      94239.55C 4.5596E-04
340-      94240.50C 1.8734E-04
341-      94241.50C 7.4134E-05
342-      94242.50C 2.0193E-05
343-      95241.50C 5.0568E-05
344-      95242.50C 1.5792E-07
345-      95243.50C 5.1612E-06
346- C      He AT 10 ATM DENSITY=1.785E-3 GM/CC
347- M3     2004.50C 1.0
warning. material 3 is not used in the problem.
348- C      ZIRCALOY-4
349- M4     8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
350-      40000.50C -0.9818 50000.35C -0.0140
351- C      ALLOY 825 density=8.14 g/cc
352- M5     6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
353-      16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
354-      25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
355-      29000.50C -0.0250 42000.50C -0.0300

```

```
356- C 1100 ALUMINUM ALLOY
357- M6 13027.50C -0.99880 29000.50C -0.00120
358- C A516 CARBON STEEL
359- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
360- 16032.50C -0.00035 25055.50C -0.0090
361- 26000.55C -0.98535
362- C SS316L
363- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
364- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
365- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
366- 42000.50C -0.02500
367- C TALLIES
368- PRINT
```

1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 12 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm212b) probid = 06/21/96 07:22:12

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14767 neutron histories and 30 active cycles with 90019 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104786 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k(collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = .88809 with an estimated standard deviation of .00286
the estimated 68, 95, & 99 percent keff confidence intervals are .88519 to .89099, .88221 to .89396, and .88016 to .89602
the estimated collision/absorption neutron removal lifetime = 2.61E-05 seconds with an estimated standard deviation of 2.67E-07

1mcnp version 4a ld=10/01/93 06/21/96 07:32:07

 inp=wm204b outp=wm204b.0

probid = 06/21/96 07:32:07

```

1- WEST 17x17 FUEL, 4 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm204b)
2- C MULTI-PURPOSE CANISTER - Simplified Model - No DCRA's
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:2 0:2 0:0 11 1 1 1 1 1 1 1 1 1 1 1 TRCL=(12.6841 12.6841 0 )
8- C FULL ASSEMBLY LATTICE POSITION
9- C ASSEMBLY CELL
10- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
11- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
12- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
13- C TOP OF ASSEMBLY OUTSIDE LATTICE
14- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
15- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
16- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
17- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
18- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
19- C PIN LATTICE DESCRIPTION
20- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
21- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
22- 9 2 4R 3 2 2 3 2 2 3 2 2 4R 9
23- 9 2 2R 3 2 2 8R 3 2 2R 9 9 2 16R 9
24- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
25- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
26- 9 2 16R 9 9 2 16R 9
27- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
28- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
29- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
30- 9 18R
31- C FUEL ROD
32- 33 2 -6.8254 -2 -17 -4 IMP:N=1 U=2
33- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
34- 35 1 -1.0000 -17 5 IMP:N=1 U=2
35- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
36- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
37- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
38- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
39- 40 1 -1.0000 19 IMP:N=1 U=2
40- C CONTROL ROD/GUIDE TUBE
41- 41 1 -1.0000 -21 -5 IMP:N=1 U=3
42- 42 1 -1.0000 -21 5 IMP:N=1 U=3
43- 43 4 -6.6000 21 -22 IMP:N=1 U=3
44- 44 1 -1.0000 22 -23 IMP:N=1 U=3
45- 45 4 -6.6000 23 -24 IMP:N=1 U=3
46- 46 1 -1.0000 24 IMP:N=1 U=3
47- C INSTRUMENTATION TUBE
48- 47 1 -1.0000 -25 IMP:N=1 U=4
49- 48 4 -6.6000 25 -26 IMP:N=1 U=4
50- 49 1 -1.0000 26 IMP:N=1 U=4
51- C WATER GAP - ASSEMBLY RIGHT
52- 50 1 -1.0000 -37 IMP:N=1 U=5
53- C INNER SS TUBE - ASSEMBLY RIGHT
54- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
55- C AL/B TUBE - ASSEMBLY RIGHT
56- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
  
```

| | | | | | | | | | |
|------|----|------------------------------------|-----|-----|-----|----|-----|---------|---------|
| 57- | C | OUTER SS TUBE - ASSEMBLY RIGHT | | | | | | | |
| 58- | 53 | 8 -8.2380 | 29 | -57 | | | | IMP:N=1 | U=5 |
| 59- | C | TOP WATER GAP - ASSEMBLY RIGHT | | | | | | | |
| 60- | 54 | 1 -1.0000 | 37 | 57 | | | | IMP:N=1 | U=5 |
| 61- | C | WATER GAP - ASSEMBLY TOP | | | | | | | |
| 62- | 55 | 1 -1.0000 | -38 | | | | | IMP:N=1 | U=6 |
| 63- | C | INNER SS TUBE - ASSEMBLY TOP | | | | | | | |
| 64- | 56 | 8 -8.2380 | 38 | -34 | -57 | | | IMP:N=1 | U=6 |
| 65- | C | AL/B TUBE - ASSEMBLY TOP | | | | | | | |
| 66- | 57 | 6 -2.7000 | 34 | -30 | -57 | | | IMP:N=1 | U=6 |
| 67- | C | OUTER SS TUBE - ASSEMBLY TOP | | | | | | | |
| 68- | 58 | 8 -8.2380 | 30 | -57 | | | | IMP:N=1 | U=6 |
| 69- | C | WATER GAP TOP - ASSEMBLY TOP | | | | | | | |
| 70- | 59 | 1 -1.0000 | 38 | 57 | | | | IMP:N=1 | U=6 |
| 71- | C | WATER GAP - ASSEMBLY LEFT | | | | | | | |
| 72- | 60 | 1 -1.0000 | 35 | | | | | IMP:N=1 | U=7 |
| 73- | C | INNER SS TUBE - ASSEMBLY LEFT | | | | | | | |
| 74- | 61 | 8 -8.2380 | -35 | 31 | -57 | | | IMP:N=1 | U=7 |
| 75- | C | AL/B TUBE - ASSEMBLY LEFT | | | | | | | |
| 76- | 62 | 6 -2.7000 | -31 | 27 | -57 | | | IMP:N=1 | U=7 |
| 77- | C | OUTER SS TUBE - ASSEMBLY LEFT | | | | | | | |
| 78- | 63 | 8 -8.2380 | -27 | -57 | | | | IMP:N=1 | U=7 |
| 79- | C | WATER GAP TOP - ASSEMBLY LEFT | | | | | | | |
| 80- | 64 | 1 -1.0000 | -35 | 57 | | | | IMP:N=1 | U=7 |
| 81- | C | WATER GAP - ASSEMBLY BOTTOM | | | | | | | |
| 82- | 65 | 1 -1.0000 | 36 | | | | | IMP:N=1 | U=8 |
| 83- | C | INNER SS TUBE - ASSEMBLY BOTTOM | | | | | | | |
| 84- | 66 | 8 -8.2380 | -36 | 32 | -57 | | | IMP:N=1 | U=8 |
| 85- | C | AL/B TUBE - ASSEMBLY BOTTOM | | | | | | | |
| 86- | 67 | 6 -2.7000 | -32 | 28 | -57 | | | IMP:N=1 | U=8 |
| 87- | C | OUTER SS TUBE - ASSEMBLY BOTTOM | | | | | | | |
| 88- | 68 | 8 -8.2380 | -28 | -57 | | | | IMP:N=1 | U=8 |
| 89- | C | WATER GAP TOP - ASSEMBLY BOTTOM | | | | | | | |
| 90- | 69 | 1 -1.0000 | -36 | 57 | | | | IMP:N=1 | U=8 |
| 91- | C | OUTSIDE ALLOY 825 EDGES | | | | | | | |
| 92- | C | TOP WATER RING GAP | | | | | | | |
| 93- | 76 | 1 -1.0000 | 1 | 2 | -73 | 6 | -79 | IMP:N=1 | |
| 94- | C | ALLOY 825 RING | | | | | | | |
| 95- | 77 | 5 -8.1400 | 1 | 2 | -9 | 73 | 6 | -79 | IMP:N=1 |
| 96- | C | SHIELD PLUG | | | | | | | |
| 97- | C | STEEL SHIELD PLUG, BOTTOM | | | | | | | |
| 98- | 78 | 8 -8.2380 | 1 | 2 | -9 | 79 | -75 | IMP:N=1 | |
| 99- | C | DU SHIELD PLUG | | | | | | | |
| 100- | 79 | 9 -18.9900 | 1 | 2 | -74 | 75 | -76 | IMP:N=1 | |
| 101- | C | STEEL SHIELD PLUG, RING | | | | | | | |
| 102- | 80 | 8 -8.2380 | 1 | 2 | -9 | 74 | 75 | -76 | IMP:N=1 |
| 103- | C | STEEL SHIELD PLUG, TOP | | | | | | | |
| 104- | 81 | 8 -8.2380 | 1 | 2 | -9 | 76 | -7 | IMP:N=1 | |
| 105- | C | ALLOY 825 LID, INNER | | | | | | | |
| 106- | 82 | 5 -8.1400 | 1 | 2 | -9 | 7 | -77 | IMP:N=1 | |
| 107- | C | STEEL HONEY COMB, IMPACT LIMITOR | | | | | | | |
| 108- | 83 | 7 -7.8320 | 1 | 2 | -9 | 77 | -78 | IMP:N=1 | |
| 109- | C | ALLOY 825 LID, OUTER + IB (2.5 cm) | | | | | | | |
| 110- | 84 | 5 -8.1400 | 1 | 2 | -9 | 78 | -8 | IMP:N=1 | |
| 111- | C | ALLOY 825 LINER + IB (2 cm) | | | | | | | |
| 112- | 85 | 5 -8.1400 | 9 | -10 | 1 | 2 | 3 | -8 | IMP:N=1 |
| 113- | C | GAP 825/MILD STEEL LINER | | | | | | | |
| 114- | 86 | 1 -1.0000 | 10 | -11 | 1 | 2 | 3 | -8 | IMP:N=1 |
| 115- | C | MILD STEEL LID | | | | | | | |
| 116- | 87 | 7 -7.8320 | 1 | 2 | -11 | 8 | -47 | IMP:N=1 | |

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117- C MILD STEEL CONTAINER
118- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
119- C WATER REFLECTOR
120- 89 1 -1.0000 12 -80 1 2 3 -47 IMP:N=1
121- 90 1 -1.0000 -80 1 2 3 47 -81 IMP:N=1
122- C OUTSIDE WORLD
123- 91 0 -1:-2:-3:81:80 IMP:N=0
124-
125- C SURFACE SPECIFICATIONS
126- 1* PX 0.0
127- 2* PY 0.00
128- 3* PZ 0.00
129- 4 PZ 182.8800 $ TOP ACTIVE FUEL
130- 5 PZ 203.3270 $ TOP FUEL HARDWARE
131- 6 PZ 246.3000 $ WATER GAP
132- 7 PZ 266.0650 $ STEEL LID
133- 8 PZ 283.1700 $ ALLOY 825 LID + IB lid (2.5 cm)
134- 9 CZ 35.86 $ ID OF WASTE CONTAINER
135- 10 CZ 40.0825 $ OD OF ALLOY 825 CONTAINER + IB (2 cm)
136- 11 CZ 41.00 $ ID OF MILD STEEL CONTAINER
137- 12 CZ 51.0 $ OD OF MILD STEEL CONTAINER
138- C PIN LATTICE BOUNDS
139- 13 PX 0.62992
140- 14 PX -0.62992
141- 15 PY 0.62992
142- 16 PY -0.62992
143- C FUEL ROD
144- 17 CZ 0.409575
145- 18 CZ 0.41783
146- 19 CZ 0.47483
147- C CONTROL ROD/GUIDE TUBE
148- 20 CZ 0.42672
149- 21 CZ 0.43688
150- 22 CZ 0.48387
151- 23 CZ 0.57150
152- 24 CZ 0.61214
153- C INSTRUMENTATION TUBE
154- C 25 CZ 1.00
155- C 26 CZ 1.09
156- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
157- 27 PX -12.4460
158- 28 PY -12.4460
159- 29 PX 12.4460
160- 30 PY 12.4460
161- 31 PX -11.8110
162- 32 PY -11.8110
163- 33 PX 11.8110
164- 34 PY 11.8110
165- 35 PX -11.1760
166- 36 PY -11.1760
167- 37 PX 11.1760
168- 38 PY 11.1760
169- 39 PX -10.708639 $ ACTUAL 10.70864
170- 40 PY -10.708639
171- 41 PX 10.708639
172- 42 PY 10.708639
173- C ASSEMBLY LATTICE BOUNDS
174- 43 PX -12.684125
175- 44 PX 12.684125
176- 45 PY -12.684125

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177- 46 PY 12.684125
178- C
179- 47 PZ 294.17 $ MILD STEEL LID
180- C BLANK PIN CELL
181- 48 PX -1.2899
182- 49 PX 1.2899
183- 50 PY -1.2899
184- 51 PY 1.2899
185- C 52 PY 0.0001
186- C 53 PY -0.0001
187- 54 PY 0.0
188- 55 P 1. -1. 0. 0.
189- 56 P 1. 1. 0. 0.
190- C EXTRA CARDS
191- 57 PZ 203.2 $ TOP BASKET MATERIAL
192- 58 PX 62.54751 $ ACTUAL 62.5475
193- 59 PY 62.54751 $ ACTUAL 62.5475
194- 60 PX 63.81751 $ ACTUAL 63.8175
195- 61 PY 63.81751 $ ACTUAL 63.8175
196- 62 PX 12.049125
197- 63 PY 12.049125
198- 64 PX 13.319125
199- 65 PY 13.319125
200- 66 PX 38.052376 $ ACTUAL 38.0523750
201- 67 PY 38.052376 $ ACTUAL 38.0523750
202- 68 PX 39.322376 $ ACTUAL 39.3223750
203- 69 PY 39.322376 $ ACTUAL 39.3223750
204- 70 CZ 35.8599 $ ACTUAL 74.0410
205- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
206- 72 P 1. -1. 0. 0.
207- C RING, PLUG, AND LID CARDS
208- 73 CZ 33.32
209- 74 CZ 34.59
210- 75 PZ 259.7150 $ BOTTOM DU PLUG
211- 76 PZ 264.7950 $ TOP DU PLUG
212- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
213- 78 PZ 273.6850 $ TOP SS HONEYCOMB
214- 79 PZ 254.0000 $ TOP WATER GAP
215- C Water Reflector
216- 80 CZ 81
217- 81 PZ 324.17
218-
219- MODE N
220- C VOL 88J
221- KCODE 3000 1. 5 35
222- C MATERIAL SPECIFICATIONS
223- C WATER AT 300 K
224- M1 1001.50C 6.691-2 8016.50C 3.345-2
225- MT1 LWTR.01T
226- C 4.545%/2 Cycle/5 YEAR -- U02 Kidman Isotopes
227- M2 8016.50C 4.5874E-02
228- 42095.50C 3.8283E-05
229- 43099.50C 4.4871E-05
230- 44101.50C 4.6563E-05
231- 45103.50C 4.0712E-05
232- 47109.50C 1.0074E-05
233- 60143.50C 3.2214E-05
234- 60145.50C 2.3194E-05
235- 62147.50C 9.1028E-06
236- 62149.50C 3.5286E-07

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1mcnp version 4a ld=10/01/93 06/20/96 17:29:10

probid = 06/20/96 17:29:10

INP=wm221c OUTP=wm221c.0

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1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/15 year Kidman Isotopes (wm221c)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8255 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      8 TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      1 WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      1 INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57      IMP:N=1 U=6
64-      C      8 AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57      IMP:N=1 U=6
66-      C      6 OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57          IMP:N=1 U=6
68-      C      8 WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      1 WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      1 INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57      IMP:N=1 U=7
74-      C      8 AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57      IMP:N=1 U=7
76-      C      6 OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57          IMP:N=1 U=7
78-      C      8 WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      1 WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      1 INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57      IMP:N=1 U=8
84-      C      8 AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57          IMP:N=1 U=8
86-      C      6 OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57          IMP:N=1 U=8
88-      C      8 WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      1 OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      5 TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      1 ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      5 SHIELD PLUG
102-     C      5 STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      8 DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      9 STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      8 STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      8 ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      5 STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      7 ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      5 ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/15 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5056E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.2782E-06
254- 63151.55C 1.5919E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 9.2434E-07
258- 92234.50C 7.1806E-07
259- 92235.50C 2.3011E-05
260- 92236.50C 5.0138E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 5.1424E-06
263- 94238.50C 3.4006E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 5.7933E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 6.5788E-05
269- 95242.50C 1.5401E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- C PRINT
296-

```

1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/15 year Kidman Isotopes (wm221c) probid = 06/20/96 17:29:10

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14700 neutron histories and 30 active cycles with 89815 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104515 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

| |
|--|
| <p>the final estimated combined collision/absorption/track-length keff = .90031 with an estimated standard deviation of .00237 the estimated 68, 95, & 99 percent keff confidence intervals are .89791 to .90271, .89546 to .90516, and .89375 to .90687 the estimated collision/absorption neutron removal lifetime = 1.79E-05 seconds with an estimated standard deviation of 1.45E-07</p> |
|--|

1mcnp version 4a ld=10/01/93 06/20/96 18:19:52

INP=wm221d OUTP=wm221d.0

probid = 06/20/96 18:19:52

```

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/100 year Kidman Isotopes (wm221d)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 -6.8256 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57     IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57     IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57     IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57     IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57     IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57     IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57     IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57     IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57     IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

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117-      85      5  -8.1400      9 -10  1  2  3  -8  IMP:N=1
118-      C      GAP 825/MILD STEEL LINER
119-      86      1  -1.0000     10 -11  1  2  3  -8  IMP:N=1
120-      C      MILD STEEL LID
121-      87      7  -7.8320      1  2 -11  8 -47      IMP:N=1
122-      C      MILD STEEL CONTAINER
123-      88      7  -7.8320     11 -12  1  2  3 -47  IMP:N=1
124-      C      OUTSIDE WORLD
125-      89      0  -1:-2:-3:47:12  IMP:N=0
126-
127-      C      SURFACE SPECIFICATIONS
128-      1*     PX      0.0
129-      2*     PY      0.00
130-      3*     PZ      0.00
131-      4      PZ 182.8800      $ TOP ACTIVE FUEL
132-      5      PZ 203.3270      $ TOP FUEL HARDWARE
133-      6      PZ 246.3000      $ WATER GAP
134-      7      PZ 266.0650      $ ALLOY 825 LID
135-      8      PZ 283.1700      $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136-      9      CZ  74.0410      $ ID OF WASTE CONTAINER
137-      10     CZ  78.5810      $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138-      11     CZ  80.080      $ ID OF MILD STEEL CONTAINER
139-      12     CZ  90.080      $ OD OF MILD STEEL CONTAINER
140-      C      PIN LATTICE BOUNDS
141-      13     PX  0.62992
142-      14     PX -0.62992
143-      15     PY  0.62992
144-      16     PY -0.62992
145-      C      FUEL ROD
146-      17     CZ  0.409575
147-      18     CZ  0.41783
148-      19     CZ  0.47483
149-      C      CONTROL ROD/GUIDE TUBE
150-      20     CZ  0.42672
151-      21     CZ  0.43688
152-      22     CZ  0.48387
153-      23     CZ  0.57150
154-      24     CZ  0.61214
155-      C      INSTRUMENTATION TUBE
156-      25     CZ  0.57150
157-      26     CZ  0.61214
158-      C      ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159-      27     PX -12.4460
160-      28     PY -12.4460
161-      29     PX  12.4460
162-      30     PY  12.4460
163-      31     PX -11.8110
164-      32     PY -11.8110
165-      33     PX  11.8110
166-      34     PY  11.8110
167-      35     PX -11.1760
168-      36     PY -11.1760
169-      37     PX  11.1760
170-      38     PY  11.1760
171-      39     PX -10.708639      $ ACTUAL 10.70864
172-      40     PY -10.708639
173-      41     PX  10.708639
174-      42     PY  10.708639
175-      C      ASSEMBLY LATTICE BOUNDS
176-      43     PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP

```

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218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/100 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5861E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 6.6498E-07
254- 63151.55C 7.7398E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 1.0313E-06
258- 92234.50C 2.3969E-06
259- 92235.50C 2.4118E-05
260- 92236.50C 6.7185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 1.9221E-05
263- 94238.50C 1.7699E-06
264- 94239.55C 4.5497E-04
265- 94240.50C 1.8685E-04
266- 94241.50C 9.5736E-07
267- 94242.50C 2.0193E-05
268- 95241.50C 1.0899E-04
269- 95242.50C 1.0121E-07
270- 95243.50C 5.1125E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

```


1mcnp version 4a ld=10/01/93 06/20/96 19:14:44

INP=wm221e OUTP=wm221e.0

probid = 06/20/96 19:14:44

```

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/1000 year Kidman Isotopes (wm221e)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8256-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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| | | | | | | | | | | |
|------|----|---|----------|-----|-----|-----|-----|-----|---------|-------------------------|
| 57- | 53 | 8 | -8.2380 | 29 | -57 | | | | IMP:N=1 | U=5 |
| 58- | C | TOP WATER GAP - ASSEMBLY RIGHT | | | | | | | | |
| 59- | 54 | 1 | -1.0000 | 37 | 57 | | | | IMP:N=1 | U=5 |
| 60- | C | WATER GAP - ASSEMBLY TOP | | | | | | | | |
| 61- | 55 | 1 | -1.0000 | -38 | | | | | IMP:N=1 | U=6 |
| 62- | C | INNER SS TUBE - ASSEMBLY TOP | | | | | | | | |
| 63- | 56 | 8 | -8.2380 | 38 | -34 | -57 | | | IMP:N=1 | U=6 |
| 64- | C | AL/B TUBE - ASSEMBLY TOP | | | | | | | | |
| 65- | 57 | 6 | -2.7000 | 34 | -30 | -57 | | | IMP:N=1 | U=6 |
| 66- | C | OUTER SS TUBE - ASSEMBLY TOP | | | | | | | | |
| 67- | 58 | 8 | -8.2380 | 30 | -57 | | | | IMP:N=1 | U=6 |
| 68- | C | WATER GAP TOP - ASSEMBLY TOP | | | | | | | | |
| 69- | 59 | 1 | -1.0000 | 38 | 57 | | | | IMP:N=1 | U=6 |
| 70- | C | WATER GAP - ASSEMBLY LEFT | | | | | | | | |
| 71- | 60 | 1 | -1.0000 | 35 | | | | | IMP:N=1 | U=7 |
| 72- | C | INNER SS TUBE - ASSEMBLY LEFT | | | | | | | | |
| 73- | 61 | 8 | -8.2380 | -35 | 31 | -57 | | | IMP:N=1 | U=7 |
| 74- | C | AL/B TUBE - ASSEMBLY LEFT | | | | | | | | |
| 75- | 62 | 6 | -2.7000 | -31 | 27 | -57 | | | IMP:N=1 | U=7 |
| 76- | C | OUTER SS TUBE - ASSEMBLY LEFT | | | | | | | | |
| 77- | 63 | 8 | -8.2380 | -27 | -57 | | | | IMP:N=1 | U=7 |
| 78- | C | WATER GAP TOP - ASSEMBLY LEFT | | | | | | | | |
| 79- | 64 | 1 | -1.0000 | -35 | 57 | | | | IMP:N=1 | U=7 |
| 80- | C | WATER GAP - ASSEMBLY BOTTOM | | | | | | | | |
| 81- | 65 | 1 | -1.0000 | 36 | | | | | IMP:N=1 | U=8 |
| 82- | C | INNER SS TUBE - ASSEMBLY BOTTOM | | | | | | | | |
| 83- | 66 | 8 | -8.2380 | -36 | 32 | -57 | | | IMP:N=1 | U=8 |
| 84- | C | AL/B TUBE - ASSEMBLY BOTTOM | | | | | | | | |
| 85- | 67 | 6 | -2.7000 | -32 | 28 | -57 | | | IMP:N=1 | U=8 |
| 86- | C | OUTER SS TUBE - ASSEMBLY BOTTOM | | | | | | | | |
| 87- | 68 | 8 | -8.2380 | -28 | -57 | | | | IMP:N=1 | U=8 |
| 88- | C | WATER GAP TOP - ASSEMBLY BOTTOM | | | | | | | | |
| 89- | 69 | 1 | -1.0000 | -36 | 57 | | | | IMP:N=1 | U=8 |
| 90- | C | OUTSIDE ALLOY 825 EDGES | | | | | | | | |
| 91- | 70 | 5 | -8.1400 | 1 | 3 | -71 | -70 | 59 | -61 | IMP:N=1 \$ LONG TOP |
| 92- | 71 | 5 | -8.1400 | 2 | 3 | -71 | -70 | 58 | -60 | IMP:N=1 \$ LONG RIGHT |
| 93- | 72 | 5 | -8.1400 | 3 | -71 | 61 | -70 | 62 | -64 | IMP:N=1 \$ SHORT TOP |
| 94- | 73 | 5 | -8.1400 | 3 | -71 | 60 | -70 | 63 | -65 | IMP:N=1 \$ SHORT RIGHT |
| 95- | 74 | 5 | -8.1400 | 3 | -71 | -72 | -59 | 66 | -68 | IMP:N=1 \$ ANGLE LEFT |
| 96- | 75 | 5 | -8.1400 | 3 | -71 | 72 | -58 | 67 | -69 | IMP:N=1 \$ ANGLE BOTTOM |
| 97- | C | TOP WATER RING GAP | | | | | | | | |
| 98- | 76 | 1 | -1.0000 | 1 | 2 | -73 | 6 | -79 | | IMP:N=1 |
| 99- | C | ALLOY 825 RING | | | | | | | | |
| 100- | 77 | 5 | -8.1400 | 1 | 2 | -9 | 73 | 6 | -79 | IMP:N=1 |
| 101- | C | SHIELD PLUG | | | | | | | | |
| 102- | C | STEEL SHIELD PLUG, BOTTOM | | | | | | | | |
| 103- | 78 | 8 | -8.2380 | 1 | 2 | -9 | 79 | -75 | | IMP:N=1 |
| 104- | C | DU SHIELD PLUG | | | | | | | | |
| 105- | 79 | 9 | -18.9900 | 1 | 2 | -74 | 75 | -76 | | IMP:N=1 |
| 106- | C | STEEL SHIELD PLUG, RING | | | | | | | | |
| 107- | 80 | 8 | -8.2380 | 1 | 2 | -9 | 74 | 75 | -76 | IMP:N=1 |
| 108- | C | STEEL SHIELD PLUG, TOP | | | | | | | | |
| 109- | 81 | 8 | -8.2380 | 1 | 2 | -9 | 76 | -7 | | IMP:N=1 |
| 110- | C | ALLOY 825 LID, INNER | | | | | | | | |
| 111- | 82 | 5 | -8.1400 | 1 | 2 | -9 | 7 | -77 | | IMP:N=1 |
| 112- | C | STEEL HONEY COMB, IMPACT LIMITOR | | | | | | | | |
| 113- | 83 | 7 | -7.8320 | 1 | 2 | -9 | 77 | -78 | | IMP:N=1 |
| 114- | C | ALLOY 825 LID, OUTER + Inner Barrier Lid | | | | | | | | |
| 115- | 84 | 5 | -8.1400 | 1 | 2 | -9 | 78 | -8 | | IMP:N=1 |
| 116- | C | ALLOY 825 LINER + Inner Barrier Thickness | | | | | | | | |

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP

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217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237-      C      MATERIAL SPECIFICATIONS
238-      C      WATER AT 300 K
239-      M1     1001.50C 6.691-2 8016.50C 3.345-2
240-      MT1    LWTR.01T
241-      C      4.545%/2 Cycle/1000 YEAR -- UO2 Kidman Isotopes
242-      M2     8016.50C 4.5874E-02
243-      42095.50C 3.8283E-05
244-      43099.50C 4.4752E-05
245-      44101.50C 4.6563E-05
246-      45103.50C 4.0712E-05
247-      47109.50C 1.0074E-05
248-      60143.50C 3.2214E-05
249-      60145.50C 2.3194E-05
250-      62147.50C 9.5861E-06
251-      62149.50C 3.5286E-07
252-      62150.50C 1.2631E-05
253-      62151.50C 6.4930E-10
254-      63151.55C 1.4350E-06
255-      62152.50C 5.7959E-06
256-      63153.55C 5.4871E-06
257-      64155.50C 1.0313E-06
258-      92234.50C 4.2375E-06
259-      92235.50C 3.5750E-05
260-      92236.50C 2.3615E-05
261-      92238.50C 2.1278E-02
262-      93237.55C 1.0335E-04
263-      94238.50C 2.9829E-09
264-      94239.55C 4.4358E-04
265-      94240.50C 1.6959E-04
266-      94241.50C 1.4287E-10
267-      94242.50C 2.0144E-05
268-      95241.50C 2.5972E-05
269-      95242.50C 1.2125E-09
270-      95243.50C 4.6938E-06
271-      C      He AT 10 ATM DENSITY=1.785E-3 GM/CC
272-      C      M3 2004.50C 1.0
273-      C      ZIRCALOY-4
274-      M4     8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275-      40000.50C -0.9818 50000.35C -0.0140
276-      C      ALLOY 825 density=8.14 g/cc
277-      M5     6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278-      16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279-      25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280-      29000.50C -0.0250 42000.50C -0.0300
281-      C      1100 ALUMINUM ALLOY
282-      M6     13027.50C -0.99880 29000.50C -0.00120
283-      C      A516 CARBON STEEL
284-      M7     6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285-      16032.50C -0.00035 25055.50C -0.0090
286-      26000.55C -0.98535
287-      C      SS316L
288-      M8     6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289-      15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290-      25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291-      42000.50C -0.02500
292-      C      DEPLETED URANIUM
293-      M9     42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294-      C      TALLIES
295-      PRINT
296-

```

1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/1000 year Kidman Isotopes (wm221e) probid = 06/20/96 19:14:44

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14492 neutron histories and 30 active cycles with 90113 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104605 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 99 percent confidence level, but not at 95 percent
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

```

-----
the final estimated combined collision/absorption/track-length keff = .85164 with an estimated standard deviation of .00250
the estimated 68, 95, & 99 percent keff confidence intervals are .84910 to .85417, .84651 to .85676, and .84471 to .85856
the estimated collision/absorption neutron removal lifetime = 1.88E-05 seconds with an estimated standard deviation of 1.32E-07
-----

```


1mcnp version 4a ld=10/01/93 06/20/96 20:08:01

probid = 06/20/96 20:08:01

INP=wm221f OUTP=wm221f.0

```

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/10000 year Kidman Isotopes (wm221f)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57-      53      8  -8.2380  29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1  -1.0000  37  57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1  -1.0000  -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8  -8.2380  38 -34 -57        IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6  -2.7000  34 -30 -57        IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8  -8.2380  30 -57          IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1  -1.0000  38  57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1  -1.0000  35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8  -8.2380 -35  31 -57        IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6  -2.7000 -31  27 -57        IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8  -8.2380 -27 -57          IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1  -1.0000 -35  57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1  -1.0000  36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8  -8.2380 -36  32 -57        IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6  -2.7000 -32  28 -57        IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8  -8.2380 -28 -57          IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1  -1.0000 -36  57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5  -8.1400  1  3 -71 -70  59 -61 IMP:N=1 $ LONG TOP
92-      71      5  -8.1400  2  3 -71 -70  58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5  -8.1400  3 -71  61 -70  62 -64 IMP:N=1 $ SHORT TOP
94-      73      5  -8.1400  3 -71  60 -70  63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5  -8.1400  3 -71 -72 -59  66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5  -8.1400  3 -71  72 -58  67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1  -1.0000  1  2 -73  6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5  -8.1400  1  2 -9  73  6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8  -8.2380  1  2 -9  79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900  1  2 -74  75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8  -8.2380  1  2 -9  74  75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8  -8.2380  1  2 -9  76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5  -8.1400  1  2 -9  7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7  -7.8320  1  2 -9  77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5  -8.1400  1  2 -9  78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

```

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```

```

237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/10000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.3435E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5861E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 63151.55C 1.4429E-06
254- 62152.50C 5.7959E-06
255- 63153.55C 5.4871E-06
256- 64155.50C 1.0313E-06
257- 92234.50C 4.1667E-06
258- 92235.50C 1.3746E-04
259- 92236.50C 1.2785E-04
260- 92238.50C 2.1278E-02
261- 93237.55C 1.2881E-04
262- 94238.50C 1.0142E-28
263- 94239.55C 3.4457E-04
264- 94240.50C 6.5570E-05
265- 94241.50C 6.8734E-11
266- 94242.50C 1.9850E-05
267- 95241.50C 2.0817E-09
268- 95242.50C 7.3827E-29
269- 95243.50C 2.0158E-06
270- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
271- C M3 2004.50C 1.0
272- C ZIRCALOY-4
273- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
274- 40000.50C -0.9818 50000.35C -0.0140
275- C ALLOY 825 density=8.14 g/cc
276- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
277- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
278- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
279- 29000.50C -0.0250 42000.50C -0.0300
280- C 1100 ALUMINUM ALLOY
281- M6 13027.50C -0.99880 29000.50C -0.00120
282- C A516 CARBON STEEL
283- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
284- 16032.50C -0.00035 25055.50C -0.0090
285- 26000.55C -0.98535
286- C SS316L
287- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
288- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
289- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
290- 42000.50C -0.02500
291- C DEPLETED URANIUM
292- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
293- C TALLIES
294- PRINT
295-

```

1 initial source from file srctp

1mcnp version 4a ld=10/01/93 06/20/96 21:00:55

 INP=wm221g OUTP=wm221g.0

probid = 06/20/96 21:00:55

```

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/30000 year Kidman Isotopes (wm221g)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8249-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
  
```

```

57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57      IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57      IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57          IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57      IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57      IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57          IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57      IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57      IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57          IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

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117-      85      5 -8.1400      9 -10      1      2      3 -8 IMP:N=1
118-      C      GAP 825/MILD STEEL LINER
119-      86      1 -1.0000      10 -11      1      2      3 -8 IMP:N=1
120-      C      MILD STEEL LID
121-      87      7 -7.8320      1      2 -11      8 -47      IMP:N=1
122-      C      MILD STEEL CONTAINER
123-      88      7 -7.8320      11 -12      1      2      3 -47 IMP:N=1
124-      C      OUTSIDE WORLD
125-      89      0 -1:-2:-3:47:12 IMP:N=0
126-
127-      C      SURFACE SPECIFICATIONS
128-      1*     PX      0.0
129-      2*     PY      0.00
130-      3*     PZ      0.00
131-      4      PZ 182.8800      $ TOP ACTIVE FUEL
132-      5      PZ 203.3270      $ TOP FUEL HARDWARE
133-      6      PZ 246.3000      $ WATER GAP
134-      7      PZ 266.0650      $ ALLOY 825 LID
135-      8      PZ 283.1700      $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136-      9      CZ  74.0410      $ ID OF WASTE CONTAINER
137-      10     CZ  78.5810      $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138-      11     CZ  80.080      $ ID OF MILD STEEL CONTAINER
139-      12     CZ  90.080      $ OD OF MILD STEEL CONTAINER
140-      C      PIN LATTICE BOUNDS
141-      13     PX  0.62992
142-      14     PX -0.62992
143-      15     PY  0.62992
144-      16     PY -0.62992
145-      C      FUEL ROD
146-      17     CZ  0.409575
147-      18     CZ  0.41783
148-      19     CZ  0.47483
149-      C      CONTROL ROD/GUIDE TUBE
150-      20     CZ  0.42672
151-      21     CZ  0.43688
152-      22     CZ  0.48387
153-      23     CZ  0.57150
154-      24     CZ  0.61214
155-      C      INSTRUMENTATION TUBE
156-      25     CZ  0.57150
157-      26     CZ  0.61214
158-      C      ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159-      27     PX -12.4460
160-      28     PY -12.4460
161-      29     PX  12.4460
162-      30     PY  12.4460
163-      31     PX -11.8110
164-      32     PY -11.8110
165-      33     PX  11.8110
166-      34     PY  11.8110
167-      35     PX -11.1760
168-      36     PY -11.1760
169-      37     PX  11.1760
170-      38     PY  11.1760
171-      39     PX -10.708639      $ ACTUAL 10.70864
172-      40     PY -10.708639
173-      41     PX  10.708639
174-      42     PY  10.708639
175-      C      ASSEMBLY LATTICE BOUNDS
176-      43     PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/30000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.0683E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5861E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 63151.55C 1.4429E-06
254- 62152.50C 5.7959E-06
255- 63153.55C 5.4871E-06
256- 64155.50C 1.0313E-06
257- 92234.50C 3.9999E-06
258- 92235.50C 2.8851E-04
259- 92236.50C 1.8551E-04
260- 92238.50C 2.1278E-02
261- 93237.55C 1.2781E-04
262- 94239.55C 1.9506E-04
263- 94240.50C 7.9374E-06
264- 94241.50C 1.3452E-11
265- 94242.50C 1.9117E-05
266- 95241.50C 4.0455E-10
267- 95243.50C 3.0675E-07
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- PRINT
293-

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1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/30000 year Kidman Isotopes (wm221g)

probid = 06/20/96 21:00:55

1mcnp version 4a ld=10/01/93 06/21/96 09:13:31

inp=wm221h outp=wm221h.0

probid = 06/21/96 09:13:31

```
1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/100000 year Kidman Isotopes (wm221h)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8235 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -2.8 -2.9 5. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.9 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```



```

237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/100000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 3.2307E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5861E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 63151.55C 1.4429E-06
254- 62152.50C 5.7959E-06
255- 63153.55C 5.4871E-06
256- 64155.50C 1.0313E-06
257- 92234.50C 3.4942E-06
258- 92235.50C 4.5770E-04
259- 92236.50C 1.9303E-04
260- 92238.50C 2.1278E-02
261- 93237.55C 1.2531E-04
262- 94239.55C 2.6140E-05
263- 94240.50C 4.8758E-09
264- 94241.50C 4.4481E-14
265- 94242.50C 1.6721E-05
266- 95241.50C 1.3403E-12
267- 95243.50C 4.2458E-10
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- PRINT
293-

```

1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/100000 year Kidman Isotopes (wm221h)

probid = 06/21/96 09:13:31

1mcnp version 4a ld=10/01/93 06/20/96 21:55:10

INP=wm221i OUTP=wm221i.o

probid = 06/20/96 21:55:10

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1- WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/250000 year Kidman Isotopes (wm221i)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8211-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```

```

237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/250000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 1.9743E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.5861E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 63151.55C 1.4429E-06
254- 62152.50C 5.7959E-06
255- 63153.55C 5.4871E-06
256- 64155.50C 1.0313E-06
257- 92234.50C 2.6902E-06
258- 92235.50C 4.8388E-04
259- 92236.50C 1.9203E-04
260- 92238.50C 2.1278E-02
261- 93237.55C 1.1932E-04
262- 94239.55C 3.5002E-07
263- 94240.50C 1.1241E-15
264- 94241.50C 2.1602E-19
265- 94242.50C 1.2712E-05
266- 95241.50C 6.8734E-18
267- 95243.50C 7.0115E-14
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- PRINT
293-

```

1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/2 Cycles/250000 year Kidman Isotopes (wm221i)

probid = 06/20/96 21:55:10

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14222 neutron histories and 30 active cycles with 89926 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104148 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

| |
|--|
| <p>the final estimated combined collision/absorption/track-length keff = .78308 with an estimated standard deviation of .00161</p> <p>the estimated 68, 95, & 99 percent keff confidence intervals are .78145 to .78471, .77978 to .78637, and .77863 to .78753</p> <p>the estimated collision/absorption neutron removal lifetime = 2.83E-05 seconds with an estimated standard deviation of 1.35E-07</p> |
|--|

1mcnp version 4a ld=10/01/93 06/20/96 23:43:23

INP=wm321c OUTP=wm321c.0

probid = 06/20/96 23:43:23

```

1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/3 Cycles/15 year Kidman Isotopes (wm321c)
2- C MULTI-PURPOSE CANISTER - Simplified Model 3 Cycle
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7966-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

```

| | | | | | | | | | | |
|------|----|---|---|-----|-----------------|-----|-----|-----|---------|-------------------------|
| 57- | 53 | 8 | -8.2380 | 29 | -57 | | | | IMP:N=1 | U=5 |
| 58- | C | | TOP WATER GAP - | | ASSEMBLY RIGHT | | | | | |
| 59- | 54 | 1 | -1.0000 | 37 | 57 | | | | IMP:N=1 | U=5 |
| 60- | C | | WATER GAP - | | ASSEMBLY TOP | | | | | |
| 61- | 55 | 1 | -1.0000 | -38 | | | | | IMP:N=1 | U=6 |
| 62- | C | | INNER SS TUBE - | | ASSEMBLY TOP | | | | | |
| 63- | 56 | 8 | -8.2380 | 38 | -34 | -57 | | | IMP:N=1 | U=6 |
| 64- | C | | AL/B TUBE - | | ASSEMBLY TOP | | | | | |
| 65- | 57 | 6 | -2.7000 | 34 | -30 | -57 | | | IMP:N=1 | U=6 |
| 66- | C | | OUTER SS TUBE - | | ASSEMBLY TOP | | | | | |
| 67- | 58 | 8 | -8.2380 | 30 | -57 | | | | IMP:N=1 | U=6 |
| 68- | C | | WATER GAP TOP - | | ASSEMBLY TOP | | | | | |
| 69- | 59 | 1 | -1.0000 | 38 | 57 | | | | IMP:N=1 | U=6 |
| 70- | C | | WATER GAP - | | ASSEMBLY LEFT | | | | | |
| 71- | 60 | 1 | -1.0000 | 35 | | | | | IMP:N=1 | U=7 |
| 72- | C | | INNER SS TUBE - | | ASSEMBLY LEFT | | | | | |
| 73- | 61 | 8 | -8.2380 | -35 | 31 | -57 | | | IMP:N=1 | U=7 |
| 74- | C | | AL/B TUBE - | | ASSEMBLY LEFT | | | | | |
| 75- | 62 | 6 | -2.7000 | -31 | 27 | -57 | | | IMP:N=1 | U=7 |
| 76- | C | | OUTER SS TUBE - | | ASSEMBLY LEFT | | | | | |
| 77- | 63 | 8 | -8.2380 | -27 | -57 | | | | IMP:N=1 | U=7 |
| 78- | C | | WATER GAP TOP - | | ASSEMBLY LEFT | | | | | |
| 79- | 64 | 1 | -1.0000 | -35 | 57 | | | | IMP:N=1 | U=7 |
| 80- | C | | WATER GAP - | | ASSEMBLY BOTTOM | | | | | |
| 81- | 65 | 1 | -1.0000 | 36 | | | | | IMP:N=1 | U=8 |
| 82- | C | | INNER SS TUBE - | | ASSEMBLY BOTTOM | | | | | |
| 83- | 66 | 8 | -8.2380 | -36 | 32 | -57 | | | IMP:N=1 | U=8 |
| 84- | C | | AL/B TUBE - | | ASSEMBLY BOTTOM | | | | | |
| 85- | 67 | 6 | -2.7000 | -32 | 28 | -57 | | | IMP:N=1 | U=8 |
| 86- | C | | OUTER SS TUBE - | | ASSEMBLY BOTTOM | | | | | |
| 87- | 68 | 8 | -8.2380 | -28 | -57 | | | | IMP:N=1 | U=8 |
| 88- | C | | WATER GAP TOP - | | ASSEMBLY BOTTOM | | | | | |
| 89- | 69 | 1 | -1.0000 | -36 | 57 | | | | IMP:N=1 | U=8 |
| 90- | C | | OUTSIDE ALLOY 825 EDGES | | | | | | | |
| 91- | 70 | 5 | -8.1400 | 1 | 3 | -71 | -70 | 59 | -61 | IMP:N=1 \$ LONG TOP |
| 92- | 71 | 5 | -8.1400 | 2 | 3 | -71 | -70 | 58 | -60 | IMP:N=1 \$ LONG RIGHT |
| 93- | 72 | 5 | -8.1400 | 3 | -71 | 61 | -70 | 62 | -64 | IMP:N=1 \$ SHORT TOP |
| 94- | 73 | 5 | -8.1400 | 3 | -71 | 60 | -70 | 63 | -65 | IMP:N=1 \$ SHORT RIGHT |
| 95- | 74 | 5 | -8.1400 | 3 | -71 | -72 | -59 | 66 | -68 | IMP:N=1 \$ ANGLE LEFT |
| 96- | 75 | 5 | -8.1400 | 3 | -71 | 72 | -58 | 67 | -69 | IMP:N=1 \$ ANGLE BOTTOM |
| 97- | C | | TOP WATER RING GAP | | | | | | | |
| 98- | 76 | 1 | -1.0000 | 1 | 2 | -73 | 6 | -79 | | IMP:N=1 |
| 99- | C | | ALLOY 825 RING | | | | | | | |
| 100- | 77 | 5 | -8.1400 | 1 | 2 | -9 | 73 | 6 | -79 | IMP:N=1 |
| 101- | C | | SHIELD PLUG | | | | | | | |
| 102- | C | | STEEL SHIELD PLUG, BOTTOM | | | | | | | |
| 103- | 78 | 8 | -8.2380 | 1 | 2 | -9 | 79 | -75 | | IMP:N=1 |
| 104- | C | | DU SHIELD PLUG | | | | | | | |
| 105- | 79 | 9 | -18.9900 | 1 | 2 | -74 | 75 | -76 | | IMP:N=1 |
| 106- | C | | STEEL SHIELD PLUG, RING | | | | | | | |
| 107- | 80 | 8 | -8.2380 | 1 | 2 | -9 | 74 | 75 | -76 | IMP:N=1 |
| 108- | C | | STEEL SHIELD PLUG, TOP | | | | | | | |
| 109- | 81 | 8 | -8.2380 | 1 | 2 | -9 | 76 | -7 | | IMP:N=1 |
| 110- | C | | ALLOY 825 LID, INNER | | | | | | | |
| 111- | 82 | 5 | -8.1400 | 1 | 2 | -9 | 7 | -77 | | IMP:N=1 |
| 112- | C | | STEEL HONEY COMB, IMPACT LIMITOR | | | | | | | |
| 113- | 83 | 7 | -7.8320 | 1 | 2 | -9 | 77 | -78 | | IMP:N=1 |
| 114- | C | | ALLOY 825 LID, OUTER + Inner Barrier Lid | | | | | | | |
| 115- | 84 | 5 | -8.1400 | 1 | 2 | -9 | 78 | -8 | | IMP:N=1 |
| 116- | C | | ALLOY 825 LINER + Inner Barrier Thickness | | | | | | | |

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/15 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 6.2939E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1197E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 62151.50C 1.3409E-06
254- 63151.55C 1.6625E-07
255- 62152.50C 7.6344E-06
256- 63153.55C 8.2809E-06
257- 64155.50C 1.6348E-06
258- 92234.50C 1.2743E-06
259- 92235.50C 1.4954E-05
260- 92236.50C 6.1068E-06
261- 92238.50C 2.0980E-02
262- 93237.55C 6.6901E-06
263- 94238.50C 8.0042E-06
264- 94239.55C 3.2378E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 6.2351E-05
267- 94242.50C 3.9163E-05
268- 95241.50C 7.2170E-05
269- 95242.50C 2.2588E-07
270- 95243.50C 1.2660E-05
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

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1mcnp version 4a ld=10/01/93 06/21/96 00:34:57

INP=wm321d OUTP=wm321d.o

probid = 06/21/96 00:34:57

```
1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/100 year Kidman Isotopes (wm321d)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7969 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
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57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57      IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57      IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57          IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57      IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57      IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57          IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57      IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57      IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57          IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRG -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/100 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 6.2939E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 62151.50C 6.9792E-07
254- 63151.55C 8.1555E-07
255- 62152.50C 7.6344E-06
256- 63153.55C 8.2809E-06
257- 64155.50C 1.8334E-06
258- 92234.50C 5.2084E-06
259- 92235.50C 1.5760E-05
260- 92236.50C 7.8215E-06
261- 92238.50C 2.0980E-02
262- C 93237.55C 2.2017E-05
263- 94238.50C 4.1364E-06
264- 94239.55C 3.2279E-04
265- 94240.50C 1.8882E-04
266- 94241.50C 1.0310E-06
267- 94242.50C 3.9163E-05
268- 95241.50C 1.1832E-04
269- 95242.50C 1.4863E-07
270- 95243.50C 1.2562E-05
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

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1mcnp version 4a ld=10/01/93 06/20/96 10:59:07

INP=wm321e OUTP=wm321e.0

probid = 06/20/96 10:59:07

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/1000 year Kidman Isotopes (wm321e)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 -6.7969 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57     IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57     IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57     IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57     IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57     IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57     IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57     IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57     IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57     IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
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138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```



```

237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/1000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 6.2820E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 62151.50C 6.8067E-10
254- 63151.55C 1.5056E-06
255- 62152.50C 7.6422E-06
256- 63153.55C 8.2809E-06
257- 64155.50C 1.8334E-06
258- 92234.50C 9.4561E-06
259- 92235.50C 2.4018E-05
260- 92236.50C 2.4969E-05
261- 92238.50C 2.0980E-02
262- 93237.55C 1.1333E-04
263- 94238.50C 5.6179E-09
264- 94239.55C 3.1586E-04
265- 94240.50C 1.7157E-04
266- 94241.50C 6.3824E-10
267- 94242.50C 3.9163E-05
268- 95241.50C 2.8230E-05
269- 95242.50C 1.7846E-09
270- 95243.50C 1.1540E-05
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

```

1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/1000 year Kidman Isotopes (wm321e) probid = 06/20/96 10:59:07

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14113 neutron histories and 30 active cycles with 89897 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104010 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

- the k(collision) cycle values appear normally distributed at the 95 percent confidence level
- the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
- the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

| |
|--|
| <p>the final estimated combined collision/absorption/track-length keff = .71084 with an estimated standard deviation of .00182</p> <p>the estimated 68, 95, & 99 percent keff confidence intervals are .70900 to .71269, .70711 to .71457, and .70580 to .71588</p> <p>the estimated collision/absorption neutron removal lifetime = 2.09E-05 seconds with an estimated standard deviation of 1.51E-07</p> |
|--|

1mcnp version 4a ld=10/01/93 06/20/96 11:52:54

INP=wm321f OUTP=wm321f.0

probid = 06/20/96 11:52:54

```

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/10000 year Kidman Isotopes (wm321f)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 -6.7966 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/10000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 6.0905E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 63151.55C 1.5056E-06
254- 62152.50C 7.6422E-06
255- 63153.55C 8.2809E-06
256- 64155.50C 1.8334E-06
257- 92234.50C 9.2538E-06
258- 92235.50C 9.6675E-05
259- 92236.50C 1.3036E-04
260- 92238.50C 2.0980E-02
261- 93237.55C 1.4129E-04
262- 94238.50C 1.4865E-28
263- 94239.55C 2.4952E-04
264- 94240.50C 6.6556E-05
265- 94241.50C 3.0587E-10
266- 94242.50C 3.8527E-05
267- 95241.50C 9.2300E-09
268- 95242.50C 1.0854E-28
269- 95243.50C 4.9178E-06
270- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
271- C M3 2004.50C 1.0
272- C ZIRCALOY-4
273- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
274- 40000.50C -0.9818 50000.35C -0.0140
275- C ALLOY 825 density=8.14 g/cc
276- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
277- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
278- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
279- 29000.50C -0.0250 42000.50C -0.0300
280- C 1100 ALUMINUM ALLOY
281- M6 13027.50C -0.99880 29000.50C -0.00120
282- C A516 CARBON STEEL
283- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
284- 16032.50C -0.00035 25055.50C -0.0090
285- 26000.55C -0.98535
286- C SS316L
287- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
288- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
289- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
290- 42000.50C -0.02500
291- C DEPLETED URANIUM
292- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
293- C TALLIES
294- PRINT
295-

```

1 initial source from file srctp

1mcnp version 4a ld=10/01/93 06/20/96 12:47:17

INP=wm321g OUTP=wm321g.o

probid = 06/20/96 12:47:17

1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/30000 year Kidman Isotopes (wm321g)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7959 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

```

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/30000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 5.7076E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 63151.55C 1.5056E-06
254- 62152.50C 7.6422E-06
255- 63153.55C 8.2809E-06
256- 64155.50C 1.8334E-06
257- 92234.50C 8.7987E-06
258- 92235.50C 2.0745E-04
259- 92236.50C 1.8852E-04
260- 92238.50C 2.0980E-02
261- 93237.55C 1.4029E-04
262- 94239.55C 1.4308E-04
263- 94240.50C 8.0360E-06
264- 94241.50C 5.9897E-11
265- 94242.50C 3.7158E-05
266- 95241.50C 1.8018E-09
267- 95243.50C 7.5470E-07
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- C PRINT
293-

```

1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/30000 year Kidman Isotopes (wm321g)

probid = 06/20/96 12:47:17

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14246 neutron histories and 30 active cycles with 90149 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104395 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:

79

the following cells with fissionable material had no neutron collisions:

79

the following cells with fissionable material had no fission source points:

79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k(collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = .72317 with an estimated standard deviation of .00175
the estimated 68, 95, & 99 percent keff confidence intervals are .72139 to .72494, .71957 to .72676, and .71831 to .72802
the estimated collision/absorption neutron removal lifetime = 2.52E-05 seconds with an estimated standard deviation of 1.41E-07

1mcnp version 4a ld=10/01/93 06/20/96 13:56:51

INP=wm321h OUTP=wm321h.0

probid = 06/20/96 13:56:51

```
1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/100000 year Kidman Isotopes (wm321h)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7938-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
```

```

57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

```



```

117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/3 Cycle/100000 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 5.4993E-05
244- 43099.50C 4.5350E-05
245- 44101.50C 6.8143E-05
246- 45103.50C 5.1178E-05
247- 47109.50C 1.2932E-05
248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 63151.55C 1.5056E-06
254- 62152.50C 7.6422E-06
255- 63153.55C 8.2809E-06
256- 64155.50C 1.8334E-06
257- 92234.50C 7.4334E-06
258- 92235.50C 3.3182E-04
259- 92236.50C 1.9604E-04
260- 92238.50C 2.0980E-02
261- 93237.55C 1.3730E-04
262- 94239.55C 1.9308E-05
263- 94240.50C 4.9301E-09
264- 94241.50C 1.9835E-13
265- 94242.50C 3.2611E-05
266- 95241.50C 5.9897E-12
267- 95243.50C 1.0420E-09
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- C PRINT
293-

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1 initial source from file srctp
1keff results for: WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/100000 year Kidman Isotopes (wm321h)

probid = 06/20/96 13:56:51

1mcnp version 4a ld=10/01/93 06/20/96 14:57:04

probid = 06/20/96 14:57:04

INP=wm321i OUTP=wm321i.0

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1- WEST 17x17, 21 ASSMBLY 4.545% Pu/3 Cycles/250000 year Kidman Isotopes (wm321i)
2- C MULTI-PURPOSE CANISTER - Simplified Model
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.7904 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.0000 -20 IMP:N=1 U=3
41- 42 1 -1.0000 20 -21 IMP:N=1 U=3
42- 43 1 -1.0000 21 -22 IMP:N=1 U=3
43- 44 1 -1.0000 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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57-      53      8 -8.2380 29 -57          IMP:N=1 U=5
58-      C      TOP WATER GAP - ASSEMBLY RIGHT
59-      54      1 -1.0000 37 57          IMP:N=1 U=5
60-      C      WATER GAP - ASSEMBLY TOP
61-      55      1 -1.0000 -38          IMP:N=1 U=6
62-      C      INNER SS TUBE - ASSEMBLY TOP
63-      56      8 -8.2380 38 -34 -57      IMP:N=1 U=6
64-      C      AL/B TUBE - ASSEMBLY TOP
65-      57      6 -2.7000 34 -30 -57      IMP:N=1 U=6
66-      C      OUTER SS TUBE - ASSEMBLY TOP
67-      58      8 -8.2380 30 -57          IMP:N=1 U=6
68-      C      WATER GAP TOP - ASSEMBLY TOP
69-      59      1 -1.0000 38 57          IMP:N=1 U=6
70-      C      WATER GAP - ASSEMBLY LEFT
71-      60      1 -1.0000 35          IMP:N=1 U=7
72-      C      INNER SS TUBE - ASSEMBLY LEFT
73-      61      8 -8.2380 -35 31 -57      IMP:N=1 U=7
74-      C      AL/B TUBE - ASSEMBLY LEFT
75-      62      6 -2.7000 -31 27 -57      IMP:N=1 U=7
76-      C      OUTER SS TUBE - ASSEMBLY LEFT
77-      63      8 -8.2380 -27 -57          IMP:N=1 U=7
78-      C      WATER GAP TOP - ASSEMBLY LEFT
79-      64      1 -1.0000 -35 57          IMP:N=1 U=7
80-      C      WATER GAP - ASSEMBLY BOTTOM
81-      65      1 -1.0000 36          IMP:N=1 U=8
82-      C      INNER SS TUBE - ASSEMBLY BOTTOM
83-      66      8 -8.2380 -36 32 -57      IMP:N=1 U=8
84-      C      AL/B TUBE - ASSEMBLY BOTTOM
85-      67      6 -2.7000 -32 28 -57      IMP:N=1 U=8
86-      C      OUTER SS TUBE - ASSEMBLY BOTTOM
87-      68      8 -8.2380 -28 -57          IMP:N=1 U=8
88-      C      WATER GAP TOP - ASSEMBLY BOTTOM
89-      69      1 -1.0000 -36 57          IMP:N=1 U=8
90-      C      OUTSIDE ALLOY 825 EDGES
91-      70      5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92-      71      5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93-      72      5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94-      73      5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95-      74      5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96-      75      5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97-      C      TOP WATER RING GAP
98-      76      1 -1.0000 1 2 -73 6 -79 IMP:N=1
99-      C      ALLOY 825 RING
100-     77      5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101-     C      SHIELD PLUG
102-     C      STEEL SHIELD PLUG, BOTTOM
103-     78      8 -8.2380 1 2 -9 79 -75 IMP:N=1
104-     C      DU SHIELD PLUG
105-     79      9 -18.9900 1 2 -74 75 -76 IMP:N=1
106-     C      STEEL SHIELD PLUG, RING
107-     80      8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108-     C      STEEL SHIELD PLUG, TOP
109-     81      8 -8.2380 1 2 -9 76 -7 IMP:N=1
110-     C      ALLOY 825 LID, INNER
111-     82      5 -8.1400 1 2 -9 7 -77 IMP:N=1
112-     C      STEEL HONEY COMB, IMPACT LIMITOR
113-     83      7 -7.8320 1 2 -9 77 -78 IMP:N=1
114-     C      ALLOY 825 LID, OUTER + Inner Barrier Lid
115-     84      5 -8.1400 1 2 -9 78 -8 IMP:N=1
116-     C      ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
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146- 17 CZ 0.409575
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166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
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222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
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239- M1 1001.50C 6.691-2 8016.50C 3.345-2
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248- 60143.50C 4.3808E-05
249- 60145.50C 3.3157E-05
250- 62147.50C 1.1358E-05
251- 62149.50C 3.1074E-07
252- 62150.50C 1.8709E-05
253- 63151.55C 1.5056E-06
254- 62152.50C 7.6422E-06
255- 63153.55C 8.2809E-06
256- 64155.50C 1.8334E-06
257- 92234.50C 5.2590E-06
258- 92235.50C 3.5095E-04
259- 92236.50C 1.9554E-04
260- 92238.50C 2.0980E-02
261- 93237.55C 1.3081E-04
262- 94239.55C 2.5843E-07
263- 94240.50C 8.4304E-15
264- 94241.50C 9.6227E-19
265- 94242.50C 2.4691E-05
266- 95241.50C 3.0587E-17
267- 95243.50C 7.3523E-13
268- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
269- C M3 2004.50C 1.0
270- C ZIRCALOY-4
271- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
272- 40000.50C -0.9818 50000.35C -0.0140
273- C ALLOY 825 density=8.14 g/cc
274- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
275- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
276- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
277- 29000.50C -0.0250 42000.50C -0.0300
278- C 1100 ALUMINUM ALLOY
279- M6 13027.50C -0.99880 29000.50C -0.00120
280- C A516 CARBON STEEL
281- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
282- 16032.50C -0.00035 25055.50C -0.0090
283- 26000.55C -0.98535
284- C SS316L
285- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
286- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
287- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
288- 42000.50C -0.02500
289- C DEPLETED URANIUM
290- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
291- C TALLIES
292- PRINT
293-

```


1mcnp version 4a ld=10/01/93 06/21/96 07:19:35

probid = 06/21/96 07:19:35

inp=wm221be outp=wm221be0

```

1- WEST 17x17 FUEL, 21 ASSEMBLY 4:545% Pu/2 Cycles/5 year Kidman Isotopes (wm221be)
2- C MULTI-PURPOSE CANISTER - Simplified Model 4 DCRA's/Assembly
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 4 2 2 4 2 2 4 2 4R 9
22- 9 2 2R 4 2 8R 4 2 2R 9 9 2 16R 9
23- 9 2 2 4 2 2 4 2 2 3 2 2 4 2 2 4 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 4 2 2 3 2 2 4 2 2 3 2 2 4 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 4 2 2 4 2 2 3 2 2 4 2 2 4 2 2 9
27- 9 2 16R 9 9 2 2R 4 2 8R 4 2 2R 9
28- 9 2 4R 4 2 2 4 2 2 4 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 10 -2.4500 -20 -5 IMP:N=1 U=3
41- 42 4 -6.6000 20 -21 -5 IMP:N=1 U=3
42- 43 1 -1.0000 -21 5 IMP:N=1 U=3
43- 44 1 -1.0000 21 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
    
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| | | | | | | | | | | |
|------|----|---|---|-----|-----|-----|-----|-----|---------|-------------------------|
| 57- | 53 | 8 | -8.2380 | 29 | -57 | | | | IMP:N=1 | U=5 |
| 58- | C | | TOP WATER GAP - | | | | | | | ASSEMBLY RIGHT |
| 59- | 54 | 1 | -1.0000 | 37 | 57 | | | | IMP:N=1 | U=5 |
| 60- | C | | WATER GAP - | | | | | | | ASSEMBLY TOP |
| 61- | 55 | 1 | -1.0000 | -38 | | | | | IMP:N=1 | U=6 |
| 62- | C | | INNER SS TUBE - | | | | | | | ASSEMBLY TOP |
| 63- | 56 | 8 | -8.2380 | 38 | -34 | -57 | | | IMP:N=1 | U=6 |
| 64- | C | | AL/B TUBE - | | | | | | | ASSEMBLY TOP |
| 65- | 57 | 6 | -2.7000 | 34 | -30 | -57 | | | IMP:N=1 | U=6 |
| 66- | C | | OUTER SS TUBE - | | | | | | | ASSEMBLY TOP |
| 67- | 58 | 8 | -8.2380 | 30 | -57 | | | | IMP:N=1 | U=6 |
| 68- | C | | WATER GAP TOP - | | | | | | | ASSEMBLY TOP |
| 69- | 59 | 1 | -1.0000 | 38 | 57 | | | | IMP:N=1 | U=6 |
| 70- | C | | WATER GAP - | | | | | | | ASSEMBLY LEFT |
| 71- | 60 | 1 | -1.0000 | 35 | | | | | IMP:N=1 | U=7 |
| 72- | C | | INNER SS TUBE - | | | | | | | ASSEMBLY LEFT |
| 73- | 61 | 8 | -8.2380 | -35 | 31 | -57 | | | IMP:N=1 | U=7 |
| 74- | C | | AL/B TUBE - | | | | | | | ASSEMBLY LEFT |
| 75- | 62 | 6 | -2.7000 | -31 | 27 | -57 | | | IMP:N=1 | U=7 |
| 76- | C | | OUTER SS TUBE - | | | | | | | ASSEMBLY LEFT |
| 77- | 63 | 8 | -8.2380 | -27 | -57 | | | | IMP:N=1 | U=7 |
| 78- | C | | WATER GAP TOP - | | | | | | | ASSEMBLY LEFT |
| 79- | 64 | 1 | -1.0000 | -35 | 57 | | | | IMP:N=1 | U=7 |
| 80- | C | | WATER GAP - | | | | | | | ASSEMBLY BOTTOM |
| 81- | 65 | 1 | -1.0000 | 36 | | | | | IMP:N=1 | U=8 |
| 82- | C | | INNER SS TUBE - | | | | | | | ASSEMBLY BOTTOM |
| 83- | 66 | 8 | -8.2380 | -36 | 32 | -57 | | | IMP:N=1 | U=8 |
| 84- | C | | AL/B TUBE - | | | | | | | ASSEMBLY BOTTOM |
| 85- | 67 | 6 | -2.7000 | -32 | 28 | -57 | | | IMP:N=1 | U=8 |
| 86- | C | | OUTER SS TUBE - | | | | | | | ASSEMBLY BOTTOM |
| 87- | 68 | 8 | -8.2380 | -28 | -57 | | | | IMP:N=1 | U=8 |
| 88- | C | | WATER GAP TOP - | | | | | | | ASSEMBLY BOTTOM |
| 89- | 69 | 1 | -1.0000 | -36 | 57 | | | | IMP:N=1 | U=8 |
| 90- | C | | OUTSIDE ALLOY 825 | | | | | | | EDGES |
| 91- | 70 | 5 | -8.1400 | 1 | 3 | -71 | -70 | 59 | -61 | IMP:N=1 \$ LONG TOP |
| 92- | 71 | 5 | -8.1400 | 2 | 3 | -71 | -70 | 58 | -60 | IMP:N=1 \$ LONG RIGHT |
| 93- | 72 | 5 | -8.1400 | 3 | -71 | 61 | -70 | 62 | -64 | IMP:N=1 \$ SHORT TOP |
| 94- | 73 | 5 | -8.1400 | 3 | -71 | 60 | -70 | 63 | -65 | IMP:N=1 \$ SHORT RIGHT |
| 95- | 74 | 5 | -8.1400 | 3 | -71 | -72 | -59 | 66 | -68 | IMP:N=1 \$ ANGLE LEFT |
| 96- | 75 | 5 | -8.1400 | 3 | -71 | 72 | -58 | 67 | -69 | IMP:N=1 \$ ANGLE BOTTOM |
| 97- | C | | TOP WATER RING GAP | | | | | | | |
| 98- | 76 | 1 | -1.0000 | 1 | 2 | -73 | 6 | -79 | | IMP:N=1 |
| 99- | C | | ALLOY 825 RING | | | | | | | |
| 100- | 77 | 5 | -8.1400 | 1 | 2 | -9 | 73 | 6 | -79 | IMP:N=1 |
| 101- | C | | SHIELD PLUG | | | | | | | |
| 102- | C | | STEEL SHIELD PLUG, BOTTOM | | | | | | | |
| 103- | 78 | 8 | -8.2380 | 1 | 2 | -9 | 79 | -75 | | IMP:N=1 |
| 104- | C | | DU SHIELD PLUG | | | | | | | |
| 105- | 79 | 9 | -18.9900 | 1 | 2 | -74 | 75 | -76 | | IMP:N=1 |
| 106- | C | | STEEL SHIELD PLUG, RING | | | | | | | |
| 107- | 80 | 8 | -8.2380 | 1 | 2 | -9 | 74 | 75 | -76 | IMP:N=1 |
| 108- | C | | STEEL SHIELD PLUG, TOP | | | | | | | |
| 109- | 81 | 8 | -8.2380 | 1 | 2 | -9 | 76 | -7 | | IMP:N=1 |
| 110- | C | | ALLOY 825 LID, INNER | | | | | | | |
| 111- | 82 | 5 | -8.1400 | 1 | 2 | -9 | 7 | -77 | | IMP:N=1 |
| 112- | C | | STEEL HONEY COMB, IMPACT LIMITOR | | | | | | | |
| 113- | 83 | 7 | -7.8320 | 1 | 2 | -9 | 77 | -78 | | IMP:N=1 |
| 114- | C | | ALLOY 825 LID, OUTER + Inner Barrier Lid | | | | | | | |
| 115- | 84 | 5 | -8.1400 | 1 | 2 | -9 | 78 | -8 | | IMP:N=1 |
| 116- | C | | ALLOY 825 LINER + Inner Barrier Thickness | | | | | | | |

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.052375
203- 67 PY 38.052376 $ ACTUAL 38.052375
204- 68 PX 39.004876 $ ACTUAL 39.004875
205- 69 PY 39.004876 $ ACTUAL 39.004875
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/5 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.1028E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.3331E-06
254- 63151.55C 1.0900E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 8.0211E-07
258- 92234.50C 5.7647E-07
259- 92235.50C 2.2960E-05
260- 92236.50C 4.9185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 4.6531E-06
263- 94238.50C 3.5348E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 7.4134E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 5.0568E-05
269- 95242.50C 1.5792E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C B4C -- Natural Boron
295- M10 5010.50C -14.1426
296- 5011.56C -64.4274

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1mcnp version 4a ld=10/01/93 06/21/96 02:15:04

 INP=wm221bd OUTP=wm221bd0

probid = 06/21/96 02:15:04

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1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221bd)
2- C MULTI-PURPOSE CANISTER - Simplified Model 12 DCRA's /Assembly
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 4 2 2 3 2 4R 9
22- 9 2 2R 4 2 8R 4 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 4 2 2 3 2 2 4 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 4 2 2 3 2 2 4 2 2 3 2 2 4 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 4 2 2 3 2 2 4 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 4 2 8R 4 2 2R 9
28- 9 2 4R 3 2 2 4 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 10 -2.4500 -20 -5 IMP:N=1 U=3
41- 42 4 -6.6000 20 -21 -5 IMP:N=1 U=3
42- 43 1 -1.0000 -21 5 IMP:N=1 U=3
43- 44 1 -1.0000 21 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT
  
```

```

57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for IB lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

```



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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/5 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.1028E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.3331E-06
254- 63151.55C 1.0900E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 8.0211E-07
258- 92234.50C 5.7647E-07
259- 92235.50C 2.2960E-05
260- 92236.50C 4.9185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 4.6531E-06
263- 94238.50C 3.5348E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 7.4134E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 5.0568E-05
269- 95242.50C 1.5792E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C B4C -- Natural Boron
295- M10 5010.50C -14.1426
296- 5011.56C -64.4274

```

297- 6000.50C -21.4300
298- C TALLIES
299- PRINT
300-

1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221bd) probid = 06/21/96 02:15:04

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 14397 neutron histories and 30 active cycles with 89939 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 104336 fission neutron source histories.

XX

the following cells with fissionable material had no neutron tracks entering:
79

the following cells with fissionable material had no neutron collisions:
79

the following cells with fissionable material had no fission source points:
79

warning. 1 fissionable cells had no tracks entering, 1 cells had no collisions, and 1 cells had no fission source points.
the keff results could be too small because these cells with fissionable material were not sampled.

XX

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k(collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = .79169 with an estimated standard deviation of .00259
the estimated 68, 95, & 99 percent keff confidence intervals are .78906 to .79432, .78637 to .79701, and .78450 to .79887
the estimated collision/absorption neutron removal lifetime = 1.56E-05 seconds with an estimated standard deviation of 1.07E-07

1mcnp version 4a ld=10/01/93 06/21/96 01:28:09

probid = 06/21/96 01:28:09

INP=wm221bc OUTP=wm221bc0

```

1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221bc)
2- C MULTI-PURPOSE CANISTER - Simplified Model 24 DCRA's/Assembly
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.0000 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1.1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.0000 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.0000 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.0000 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.0000 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.0000 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.0000 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 4 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254 -2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.0000 -17 5 IMP:N=1 U=2
34- 36 1 -1.0000 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.0000 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.0000 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.0000 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 10 -2.4500 -20 -5 IMP:N=1 U=3
41- 42 4 -6.6000 20 -21 -5 IMP:N=1 U=3
42- 43 1 -1.0000 -21 5 IMP:N=1 U=3
43- 44 1 -1.0000 21 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.0000 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.0000 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.0000 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.0000 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

```

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57- 53 8 -8.2380 29 -57 IMP:N=1 U=5
58- C TOP WATER GAP - ASSEMBLY RIGHT
59- 54 1 -1.0000 37 57 IMP:N=1 U=5
60- C WATER GAP - ASSEMBLY TOP
61- 55 1 -1.0000 -38 IMP:N=1 U=6
62- C INNER SS TUBE - ASSEMBLY TOP
63- 56 8 -8.2380 38 -34 -57 IMP:N=1 U=6
64- C AL/B TUBE - ASSEMBLY TOP
65- 57 6 -2.7000 34 -30 -57 IMP:N=1 U=6
66- C OUTER SS TUBE - ASSEMBLY TOP
67- 58 8 -8.2380 30 -57 IMP:N=1 U=6
68- C WATER GAP TOP - ASSEMBLY TOP
69- 59 1 -1.0000 38 57 IMP:N=1 U=6
70- C WATER GAP - ASSEMBLY LEFT
71- 60 1 -1.0000 35 IMP:N=1 U=7
72- C INNER SS TUBE - ASSEMBLY LEFT
73- 61 8 -8.2380 -35 31 -57 IMP:N=1 U=7
74- C AL/B TUBE - ASSEMBLY LEFT
75- 62 6 -2.7000 -31 27 -57 IMP:N=1 U=7
76- C OUTER SS TUBE - ASSEMBLY LEFT
77- 63 8 -8.2380 -27 -57 IMP:N=1 U=7
78- C WATER GAP TOP - ASSEMBLY LEFT
79- 64 1 -1.0000 -35 57 IMP:N=1 U=7
80- C WATER GAP - ASSEMBLY BOTTOM
81- 65 1 -1.0000 36 IMP:N=1 U=8
82- C INNER SS TUBE - ASSEMBLY BOTTOM
83- 66 8 -8.2380 -36 32 -57 IMP:N=1 U=8
84- C AL/B TUBE - ASSEMBLY BOTTOM
85- 67 6 -2.7000 -32 28 -57 IMP:N=1 U=8
86- C OUTER SS TUBE - ASSEMBLY BOTTOM
87- 68 8 -8.2380 -28 -57 IMP:N=1 U=8
88- C WATER GAP TOP - ASSEMBLY BOTTOM
89- 69 1 -1.0000 -36 57 IMP:N=1 U=8
90- C OUTSIDE ALLOY 825 EDGES
91- 70 5 -8.1400 1 3 -71 -70 59 -61 IMP:N=1 $ LONG TOP
92- 71 5 -8.1400 2 3 -71 -70 58 -60 IMP:N=1 $ LONG RIGHT
93- 72 5 -8.1400 3 -71 61 -70 62 -64 IMP:N=1 $ SHORT TOP
94- 73 5 -8.1400 3 -71 60 -70 63 -65 IMP:N=1 $ SHORT RIGHT
95- 74 5 -8.1400 3 -71 -72 -59 66 -68 IMP:N=1 $ ANGLE LEFT
96- 75 5 -8.1400 3 -71 72 -58 67 -69 IMP:N=1 $ ANGLE BOTTOM
97- C TOP WATER RING GAP
98- 76 1 -1.0000 1 2 -73 6 -79 IMP:N=1
99- C ALLOY 825 RING
100- 77 5 -8.1400 1 2 -9 73 6 -79 IMP:N=1
101- C SHIELD PLUG
102- C STEEL SHIELD PLUG, BOTTOM
103- 78 8 -8.2380 1 2 -9 79 -75 IMP:N=1
104- C DU SHIELD PLUG
105- 79 9 -18.9900 1 2 -74 75 -76 IMP:N=1
106- C STEEL SHIELD PLUG, RING
107- 80 8 -8.2380 1 2 -9 74 75 -76 IMP:N=1
108- C STEEL SHIELD PLUG, TOP
109- 81 8 -8.2380 1 2 -9 76 -7 IMP:N=1
110- C ALLOY 825 LID, INNER
111- 82 5 -8.1400 1 2 -9 7 -77 IMP:N=1
112- C STEEL HONEY COMB, IMPACT LIMITOR
113- 83 7 -7.8320 1 2 -9 77 -78 IMP:N=1
114- C ALLOY 825 LID, OUTER + Inner Barrier Lid
115- 84 5 -8.1400 1 2 -9 78 -8 IMP:N=1
116- C ALLOY 825 LINER + Inner Barrier Thickness

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```

117- 85 5 -8.1400 9 -10 1 2 3 -8 IMP:N=1
118- C GAP 825/MILD STEEL LINER
119- 86 1 -1.0000 10 -11 1 2 3 -8 IMP:N=1
120- C MILD STEEL LID
121- 87 7 -7.8320 1 2 -11 8 -47 IMP:N=1
122- C MILD STEEL CONTAINER
123- 88 7 -7.8320 11 -12 1 2 3 -47 IMP:N=1
124- C OUTSIDE WORLD
125- 89 0 -1:-2:-3:47:12 IMP:N=0
126-
127- C SURFACE SPECIFICATIONS
128- 1* PX 0.0
129- 2* PY 0.00
130- 3* PZ 0.00
131- 4 PZ 182.8800 $ TOP ACTIVE FUEL
132- 5 PZ 203.3270 $ TOP FUEL HARDWARE
133- 6 PZ 246.3000 $ WATER GAP
134- 7 PZ 266.0650 $ ALLOY 825 LID
135- 8 PZ 283.1700 $ STEEL LID Bottom (height includes 2.5 cm for 1B lid)
136- 9 CZ 74.0410 $ ID OF WASTE CONTAINER
137- 10 CZ 78.5810 $ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier)
138- 11 CZ 80.080 $ ID OF MILD STEEL CONTAINER
139- 12 CZ 90.080 $ OD OF MILD STEEL CONTAINER
140- C PIN LATTICE BOUNDS
141- 13 PX 0.62992
142- 14 PX -0.62992
143- 15 PY 0.62992
144- 16 PY -0.62992
145- C FUEL ROD
146- 17 CZ 0.409575
147- 18 CZ 0.41783
148- 19 CZ 0.47483
149- C CONTROL ROD/GUIDE TUBE
150- 20 CZ 0.42672
151- 21 CZ 0.43688
152- 22 CZ 0.48387
153- 23 CZ 0.57150
154- 24 CZ 0.61214
155- C INSTRUMENTATION TUBE
156- 25 CZ 0.57150
157- 26 CZ 0.61214
158- C ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL
159- 27 PX -12.4460
160- 28 PY -12.4460
161- 29 PX 12.4460
162- 30 PY 12.4460
163- 31 PX -11.8110
164- 32 PY -11.8110
165- 33 PX 11.8110
166- 34 PY 11.8110
167- 35 PX -11.1760
168- 36 PY -11.1760
169- 37 PX 11.1760
170- 38 PY 11.1760
171- 39 PX -10.708639 $ ACTUAL 10.70864
172- 40 PY -10.708639
173- 41 PX 10.708639
174- 42 PY 10.708639
175- C ASSEMBLY LATTICE BOUNDS
176- 43 PX -12.684125

```



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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/5 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.1028E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.3331E-06
254- 63151.55C 1.0900E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 8.0211E-07
258- 92234.50C 5.7647E-07
259- 92235.50C 2.2960E-05
260- 92236.50C 4.9185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 4.6531E-06
263- 94238.50C 3.5348E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 7.4134E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 5.0568E-05
269- 95242.50C 1.5792E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C B4C -- Natural Boron
295- M10 5010.50C -14.1426
296- 5011.56C -64.4274

```


1mcnp version 4a ld=10/01/93 07/10/96 10:30:35

probid = 07/10/96 10:30:35

inp=wm221dr outp=wm221dr0

```

1- WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221dr)
2- C MULTI-PURPOSE CANISTER - Simplified Model Dry
3- C CELL SPECIFICATIONS
4- 1 0 1 2 3 -6 -9 #70 #71 #72 #73 #74 #75 FILL=1 IMP:N=1
5- C ASSEMBLY LATTICE DESCRIPTION
6- 2 1 -1.00-6 -44 43 -46 45 IMP:N=1 LAT=1 U=1
7- FILL=0:4 0:4 0:0 11 2R 1 1 11 2R 1 1 11 11 1 1 1 1 1 7R
8- C FULL ASSEMBLY LATTICE POSITION
9- 8 1 -1.00-6 -41 39 -42 40 IMP:N=1 FILL=9 U=11
10- C RIGHT SIDE OF ASSEMBLY OUTSIDE LATTICE
11- 10 1 -1.00-6 41 55 56 IMP:N=1 FILL=5 U=11
12- C TOP OF ASSEMBLY OUTSIDE LATTICE
13- 11 1 -1.00-6 -55 56 42 IMP:N=1 FILL=6 U=11
14- C LEFT SIDE OF ASSEMBLY OUTSIDE LATTICE
15- 12 1 -1.00-6 -39 -55 -56 IMP:N=1 FILL=7 U=11
16- C BOTTOM OF ASSEMBLY OUTSIDE LATTICE
17- 13 1 -1.00-6 55 -56 -40 IMP:N=1 FILL=8 U=11
18- C PIN LATTICE DESCRIPTION
19- 32 1 -1.00-6 -13 14 -15 16 IMP:N=1 LAT=1 U=9
20- FILL -9:9 -9:9 0:0 9 18R 9 2 16R 9 9 2 16R 9
21- 9 2 4R 3 2 2 3 2 2 3 2 2 4R 9
22- 9 2 2R 3 2 8R 3 2 2R 9 9 2 16R 9
23- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9 9 2 16R 9
24- 9 2 16R 9 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
25- 9 2 16R 9 9 2 16R 9
26- 9 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 9
27- 9 2 16R 9 9 2 2R 3 2 8R 3 2 2R 9
28- 9 2 4R 3 2 2 3 2 2 3 2 4R 9 9 2 16R 9 9 2 16R 9
29- 9 18R
30- C FUEL ROD
31- 33 2 6.8254-2 -17 -4 IMP:N=1 U=2
32- 34 4 -6.6000 -17 4 -5 IMP:N=1 U=2
33- 35 1 -1.00-6 -17 5 IMP:N=1 U=2
34- 36 1 -1.00-6 17 -18 -5 IMP:N=1 U=2
35- 37 1 -1.00-6 17 -18 5 IMP:N=1 U=2
36- 38 4 -6.6000 18 -19 -5 IMP:N=1 U=2
37- 39 1 -1.00-6 18 -19 5 IMP:N=1 U=2
38- 40 1 -1.00-6 19 IMP:N=1 U=2
39- C CONTROL ROD/GUIDE TUBE
40- 41 1 -1.00-6 -20 IMP:N=1 U=3
41- 42 1 -1.00-6 20 -21 IMP:N=1 U=3
42- 43 1 -1.00-6 21 -22 IMP:N=1 U=3
43- 44 1 -1.00-6 22 -23 IMP:N=1 U=3
44- 45 4 -6.6000 23 -24 IMP:N=1 U=3
45- 46 1 -1.00-6 24 IMP:N=1 U=3
46- C INSTRUMENTATION TUBE
47- 47 1 -1.00-6 -25 IMP:N=1 U=4
48- 48 4 -6.6000 25 -26 IMP:N=1 U=4
49- 49 1 -1.00-6 26 IMP:N=1 U=4
50- C WATER GAP - ASSEMBLY RIGHT
51- 50 1 -1.00-6 -37 IMP:N=1 U=5
52- C INNER SS TUBE - ASSEMBLY RIGHT
53- 51 8 -8.2380 37 -33 -57 IMP:N=1 U=5
54- C AL/B TUBE - ASSEMBLY RIGHT
55- 52 6 -2.7000 33 -29 -57 IMP:N=1 U=5
56- C OUTER SS TUBE - ASSEMBLY RIGHT

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| | | | | | | | | | | |
|------|----|--|----------------|----|-----|-----|---|-----|-----|--|
| 117- | 85 | 5 | -8.1400 | 9 | -10 | 1 | 2 | 3 | -8 | IMP:N=1 |
| 118- | C | GAP 825/MILD STEEL LINER | | | | | | | | |
| 119- | 86 | 1 | -1.00-6 | 10 | -11 | 1 | 2 | 3 | -8 | IMP:N=1 |
| 120- | C | MILD STEEL LID | | | | | | | | |
| 121- | 87 | 7 | -7.8320 | 1 | 2 | -11 | 8 | -47 | | IMP:N=1 |
| 122- | C | MILD STEEL CONTAINER | | | | | | | | |
| 123- | 88 | 7 | -7.8320 | 11 | -12 | 1 | 2 | 3 | -47 | IMP:N=1 |
| 124- | C | OUTSIDE WORLD | | | | | | | | |
| 125- | 89 | 0 | -1:-2:-3:47:12 | | | | | | | IMP:N=0 |
| 126- | | | | | | | | | | |
| 127- | C | SURFACE SPECIFICATIONS | | | | | | | | |
| 128- | 1* | PX | 0.0 | | | | | | | |
| 129- | 2* | PY | 0.00 | | | | | | | |
| 130- | 3* | PZ | 0.00 | | | | | | | |
| 131- | 4 | PZ | 182.8800 | | | | | | | \$ TOP ACTIVE FUEL |
| 132- | 5 | PZ | 203.3270 | | | | | | | \$ TOP FUEL HARDWARE |
| 133- | 6 | PZ | 246.3000 | | | | | | | \$ WATER GAP |
| 134- | 7 | PZ | 266.0650 | | | | | | | \$ ALLOY 825 LID |
| 135- | 8 | PZ | 283.1700 | | | | | | | \$ STEEL LID Bottom (height includes 2.5 cm for IB lid) |
| 136- | 9 | CZ | 74.0410 | | | | | | | \$ ID OF WASTE CONTAINER |
| 137- | 10 | CZ | 78.5810 | | | | | | | \$ OD OF ALLOY 825 CONTAINER (MPC Shell + Inner Barrier) |
| 138- | 11 | CZ | 80.080 | | | | | | | \$ ID OF MILD STEEL CONTAINER |
| 139- | 12 | CZ | 90.080 | | | | | | | \$ OD OF MILD STEEL CONTAINER |
| 140- | C | PIN LATTICE BOUNDS | | | | | | | | |
| 141- | 13 | PX | 0.62992 | | | | | | | |
| 142- | 14 | PX | -0.62992 | | | | | | | |
| 143- | 15 | PY | 0.62992 | | | | | | | |
| 144- | 16 | PY | -0.62992 | | | | | | | |
| 145- | C | FUEL ROD | | | | | | | | |
| 146- | 17 | CZ | 0.409575 | | | | | | | |
| 147- | 18 | CZ | 0.41783 | | | | | | | |
| 148- | 19 | CZ | 0.47483 | | | | | | | |
| 149- | C | CONTROL ROD/GUIDE TUBE | | | | | | | | |
| 150- | 20 | CZ | 0.42672 | | | | | | | |
| 151- | 21 | CZ | 0.43688 | | | | | | | |
| 152- | 22 | CZ | 0.48387 | | | | | | | |
| 153- | 23 | CZ | 0.57150 | | | | | | | |
| 154- | 24 | CZ | 0.61214 | | | | | | | |
| 155- | C | INSTRUMENTATION TUBE | | | | | | | | |
| 156- | 25 | CZ | 0.57150 | | | | | | | |
| 157- | 26 | CZ | 0.61214 | | | | | | | |
| 158- | C | ASSEMBLY STRUCTURAL/CRITICALITY MATERIAL | | | | | | | | |
| 159- | 27 | PX | -12.4460 | | | | | | | |
| 160- | 28 | PY | -12.4460 | | | | | | | |
| 161- | 29 | PX | 12.4460 | | | | | | | |
| 162- | 30 | PY | 12.4460 | | | | | | | |
| 163- | 31 | PX | -11.8110 | | | | | | | |
| 164- | 32 | PY | -11.8110 | | | | | | | |
| 165- | 33 | PX | 11.8110 | | | | | | | |
| 166- | 34 | PY | 11.8110 | | | | | | | |
| 167- | 35 | PX | -11.1760 | | | | | | | |
| 168- | 36 | PY | -11.1760 | | | | | | | |
| 169- | 37 | PX | 11.1760 | | | | | | | |
| 170- | 38 | PY | 11.1760 | | | | | | | |
| 171- | 39 | PX | -10.708639 | | | | | | | \$ ACTUAL 10.70864 |
| 172- | 40 | PY | -10.708639 | | | | | | | |
| 173- | 41 | PX | 10.708639 | | | | | | | |
| 174- | 42 | PY | 10.708639 | | | | | | | |
| 175- | C | ASSEMBLY LATTICE BOUNDS | | | | | | | | |
| 176- | 43 | PX | -12.684125 | | | | | | | |

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177- 44 PX 12.684125
178- 45 PY -12.684125
179- 46 PY 12.684125
180- C
181- 47 PZ 294.17 $ MILD STEEL LID
182- C BLANK PIN CELL
183- 48 PX -0.7
184- 49 PX 0.7
185- 50 PY -0.7
186- 51 PY 0.7
187- 52 PY 0.0001
188- 53 PY -0.0001
189- 54 PY 0.0
190- 55 P 1. -1. 0. 0.
191- 56 P 1. 1. 0. 0.
192- C EXTRA CARDS
193- 57 PZ 203.2 $ TOP BASKET MATERIAL
194- 58 PX 62.54751 $ ACTUAL 62.5475
195- 59 PY 62.54751 $ ACTUAL 62.5475
196- 60 PX 63.50001 $ ACTUAL 63.5
197- 61 PY 63.50001 $ ACTUAL 63.5
198- 62 PX 11.890375
199- 63 PY 11.890375
200- 64 PX 13.160375
201- 65 PY 13.160375
202- 66 PX 38.052376 $ ACTUAL 38.0523750
203- 67 PY 38.052376 $ ACTUAL 38.0523750
204- 68 PX 39.004876 $ ACTUAL 39.0048750
205- 69 PY 39.004876 $ ACTUAL 39.0048750
206- 70 CZ 74.0409 $ ACTUAL 74.0410
207- 71 PZ 203.30 $ TOP BASKET EDGE MATERIAL
208- 72 P 1. -1. 0. 0.
209- C RING, PLUG, AND LID CARDS
210- 73 CZ 71.5010
211- 74 CZ 72.7710
212- 75 PZ 259.7150 $ BOTTOM DU PLUG
213- 76 PZ 264.7950 $ TOP DU PLUG
214- 77 PZ 271.1450 $ TOP ALLOY 825 2" LID
215- 78 PZ 273.6850 $ TOP SS HONEYCOMB
216- 79 PZ 254.0000 $ TOP WATER GAP
217-
218- MODE N
219- C VOL 88J
220- KCODE 3000 1. 5 35
221- C KSRC -4.3 -5.7 1. -2.8 -5.7 5. -1.4 -5.7 10. 0. -5.7 5.
222- C 1.44 -5.7 3. 2.88 -5.7 8. 4.32 -5.7 9.
223- C -5.7 -4.3 2. -4.3 -4.3 1. -2.8 -4.3 5. -1.4 -4.3 10.
224- C 0. -4.3 5. 1.44 -4.3 3. 2.88 -4.3 8. 4.32 -4.3 9.
225- C -5.7 -2.9 2. -4.3 -2.9 1. -1.4 -2.9 10.
226- C 0. -2.9 5. 2.88 -2.9 8. 4.32 -2.0 9.
227- C -5.7 -1.4 2. -4.3 -1.4 1. -2.8 -1.4 5. -1.4 -1.4 10.
228- C 0. -1.4 5. 1.44 -1.4 3. 2.88 -1.4 8. 4.32 -1.4 9.
229- C -5.7 0.0 2. -4.3 0.0 1. -2.8 0.0 5. -1.4 0.0 10.
230- C 1.44 0.0 3. 2.88 0.0 8. 4.32 0.0 9.
231- C -5.7 1.4 2. -2.8 1.4 5. -1.4 1.4 10.
232- C 0. 1.4 5. 1.44 1.4 3. 2.88 1.4 8. 4.32 1.4 9.
233- C -5.7 2.9 2. -4.3 2.9 1. -2.8 2.9 5. -1.4 2.9 10.
234- C 0. 2.9 5. 1.44 2.9 3. 2.88 2.9 8. 4.32 2.9 9.
235- C -5.7 4.3 2. -4.3 4.3 1. -2.8 4.3 5. -1.4 4.3 10.
236- C 0. 4.3 5. 1.44 4.3 3. 2.88 4.3 8. 4.32 4.3 9.

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237- C MATERIAL SPECIFICATIONS
238- C WATER AT 300 K
239- M1 1001.50C 6.691-2 8016.50C 3.345-2
240- MT1 LWTR.01T
241- C 4.545%/2 Cycle/5 YEAR -- UO2 Kidman Isotopes
242- M2 8016.50C 4.5874E-02
243- 42095.50C 3.8283E-05
244- 43099.50C 4.4871E-05
245- 44101.50C 4.6563E-05
246- 45103.50C 4.0712E-05
247- 47109.50C 1.0074E-05
248- 60143.50C 3.2214E-05
249- 60145.50C 2.3194E-05
250- 62147.50C 9.1028E-06
251- 62149.50C 3.5286E-07
252- 62150.50C 1.2631E-05
253- 62151.50C 1.3331E-06
254- 63151.55C 1.0900E-07
255- 62152.50C 5.7959E-06
256- 63153.55C 5.4871E-06
257- 64155.50C 8.0211E-07
258- 92234.50C 5.7647E-07
259- 92235.50C 2.2960E-05
260- 92236.50C 4.9185E-06
261- 92238.50C 2.1278E-02
262- 93237.55C 4.6531E-06
263- 94238.50C 3.5348E-06
264- 94239.55C 4.5596E-04
265- 94240.50C 1.8734E-04
266- 94241.50C 7.4134E-05
267- 94242.50C 2.0193E-05
268- 95241.50C 5.0568E-05
269- 95242.50C 1.5792E-07
270- 95243.50C 5.1612E-06
271- C He AT 10 ATM DENSITY=1.785E-3 GM/CC
272- C M3 2004.50C 1.0
273- C ZIRCALOY-4
274- M4 8016.50C -0.0012 24000.50C -0.0010 26000.55C -0.0020
275- 40000.50C -0.9818 50000.35C -0.0140
276- C ALLOY 825 density=8.14 g/cc
277- M5 6000.50C -0.0005 13027.50C -0.0020 14000.50C -0.0050
278- 16032.50C -0.0003 22000.50C -0.0090 24000.50C -0.2150
279- 25055.50C -0.0100 26000.55C -0.2857 28000.50C -0.4200
280- 29000.50C -0.0250 42000.50C -0.0300
281- C 1100 ALUMINUM ALLOY
282- M6 13027.50C -0.99880 29000.50C -0.00120
283- C A516 CARBON STEEL
284- M7 6000.50C -0.0022 14000.50C -0.00275 15031.50C -0.00035
285- 16032.50C -0.00035 25055.50C -0.0090
286- 26000.55C -0.98535
287- C SS316L
288- M8 6000.50C -0.00030 7014.50C -0.00100 14000.50C -0.00750
289- 15031.50C -0.00045 16032.50C -0.00030 24000.50C -0.17000
290- 25055.50C -0.02000 26000.55C -0.64545 28000.50C -0.12000
291- 42000.50C -0.02500
292- C DEPLETED URANIUM
293- M9 42000.50C -0.200 92235.50C -0.200 92238.50C -99.600
294- C TALLIES
295- PRINT
296-

```

1 initial source from file srctp
1keff results for: WEST 17x17 FUEL, 21 ASSEMBLY 4.545% Pu/2 Cycles/5 year Kidman Isotopes (wm221dr) probid = 07/10/96 10:30:35

the initial fission neutron source distribution was read from the srctp file named srctp .
the criticality problem was scheduled to skip 5 cycles and run a total of 35 cycles with nominally 3000 neutrons per cycle.
this problem has run 5 inactive cycles with 12973 neutron histories and 30 active cycles with 89835 neutron histories.

this calculation has completed the requested number of keff cycles using a total of 102808 fission neutron source histories.
all cells with fissionable material were sampled and had fission neutron source points.

the results of the w test for normality applied to the individual collision, absorption, and track-length keff cycle values are:

the k(collision) cycle values appear normally distributed at the 95 percent confidence level
the k(absorption) cycle values appear normally distributed at the 95 percent confidence level
the k(trk length) cycle values appear normally distributed at the 95 percent confidence level

the final estimated combined collision/absorption/track-length keff = .32903 with an estimated standard deviation of .00085
the estimated 68, 95, & 99 percent keff confidence intervals are .32818 to .32989, .32730 to .33077, and .32669 to .33138
the estimated collision/absorption neutron removal lifetime = 2.08E-06 seconds with an estimated standard deviation of 2.15E-08
