CRWMS/M&O

Design Analysis Cover Sheet

Complete only applicable items.

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01	Issued Approved with addition of Section 7.5 and 10 Attachments to provide data on a long term low power criticality event within a waste package.

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INFORMATION ONLY

1. Purpose

This analysis is prepared by the Mined Geologic Disposal System (MGDS) Waste Package Development Department (WPDD) to provide pressurized water reactor (PWR) isotopic composition data as a function of time for use in criticality analyses. The objectives of this evaluation are to generate burnup and decay dependant isotopic inventories and to provide these inventories in a form which can easily be utilized in subsequent criticality calculations.

2. Quality Assurance

INFORMATION ONLY

The work performed for this analysis is covered by a Waste Package Development (WPD) QAP-2-0 work control Activity Evaluation entitled "Perform Criticality, Thermal, Structural, and Shielding Analyses" (Ref. 5.1). The QAP-2-0 evaluation determined that such activities are subject to Quality Assurance Requirements and Description (QARD) (Ref. 5.2) controls. Applicable procedural controls are listed in the activity evaluation. The waste package is on the Q-List (Ref. 5.3) by direct inclusion by the Department of Energy (DOE), as an item important to safety and waste isolation; because of the direct inclusion of the waste package on the Q-List, a QAP-2-3 evaluation is not required to be conducted.

The work reported in this document is part of the neutronic analysis for the preliminary design; thus, design inputs include unqualified data and unconfirmed assumptions. These design inputs will require subsequent qualification (or superseding inputs) as the waste package design proceeds. This document will not directly support any construction, fabrication, or procurement activity and, therefore, does not require initiation of a TBV (to be verified) number for tracking purposes. However, use of any data or output from this analysis for input into documents supporting procurement, fabrication, or construction is required to be controlled as TBV in accordance with appropriate procedures.

3. Method

The SAS2H sequence in SCALE 4.2 (Ref. 5.4) is used to calculate the isotopic composition, as a function of time, for the PWR criticality design basis fuel assembly. The prime module of this sequence is the ORIGEN-S code. This code does a point depletion of a selected fuel type with user specified irradiation conditions. At the completion of the depletion calculation, decay of the irradiated fuel with user specified time intervals is computed.

4. Design Inputs

The design inputs identified in this document are for preliminary design and shall be treated as unqualified data; the design inputs will require subsequent qualification (or superseding inputs) as the waste package design proceeds. This document will not support any construction, fabrication, or procurement activity and therefore is not required to be procedurally controlled as TBV.

The dimensions listed in this section and throughout this analysis are in the metric units used directly in the neutronics codes to facilitate checking and preclude errors in input.

4.1 Design Parameters

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The fuel assembly upon which this calculation is based is the B&W 15 x 15 fuel assembly. The mechanical parameters and typical operating parameters for this assembly type are shown in the two tables below.

Table 4.1-1 Mechanical Parameters of B&W 15x15 Fuel Assembly

Parameter	Value	Units	Metric	Units	Radius (cm)	Ref
Fuel Rods	208	/assbly	208	/assbly		5.5
Fuel Rods on a Lattice Side	15	/side	15	/side		5.5
Guide Tubes	16	/assbly	16	/assbly		5.5
Instrumentation Tubes	1	/assbly	1	/assbly		5.5
Total Guide + Instrument Tubes	17	/assbly	17	/assbly		-
Clad/Tube Material	ZIRC-4		ZIRC-4			5.5
Fuel Pellet OD	0.3686	inches	0.936244	cm	0.468122	5.5
Fuel Stack Height	141.8	inches	360.172	cm		5.5
Mass of U	1023	lb	464	kg		5.6
Mass of UO_2	1160.64	lb	526.38	kg		5.5
Percent of Theoretical Density	95	%	95	%		5.5
Fuel Clad OD	0.430	inches	1.0922	cm	0.5461	5.5
Clad Thickness	0.0265	inches	0.06731	cm		5.5
Fuel Clad ID*	0.377	inches	0.95758	cm	0.47879	-
Fuel Rod Pitch	0.568	inches	1.44272	cm		5.5
Guide Tube OD	0.530	inches	1.3462	cm	0.6731	5.5
Guide Tube Thickness	0.016	inches	0.04064	cm		5.5
Guide Tube ID*	0.498	inches	1.26492	cm	0.63246	-
Instrumentation Tube OD	0.493	inches	1.25222	cm	0.62611	5.5
Fuel Assembly Envelope	8.536	inches	21.6814	cm		5.5

* The inner diameters (IDs) above are calculated by subtracting 2 × thickness from the outer diameter (OD).

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The values listed in Table 4.1-2 are preliminary and were obtained through a phone conversation with Framatome Cogema Fuels (formerly B&W Fuel Company) personnel.

Table 4.1-2 Typical Assembly/Core Operating Parameters for a B&W 15x15 Fuel Assembly

Parameter	Value	Units	Metric	Units	Ref
Pellet Average Fuel Temperature	1200	°F	922	K	BWFC
Maximum (peaked) Pellet Average Fuel Temperature	1295	°F	975	K	BWFC
Clad Temperature	50-75 above moderator	°F	28-42 above moderator	K	BWFC
Average Core Exit Moderator Temperature	612	°F	595.4	K	BWFC
Peak Core Exit Moderator Temperature	634	°F	607.6	K	BWFC
Core Exit Moderator Density	-	-	0.6272	g/cm^3	Sat @ 607.6 K
Maximum Beginning of Cycle Boron Concentration	1050	ppm	-	-	BWFC
Number of Assemblies in the Core	177		177		BWFC
Total Core Thermal Power			2568	MWth	BWFC
Typical Power Peaking Across Core	1.2	-	-	-	BWFC
Capacity Factor (lowest expected)	0.6	-	-	-	-
Average Specific Power MW/MTU			31.27	MW/ MTU	BWFC

The theoretical density of UO_2 is 10.96 g/cm^3 as indicated in Table M8.2.1 of the SCALE 4.2 manual (Ref. 5.4).

The atomic weights of isotopes are listed in Table 4.1-3 below (Ref. 5.7).

Avogadro's Number $[N_A] = 0.602252\ (g\text{-}mol)^{-1} \times 10^{24}$ (Ref. 5.7 p. 933). A physical constant is taken to be established fact that requires no additional qualification.

Table 4.1-3 Atomic Weights (Ref 5.7)

Isotope	MCNP ID	Atomic Weight
O-16	8016.50C	15.994915
nat. Mo	42000.50C	95.94
Mo-95	42095.50C	94.905839
Tc-99	43099.50C	98.90627501
Ru-101	44101.50C	100.905576
Rh-103	45103.50C	102.905511
Ag-109	47109.50C	108.904756
nat. Cd	48000.50C	112.4
Cs-133	55133.50C	132.905355
Cs-135	55135.50C	134.90577
Nd-143	60143.50C	142.909779
Nd-145	60145.50C	144.912538
Sm-147	62147.50C	146.914867
Sm-149	62149.50C	148.91718
Sm-150	62150.50C	149.917276
Sm-151	62151.50C	150.919919
Sm-152	62152.50C	151.919756
Eu-151	63151.55C	150.919838
Eu-153	63153.55C	152.921242
Eu-154	63154.50C	153.923053
Gd-155	64155.50C	154.922664
Gd-157	64157.50C	156.924025
U-233	92233.50C	233.039522
U-234	92234.50C	234.040904
U-235	92235.50C	235.043915
U-236	92236.50C	236.045637
U-238	92238.50C	238.05077
Np-237	93237.55C	237.048056
Pu-238	94238.50C	238.049511
Pu-239	94239.55C	239.052146
Pu-240	94240.50C	240.053882
Pu-241	94241.50C	241.056737
Pu-242	94242.50C	242.058725
Pu-243	94243.35C	243.061972
Am-241	95241.50C	241.056714
Am-242m	95242.50C	242.059502
Am-243	95243.50C	243.061367
Cm-243	96243.35C	243.06137
Cm-245	96245.35C	245.065371

INFORMATION ONLY

4.2 Criteria

This design analysis provides input for criticality analyses which evaluate whether waste package designs meet the repository criticality control design criteria from requirement documents. The *Mined Geological Disposal System Requirements Document* (Ref. 5.8) and the *Engineered Barrier Design Requirements Document* (Ref. 5.9) have criteria which pertain to criticality analyses. Reference 5.9 is the lower level document and contains all of the criteria listed in Reference 5.8. The criteria cited that have bearing on this analysis are the following:

EBDRD Requirements (Ref. 5.9)

"3.2.2.6 CRITICALITY PROTECTION INFORMATION ONLY

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)]

B. To mitigate the potential for nuclear criticality, the Engineering Barrier Segment shall be designed and constructed to comply with the nuclear criticality requirements specified by DOE order 6430.1A, 1300-4.

[MGDS-RD 3.2.2.6.B] [DOE Order 6430.1A, 1300-4]"

"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)]"

This document provides SNF composition data which may potentially be used in subsequent analyses for calculation of k_{eff} values. This document does not directly address the above listed requirements, but provides input for future analyses which may address these requirements. This document will not directly support any construction, fabrication, or procurement activity and therefore is not required to carry TBV (to be verified) or TBD (to be determined) items

associated with criteria to design outputs.

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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 unconfirmed items for preliminary design. For this preliminary design, that will not be used to support procurement, fabrication, or construction, the assumptions are clearly identified and traceable to a source, but are not procedurally controlled as TBV.

4.3.1 Principal Isotope (PI) burnup credit is an acceptable criticality control mechanism for the waste package. (CDA Key 009, Ref. 5.10). This assumption is used throughout Section 7.

4.3.2 The Reference PWR fuel assembly selected for conceptual development is the B&W 15 x 15 fuel type, which has been established as one of the more reactive PWR fuel designs under intact fuel assembly and fixed Multi-Purpose Canister (MPC) geometry conditions (Ref. 5.11 p. II.A.3-35). This assumption is used throughout Section 7.

4.3.3 It is assumed that the criticality design basis fuel (DBF) characteristics are 3.0% U-235 enrichment and 20 GWd/MTU burnup. The basis for this assumption is a re-evaluation of the DBF in which scoping analysis indicates this DBF bounds (regarding criticality) 98% of the PWR SNF. This is more appropriate than the previous analysis which designated a primary criticality DBF with characterisitics of 3.75% U-235 enrichment and 32 GWd/MTU and a secondary criticality DBF with characteristics of 3.75% U-235 enrichment and 18 GWd/MTU providing reactivity coverage of 80% and 96% (Ref. 5.12, p. 11), respectively. Re-evaluation of the DBF will be finalized in early FY97 to verifiy these characteristics. This assumption is used throughout Section 7.

4.3.4 For SNF, the list of "Principal Isotopes" previously established (Ref. 5.13 p 4-4) for long-term criticality control was used. The 29 principal isotopes are shown in Table 4.3-1. This assumption is used in Sections 7.3.2 and 7.4.

Table 4.3-1 Principal Long-Term Burnup Credit Isotopes

-	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

4.3.5 The assembly specific power is assumed to be a reasonable "minimum" value of 7.25 MW/assembly. This assumption should maximize the reactivity of the decayed SNF as documented in ORNL/TM-12973 (Ref. 5.14) studies using a similar group of isotopes as included in this analysis. The use of this value will require verification through a parametric analysis applicable to PI burnup credit. This assumption is used in Section 7.3.7.

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4.3.6 The maximum core outlet temperature for B&W 15x15 reactor cores (607.6 K) is used and the reactor operating pressure is assumed to be saturation for the purposes of calculating moderator density. Minimizing moderator density should result in maximizing SNF residual reactivity consistent with DOE/RW-0472, Chapter 4 assumptions (Ref. 5.15). The use of this value will require verification through a parametric analysis applicable to PI burnup credit. This assumption is used in Sections 7.3.4 and 7.3.5.

4.3.7 The maximum pellet average temperature is assumed to be 975 K based on personal communication with BWFC personnel. This is a volume weighted average. The use of this value will require verification through a parametric analysis applicable to PI burnup credit. This assumption is used in Section 7.3.2.

4.3.8 The maximum beginning of cycle, hot full power boron concentration is assumed to be 1050 ppm based on personal communication with BWFC personnel. This is the maximum parts per million boron (ppmb) with Xe and Sm equilibrium buildup. The use of this value will require verification through a parametric analysis applicable to PI burnup credit. This assumption is used in Section 7.3.5.

4.3.9 The clad temperature is assumed to be 42 K higher than the moderator temperature based on personal communication with BWFC personnel. The use of this value will require verification through a parametric analysis applicable to PI burnup credit. This assumption is used in Section 7.3.3.

4.3.10 SAS2H/ORIGEN-S is assumed to provide reasonable predictions of isotopic compositions for a low power criticality event in a waste package over several thousand years. This assumptions will require future verification. This assumption is used in Section 7.5.2.

4.3.11 The temperature in a waste package during a long term low power criticality event is assumed to be an average of 373 K and the water density is assumed to be 1.0 g/cm^3. SAS2H allows only a single average temperature to be entered as was required for this case. This assumption is used in Section 7.5.1.

4.3.12 The power level in a waste package during a long term low power criticality event is assumed to be 2.182 kw (Ref. 5.20, p. 55). This assumption is used in Section 7.5.2.

4.4 Codes and Standards

Not Applicable.

INFORMATION ONLY

5. References

5.1 "Perform Criticality, Thermal, Structural, and Shielding Analyses," Document Identifier (DI) Number: BB0000000-01717-2200-00025 REV 02, Civilian Radioactive Waste Management System (CRWMS) Management and Operating Contractor (M&O).

5.2 *Quality Assurance Requirements and Description* (QARD), DOE/RW-0333P, REV 5, U. S. Department of Energy (USDOE) Office of Civilian Radioactive Waste Management (OCRWM).

5.3 *Yucca Mountain Site Characterization Project Q-List*, YMP/90-55Q, REV 3, Yucca Mountain Site Characterization Project.

5.4 *SCALE 4.2*, RSIC Computer Code Collection, CCC-545, Oak Ridge National Laboratory, September 1994.

5.5 *Preliminary Waste Form Characteristics Report Version 1.0*, UCRL-ID-108314 Rev 1, Lawrence Livermore National Laboratory (LLNL), page 2.1.2.2-6, December 1994.

5.6 *Characteristics of Potential Repository Wastes*, DOE/RW-0184-R1, Volume 1, USDOE OCRWM, page 2A-8, July 1992.

5.7 Benedict, Manson, et al., Nuclear Chemical Engineering, Second Edition, McGraw-Hill Book Company, New York, 1981.

5.8 *Mined Geological Disposal System Requirements Document*, DOE/RW-0404P, DI#: B00000000-00811-1708-00002 REV 02 ICN 1, USDOE OCRWM.

5.9 *Engineered Barrier Design Requirements Document*, YMP/CM-0024, REV 0, ICN 1, Yucca Mountain Site Characterization Project.

5.10 *Controlled Design Assumptions (CDA) Document*, DI#: B00000000-01717-4600-00032 REV 03, CRWMS M&O. (TBV-221-DD)

5.11 "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.

5.12 "Waste Package Design Basis Fuel Analysis," DI#: BBA000000-01717-0200-00121 REV

INFORMATION ONLY

00, CRWMS M&O.

5.13 "Disposal Criticality Analysis Technical Report," DI#: B00000000-01717-5705-00020 REV 00, CRWMS M&O.

5.14 DeHart, M. D., *Sensitivity and Parametric Evaluations of Significant Aspects of Burnup Credit for PWR Spent Fuel Packages*, ORNL/TM-12973, Oak Ridge National Laboratory, June 1995.

5.15 *Topical Report of Actinide-Only Burnup Credit for PWR Spent Nuclear Fuel Packages*, DOE/RW-0472, USDOE OCRWM, May 1995.

5.16 "Characteristics Data Base (CDB_R)," CSCI#: A00000000-02268-1200-20002 V1.1 REV 01, CRWMS M&O.

5.17 Bowman, S. M., and O. W. Hermann, *SCALE-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 3 - Surry Unit 1 Cycle 2*, ORNL/TM-12294/V2, Oak Ridge National Laboratory, March 1995, page 18.

5.18 Incropera, F. P., and D. P. Dewitt, Fundamentals of Heat Transfer, John Wiley & Sons, NY, 1981, Table A.6, page 783.

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

5.20 "Second Waste Package Probabilistic Criticality Analysis: Generation and Evaluation of Internal Criticality Configurations," DI#: BBA000000-01717-2200-00005 REV 00, CRWMS M&O.

6. Use of Computer Software

6.1 Scientific and Engineering Software

SCALE 4.2 CSCI 30004 V1.0 Rev 0. Hewlett Packard Apollo 9000, Series 735 Workstations

The SAS2H sequence of the SCALE 4.2 code system (Ref. 5.4) was used for this analysis. This software was designed for PWR fuel depletion calculations to determine spent fuel isotopic content, decay heat rates, and radioactive source terms. The application to PWR fuel depletion in a reactor is appropriate for the use of this software and falls within the range of validation of this software. The application to long term low power depletion in a waste package does not fall within the range of validation and must be validated in the future. The associated 27BURNUPLIB cross section library was used for these calculations.

A benchmarking and result biasing methodology is in the process of being developed for SAS2H. Bias and uncertainties are applied to the MCNP results which are based on input from SAS2H.

6.2 Computational Support Software

INFORMATION ONLY

LOTUS 1-2-3, Release 4.01 for Windows was used to calculate the isotopic number densities from the g/assembly output per time step provided in the SAS2H/ORIGEN-S output.

7. Design Analysis

This analysis is performed to provide the isotopic inventories as a function of time for the design basis PWR fuel and to provide the change in activity of the isotopic inventories as the result of a long term low power criticality event in a waste package.

7.1 Background

Previous analyses have been performed based on spent nuclear fuel (SNF) isotopic compositions obtained from the Characteristics Data Base (CDB) (Ref. 5.16). This is a preliminary analysis to generate PWR SNF isotopic compositions using SCALE 4.2 (Ref. 5.4). The data in the CDB was generated based on nominal fuel and operating characteristics. SCALE 4.2 can utilize bounding physical and operating paramaters as input to provide a conservative estimate of isotopic inventories.

7.2 Evaluation Procedure

The evaluation procedure is broken into three major tasks, with subtasks in each. The general procedure is as follows:

1) Parameter (Input) Identification
   a) Develop physical fuel description - mechanical parameters
   b) Obtain typical operating parameters

2) Run SCALE 4.2
   a) Calculate/ determine input parameters from task 1 for burnup calculation
   b) Determine decay time steps required for isotopic inventories

3) Process Output
   a) Using a spreadsheet, calculate isotopic number densities based upon selected output
   b) Format and extract number densities in a form suitable for use in MCNP

The results of task 1 are listed in Section 4.1. Details of tasks 2 and 3 are presented in Sections

7.3 and 7.4, respectively.

INFORMATION ONLY

7.3 Code Input Calculations

7.3.1 SAS2H Data Block 5 Input

Table 4.1-1 provides the dimensions required for Data Block 5 in the SAS2H input file. The data is shown in the table below. The material numbers are standard (Ref. 5.4, p. S.2.5.10) for SAS2H.

Table 7.3.1-1 - Data Block 5

PITCH	1.44272
FUELOD	0.936244
MFUEL	1
MMOD	3
CLADOD	1.0922
MCLAD	2
CLADID	0.95758
MGAP	0

7.3.2 Fuel Density and Composition Calculations

The effective density to be used in the calculations is determined by dividing the UO_2 mass in Table 4.1-1 by the volume of the fuel in the assembly. The dimensions necessary to calculate the volume of fuel in the assembly are available in Table 4.1-1. The density is calculated as follows:

$$\rho_{UO2} = UO_2 \text{ mass} / \{\pi*(\text{fuel pellet radius})^2 * \text{fueled height} * \#\text{ of fuel Rods/assembly}\}$$
$$= 526.38 \text{ kg} / \{\pi*(0.468122 \text{ cm})^2 * 360.172 \text{ cm} * 208\} = 10.206 \text{ g/cm}^3$$

The theoretical density of UO_2 is listed as 10.96 g/cm^3 in the SCALE 4.2 database (Ref. 5.4). Therefore, the effective density of fuel is 93.12% of theoretical.

The isotopic distribution of the uranium is determined by the given initial enrichment and the following emperical relationship (Ref. 5.17).

$$wt\%_{234} = 0.007731(wt\%_{235})^{1.0837},$$
$$wt\%_{236} = 0.0046wt\%_{235},$$
$$wt\%_{238} = 100\% - wt\%_{234} - wt\%_{235} - wt\%_{236}$$

Using this formulation, the fresh fuel isotopics for 3.00% U_{235} enrichment was calculated as shown in Table 7.3.2-1. The U-234 and U-238 concentrations were found to be in error in the check of Rev 00. The wt% used was 0.0240 and 96.9622, for U-234 and U-238, respectively. These minor variations compared to the values in Table 7.3.2-1 would have no effect on the

resulting calculations. For consistency, these concentrations were also used in Rev 01 since only variations of the original case were run.

Table 7.3.2-1 Isotopic Breakdown of Uranium for 3% U_{235} Enrichment.

ISOTOPE	WT%
U-234	0.0254
U-235	3.0000
U-236	0.0138
U-238	96.9608

A trace amount of the fission products for which time dependant cross sections are desired are input along with the U mass fractions on the UO_2 "standard composition specification data" cards as described in Section S2.5.4.1 in the SCALE 4.2 manual (Ref. 5.4). The peak fuel temperature (975 K) from Table 4.1-2 is also entered on each of these cards.

7.3.3 Clad Temperature

The clad temperature is calculated by adding the maximum of 42 K to the peak moderator temperature of 607.6 K, as indicated in Table 4.1-2, giving approximately 650 K. Using the peak or maximum is consistent with the temperatures used for the other material regions. This information is listed on a zircaloy standard composition card as material 2.

7.3.4 Moderator Density

The maximum moderator temperature is assumed to provide a minimum moderator density and maximum temperature to result in maximum SNF residual reactivity consistent with Chapter 4 of the Burnup Credit Topical Report (Ref. 5.15). A temperature of 607.6 K is used from Table 4.1-2. The corresponding density is interpolated from the values listed for saturated water (Ref. 5.18) shown in Table 7.3.3-1. The density for 590 K is also included for trending and estimation of the density corresponding to the average exit temperature (595.4 K).

Table 7.3.3-1 Saturated Water Properties from Fundamentals of Heat Transfer (Ref. 5.18)

Temp (K)	Specific Volume (cm^3/g)	Calculated Density (Inverse Specific Volume, g/cm^3)
590	1.482	0.674764
600	1.541	0.648929
610	1.612	0.620347

The density at 607.6 K is determined as shown below:

$$\{(.648929 - .620347)/(600 - 610)\}(607.6 - 600) + .648929 = 0.6272$$

The moderator temperature and density are entered on a H_2O standard composition card as material number 3.

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7.3.5 Boron Concentration

As indicated on page S2.5.12 of the SCALE 4.2 manual (Ref. 5.4), the average boron concentration is calculated by dividing the beginning of cycle value by 1.9. The beginning of cycle value is taken from Table 4.1-2 and the average value is determined to be 552.6 ppm.

The boron concentration along with the moderator temperature and density are entered on an arbitrary material card as described in Table M7.4.5 in the SCALE 4.2 manual (Ref. 5.4) as material number 3.

7.3.6 SAS2H Data Block 8 Input

This problem is making use of the larger unit cell capability of SAS2H. Therefore, the inputs for Data Block 8 must be determined. Four zones are modeled using information from Table 4.1-1.

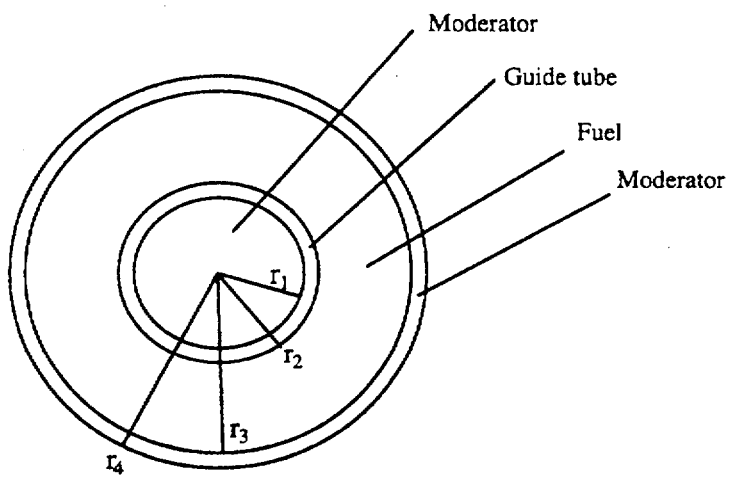

Figure 7.3.6-1 - Larger Unit Cell Model

The first radius, r_1, corresponds to the actual ID of the guide tube (OD of the moderator channel) with a material set to that of the moderator. $r_1 = 0.63246$ cm. The second radius, r_2, is the actual OD of the guide tube with the material set to that of the cladding. $r_2 = 0.67310$ cm. The third radius, r_3, is calculated to give an equal area equivalent to the maximum area of the fuel cell (or the pitch squared). The fourth radius is calculated to preserve the fuel to moderator ratio with the material set to a special number in the code -- 500. The method was determined in consultation with the author of the program at the Radiation Shielding Information Center (RSIC) at Oak Ridge National Laboratory.

The third radius is determined by setting the maximum area of the fuel cell equal to the area of

the equivalent circle.

$$s^2 = \pi \times r_3^2 \qquad r_3^2 = \frac{s^2}{\pi}$$

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$$r_3 = \sqrt{\frac{s^2}{\pi}} = \frac{s}{\sqrt{\pi}} = \frac{1.44272}{\sqrt{\pi}} = 0.814cm$$

where r_3 = the third radius of the larger unit cell encompassing the moderator
s = side of the square (or the rod pitch in this case)

The fourth radius is calculated by taking a ratio of the number of available positions for fuel rods in the assembly to the number of positions used by the guide tubes and instrumentation tubes. For this model, the instrumentation tube is taken as equivalent to a guide tube. This ratio is set equal to the ratio of the areas of the fuel and moderator.

$$\frac{N_{positions}}{N_{guidetubes}} = \frac{\pi \times r_4^2}{\pi \times r_3^2} = \frac{r_4^2}{r_3^2}$$

$$r_4^2 = r_3^2 \times \frac{N_{positions}}{N_{guidetubes}}$$

$$r_4 = \sqrt{r_3^2 \times \frac{N_{positions}}{N_{guidetubes}}} = \sqrt{0.814^2 \times \frac{15 \times 15}{17}} = 2.961cm$$

where r_4 = fourth radius of the larger unit cell encompassing the fuel
$N_{positions}$ = total number of available positions in the lattice structure
$N_{guidetubes}$ = number of positions taken up by instrument & guide tubes

To summarize and group these radii and material numbers with the keywords used in the Data Block 8 input table in the SAS2H manual, the Table is presented below:

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Table 7.3.6-1 Data Block 8

MIXES	3	Material No. for the moderator
RADIUS	0.63246	cm
MIXES	2	Material No. for the Zircaloy
RADIUS	0.67310	cm
MIXES	3	Material No. for the moderator
RADIUS	0.814	cm
MIXES	500	Special Material No. for fuel in the larger unit cell
RADIUS	2.961	cm

7.3.7 Specific Power and Effective Full Power Days Calculations

The calculated average assembly specific power is 2568 MW / 177 assemblies, or 14.51 MW/assembly. The reasonable minimum assembly specific power is calculated as follows:

1. Divide the average specific power by 1.2 (Table 4.1-2) to account for variation in assembly power across the core; 14.51/1.2 = 12.09 MW/assembly.

2. Multiply the minimum core assembly specific power by a capacity factor assumption of 0.6 (Table 4.1-2); 0.6 x 12.09 = 7.25 MW/assembly.

The Effective Full Power Day (EFPD) input is calculated for the desired burnup assuming the minimum assembly power and an assembly uranium loading of 0.464 MTU/assembly (Table 4.1-1): EFPD = Burnup of 20,000 (MWd/MTU) x 0.464 (MTU/assembly) / 7.25 (MW/assembly) = 1280 days. The power and burn values are entered in Data Block 9.

The burnup calculation was divided into 8 substeps through use of the nlib/cyc entry in Data Block 8.

7.3.8 Decay Input

The decay out to 1 million years was run as a separate case from the burnup calculation. The decay case is a stand alone ORIGEN-S problem which utilizes the output from the SAS2H burnup calculation and decays to a number of specified times.

The ORIGEN-S case was run immediately after the corresponding SAS2H case and utilized the final binary cross section file on unit 21 from the SAS2H case. The case input and output are included in Attachment II. The fact that the correct SAS2H generated library is used (unit 21) is verified by comparing the final downtime print of concentrations in the SAS2H output with the concentrations in the corresponding decay times in the ORIGEN-S output (compositions will match). The library contains only the final cycle step (1 position in library). The library unit

number and data position are entered in the input by the following line:

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3$$ 21 0 1 e

The decay times are grouped in 10 steps with the units changing from days to years as appropriate. Based on the SAS2H input, the activities and masses listed in the output are per assembly.

7.4 Number Density Calculations Using ORIGEN-S Output

The grams/assembly output per time step from Attachment II was used to calculate the number density of each of the Principal Isotopes using a LOTUS 1-2-3 spreadsheet. The equation for number density is shown below (Ref. 5.19).

$$N = \rho N_A/M$$

where ρ is the physical density in g/cm^3,
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/cm^3. The required units for subsequent use are atoms/b-cm where 1 barn equals 10^{-24} cm^2. The calculations in the spreadsheet drops the E+24 from Avagadro's Number to account for the conversion. As a conservatism in the criticality calculations which will use these number densities, the values are adjusted up to a 96% theoretical density.

The input and output from these calculations are shown in Attachment III.

7.5 Effects of Long Term Low Power Criticality in the Waste Package

An additional set of calculations were performed to demonstrate the effects of a long term low power criticality in the waste package per the request of the originators of Ref. 5.20. These calculations required minor modifications of the previous SAS2H and ORIGEN-S inputs.

7.5.1 SAS2H Input Modifications

Minor changes as indicated below were made to the SAS2H input to facilitate cross section production at an appropriate temperature for the criticality effects calculations performed using ORIGEN-S. The nlib/cycle entry was changed to 1 from 8 and ncycles was increased to 9 from 1 in Data Block 8. Instead of 1 cycle at 7.25 MW/assembly for 1280 days, the Data Block 9 entries were changed to eight cycles at 7.25 MW/assembly for 160 days each with 0 down time between each cycle. The ninth cycle was set up with an arbitrary low power level (4.976E-5 MW/assembly) for 1 day with the addition of the following parameters which are assumed

representative of the postulated criticality in the waste package (Assumption 4.3.11).

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bfrac (boron fraction)	-	0.
h2ofrac (inverse of the density in reactor calculation to bring density=1 g/cm^3)	-	1.594
temkcyc (modified temperature of all materials in current cycle)	-	373 K

SAS2H is limited to a single average temperature using this method. The input for this case (s3020ucf4.in) is included in Attachment IV. The output is essentially the same as that included in Attachment I for the original SAS2H case.

7.5.2 ORIGEN-S Input Modifications

Four ORIGEN-S cases were run based on the binary output files created by the SAS2H case discussed in Section 7.5.1. The data used includes cross sections and isotopic compositions from the last cycle run.

The first case (s3020ucfo1.in) is the same as the case described in Section 7.3.8 with minor modification to the time step edits and the addition of activity edits in curies for comparison to the long term low power criticality event simulations that follow. The input for this case is included in Attachment V and the activity edits from the output are summarized in Attachment VI.

The second through fourth cases (joklo7.in, joklo8.in, and joklo9.in) have depletion at a power level of 1.039-4 MW/assembly (2.182 kw/waste package divided by 21 assemblies/package) for periods of 10,000, 1000, and 5000 years, respectively, starting 15,000 years after discharge from the reactor cycles. The inputs for these cases are included in Attachments VII through IX. The summarized activity edits for these three cases are included in Attachment X for times after the depletion at a low power level which simulates a criticality event over a long time period.

The summarized grams/assembly table for the 15,000 year decay point of the decay only case is included in Attachment XI. The summarized grams/assembly tables for the criticality cases for the 10 decay times immediately following the criticality are included in Attachment XII.

8. Conclusions

The number densities calculated as indicated in Section 7.4 are shown in Table 8.1 for each isotope for 27 time steps from 1 to 999,999 years.

The activity tables generated in the cases for long term low power criticality simulations in a waste package are included in Attachments VI and X. The neutron flux distribution between the fast, epi-thermal, and thermal groups is provided from s3020ucf4.out (summarized in Attachment XIII) to demonstrate the components of the total flux indicated in Attachment X.

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Table 8-1 Number Densities as a Function of Time for 3.0% Enriched, 20GWD/MT Burnup B&W 15x15 SNF

MCNP ID	1 years	5 years	10 years	20 years	50 years	100 years	200 years
	NUMBER DENSITY (atoms/b-cm)						
8016.50C	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02
42095.50C	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05
43099.50C	2.8116E-05	2.8116E-05	2.8116E-05	2.8116E-05	2.8116E-05	2.7994E-05	2.7994E-05
44101.50C	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05
45103.50C	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05
47109.50C	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06
60143.50C	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05
60145.50C	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05
62147.50C	3.6054E-06	6.0472E-06	6.9977E-06	7.3255E-06	7.3501E-06	7.3501E-06	7.3501E-06
62149.50C	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07
62150.50C	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06
62151.50C	4.9056E-07	4.7620E-07	4.5786E-07	4.2436E-07	3.3661E-07	2.2893E-07	1.0609E-07
63151.55C	5.0253E-09	1.9942E-08	3.7889E-08	7.1869E-08	1.5953E-07	2.6722E-07	3.9006E-07
62152.50C	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06
63153.55C	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06
64155.50C	3.7532E-08	1.3132E-07	1.9193E-07	2.3467E-07	2.4710E-07	2.4710E-07	2.4710E-07
92233.50C	5.2691E-11	6.1989E-11	7.2321E-11	9.3501E-11	1.6324E-10	2.9755E-10	6.3539E-10
92234.50C	4.1561E-06	4.2024E-06	4.2590E-06	4.3670E-06	4.6447E-06	4.9842E-06	5.3494E-06
92235.50C	3.2267E-04	3.2267E-04	3.2267E-04	3.2267E-04	3.2267E-04	3.2318E-04	3.2318E-04
92236.50C	7.1910E-05	7.1910E-05	7.1910E-05	7.1910E-05	7.2420E-05	7.2420E-05	7.2930E-05
92238.50C	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02
93237.55C	6.5004E-06	6.5512E-06	6.6019E-06	6.7543E-06	7.5669E-06	9.0396E-06	1.1782E-05
94238.50C	1.4969E-06	1.4817E-06	1.4210E-06	1.3148E-06	1.0418E-06	7.0293E-07	3.2163E-07
94239.55C	1.3244E-04	1.3244E-04	1.3244E-04	1.3244E-04	1.3244E-04	1.3194E-04	1.3194E-04
94240.50C	3.3700E-05	3.3700E-05	3.3700E-05	3.3650E-05	3.3599E-05	3.3399E-05	3.3048E-05
94241.50C	1.9277E-05	1.5881E-05	1.2485E-05	7.6907E-06	1.8078E-06	1.6131E-07	1.2884E-09
94242.50C	3.5211E-06	3.5211E-06	3.5211E-06	3.5211E-06	3.5211E-06	3.5211E-06	3.5211E-06
95241.50C	1.8028E-06	5.1438E-06	8.5397E-06	1.3134E-05	1.8228E-05	1.8378E-05	1.5781E-05
95242.50C	2.1385E-08	2.0938E-08	2.0440E-08	1.9446E-08	1.6810E-08	1.3129E-08	8.0567E-09
95243.50C	5.0023E-07	5.0023E-07	5.0023E-07	5.0023E-07	4.9528E-07	4.9478E-07	4.9033E-07
Total	7.005442E-02	7.005698E-02	7.005804E-02	7.005831E-02	7.005883E-02	7.005849E-02	7.005861E-02

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Table 8-1 Number Densities as a Function of Time for 3.0% Enriched, 20GWD/MT Burnup B&W 15x15 SNF Continued

MCNP ID	300 years	400 years	500 years	1000 years	4000 years	8000 years	10000 years
	NUMBER DENSITY (atoms/b-cm)						
8016.50C	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02
42095.50C	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05
43099.50C	2.7994E-05	2.7994E-05	2.7994E-05	2.7994E-05	2.7751E-05	2.7386E-05	2.7142E-05
44101.50C	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05
45103.50C	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05
47109.50C	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06
60143.50C	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05
60145.50C	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05
62147.50C	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06
62149.50C	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07
62150.50C	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06
62151.50C	4.9056E-08	2.2733E-08	1.0529E-08	2.2335E-10	2.0580E-20	8.5350E-34	1.7469E-40
63151.55C	4.4669E-07	4.7301E-07	4.8498E-07	4.9535E-07	4.9615E-07	4.9615E-07	4.9615E-07
62152.50C	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06
63153.55C	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06
64155.50C	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07
92233.50C	1.0538E-09	1.5446E-09	2.0973E-09	5.4757E-09	3.1150E-08	6.6122E-08	8.3169E-08
92234.50C	5.5552E-06	5.6066E-06	5.6580E-06	5.7095E-06	5.6580E-06	5.6066E-06	5.5552E-06
92235.50C	3.2369E-04	3.2421E-04	3.2472E-04	3.2625E-04	3.3701E-04	3.4981E-04	3.5596E-04
92236.50C	7.2930E-05	7.3440E-05	7.3950E-05	7.5480E-05	8.3640E-05	9.1290E-05	9.3840E-05
92238.50C	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02
93237.55C	1.4118E-05	1.6099E-05	1.7825E-05	2.3208E-05	2.7525E-05	2.7525E-05	2.7474E-05
94238.50C	1.4767E-07	6.8270E-08	3.1556E-08	7.7373E-10	8.4453E-17	2.4426E-25	1.3148E-29
94239.55C	1.3144E-04	1.3093E-04	1.3043E-04	1.2892E-04	1.1834E-04	1.0575E-04	9.9710E-05
94240.50C	3.2697E-05	3.2396E-05	3.2045E-05	3.0390E-05	2.2115E-05	1.4493E-05	1.1735E-05
94241.50C	1.3983E-11	3.7655E-12	3.6556E-12	3.5108E-12	2.7467E-12	1.9826E-12	1.6830E-12
94242.50C	3.5211E-06	3.5211E-06	3.5211E-06	3.5161E-06	3.4962E-06	3.4714E-06	3.4614E-06
95241.50C	1.3434E-05	1.1486E-05	9.7882E-06	4.3797E-06	3.5857E-08	1.2135E-10	5.5433E-11
95242.50C	4.9136E-09	3.0088E-09	1.8401E-09	1.5765E-10	6.2166E-17	1.7904E-25	9.5984E-30
95243.50C	4.8537E-07	4.8092E-07	4.7646E-07	4.5467E-07	3.4273E-07	2.3526E-07	1.9514E-07
Total	7.005827E-02	7.005849E-02	7.005870E-02	7.005857E-02	7.005821E-02	7.005790E-02	7.005741E-02

Table 8-1 Number Densities as a Function of Time for 3.0% Enriched, 20GWD/MT Burnup B&W 15x15 SNF Continued

MCNP ID	14000 years	18000 years	22000 years	26000 years	30000 years	36000 years	45000 years
	NUMBER DENSITY (atoms/b-cm)						
8016.50C	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02
42095.50C	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05
43099.50C	2.6777E-05	2.6412E-05	2.6047E-05	2.5803E-05	2.5438E-05	2.4951E-05	2.4221E-05
44101.50C	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05
45103.50C	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05
47109.50C	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06
60143.50C	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05
60145.50C	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05
62147.50C	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06
62149.50C	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07
62150.50C	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06
62151.50C	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63151.55C	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07
62152.50C	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06
63153.55C	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06
64155.50C	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07
92233.50C	1.1675E-07	1.5032E-07	1.8287E-07	2.1490E-07	2.4641E-07	2.9238E-07	3.5902E-07
92234.50C	5.5037E-06	5.5037E-06	5.4523E-06	5.4009E-06	5.3494E-06	5.2465E-06	5.1437E-06
92235.50C	3.6672E-04	3.7645E-04	3.8515E-04	3.9284E-04	3.9949E-04	4.0820E-04	4.1896E-04
92236.50C	9.7920E-05	1.0098E-04	1.0251E-04	1.0353E-04	1.0455E-04	1.0506E-04	1.0557E-04
92238.50C	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02
93237.55C	2.7474E-05	2.7423E-05	2.7373E-05	2.7373E-05	2.7322E-05	2.7271E-05	2.7170E-05
94238.50C	3.7877E-38	1.0923E-46	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
94239.55C	8.9135E-05	7.9063E-05	7.0502E-05	6.2948E-05	5.6401E-05	4.7287E-05	3.6510E-05
94240.50C	7.6727E-06	5.0650E-06	3.3048E-06	2.1664E-06	1.4192E-06	7.5223E-07	2.9136E-07
94241.50C	1.2135E-12	8.7894E-13	6.3423E-13	4.5645E-13	3.2960E-13	2.0176E-13	9.6883E-14
94242.50C	3.4365E-06	3.4067E-06	3.3818E-06	3.3570E-06	3.3321E-06	3.2973E-06	3.2426E-06
95241.50C	3.8254E-11	2.7567E-11	1.9926E-11	1.4383E-11	1.0387E-11	6.3923E-12	2.9265E-12
95242.50C	2.7701E-38	8.0070E-47	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
95243.50C	1.3373E-07	9.2122E-08	6.2900E-08	4.3287E-08	2.9717E-08	1.6889E-08	7.2311E-09
Total	7.005714E-02	7.005680E-02	7.005623E-02	7.005593E-02	7.005584E-02	7.005463E-02	7.005373E-02

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Table 8-1 Number Densities as a Function of Time for 3.0% Enriched, 20GWD/MT Burnup B&W 15x15 SNF Continued

MCNP ID	60000 years	70000 years	100000 years	250000 years	500000 years	999999 years
	NUMBER DENSITY (atoms/b-cm)					
8016.50C	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02	4.6947E-02
42095.50C	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05	2.8413E-05
43099.50C	2.3004E-05	2.2274E-05	2.0205E-05	1.2293E-05	5.4285E-06	1.0516E-06
44101.50C	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05	2.6008E-05
45103.50C	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05	1.6846E-05
47109.50C	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06	2.4208E-06
60143.50C	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05	2.2660E-05
60145.50C	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05	1.6864E-05
62147.50C	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06	7.3501E-06
62149.50C	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07	1.1479E-07
62150.50C	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06	6.4561E-06
62151.50C	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63151.55C	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07	4.9615E-07
62152.50C	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06	2.9636E-06
63153.55C	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06	2.1255E-06
64155.50C	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07	2.4710E-07
92233.50C	4.6389E-07	5.3208E-07	7.0771E-07	1.2966E-06	1.6324E-06	1.5756E-06
92234.50C	5.0048E-06	4.8968E-06	4.5984E-06	3.4360E-06	2.3198E-06	1.4968E-06
92235.50C	4.3176E-04	4.3791E-04	4.4815E-04	4.5532E-04	4.5532E-04	4.5532E-04
92236.50C	1.0557E-04	1.0557E-04	1.0557E-04	1.0506E-04	1.0455E-04	1.0251E-04
92238.50C	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02	2.2352E-02
93237.55C	2.7068E-05	2.6966E-05	2.6713E-05	2.5443E-05	2.3462E-05	1.9958E-05
94238.50C	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
94239.55C	2.3719E-05	1.7827E-05	7.5034E-06	1.0072E-07	7.6041E-11	2.3215E-15
94240.50C	5.9677E-08	2.0761E-08	8.7258E-10	1.1735E-16	3.8163E-18	5.1653E-18
94241.50C	2.8516E-14	1.2635E-14	1.0937E-15	5.2936E-21	7.3911E-30	0.0000E+00
94242.50C	3.1531E-06	3.0934E-06	2.9293E-06	2.2181E-06	1.3925E-06	5.5204E-07
95241.50C	8.5896E-13	3.8054E-13	3.2910E-14	1.5981E-19	2.3472E-28	4.5645E-46
95242.50C	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
95243.50C	1.7681E-09	6.8844E-10	4.1108E-11	7.5282E-16	7.1320E-16	6.9834E-16
Total	7.005206E-02	7.005135E-02	7.004864E-02	7.003743E-02	7.002636E-02	7.001472E-02

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9. Attachments

The following attachments are case input and output files and spreadsheets as listed. The name of the file is listed in parenthesis. The first three attachments are included in Revision 00 of this document and are unchanged by Revision 01.

I. SAS2H Burnup Case Output (s3020ucf.out) 2/16/96 825 pages
II. ORIGEN-S Decay Case Output (s3020ucfo.out) 2/16/96 122 pages
III. Spreadsheet for Number Density Calculation 3/31/96 18 pages
IV. Modified SAS2H Burnup Case Input (s3020ucf4.in) 3/7/96 2 pages
V. Modified ORIGEN-S Decay Case Input (s3020ucfo1.in) 3/12/96 1 page
VI. Modified ORIGEN-S Decay Case Output Summary (decay.sum) 3/29/96 93 pages
VII. Modified ORIGEN-S 10,000 year Criticality Case Input (joklo7.in) 3/14/96 1 page
VIII. Modified ORIGEN-S 1000 year Criticality Case Input (joklo8.in) 3/14/96 1 page
IX. Modified ORIGEN-S 5000 year Criticality Case Input (joklo9.in) 3/14/96 1 page
X. Modified ORIGEN-S Criticality Cases Output Summary (joklo8.sum) 3/14/96 95 pages
XI. Modified ORIGEN Decay Case Output Summary of grams/assembly tables (s3020ucfO1.sum) 8/8/96 19 pages
XII. Modified ORIGEN Criticality Cases Output Summary of grams/assembly tables (joklo8.grams) 8/9/96 51 pages
XIII. Modified SAS2H Burnup Case Flux Output Summary (flux) 3/12/96 1 page

```
0*************************************************************************
*                                                                       *
*                  scale4.2  bulletin  board                            *
*                  --------  --------  -----                            *
*                                                                       *
*     welcome to the configuration controlled version of scale4.2.      *
*     any problems should be reported to kay martin at 4-9213.          *
*                                                                       *
*     updates that have been made from version 4.1 to 4.2 include:      *
*                                                                       *
*     nitawl:  parameter added to prevent exponent underflows for very  *
*     dilute resonance calculations on workstation.  (mrr 93-011)       *
*                                                                       *
*     nitawl:  corrected discrepancies in maximum fractional energy loss *
*     of neutron in admixed moderator calculation and simpson rule      *
*     calculation of collision density as documented in "improved       *
*     calculation of flux shapes with the resonance shielding code      *
*     nitawl", by j. oppe, ecn-i--93-003.  affects all calculations.    *
*     impact will vary, but is insignificant for hydrogen-moderated     *
*     systems. (mrr 93-030)                                             *
*                                                                       *
*     sas4:  added option of axial source profile input for both radial *
*     and axial dose calculations. also added option idr = 2 for        *
*     estimation to point detectors from collisions in both top and     *
*     bottom halves of geometry.  (mrr 92-016)                          *
*                                                                       *
*     morse:  modifications made for compatibility with the new options in *
*     sas4 (i.e., the axial source profile input option and             *
*     the option idr = 2 for estimation to point detectors from collisions *
*     in both top and bottom halves of geometry).  (mrr 92-016)         *
*                                                                       *
*     csas & keno-v.a:  error checking during input processing was added *
*     so that these modules terminate with an error message if input    *
*     errors are encountered.  (mrr 93-013, 93-014, 93-015, 93-018)     *
*                                                                       *
*     keno-v.a:  corrections made for applying differential albedo      *
*     boundary conditions to supergrouped problems where global unit    *
*     contains only an array specification.  effect on keff is very large *
*     for this type of problem.  (mrr 93-033)                           *
*                                                                       *
*     keno-v.a:  corrected an error introduced with modification on may 24, *
*     1993 (mrr 93-033). this error affected problems with mirror or    *
*     periodic boundary conditions and could cause problem to loop, fail, *
*     or run incorrectly.                                               *
*                                                                       *
*     xsdrnpm:  corrected calculation of number of direct access data   *
*     blocks needed to weight the cross sections to prevent occasional  *
*     failure.  improved calculation of balance tables.  (mrr 93-021)   *
*                                                                       *
*     origen-s:  modified program to read combined binary libraries that *
*     include multi-cycle cross sections.  add option to edit binary    *
*     library.  (mrr 93-026)                                            *
*                                                                       *
*     sas2:  modified to produce combined binary libraries for origen-s. *
*     (mrr 93-027)                                                      *
*                                                                       *
*     couple:  modified to allow combined binary libraries to be made by *
*     sas2.  (mrr 93-031)                                               *
*                                                                       *
*     origen-s couple, sas2:  modified programs to accept the new updated *
```

```
*     and expanded decay data and fission product yield libraries.  (mrr      *
*     92-083, 92-025, 92-026)                                                 *
*                                                                             *
*     origen-s libraries:  the six standard origen-s card image libraries     *
*     have been replaced by two new libraries, end6dec and xsectpho.          *
*     end6dec contains the updated and expanded decay data library based      *
*     on endf/b-vi data.  xsectpho contains the basic cross section and       *
*     photon spectra data and updated fission product yield data based on     *
*     endf/b-v data.  (drr 92-006, 007, 008, 009, 010, and drr 93-001,        *
*     002, 003, 006, 008, 009)                                                *
*                                                                             *
*     std. comp. library:  in drr 92-033, the following nuclides were         *
*     changed to turn on resonance processing flag but should not have        *
*     been changed:  niss, fess, mnss, crss, niinconel, crinconel,            *
*     feinconel.  flags for these nuclides have now been returned to off.     *
*     (drr 93-014)                                                            *
*                                                                             *
*     heating7:  replaced heating6 with version 7.2.  (mrr 93-058)            *
*                                                                             *
*     htas1:  updated for compatibility with heating7 and to interact         *
*     effectively with ocular.  fin effectiveness technique was added.        *
*     (mrr 93-056)                                                            *
*                                                                             *
*     ocular:  made compatible with heating7 and htas1 on mainframe and       *
*     workstation.  (mrr 93-057)                                              *
*                                                                             *
*     sas2:  corrected so that 'parm=skipshipdata' would work on              *
*     workstation.  (mrr 93-051)                                              *
*                                                                             *
*     aim:  ft47ft001 is no longer require for aim to execute on              *
*     workstation.  (mrr 93-052)                                              *
*                                                                             *
*     27group, 27burnup, and 218group - these libraries have been             *
*     updated to correct an error found in the chlorine cross-sections.       *
*     (drr93-022)                                                             *
*                                                                             *
*     bonami:  corrected so that a case with a number density of zero         *
*     for a nuclide that has bondarenko data will run without failing.        *
*     (mrr 93-060)                                                            *
*                                                                             *
*     csas:  corrected calculation of dancoff correction factor for           *
*     cylindrical cells.  note that previous calculations of small            *
*     cylindrical cells (o.d. < 0.3 cm) gave non-conservative keff            *
*     values.  also corrected dancoff factor for multiregion slab             *
*     cell with vacuum boundary conditions to be set to zero.                 *
*     (mrr 93-065)                                                            *
*                                                                             *
*     csas, sas1, sas2, sas3, sas4:  error in miplib was corrected.  for       *
*     resonance materials that are not part of the unit cell in lattice-      *
*     cell or multiregion problems, the dancoff factor defaulted  to -1.      *
*     check your nitawl output in any previous scale-4.2 calculations         *
*     for dancoff factors =-1.                                                *
*     (mrr 93-070)                                                            *
*                                                                             *
*******************************************************************************
1          primary module access and input record ( scale driver - 10/01/86 - 14:00 )
-  module sas2h    will be called
     SAS2H: Babcock Wilcox 15x15, 3.00wt%, 20gwd/mtu burn High Temp
     27burnuplib    latticecell
     '
```

```
' mixtures of fuel-pin-unit-cell:
'   dammass UO2/ Volume assembly = 526377.3 g/5.157524E4
uo2 1 den=10.2060 1 975 92235 3.00 92234 0.0240 92236 0.0138 92238 96.9622 end
kr-83     1 0 1-20 975 end
kr-85     1 0 1-20 975 end
sr-90     1 0 1-20 975 end
 y-89     1 0 1-20 975 end
mo-95     1 0 1-20 975 end
zr-93     1 0 1-20 975 end
zr-94     1 0 1-20 975 end
zr-95     1 0 1-20 975 end
nb-94     1 0 1-20 975 end
tc-99     1 0 1-20 975 end
rh-103    1 0 1-20 975 end
rh-105    1 0 1-20 975 end
ru-101    1 0 1-20 975 end
ru-106    1 0 1-20 975 end
pd-105    1 0 1-20 975 end
pd-108    1 0 1-20 975 end
ag-109    1 0 1-20 975 end
sb-124    1 0 1-20 975 end
xe-131    1 0 1-20 975 end
xe-132    1 0 1-20 975 end
xe-135    1 0 1-20 975 end
xe-136    1 0 1-20 975 end
cs-134    1 0 1-20 975 end
cs-135    1 0 1-20 975 end
cs-137    1 0 1-20 975 end
ba-136    1 0 1-20 975 end
la-139    1 0 1-20 975 end
pr-141    1 0 1-20 975 end
pr-143    1 0 1-20 975 end
ce-144    1 0 1-20 975 end
nd-143    1 0 1-20 975 end
nd-145    1 0 1-20 975 end
pm-147    1 0 1-20 975 end
pm-148    1 0 1-20 975 end
nd-147    1 0 1-20 975 end
sm-147    1 0 1-20 975 end
sm-149    1 0 1-20 975 end
sm-150    1 0 1-20 975 end
sm-151    1 0 1-20 975 end
sm-152    1 0 1-20 975 end
gd-155    1 0 1-20 975 end
eu-153    1 0 1-20 975 end
eu-154    1 0 1-20 975 end
eu-155    1 0 1-20 975 end
zircalloy 2   1.0  650 end
h2o       3 den=0.6272 1 607.6 end
arbm-bormod 0.6272 1 1 0 0 5000 100 3 552.6e-6 607.6 end
'
' 1050 ppm boron
' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
end comp
'
' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
'
'  fuel-pin-cell geometry:
'
squarepitch  1.44272  0.956244 1 3 1.0922 2 0.95758 0 end
```

```
      '
      '- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
      '
      '
      '  assembly and cycle parameters:
      '
      npin/assm=208 fuelngth=360.172 ncycles=1 nlib/cyc=8
      printlevel=5 implevel=2 numtotal=4  end
      3 0.65246 2 0.67310 3 0.814 500 2.961
      power=7.25 burn=1280 down=1826.25
        end
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used    20.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     3.00 (seconds).
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c005   has been called.
0   module c0c005   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c004   has been called.
0   module c0c004   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used    20.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used      .00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c005   has been called.
0   module c0c005   is finished. completion code     0. cpu time used     1.00 (seconds).
0   secondary module c0c004   has been called.
0   module c0c004   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used      .00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used    22.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     3.00 (seconds).
0   secondary module c0c008   has been called.
0   module c0c008   is finished. completion code     0. cpu time used      .00 (seconds).
0   secondary module c0c002   has been called.
0   module c0c002   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c001   has been called.
0   module c0c001   is finished. completion code     0. cpu time used     2.00 (seconds).
0   secondary module c0c005   has been called.
0   module c0c005   is finished. completion code     0. cpu time used      .00 (seconds).
0   secondary module c0c004   has been called.
0   module c0c004   is finished. completion code     0. cpu time used     3.00 (seconds).
0   secondary module c0c008   has been called.
```

```
0  module a0c008   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c005   has been called.
0  module a0c005   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c004   has been called.
0  module a0c004   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c005   has been called.
0  module a0c005   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c004   has been called.
0  module a0c004   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c005   has been called.
0  module a0c005   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module a0c004   has been called.
0  module a0c004   is finished. completion code    0. cpu time used    3.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c008   has been called.
0  module a0c008   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module a0c002   has been called.
0  module a0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module a0c001   has been called.
0  module a0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module a0c005   has been called.
```

```
0  module c0c005   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c004   has been called.
0  module c0c004   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module c0c008   has been called.
0  module c0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c002   has been called.
0  module c0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module c0c001   has been called.
0  module c0c001   is finished. completion code    0. cpu time used    3.00 (seconds).
0  secondary module c0c008   has been called.
0  module c0c008   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module c0c002   has been called.
0  module c0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c001   has been called.
0  module c0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module c0c005   has been called.
0  module c0c005   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c004   has been called.
0  module c0c004   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module c0c008   has been called.
0  module c0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c002   has been called.
0  module c0c002   is finished. completion code    0. cpu time used   20.00 (seconds).
0  secondary module c0c001   has been called.
0  module c0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module c0c008   has been called.
0  module c0c008   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c002   has been called.
0  module c0c002   is finished. completion code    0. cpu time used    1.00 (seconds).
0  secondary module c0c001   has been called.
0  module c0c001   is finished. completion code    0. cpu time used    2.00 (seconds).
0  secondary module c0c005   has been called.
0  module c0c005   is finished. completion code    0. cpu time used     .00 (seconds).
0  secondary module c0c004   has been called.
0  module c0c004   is finished. completion code    0. cpu time used   13.00 (seconds).
0  module sas2h    is finished. completion code    0. cpu time used  281.00 (seconds).
0requested parm=halt8,skipcellwt,skipshipdata
  pass= 0, exec halts after pass   8

0                    90      unit no. of master storage data
0                    96      unit no. of bonami input data
0                    97      unit no. of nitawl input data
0                    98      unit no. of xsdrnpm input data
0                    93      unit no. of couple input data
0                    94      unit no. of origens input data
0                    95      unit no. of xsdose input data
0                    71      unit no. of recycled densities
0                    74      unit no. of neut. & gamma sources
0                    21      unit no. of origens input library
0                    33      unit no. of final origens library produced by sas2 case
0                    70      unit no. of sas2h storage data
0                    72      unit no. of (formatted) cycle atom densities, burnups, sources, etc.
1  SSSSSSSSSS     AAAAAAAA     SSSSSSSSSS   ZZZZZZZZZZZZ   HH        HH
  SSSSSSSSSSSS   AAAAAAAAAA   SSSSSSSSSSSS  ZZZZZZZZZZZZZ  HH        HH
  SS        SS   AA        AA  SS        SS  ZZ        ZZ  HH        HH
  SS             AA        AA  SS            ZZ          HH        HH
  SS             AA        AA  SS            ZZ          HH        HH
  SSSSSSSSSSS    AAAAAAAAAAAA  SSSSSSSSSSS   ZZ          HHHHHHHHHHHH
   SSSSSSSSSSS   AAAAAAAAAAAA   SSSSSSSSSSS  ZZ          HHHHHHHHHHHH
          SS     AA        AA          SS   ZZ          HH        HH
```

```
          ss  aa      aa          ss    22        hh      hh
  ss      ss  aa      aa  ss      ss  22          hh      hh
  sssssssssss aa      aa  sssssssssss 22222222222 hh      hh
   sssssssss  aa      aa   sssssssss  22222222222 hh      hh
0

  dddddddddd    aaaaaaaa   w       w iiiiiiiiiii   sssssssss
  dddddddddd   aaaaaaaaaa  w       w iiiiiiiiiii  sssssssssss
  dd      dd  aa      aa  w       w     ii       ss      ss
  dd      dd  aa      aa  w       w     ii       ss
  dd      dd  aa      aa  w       w     ii       ss
  dd      dd  aaaaaaaaaaaa w       w     ii       sssssssss
  dd      dd  aaaaaaaaaaaa  w     w      ii        sssssssss
  dd      dd  aa      aa    w   w        ii              ss
  dd      dd  aa      aa     w  w        ii              ss
  dd      dd  aa      aa      w w        ii       ss     ss
  dddddddddd  aa      aa       ww    iiiiiiiiiii sssssssss
  dddddddddd  aa      aa        v    iiiiiiiiiii  sssssssss
0

   000000     22222222222        //     11     666666666666        //  999999999   666666666666
  00000000    22222222222        //    111     666666666666        //  999999999999 666666666666
 00      00   22      22         //   1111     66                  //  99      99  66
00        00          22        //     11     66                  //  99      99  66
00        00          22       //      11     66                  //  99      99  66
00        00        22         //      11     666666666666        //  999999999999 666666666666
00        00      22           //      11     666666666666        //   999999999999 666666666666
00        00    22             //      11     66      66          //           99  66      66
00        00  22               //      11     66      66          //           99  66      66
 00      00  22                //      11     66      66          //           99  66      66
  00000000   22222222222       //    11111111 666666666666        //  999999999999 666666666666
   000000    22222222222       //    11111111  666666666          //  999999999    666666666
0

   000000     999999999                 555555555555     44                 22222222222  3333333333
  00000000    999999999999              555555555555    444                 22222222222  3333333333333
 00      00   99      99       :::      55             4444       :::      22      22  33        33
00        00  99      99       :::      55            44 44               22          33
00        00  99      99       :::      55           44  44               22          33
00        00  999999999999              555555555555 44   44                22       333
00        00   999999999999             555555555555 4    44                 22      333
00        00          99       :::               55 44444444444      :::      22        33
00        00          99       :::               55 44444444444      :::     22         33
 00      00           99       :::      55       55     44          :::    22      33  33
  00000000   999999999999              555555555555     44                 22222222222  3333333333333
   000000    999999999999               555555555555    44                 22222222222  3333333333
1
0                        sssssssss   cccccccccc    aaaaaaaa   ll            eeeeeeeeeeee
                        ssssssssssss cccccccccccc  aaaaaaaaaa  ll            eeeeeeeeeeee
                        ss      ss   cc      cc   aa      aa  ll            ee
                        ss           cc           aa      aa  ll            ee
                        ss           cc           aa      aa  ll            ee
                        sssssssssss  cc           aaaaaaaaaaaa ll           eeeeeeeee
                         sssssssssss cc           aaaaaaaaaaaa ll           eeeeeeeee
                                 ss  cc           aa      aa  ll            ee
                                 ss  cc           aa      aa  ll            ee
                        ss       ss  cc      cc   aa      aa  ll            ee
                        ssssssssssss cccccccccccc aa      aa  llllllllllll eeeeeeeeeeee
                         sssssssssss  cccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
```

```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   scale  version:   4.2         *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program:  sas2                               *****
*****                                                       *****
*****     creation date:  04/27/95                          *****
*****                                                       *****
*****          library:  /neutronics/scale/exe              *****
*****                                                       *****
*****                                                       *****
*****  this is not a  scale  configuration controlled code  *****
*****                                                       *****
*****          jobname:  davis                              *****
*****                                                       *****
*****  date of execution:  02/16/96                         *****
*****                                                       *****
*****  time of execution:  09:54:23                         *****
*****                                                       *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****************************************************************
```

```
1
0'
0'  mixtures of fuel-pin-unit-cell:
0'   dim-mass UO2/ Volume assembly = 526377.3 g/5.1575246E4
0'
0' 1060 ppm boron
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0'
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0'
0'  fuel-pin-cell geometry:
0'
0'
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0'
0'
0'  assembly and cycle parameters:
0'
0'
0'  mixtures of fuel-pin-unit-cell:
0'   dim-mass UO2/ Volume assembly = 526377.3 g/5.1575246E4
     sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp

0    **** problem parameters ****
```

```
    lib 27burnup.lib  library
    mxx            3 mixtures
    msc           48 composition specifications
    izm            4 material zones
    ge  latticecell  geometry
    more           0 0/1 do not read/read optional parameter data
    msln           0 fuel solutions

0   **** problem composition description ****

    sc  uo2          standard composition
    mx             1 mixture no.
    vf        1.0000 volume fraction
    roth     10.2060 specified density
    temp       975.0 deg kelvin
               92235   3.00%
               92234    .02%
               92236    .01%
               92238  96.96%
    end

    sc  kr-83        standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
    temp       975.0 deg kelvin
    end

    sc  kr-85        standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
    temp       975.0 deg kelvin
    end

    sc  sr-90        standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
    temp       975.0 deg kelvin
    end

    sc  y-89         standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
    temp       975.0 deg kelvin
    end

    sc  mo-95        standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
    temp       975.0 deg kelvin
    end

    sc  zr-95        standard composition
    mx             1 mixture no.
    den   1.0000E-20 atomic density
    roth      1.0000 theoretical density
```

```
temp        975.0 deg kelvin
end

sc  zr-94          standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  zr-95          standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  nb-94          standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  tc-99          standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  rh-103         standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth      12.5000 theoretical density
temp        975.0 deg kelvin
end

sc  rh-105         standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth      12.5000 theoretical density
temp        975.0 deg kelvin
end

sc  ru-101         standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  ru-106         standard composition
mx               1 mixture no.
den   1.0000E-20 atomic density
roth       1.0000 theoretical density
temp        975.0 deg kelvin
end

sc  pd-105         standard composition
```

```
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  pd-108       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  ag-109       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth     10.6010 theoretical density
temp       975.0 deg kelvin
end

sc  sb-124       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  xe-131       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  xe-132       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  xe-135       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  xe-136       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  cs-134       standard composition
mx              1 mixture no.
den   1.0000E-20 atomic density
roth      1.8730 theoretical density
temp       975.0 deg kelvin
```

```
end

sc  cs-135        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.8730 theoretical density
temp       975.0 deg kelvin
end

sc  cs-137        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  ba-136        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  la-139        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  pr-141        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  pr-143        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  ce-144        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  nd-143        standard composition
mk              1 mixture no.
den   1.0000E-20 atomic density
roth      6.9600 theoretical density
temp       975.0 deg kelvin
end

sc  nd-145        standard composition
mk              1 mixture no.
```

```
den   1.0000E-20 atomic density
roth      6.9600 theoretical density
temp       975.0 deg kelvin
end

sc  pm-147       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  pm-148       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  nd-147       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  sm-147       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      1.0000 theoretical density
temp       975.0 deg kelvin
end

sc  sm-149       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      7.7000 theoretical density
temp       975.0 deg kelvin
end

sc  sm-150       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      7.7000 theoretical density
temp       975.0 deg kelvin
end

sc  sm-151       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      7.7000 theoretical density
temp       975.0 deg kelvin
end

sc  sm-152       standard composition
mk             1 mixture no.
den   1.0000E-20 atomic density
roth      7.7000 theoretical density
temp       975.0 deg kelvin
end
```

```
    sc  gd-155          standard composition
    mx                1 mixture no.
    den    1.0000E-20 atomic density
    roth       1.0000 theoretical density
    temp        975.0 deg kelvin
    end

    sc  eu-153          standard composition
    mx                1 mixture no.
    den    1.0000E-20 atomic density
    roth       5.2400 theoretical density
    temp        975.0 deg kelvin
    end

    sc  eu-154          standard composition
    mx                1 mixture no.
    den    1.0000E-20 atomic density
    roth       5.2400 theoretical density
    temp        975.0 deg kelvin
    end

    sc  eu-155          standard composition
    mx                1 mixture no.
    den    1.0000E-20 atomic density
    roth       5.2400 theoretical density
    temp        975.0 deg kelvin
    end

    sc  zircalloy       standard composition
    mx                2 mixture no.
    vf         1.0000 volume fraction
    roth       6.4400 theoretical density
    temp        650.0 deg kelvin
    end

    sc  h2o             standard composition
    mx                3 mixture no.
    vf         1.0000 volume fraction
    roth        .6272 specified density
    temp        607.6 deg kelvin
    end

    sc  arlm-borrod     standard composition
    mx                3 mixture no.
    vf          .0006 volume fraction
    temp        607.6 deg kelvin
    roth        .6272 density
    nel               1 no. elements
    ivis              1 0/1 no variable isotope/variable isotope
    icp               0 0/1 mixture/compound
    irs               0 0/1 no resonance mtl./resonance mtl.

                 5000 100.00
0'
0' 1050 ppm boron
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
    end

0   **** problem geometry ****
```

```
0'
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0'
0'  fuel-pin-cell geometry:
0'
    ctp squarepitch  cell type
    pitch     1.4427 cm center to center spacing
    fuelod     .9362 cm fuel diameter or slab thickness
    mfuel          1 mixture no. of fuel
    mmod           3 mixture no. of moderator
    cladod    1.0922 cm clad outer diameter
    mclad          2 mixture no. of clad
    gapod      .9576 cm gap outer diameter
    mgap           0 mixture no. of gap

0   zone specifications for latticecell geometry

                zone  1 is fuel
                zone  2 is gap
                zone  3 is clad
                zone  4 is mod
1     ******************************************************************************************
      ***                                                                                    ***
      ***                        sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp ***
      ***                                                                                    ***
      ******************************************************************************************
      ******************************************************************************************
      ***                                                                                    ***
      ***                          ********** data library information **********           ***
      ***                                                                                    ***
      ***        unit                                          volume                        ***
      ***       number          data set name                   name       unit function    ***
      ***       ------          -------------                   ----       -------------    ***
      ***                                                                                    ***
      ***         89     /neutronics/scale/datalib/scale.rev04.sclib        standard composition library ***
      ***                                                                                    ***
      ***         87     /neutronics/scale/datalib/scale.rev03.xn27bu       cross section library ***
      ***                                                                                    ***
      ***         12     ft12f001                                           short cross section library ***
      ***                                                                                    ***
      ******************************************************************************************
      ******************************************************************************************
      ***                                                                                    ***
      ***                                                                                    ***
      ***                          standard composition library data                         ***
      ***                          --------------------------------                          ***
      ***                                                                                    ***
      ***          unit number  :  89                                                        ***
      ***                                                                                    ***
      ***          dataset name :  /neutronics/scale/datalib/scale.rev04.sclib               ***
      ***                                                                                    ***
      ***          library title:  scale-4 standard composition library                      ***
      ***                          385 standard compositions, 332 nuclides                   ***
      ***                          10 elements with variable isotopic distributions.         ***
      ***                                                                                    ***
      ***          creation date:  4/17/95                                                   ***
      ***                                                                                    ***
      ***                                                                                    ***
      ***                                                                                    ***
```

```
      ***                                cross section library data                                  ***
      ***                                ---------------------------                                ***
      ***                                                                                           ***
      ***          unit number  :  87                                                               ***
      ***                                                                                           ***
      ***          dataset name :  /neutronics/scale/datalib/scale.rev03.xn27bu                     ***
      ***                                                                                           ***
      ***          library title:  scale 4.2 - 27 group neutron burnup library                      ***
      ***                            based on endf-b version 4 data with endf-b version 5 fission products ***
      ***                              compiled for nrc      1/27/89                                ***
      ***                                last updated        9/16/93                                ***
      ***                                  l.m.petrie   -   ornl                                    ***
      ***                                                                                           ***
      ***                                                                                           ***
      ***                                                                                           ***
      ***                                                                                           ***
      ***                                                                                           ***
      ***********************************************************************************************
      ***********************************************************************************************
1

0   **** xsdrn mesh intervals ****

      8 mesh intervals in zone  1
      4 mesh intervals in zone  2
      4 mesh intervals in zone  3
      8 mesh intervals in zone  4
0'
0' - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0'
0'
0'  assembly and cycle parameters:
0'
1    **** larger cell data (using sas2h) ****
0    inplevel=        2
     runzones=        4
     mixmoder=        3
     morepeats=       1
     facmesh=   1.000E+00
0    **** larger cell geometry
0    zone   xsdrnpm mixture   radius (cm)

      1          3          6.3246E-01
      2          2          6.7310E-01
      3          3          8.1400E-01
      4          1          2.9610E+00
1    **** reactor history data ****
0    npin/assm=       208
     fuelngth=  3.602E+02
     ncycles=         1
     nlib/cyc=        8
     lightel=         0
     printlevel=      5
0                                          .....average density.....
     cycle   power(mw)  burn, days  down, days  relative to that in cycle 1
                                                   boron      water
       1    7.250E+00   1.280E+03   1.828E+03    1.000E+00   1.000E+00
1  bbbbbbbbbbb    ooooooooooo   nn        nn              aaaaaaaa    nnn       nnn  iiiiiiiiiiii    zzzzzzzzzzz
   bbbbbbbbbbbb   oooooooooooo  nnn       nn              aaaaaaaaaa  nnnn      nnnn iiiiiiiiiiii    zzzzzzzzzzzz
   bb       bb    oo        oo  nnnn      nn              aa      aa  nnnnn     nnnnn    ii        zz        zz
   bb       bb    oo        oo  nn nn     nn              aa      aa  nn nnn   nnn nn    ii                  zz
```

INFORMATION ONLY

```
bb      bb  oo      oo  m  m   m            aa      aa  mm  mm mm  mm     ii            22
bbbbbbbbbb  oo      oo  m   m  m  ------------ aaaaaaaaaaaa mm   mmm  mm     ii           22
bbbbbbbbbb  oo      oo  m   m  m  ------------ aaaaaaaaaaaa mm    m   mm     ii          22
bb      bb  oo      oo  m    m m            aa      aa  mm      mm     ii         22
bb      bb  oo      oo  m     m m            aa      aa  mm      mm     ii        22
bb      bb  oo      oo  m     mmm            aa      aa  mm      mm     ii      22
bbbbbbbbbb  oooooooooo  m      mm            aa      aa  mm      mm iiiiiiiiiii 22222222222
bbbbbbbbb    oooooooo   m       m            aa      aa  mm      mm iiiiiiiiiii 22222222222
0

dddddddddd    aaaaaaaa   w       w iiiiiiiiiii  sssssssss
dddddddddd   aaaaaaaaaa  w       w iiiiiiiiiii sssssssssss
dd      dd  aa      aa  w       w     ii      ss      ss
dd      dd  aa      aa  w       w     ii      ss
dd      dd  aa      aa  w       w     ii      ss
dd      dd  aaaaaaaaaaaa w      w     ii      sssssssssss
dd      dd  aaaaaaaaaaaa  w     w     ii       sssssssssss
dd      dd  aa      aa    w   w       ii              ss
dd      dd  aa      aa     w w        ii              ss
dd      dd  aa      aa      w w       ii      ss      ss
dddddddddd  aa      aa       ww  iiiiiiiiiii sssssssssss
dddddddddd  aa      aa        v  iiiiiiiiiii  sssssssss
0

   000000    22222222222        //     11     666666666666        //  999999999   666666666666
  00000000   22222222222       //     111     666666666666       //  999999999999 666666666666
 00      00  22      22      //     1111     66              //  99      99  66
00        00        22     //       11      66             //  99      99  66
00        00        22    //        11      66            //  99      99  66
00        00       22    //         11      666666666666 //  999999999999 666666666666
00        00      22    //          11      666666666666 //   99999999999 666666666666
00        00     22    //           11      66      66  //          99  66      66
00        00    22    //            11      66      66 //           99  66      66
 00      00   22    //              11      66      66 //           99  66      66
  00000000   22222222222 //         11111111 666666666666 //  999999999999 666666666666
   000000    22222222222 //         11111111  666666666  //   99999999999  666666666
0

   000000    999999999          555555555555      44            3333333333  3333333333
  00000000   999999999999       555555555555     444            3333333333  3333333333
 00      00  99      99    :::  55             4444     :::   33      33  33      33
00        00 99      99   :::  55            44 44     :::           33          33
00        00 99      99  :::  55           44  44     :::           33          33
00        00 999999999999     555555555555 44   44          333         333
00        00  99999999999     555555555555 44   44          333         333
00        00          99  :::          55 44444444444 :::      33          33
00        00          99 :::          55 44444444444 :::      33          33
 00      00           99 :::  55      55      44     :::  33      33  33      33
  00000000   999999999999     555555555555      44          3333333333  3333333333
   000000    999999999          555555555      44           3333333333  3333333333
1
0                          9999999999  cccccccccc   aaaaaaaa  ll        eeeeeeeeeeee
                          99999999999 cccccccccccc aaaaaaaaaa ll        eeeeeeeeeeee
                          99      99  cc      cc  aa      aa ll        ee
                          99          cc          aa      aa ll        ee
                          99          cc          aa      aa ll        ee
                          99999999999 cc          aaaaaaaaaaaa ll        eeeeeeee
                           999999999  cc          aaaaaaaaaaaa ll        eeeeeeee
                                   99 cc          aa      aa ll        ee
                                   99 cc          aa      aa ll        ee
```

```
ss        ss  cc        cc  aa        aa  ll          ee
sssssssssss   ccccccccccc   aa        aa  lllllllllll eeeeeeeeeee
 sssssssss     ccccccccc    aa        aa  lllllllllll eeeeeeeeeee
```

INFORMATION ONLY

```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   scale  version:   4.2         *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program:  c0c008                             *****
*****                                                       *****
*****     creation date:  04/27/95                          *****
*****                                                       *****
*****          library:  /neutronics/scale/exe              *****
*****                                                       *****
*****                                                       *****
*****  this is not a  scale  configuration controlled code  *****
*****                                                       *****
*****          jobname:  davis                              *****
*****                                                       *****
*****  date of execution:  02/16/96                         *****
*****                                                       *****
*****  time of execution:  09:54:33                         *****
*****                                                       *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****************************************************************
```

```
1
0      -1q array has     1 entries.
0       0q array has     4 entries.
0       1q array has     6 entries.
0       2q array has     2 entries.
1logical assignments
0master library   12
 working library   0
 scratch file     18
 new library       1
0p r o b l e m   d e s c r i p t i o n
0igr--geometry (0/1/2/3--inf med/slaby/cyl/sphere              2
0izm--number of zones or material regions                      4
0ms--mixing table length                                      66
0ibl--shielded cross section edit option (0/1--no/yes)         0
0ibr--bondarenko factor edit option (0/1--no/yes)              0
0issopt--dancoff factor option                                 0
0convergence criterion    1.00000E-03
0geometry correction factor for wigner rational approximation  1.350E+00
0       3q array has    66 entries.
0       4q array has    66 entries.
```

```
0       5q array has     66 entries.
0       6q array has      4 entries.
0       7q array has      4 entries.
0       8q array has      4 entries.
0       9q array has      4 entries.
0      10q array has     66 entries.
0      11q array has      4 entries.
0m i x i n g   t a b l e
0entry  mixture  isotope  number density  new identifier
```

1	1	92235	6.91508E-04	92235
2	1	92234	5.55578E-06	92234
3	1	92236	3.16744E-06	92236
4	1	92238	2.20677E-02	92238
5	1	8016	4.55359E-02	8016
6	3	8016	2.09710E-02	6
7	1	36083	1.00000E-20	36083
8	1	36085	1.00000E-20	36085
9	1	38090	1.00000E-20	38090
10	1	39089	1.00000E-20	39089
11	1	42095	1.00000E-20	42095
12	1	40093	1.00000E-20	40093
13	1	40094	1.00000E-20	40094
14	1	40095	1.00000E-20	40095
15	1	41094	1.00000E-20	41094
16	1	43099	1.00000E-20	43099
17	1	45103	1.00000E-20	45103
18	1	45105	1.00000E-20	45105
19	1	44101	1.00000E-20	44101
20	1	44106	1.00000E-20	44106
21	1	46105	1.00000E-20	46105
22	1	46108	1.00000E-20	46108
23	1	47109	1.00000E-20	47109
24	1	51124	1.00000E-20	51124
25	1	54131	1.00000E-20	54131
26	1	54132	1.00000E-20	54132
27	1	54135	1.00000E-20	54135
28	1	54136	1.00000E-20	54136
29	1	55134	1.00000E-20	55134
30	1	55135	1.00000E-20	55135
31	1	55137	1.00000E-20	55137
32	1	56136	1.00000E-20	56136
33	1	57139	1.00000E-20	57139
34	1	59141	1.00000E-20	59141
35	1	59143	1.00000E-20	59143
36	1	58144	1.00000E-20	58144
37	1	60143	1.00000E-20	60143
38	1	60145	1.00000E-20	60145
39	1	61147	1.00000E-20	61147
40	1	61148	1.00000E-20	61148
41	1	60147	1.00000E-20	60147
42	1	62147	1.00000E-20	62147
43	1	62149	1.00000E-20	62149
44	1	62150	1.00000E-20	62150
45	1	62151	1.00000E-20	62151
46	1	62152	1.00000E-20	62152
47	1	64155	1.00000E-20	64155
48	1	63153	1.00000E-20	63153
49	1	63154	1.00000E-20	63154
50	1	63155	1.00000E-20	63155
51	2	40802	4.25156E-02	40802

INFORMATION

```
  52     3       1001    4.19420E-02          1001
  53     3       5010    3.81515E-06          5010
  54     3       5011    1.54884E-05          5011
  55     1      55133    1.00000E-20         55133
  56     1      93237    1.00000E-20         93237
  57     1      94238    1.00000E-20         94238
  58     1      94239    1.00000E-20         94239
  59     1      94240    1.00000E-20         94240
  60     1      94241    1.00000E-20         94241
  61     1      94242    1.00000E-20         94242
  62     1      95241    1.00000E-20         95241
  63     1      95243    1.00000E-20         95243
  64     1      96244    1.00000E-20         96244
  65     1        999    1.00000E-20           999
  66     4        999    1.00000E-20            66
0geometry and material description
0zone  mixture  outer dimension  temperature     extra xs   type (0/1--fuel/mod)
   1      1        4.68122E-01   9.75000E+02  9.05844E-01          0
   2      4        4.78790E-01   2.93000E+02  5.49010E-01          0
   3      2        5.46100E-01   6.50000E+02   .00000E+00          0
   4      3        8.13968E-01   6.07600E+02   .00000E+00          0
     7711 locations of   200000 available are required to make a new master containing the self-shielded values
0no nuclides in your problem have bondarenko factor data**bonami will copy from logical 12 to logical  1
0copy      999  1/v cross sectio from log 12 to log 18   bondarenko trigger 0
0copy      999  1/v cross sectio from log 18 to log  1   bondarenko trigger 0
0copy      999  1/v cross sectio from log 18 to log  1   bondarenko trigger 0
0copy     1001   hydrogen        from log 12 to log  1   bondarenko trigger 0
0copy     5010  b-10 1273 218ngp from log 12 to log  1   bondarenko trigger 0
0copy     5011   boron-11        from log 12 to log  1   bondarenko trigger 0
0copy     8016   oxygen-16       from log 12 to log 18   bondarenko trigger 0
0copy     8016   oxygen-16       from log 18 to log  1   bondarenko trigger 0
0copy     8016   oxygen-16       from log 18 to log  1   bondarenko trigger 0
0copy    36083   kr-83           from log 12 to log  1   bondarenko trigger 0
0copy    36085   kr-85           from log 12 to log  1   bondarenko trigger 0
0copy    38090   sr-90           from log 12 to log  1   bondarenko trigger 0
0copy    39089    y-89           from log 12 to log  1   bondarenko trigger 0
0copy    40093   zr-93           from log 12 to log  1   bondarenko trigger 0
0copy    40094   zr-94           from log 12 to log  1   bondarenko trigger 0
0copy    40095   zr-95           from log 12 to log  1   bondarenko trigger 0
0copy    40302   zircalloy       from log 12 to log  1   bondarenko trigger 0
0copy    41094   nb-94           from log 12 to log  1   bondarenko trigger 0
0copy    42095   mo-95           from log 12 to log  1   bondarenko trigger 0
0copy    43099   tc-99           from log 12 to log  1   bondarenko trigger 0
0copy    44101   ru-101          from log 12 to log  1   bondarenko trigger 0
0copy    44106   ru-106          from log 12 to log  1   bondarenko trigger 0
0copy    45103   rh-103          from log 12 to log  1   bondarenko trigger 0
0copy    45105   rh-105          from log 12 to log  1   bondarenko trigger 0
0copy    46105   pd-105          from log 12 to log  1   bondarenko trigger 0
0copy    46108   pd-108          from log 12 to log  1   bondarenko trigger 0
0copy    47109   silver-109      from log 12 to log  1   bondarenko trigger 0
0copy    51124   sb-124          from log 12 to log  1   bondarenko trigger 0
0copy    54131   xe-131          from log 12 to log  1   bondarenko trigger 0
0copy    54132   xe-132          from log 12 to log  1   bondarenko trigger 0
0copy    54135   xenon-135       from log 12 to log  1   bondarenko trigger 0
0copy    54136   xe-136          from log 12 to log  1   bondarenko trigger 0
0copy    55133   cesium-133      from log 12 to log  1   bondarenko trigger 0
0copy    55134   cs-134          from log 12 to log  1   bondarenko trigger 0
0copy    55135   cs-135          from log 12 to log  1   bondarenko trigger 0
0copy    55137   cs-137          from log 12 to log  1   bondarenko trigger 0
0copy    56136   ba-136          from log 12 to log  1   bondarenko trigger 0
```

```
0copy   57139  la-139          from log 12 to log  1   bondarenko trigger 0
0copy   58144  ce-144          from log 12 to log  1   bondarenko trigger 0
0copy   59141  pr-141          from log 12 to log  1   bondarenko trigger 0
0copy   59143  pr-143          from log 12 to log  1   bondarenko trigger 0
0copy   60143  nd-143          from log 12 to log  1   bondarenko trigger 0
0copy   60145  nd-145          from log 12 to log  1   bondarenko trigger 0
0copy   60147  nd-147          from log 12 to log  1   bondarenko trigger 0
0copy   61147  pm-147          from log 12 to log  1   bondarenko trigger 0
0copy   61148  pm-148          from log 12 to log  1   bondarenko trigger 0
0copy   62147  sm-147          from log 12 to log  1   bondarenko trigger 0
0copy   62149  sm-149          from log 12 to log  1   bondarenko trigger 0
0copy   62150  sm-150          from log 12 to log  1   bondarenko trigger 0
0copy   62151  sm-151          from log 12 to log  1   bondarenko trigger 0
0copy   62152  sm-152          from log 12 to log  1   bondarenko trigger 0
0copy   63153  eu-153          from log 12 to log  1   bondarenko trigger 0
0copy   63154  eu-154          from log 12 to log  1   bondarenko trigger 0
0copy   63155  eu-155          from log 12 to log  1   bondarenko trigger 0
0copy   64155  gd-155          from log 12 to log  1   bondarenko trigger 0
0copy   92234  u-234 1043 sigo= from log 12 to log  1   bondarenko trigger 0
0copy   92235  uranium-235     from log 12 to log  1   bondarenko trigger 0
0copy   92236  u-236 1163 sigo= from log 12 to log  1   bondarenko trigger 0
0copy   92238  uranium-238     from log 12 to log  1   bondarenko trigger 0
0copy   93237  neptunium-237   from log 12 to log  1   bondarenko trigger 0
0copy   94238  pu-238 1050 sigo from log 12 to log  1   bondarenko trigger 0
0copy   94239  plutonium-239   from log 12 to log  1   bondarenko trigger 0
0copy   94240  plutonium-240   from log 12 to log  1   bondarenko trigger 0
0copy   94241  plutonium-241   from log 12 to log  1   bondarenko trigger 0
0copy   94242  plutonium-242   from log 12 to log  1   bondarenko trigger 0
0copy   95241  am-241 1056 sigp from log 12 to log  1   bondarenko trigger 0
0copy   95243  am-243 1057 218  from log 12 to log  1   bondarenko trigger 0
0copy   96244  curium-244      from log 12 to log  1   bondarenko trigger 0
1     scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
           compiled for nrc      1/27/89
              last updated       9/16/93
                l.m.petrie  -    ornl
        tape id                          4321        number of nuclides              66
        number of neutron groups           27        number of gamma groups           0
        first thermal group                15        logical unit                     1
                                  table of contents
       1/v cross sections normalized to 1.0 at 0.0253 ev                        id    999
       1/v cross sections normalized to 1.0 at 0.0253 ev                        id     66
        hydrogen       endf/b-iv mat 1269/thmm1002   updated 10/13/89           id   1001
       b-10 1273 218ngp 042575 p-3 298k                                         id   5010
        boron-11       endf/b-iv mat 1160            updated 10/13/89           id   5011
        oxygen-16      endf/b-iv mat 1276            updated 10/13/89           id   8016
        oxygen-16      endf/b-iv mat 1276            updated 10/13/89           id      6
        kr-83          mt=102,103,103,105,106,107    updated 10/13/89           id  36083
        kr-85            mt=  102                                               id  36085
        sr-90          mt=102                        updated 10/13/89           id  38090
         y-89          mt=102                        updated 10/13/89           id  39089
        zr-93            mt=  102                                               id  40093
        zr-94          mt=102                        updated 10/13/89           id  40094
        zr-95          mt=102                        updated 10/13/89           id  40095
        zircalloy      endf/b-iv mat 1284            updated 10/13/89           id  40302
        nb-94          mt=102                        updated 10/13/89           id  41094
        mo-95          mt=102                        updated 10/13/89           id  42095
        tc-99          mt=102                        updated 10/13/89           id  43099
        ru-101         mt=102                        updated 10/13/89           id  44101
        ru-106         mt=102                        updated 10/13/89           id  44106
```

```
rh-103        mt=102                          updated 10/13/89          id   45103
rh-105          mt=  102                                                id   45105
pd-105        mt=102                          updated 10/13/89          id   46105
pd-108        mt=102                          updated 10/13/89          id   46108
silver-109    endf/b-iv mat 1139              updated 10/13/89          id   47109
sb-124        mt=102                          updated 10/13/89          id   51124
xe-131        mt=102,103,104,105,106          updated 10/13/89          id   54131
xe-132        mt=102,103,104,105,106          updated 10/13/89          id   54132
xenon-135     endf/b-iv mat 1294              updated 10/13/89          id   54135
xe-136          mt=  102, 103, 104, 105, 107                            id   54136
cesium-133    endf/b-iv mat 1141              updated 10/13/89          id   55133
cs-134        mt=102                          updated 10/13/89          id   55134
cs-135          mt=  102                                                id   55135
cs-137        mt=102                          updated 10/13/89          id   55137
ba-136        mt=102                          updated 10/13/89          id   56136
la-139        mt=102                          updated 10/13/89          id   57139
ce-144          mt=  102                                                id   58144
pr-141        mt=102,103,104,105,106,107      updated 10/13/89          id   59141
pr-143        mt=102                          updated 10/13/89          id   59143
nd-143        mt=102                          updated 10/13/89          id   60143
nd-145        mt=102                          updated 10/13/89          id   60145
nd-147        mt=102                          updated 10/13/89          id   60147
pm-147        mt=102                          updated 10/13/89          id   61147
pm-148          mt=  102                                                id   61148
sm-147        endf/b-v fission product        updated 10/13/89          id   62147
sm-149        mt=102,103,107                  updated 10/13/89          id   62149
sm-150        mt=102                          updated 10/13/89          id   62150
sm-151        mt=102,103,104,105,106,107      updated 10/13/89          id   62151
sm-152        mt=102,103,104,105,106,107      updated 10/13/89          id   62152
eu-153        mt=102,103,104,105,106,107      updated 10/13/89          id   63153
eu-154        mt=102,103,104,105,106,107      updated 10/13/89          id   63154
eu-155        mt=102,103,104,105,106,107      updated 10/13/89          id   63155
gd-155        mt=102                          updated 10/13/89          id   64155
u-234 1043 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                     id   92234
uranium-235   endf/b-iv mat 1261              updated 10/13/89          id   92235
u-236 1163 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                     id   92236
uranium-238   endf/b-iv mat 1262              updated 10/13/89          id   92238
neptunium-237 endf/b-iv mat 1263              updated 10/13/89          id   93237
pu-238 1050 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                    id   94238
plutonium-239 endf/b-iv mat 1264              updated 10/13/89          id   94239
plutonium-240 endf/b-iv mat 1265              updated 10/13/89          id   94240
plutonium-241 endf/b-iv mat 1266              updated 10/13/89          id   94241
plutonium-242 endf/b-iv mat 1161              updated 10/13/89          id   94242
am-241 1056 sigo=5+4 newklacs 218ngp p-3 293k                           id   95241
am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                            id   95243
curium-244    endf/b-iv mat 1162              updated 10/13/89          id   96244
0     tape copy used      0 i/o's, and took     .00 seconds
1          m        m  iiiiiiiiiiii   tttttttttttt    aaaaaaaa    ww        ww  ll
           mm       m  iiiiiiiiiiii   tttttttttttt   aaaaaaaaaa   ww        ww  ll
           mmm      m      ii            tt        aa        aa  ww        ww  ll
           m m      m      ii            tt        aa        aa  ww        ww  ll
           m  m     m      ii            tt        aa        aa  ww        ww  ll
           m   m    m      ii            tt        aaaaaaaaaaaa  ww    w   ww  ll
           m    m   m      ii            tt        aaaaaaaaaaaa  ww   www  ww  ll
           m     m  m      ii            tt        aa        aa  ww  ww ww  ww  ll
           m      m m      ii            tt        aa        aa  ww ww   ww ww  ll
           m       mm      ii            tt        aa        aa  wwww     wwww  ll
           m        mm iiiiiiiiiiii      tt        aa        aa  www       www  llllllllllll
           m         m iiiiiiiiiiii      tt        aa        aa  ww        ww  llllllllllll
0
```

```
dddddddddd    aaaaaaaa   w        w  iiiiiiiiiii   ssssssssss
dddddddddddd  aaaaaaaaaa w        w  iiiiiiiiiii   ssssssssssss
dd      dd   aa      aa  w        w      ii       ss      ss
dd      dd   aa      aa  w        w      ii       ss
dd      dd   aa      aa  w        w      ii       ss
dd      dd   aaaaaaaaaaaa w        w      ii       ssssssssss
dd      dd   aaaaaaaaaaaa  w      w       ii        ssssssssss
dd      dd   aa      aa    w    w        ii               ss
dd      dd   aa      aa     w  w         ii               ss
dd      dd   aa      aa      w w         ii       ss      ss
dddddddddddd aa      aa       ww     iiiiiiiiiii  ssssssssssss
dddddddddd   aa      aa        v     iiiiiiiiiii   ssssssssss
0

  oooooo     zzzzzzzzzz          //      11      eeeeeeeeee          //  ppppppppp   eeeeeeeeee
 oooooooo    zzzzzzzzzzz         //     111      eeeeeeeeee          //  pppppppppp  eeeeeeeeee
oo    oo     zz      zz         //    1111      ee                  //  pp      pp  ee
oo    oo            zz        //       11      ee                  //  pp      pp  ee
oo    oo            zz       //        11      ee                  //  pp      pp  ee
oo    oo          zz        //         11      eeeeeeeeee          //  pppppppppp  eeeeeeeeee
oo    oo        zz         //          11      eeeeeeeeee          //   pppppppp   eeeeeeeeee
oo    oo      zz          //           11      ee      ee          //         pp   ee      ee
oo    oo    zz           //            11      ee      ee          //         pp   ee      ee
oo    oo  zz            //             11      ee      ee          //         pp   ee      ee
 oooooooo   zzzzzzzzzzz //            11111111  eeeeeeeeee          //  pppppppppp  eeeeeeeeee
  oooooo    zzzzzzzzzzz //            11111111   eeeeeeeee          //  pppppppppp   eeeeeeeee
0

  oooooo     ppppppppp                 ssssssssss        44          ssssssssss  ssssssssss
 oooooooo    pppppppppp                ssssssssss       444          ssssssssss  ssssssssss
oo    oo     pp      pp      :::       ss              4444      :::  ss      ss  ss
oo    oo     pp      pp      :::       ss             44 44      :::          ss  ss
oo    oo     pp      pp      :::       ss            44  44      :::          ss  ss
oo    oo     pppppppppp                ssssssssss   44   44                sss  ssssssssss
oo    oo     ppppppppp                 ssssssssss  44    44                sss  ssssssssss
oo    oo           pp      :::                ss  44444444444  :::          ss          ss
oo    oo           pp      :::                ss  44444444444  :::          ss          ss
 oooooooo    pppppppppp    :::       ss      ss        44      :::  ss      ss  ss      ss
 oooooooo    pppppppppp                ssssssssss        44          ssssssssss  ssssssssss
  oooooo     ppppppppp                  ssssssss         44           ssssssss   ssssssssss
1
0                          ssssssssss   cccccccccc    aaaaaaaa   ll   eeeeeeeeeeee
                          ssssssssssss cccccccccccc  aaaaaaaaaa  ll   eeeeeeeeeeee
                          ss      ss   cc      cc   aa      aa  ll   ee
                          ss           cc           aa      aa  ll   ee
                          ss           cc           aa      aa  ll   ee
                          ssssssssss   cc           aaaaaaaaaaaa ll   eeeeeeee
                           ssssssssss  cc           aaaaaaaaaaaa ll   eeeeeeee
                                   ss  cc           aa      aa  ll   ee
                                   ss  cc           aa      aa  ll   ee
                          ss       ss  cc      cc   aa      aa  ll   ee
                          ssssssssssss cccccccccccc aa      aa  llllllllllll eeeeeeeeeeee
                           ssssssssss   cccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
```

****

```
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                program verification information                   *****
*****                                                                   *****
*****                code system:    scale  version:    4.2              *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****                program:  c0c002                                   *****
*****                                                                   *****
*****           creation date:  04/27/95                                *****
*****                                                                   *****
*****                library:  /neutronics/scale/exe                    *****
*****                                                                   *****
*****                                                                   *****
*****      this is not a   scale  configuration controlled code         *****
*****                                                                   *****
*****                jobname:  davis                                    *****
*****                                                                   *****
*****      date of execution:  02/16/96                                 *****
*****                                                                   *****
*****      time of execution:  09:54:35                                 *****
*****                                                                   *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****************************************************************************
1
0       -1q array has       1 entries.
0        0q array has       9 entries.
0        1q array has      12 entries.
0select 65 nuclides from the master  library on logical  1
        0 nuclides from the working library on logical  2
        0 nuclides from the working library on logical  3
          to create the new working library on logical  4

       61 resonance calculations have been requested
        0 output option for aapx formatted cross section data
0the storage allocated for this case is 200000 words
0        2q array has      65 entries.
0        3q array has     915 entries.
0        4q array has      65 entries.
0 general information concerning cross section library
    tape identification number                  4321
    number of nuclides on tape                    66
    number of neutron energy groups               27
    first thermal neutron energy group            15
    number of gamma energy groups                  0
0  direct access unit number  9 requires 117 blocks of length  1484 words
- xsdrn tape   4321
                        scale 4.2 - 27 group neutron burnup library
                           based on endf-b version 4 data with endf-b version 5 fission products
                              compiled for nnc      1/27/89
                                 last updated       9/16/93
                                    l.m.petrie   -   ornl
0 nuclides from xsdrn tape
    1    1/v cross sections normalized to 1.0 at 0.0253 ev                    999
```

```
 2   hydrogen        endf/b-iv mat 1269/thrm1002     updated 10/13/89        1001
 3  b-10 1273 218ngp 042375 p-3 293k                                         5010
 4   boron-11        endf/b-iv mat 1160              updated 10/13/89        5011
 5   oxygen-16       endf/b-iv mat 1276              updated 10/13/89        8016
 6   oxygen-16       endf/b-iv mat 1276              updated 10/13/89          .6
 7   kr-83           mt=102,103,103,105,106,107      updated 10/13/89       36083
 8   kr-85             mt=  102                                             36085
 9   sr-90           mt=102                          updated 10/13/89       38090
10    y-89           mt=102                          updated 10/13/89       39089
11   zr-93             mt=  102                                             40093
12   zr-94           mt=102                          updated 10/13/89       40094
13   zr-95           mt=102                          updated 10/13/89       40095
14   zircalloy       endf/b-iv mat 1284              updated 10/13/89       40302
15   nb-94           mt=102                          updated 10/13/89       41094
16   mo-95           mt=102                          updated 10/13/89       42095
17   tc-99           mt=102                          updated 10/13/89       43099
18   ru-101          mt=102                          updated 10/13/89       44101
19   ru-106          mt=102                          updated 10/13/89       44106
20   rh-103          mt=102                          updated 10/13/89       45103
21   rh-105            mt=  102                                             45105
22   pd-105          mt=102                          updated 10/13/89       46105
23   pd-108          mt=102                          updated 10/13/89       46108
24   silver-109      endf/b-iv mat 1139              updated 10/13/89       47109
25   sb-124          mt=102                          updated 10/13/89       51124
26   xe-131          mt=102,103,104,105,106          updated 10/13/89       54131
27   xe-132          mt=102,103,104,105,106          updated 10/13/89       54132
28   xenon-135       endf/b-iv mat 1294              updated 10/13/89       54135
29   xe-136            mt=  102, 103, 104, 105, 107                         54136
30   cesium-133      endf/b-iv mat 1141              updated 10/13/89       55133
31   cs-134          mt=102                          updated 10/13/89       55134
32   cs-135            mt=  102                                             55135
33   cs-137          mt=102                          updated 10/13/89       55137
34   ba-136          mt=102                          updated 10/13/89       56136
35   la-139          mt=102                          updated 10/13/89       57139
36   ce-144            mt=  102                                             58144
37   pr-141          mt=102,103,104,105,106,107      updated 10/13/89       59141
38   pr-143          mt=102                          updated 10/13/89       59143
39   nd-143          mt=102                          updated 10/13/89       60143
40   nd-145          mt=102                          updated 10/13/89       60145
41   nd-147          mt=102                          updated 10/13/89       60147
42   pm-147          mt=102                          updated 10/13/89       61147
43   pm-148            mt=  102                                             61148
44   sm-147          endf/b-v fission product        updated 10/13/89       62147
45   sm-149          mt=102,103,107                  updated 10/13/89       62149
46   sm-150          mt=102                          updated 10/13/89       62150
47   sm-151          mt=102,103,104,105,106,107      updated 10/13/89       62151
48   sm-152          mt=102,103,104,105,106,107      updated 10/13/89       62152
49   eu-153          mt=102,103,104,105,106,107      updated 10/13/89       63153
50   eu-154          mt=102,103,104,105,106,107      updated 10/13/89       63154
51   eu-155          mt=102,103,104,105,106,107      updated 10/13/89       63155
52   gd-155          mt=102                          updated 10/13/89       64155
53  u-234 1043 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)                     92234
54   uranium-235     endf/b-iv mat 1261              updated 10/13/89       92235
55  u-236 1163 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)                     92236
56   uranium-238     endf/b-iv mat 1262              updated 10/13/89       92238
57   neptunium-237   endf/b-iv mat 1263              updated 10/13/89       93237
58  pu-238 1060 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)                    94238
59   plutonium-239   endf/b-iv mat 1264              updated 10/13/89       94239
60   plutonium-240   endf/b-iv mat 1265              updated 10/13/89       94240
61   plutonium-241   endf/b-iv mat 1266              updated 10/13/89       94241
```

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   62.   plutonium-242  endf/b-iv mat 1161            updated 10/13/89              94242
   63   am-241 1056 sigp=5+4 newklacs 218ngp p-3 295k                                95241
   64   am-243 1057 218 gp wt f-1/e-m 090876 p3 295k                                 95243
   65    curium-244     endf/b-iv mat 1162            updated 10/13/89              96244
01/v cross sections normalized to 1.0 at 0.0253 ev                          999     temperature=   975.00
0 hydrogen        endf/b-iv mat 1269/thmm1002    updated 10/13/89          1001     temperature=   607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0b-10 1273 218ngp 042375 p-3 295k                                         5010     temperature=   607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 boron-11        endf/b-iv mat 1160             updated 10/13/89          5011     temperature=   607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 oxygen-16       endf/b-iv mat 1276             updated 10/13/89          8016     temperature=   975.00
0 oxygen-16       endf/b-iv mat 1276             updated 10/13/89             6     temperature=   607.60
0 kr-83           mt=102,103,103,105,106,107     updated 10/13/89         36083     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   82.202          temperature(kelvin)        =   975.000
0potential scatter sigma  =    7.004          lumped nuclear density     = 9.9999997E-21
0spin factor (g)          = 4988.190          lump dimension (a-bar)     = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)     = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11      1.809447E-04     .000000E+00    2.092318E-04
  12      2.169717E-02     .000000E+00    9.922364E-03
  13     -4.337918E-03     .000000E+00   -6.988131E-03
  14      4.783569E-05     .000000E+00   -1.724112E-05
0excess resonance integrals
0                 resolved
0absorption      1.45275E+02
 fission          .00000E+00
- elapsed time    .00 min.
0 kr-85           mt=  102                                                36085     temperature=   975.00
0 sr-90           mt=102                         updated 10/13/89         38090     temperature=   975.00
0  y-89           mt=102                         updated 10/13/89         39089     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   88.142          temperature(kelvin)        =   975.000
0potential scatter sigma  =    3.644          lumped nuclear density     = 9.9999997E-21
0spin factor (g)          =   78.664          lump dimension (a-bar)     = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)     = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   9      1.364407E-06     .000000E+00    2.180942E-04
  10      2.638645E-06     .000000E+00    7.570678E-06
0excess resonance integrals
0                 resolved
0absorption      1.46528E-01
 fission          .00000E+00
- elapsed time    .00 min.
0 zr-93           mt=  102                                                40093     temperature=   975.00
```

INFORMATION ONLY

```
0 zr-94          mt=102                    updated 10/13/89          40094    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   93.100          temperature(kelvin)      =  975.000
0potential scatter sigma  =    3.779          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  180.853          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995            sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953            sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   8      3.255227E-07     .000000E+00    2.652856E-04
   9      1.224071E-06     .000000E+00    9.974551E-05
0excess resonance integrals
0                  resolved
0absorption       3.44401E-02
 fission           .00000E+00
-  elapsed time    .00 min.
0 zr-95          mt=102                    updated 10/13/89          40095    temperature=  975.00
0 zircalloy      endf/b-iv mat 1284        updated 10/13/89          40302    temperature=  650.00
0resonance data for this nuclide
0mass number (a)          =   90.436          temperature(kelvin)      =  650.000
0potential scatter sigma  =    6.385          lumped nuclear density   = 4.2515602E-02
0spin factor (g)          =    1.079          lump dimension (a-bar)   = 5.4610002E-01
0inner radius             = 4.7878999E-01     dancoff correction (c)   = 5.0364637E-01
0the absorber will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   8     -1.780596E-03     .000000E+00   -1.286907E+00
   9     -5.893373E-02     .000000E+00   -2.695297E+00
  10     -6.959985E-02     .000000E+00   -1.601321E+00
  11     -1.883957E-01     .000000E+00   -7.920912E-01
0excess resonance integrals
0                  resolved
0absorption       2.28539E-01
 fission           .00000E+00
-  elapsed time    .02 min.
0 rb-94          mt=102                    updated 10/13/89          41094    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   93.101          temperature(kelvin)      =  975.000
0potential scatter sigma  =    3.779          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 43808.801         lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995            sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953            sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  13      1.043336E-02     .000000E+00    9.253548E-04
  14      9.836751E-03     .000000E+00   -4.064909E-04
0excess resonance integrals
0                  resolved
0absorption       9.15001E-01
```

```
 fission          .00000E+00
 - elapsed time    .02 min.
0 mo-95          mt=102                    updated 10/13/89          42095     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   94.091          temperature(kelvin)      =  975.000
0potential scatter sigma  =    3.806          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  607.724          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10      -7.915671E-05    .000000E+00    2.663419E-04
  11       2.016730E-04    .000000E+00    2.080861E-05
  12       9.774911E-03    .000000E+00    8.762282E-03
  13       1.615204E-04    .000000E+00   -2.779908E-05
0excess resonance integrals
0                 resolved
0absorption      1.03222E+02
 fission          .00000E+00
 - elapsed time    .02 min.
0 tc-99          mt=102                    updated 10/13/89          43099     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   98.150          temperature(kelvin)      =  975.000
0potential scatter sigma  =    6.000          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 4527.940          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11       2.904125E-04    .000000E+00    1.159129E-04
  12       2.889429E-04    .000000E+00    1.895800E-05
  13       5.058587E-03    .000000E+00    2.067952E-04
  14       9.706323E-02    .000000E+00    2.243266E-03
  15       1.072213E-02    .000000E+00   -5.414662E-04
  16       4.836156E-03    .000000E+00   -2.802451E-04
  17       2.074327E-04    .000000E+00   -1.191957E-05
0excess resonance integrals
0                 resolved
0absorption      3.35536E+02
 fission          .00000E+00
 - elapsed time    .03 min.
0 ru-101         mt=102                    updated 10/13/89          44101     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =  100.089          temperature(kelvin)      =  975.000
0potential scatter sigma  =    3.965          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 8785.290          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
```

```
0mass of moderator-2    =   237.933              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  11      -3.518813E-02     .000000E+00   -3.622225E-03
  12       5.204988E-02     .000000E+00    5.420228E-03
  13       7.549752E-03     .000000E+00    1.902731E-04
  14       2.381085E-04     .000000E+00   -4.201588E-05
0excess resonance integrals
0                  resolved
0absorption       8.00378E+01
 fission           .00000E+00
- elapsed time    .03 min.
0 ru-106        mt=102                        updated 10/13/89          44106     temperature=   975.00
0 rh-103        mt=102                        updated 10/13/89          45103     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   102.021            temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.408            lumped nuclear density    = 9.9999997E-21
0spin factor (g)          =      .500            lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00         dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
   9       1.326827E-03     .000000E+00    2.167915E-03
  10      -1.286871E-03     .000000E+00   -1.980879E-03
  11       4.747010E-04     .000000E+00    2.049829E-04
  12       6.839059E-05     .000000E+00   -1.216555E-05
  13        .000000E+00     .000000E+00     .000000E+00
  14        .000000E+00     .000000E+00     .000000E+00
  15       2.333214E-01     .000000E+00    3.451227E-03
  16       4.081323E+01     .000000E+00   -2.742478E-02
  17      -1.809042E+02     .000000E+00   -1.277730E-01
  18       8.817304E+01     .000000E+00    2.622113E-01
  19       1.162716E+01     .000000E+00   -1.845762E-03
  20       1.066385E+00     .000000E+00   -2.236318E-03
  21       2.092157E-01     .000000E+00    2.075584E-03
  22       2.606602E-01     .000000E+00    2.727417E-03
  23      -8.670080E-02     .000000E+00    1.600945E-03
0excess resonance integrals
0                  resolved
0absorption       1.17075E+03
 fission           .00000E+00
- elapsed time    .07 min.
0 rh-105          mt=  102                                                45105     temperature=   975.00
0 pd-105        mt=102                        updated 10/13/89          46105     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   104.004            temperature(kelvin)       =   975.000
0potential scatter sigma  =     4.059            lumped nuclear density    = 9.9999997E-21
0spin factor (g)          = 15210.000            lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00         dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933              sigma(per absorber atom)= 1.9051458E+19
```

```
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  12      -4.362008E-02     .000000E+00    -2.957456E-04
  13       5.553506E-02     .000000E+00     5.201802E-04
  14       7.784640E-04     .000000E+00    -8.188062E-05
0excess resonance integrals
0                 resolved
0absorption      6.1340 4E+01
 fission          .00000E+00
- elapsed time    .07 min.
0 pd-108        mt=102                    updated 10/13/89          46108     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   106.977          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.146          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 21175.100          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   257.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11       1.170581E-04     .000000E+00     3.532039E-04
  12       1.367686E-02     .000000E+00     9.317974E-03
  13       6.983784E-03     .000000E+00     1.812033E-03
  14       8.561562E-02     .000000E+00    -3.205911E-05
  15      -1.840045E-01     .000000E+00     8.083985E-05
  16       2.946594E-04     .000000E+00    -9.255802E-06
0excess resonance integrals
0                 resolved
0absorption      2.14135E+02
 fission          .00000E+00
- elapsed time    .07 min.
0 silver-109    endf/b-iv mat 1139          updated 10/13/89          47109     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   107.969          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.988          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  1441.870          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   257.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  10       3.941120E-05     .000000E+00     8.699980E-05
  11       5.547873E-04     .000000E+00     3.035632E-04
  12      -6.959971E-01     .000000E+00    -3.045062E-02
  13       7.673479E-01     .000000E+00     3.380764E-02
  14       4.382060E-01     .000000E+00     2.461560E-02
0excess resonance integrals
0                 resolved
0absorption      1.40425E+03
 fission          .00000E+00
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- elapsed time    .07 min.
0 sb-124        mt=102                    updated 10/13/89          51124    temperature=  975.00
0 xe-131        mt=102,103,104,105,106    updated 10/13/89          54131    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  129.781          temperature(kelvin)      =  975.000
0potential scatter sigma  =    4.301          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  246.825          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =  15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953         sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs        res fiss       res scat
  9      3.548233E-07    .000000E+00    2.687395E-06
 10      1.703408E-05    .000000E+00    2.475561E-05
 11      1.002568E-04    .000000E+00    3.780379E-05
 12      8.386960E-04    .000000E+00    6.769228E-05
 13      1.244908E-01    .000000E+00    1.863688E-01
 14      1.136255E-02    .000000E+00    1.588561E-02
0excess resonance integrals
0                 resolved
0absorption     8.40544E+02
 fission          .00000E+00
- elapsed time    .08 min.
0 xe-132        mt=102,103,104,105,106    updated 10/13/89          54132    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  130.771          temperature(kelvin)      =  975.000
0potential scatter sigma  =    4.301          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  675.899          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =  15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953         sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs        res fiss       res scat
  9      3.846073E-07    .000000E+00    4.707593E-06
 10      2.022505E-05    .000000E+00    2.391328E-04
 11      3.346509E-08    .000000E+00   -9.309281E-07
0excess resonance integrals
0                 resolved
0absorption     9.84435E-01
 fission          .00000E+00
- elapsed time    .08 min.
0 xenon-135     endf/b-iv mat 1294        updated 10/13/89          54135    temperature=  975.00
0 xe-136          mt=  102, 103, 104, 105, 107                      54136    temperature=  975.00
0 cesium-133    endf/b-iv mat 1141        updated 10/13/89          55133    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  131.764          temperature(kelvin)      =  975.000
0potential scatter sigma  =    7.100          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  374.437          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =  15.995          sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
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0mass of moderator-2    =   238.051              sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  9      -3.703633E-06     .000000E+00     4.731736E-05
 10       6.616260E-05     .000000E+00     8.590073E-05
 11       5.685005E-04     .000000E+00     7.995660E-04
 12       1.210578E-03     .000000E+00     1.180691E-04
 13       2.886432E-03     .000000E+00     1.459001E-04
 14       7.713464E-02     .000000E+00     2.332192E-03
 15       5.632077E-03     .000000E+00    -4.067794E-04
 16       2.777925E-03     .000000E+00    -2.215554E-04
 17       2.352236E-03     .000000E+00    -1.830809E-04
 18       2.214984E-03     .000000E+00    -1.679470E-04
 19       1.316890E-03     .000000E+00    -9.665920E-05
0excess resonance integrals
0                resolved
0absorption      3.67817E+02
 fission          .00000E+00
-  elapsed time    .10 min.
0 cs-134        mt=102                    updated 10/13/89          55134    temperature=  975.00
0 cs-135          mt=  102                                        55135    temperature=  975.00
0 cs-137        mt=102                    updated 10/13/89          55137    temperature=  975.00
0 ba-136        mt=102                    updated 10/13/89          56136    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   134.737          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.835          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  1247.690          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
 10       1.392643E-06     .000000E+00     6.052888E-07
 11       2.651689E-05     .000000E+00     2.268840E-05
0excess resonance integrals
0                resolved
0absorption      1.38478E+00
 fission          .00000E+00
-  elapsed time    .10 min.
0 la-139        mt=102                    updated 10/13/89          57139    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   137.713          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.906          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =   145.855          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  9       5.785221E-05     .000000E+00     8.074925E-03
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  10      -5.416118E-05     .000000E+00   -7.962958E-05
  11       .000000E+00      .000000E+00    .000000E+00
  12       3.425439E-04     .000000E+00    1.623582E-04
0excess resonance integrals
0                  resolved
0absorption       8.15213E+00
 fission           .00000E+00
-  elapsed time    .12 min.
0 ce-144           mt=  102                                        58144    temperature=  975.00
0 pr-141         mt=102,103,104,105,106,107     updated 10/13/89    59141    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  139.697          temperature(kelvin)      =  975.000
0potential scatter sigma  =    4.953          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 1026.500          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10      2.722221E-05     .000000E+00    9.441898E-04
  11      1.657300E-04     .000000E+00    1.836016E-03
  12      6.502524E-05     .000000E+00    8.269918E-06
0excess resonance integrals
0                  resolved
0absorption       1.29055E+01
 fission           .00000E+00
-  elapsed time    .12 min.
0 pr-143         mt=102                         updated 10/13/89    59143    temperature=  975.00
0 nd-143         mt=102                         updated 10/13/89    60143    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  141.682          temperature(kelvin)      =  975.000
0potential scatter sigma  =    5.000          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 1964.860          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10      -5.299144E-06     .000000E+00    3.773363E-05
  11      8.773024E-04     .000000E+00    7.552554E-03
  12      1.098715E-03     .000000E+00    4.429725E-04
0excess resonance integrals
0                  resolved
0absorption       5.16983E+01
 fission           .00000E+00
-  elapsed time    .12 min.
0 nd-145         mt=102                         updated 10/13/89    60145    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  143.668          temperature(kelvin)      =  975.000
0potential scatter sigma  =    5.047          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 1007.250          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
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0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.707597OE+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10       9.267461E-05     .000000E+00    1.134150E-03
  11       5.599182E-05     .000000E+00    9.373953E-04
  12       3.607317E-03     .000000E+00    1.298681E-02
  13       9.669940E-05     .000000E+00    2.031052E-04
  14       3.997842E-02     .000000E+00    9.739675E-04
  15       5.917626E-03     .000000E+00   -4.639855E-04
  16       1.326674E-03     .000000E+00   -1.451365E-04
  17       9.642377E-04     .000000E+00   -1.063806E-04
  18       8.539549E-04     .000000E+00   -9.312791E-05
  19       7.633875E-04     .000000E+00   -8.068838E-05
  20       2.839147E-05     .000000E+00   -2.919823E-06
0excess resonance integrals
0                 resolved
0absorption      2.10327E+02
 fission          .00000E+00
-  elapsed time    .13 min.
0 nd-147        mt=102                    updated 10/13/89          60147    temperature=   975.00
0 pm-147        mt=102                    updated 10/13/89          61147    temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   145.653          temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.093          lumped nuclear density    = 9.9999997E-21
0spin factor (g)          = 21589.500          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.707597OE+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933              sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12       6.966507E-03     .000000E+00    1.468595E-03
  13       1.578601E-03     .000000E+00   -2.277522E-04
  14       5.786348E-01     .000000E+00    1.423051E-01
  15       4.142128E-02     .000000E+00    7.001469E-03
  16       1.698034E-02     .000000E+00    1.746893E-03
  17       1.369746E-02     .000000E+00    1.150502E-03
  18       1.253748E-02     .000000E+00    9.648900E-04
  19       6.999250E-04     .000000E+00    5.068569E-05
0excess resonance integrals
0                 resolved
0absorption      2.12313E+03
 fission          .00000E+00
-  elapsed time    .13 min.
0 pm-148        mt=  102                                            61148    temperature=   975.00
0 sm-147        endf/b-v fission product  updated 10/13/89          62147    temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   145.653          temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.093          lumped nuclear density    = 9.9999997E-21
0spin factor (g)          =      .000          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
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```
  10      -8.693130E-05     .000000E+00   -2.192214E-04
  11       3.915146E-04     .000000E+00    2.219730E-03
  12       1.559308E-03     .000000E+00    4.600983E-04
  13       2.722763E-02     .000000E+00    1.456118E-02
  14       1.067168E-04     .000000E+00   -6.439571E-05
0excess resonance integrals
0                  resolved
0absorption       2.95075E+02
 fission           .00000E+00
-  elapsed time    .15 min.
0 sm-151        mt=102,103,104,105,106,107     updated 10/13/89              62151     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   149.623              temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.185              lumped nuclear density    = 9.9999997E-21
0spin factor (g)          = 75574.703              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             =  .0000000E+00          dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995                sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953                sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss         res scat
  14       5.260533E-03     .000000E+00   -7.897375E-03
  15       1.507732E+01     .000000E+00    7.666258E-02
  16      -2.165288E+01     .000000E+00   -6.105221E-02
  17       1.746777E+02     .000000E+00    8.370620E-01
  18      -3.198667E+02     .000000E+00   -1.772521E+00
  19       6.261735E+01     .000000E+00    3.870579E-01
  20       1.102369E+00     .000000E+00    3.251883E-04
  21      -8.248987E-02     .000000E+00    1.288040E-02
  22       7.434122E-02     .000000E+00    3.612984E-03
  23      -9.669451E-03     .000000E+00    3.056623E-04
0excess resonance integrals
0                  resolved
0absorption       2.06074E+03
 fission           .00000E+00
-  elapsed time    .15 min.
0 sm-152        mt=102,103,104,105,106,107     updated 10/13/89              62152     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   150.615              temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.208              lumped nuclear density    = 9.9999997E-21
0spin factor (g)          =   863.594              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             =  .0000000E+00          dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995                sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953                sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss         res scat
   9       2.403198E-06     .000000E+00    1.159116E-04
  10       9.314650E-05     .000000E+00    7.525454E-04
  11       5.544180E-04     .000000E+00    1.900341E-03
  12       1.606336E-03     .000000E+00    3.771814E-03
  13       4.298352E-02     .000000E+00    1.044723E-01
  14       5.906535E-01     .000000E+00    6.507989E-01
0excess resonance integrals
```

```
0                resolved
0absorption      2.91111E+03
 fission          .00000E+00
- elapsed time    .17 min.
0 eu-153        mt=102,103,104,105,106,107     updated 10/13/89              63153     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   151.607          temperature(kelvin)      =   975.000
0potential scatter sigma  =     9.731          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 12265.900          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12      -2.580043E-01     .000000E+00   -5.022002E-02
  13      -2.080346E-02     .000000E+00    2.732525E-03
  14      -4.284205E-01     .000000E+00    5.670892E-03
  15       3.649734E+00     .000000E+00   -9.770704E-03
  16      -3.288213E+00     .000000E+00    8.161153E-03
  17       1.505635E-01     .000000E+00   -3.437884E-03
  18       7.726885E-02     .000000E+00   -2.231282E-03
  19       5.055514E-02     .000000E+00   -1.541163E-03
  20      -1.265644E-01     .000000E+00   -1.041209E-03
0excess resonance integrals
0                resolved
0absorption      1.35663E+03
 fission          .00000E+00
- elapsed time    .17 min.
0 eu-154        mt=102,103,104,105,106,107     updated 10/13/89              63154     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   152.601          temperature(kelvin)      =   975.000
0potential scatter sigma  =     9.731          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 19135.801          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12      -3.844084E-01     .000000E+00   -6.007666E-02
  13      -2.933085E-01     .000000E+00   -2.421374E-02
  14       3.604651E-01     .000000E+00    1.521953E-02
  15       2.304189E-01     .000000E+00    2.127269E-02
  16       7.322216E+00     .000000E+00    9.281573E-02
  17      -1.435965E+02     .000000E+00   -1.894614E+00
  18       1.138804E+02     .000000E+00    1.860162E+00
  19      -1.089527E+02     .000000E+00    1.221570E+00
0excess resonance integrals
0                resolved
0absorption      2.13732E+03
 fission          .00000E+00
- elapsed time    .18 min.
0 eu-155        mt=102,103,104,105,106,107     updated 10/13/89              63155     temperature=   975.00
```

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0 gd-155        mt=102                    updated 10/13/89          64155     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   153.592          temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.277          lumped nuclear density    = 9.9999997E-21
0spin factor (g)          = 12700.100          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075970E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.933          sigma(per absorber atom)= 1.9051458E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12      -1.439257E+00    .000000E+00   -1.839427E-01
  13       1.541437E+00    .000000E+00    1.985446E-01
  14       2.192559E-01    .000000E+00    9.810255E-03
  15      -3.286444E-01    .000000E+00    5.341723E-05
  16       1.477360E+00    .000000E+00   -4.148862E-03
  17       1.568853E-01    .000000E+00   -1.479130E-03
  18       9.605146E-02    .000000E+00   -1.078069E-03
  19       6.255317E-02    .000000E+00   -8.026487E-04
  20       1.400321E-02    .000000E+00    3.090602E-04
  21        .000000E+00    .000000E+00     .000000E+00
  22        .000000E+00    .000000E+00     .000000E+00
  23        .000000E+00    .000000E+00     .000000E+00
  24        .000000E+00    .000000E+00     .000000E+00
  25      -2.406941E+03    .000000E+00   -1.882743E+00
  26      -5.227043E+03    .000000E+00    1.971364E+00
  27      -1.662799E+03    .000000E+00    7.404465E-01
0excess resonance integrals
0                resolved
0absorption      3.82329E+04
 fission          .00000E+00
-  elapsed time    .18 min.
0u-234 1043 sigo=5+4 new-lacs p-3 293k f-1/e-m(1.+5)                92234     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   232.029          temperature(kelvin)       =   975.000
0potential scatter sigma  =    10.021          lumped nuclear density    = 5.5557821E-06
0spin factor (g)          = 6948.450           lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 3.0735492E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.955          sigma(per absorber atom)= 3.4280727E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11      -2.660897E-02    .000000E+00   -7.755044E-02
  12      -2.166410E-01    .000000E+00   -9.087193E-02
  13       7.759067E-04    .000000E+00   -6.469014E-04
  14      -2.108644E+01    .000000E+00   -3.452136E+00
0excess resonance integrals
0                resolved
0absorption      5.78630E+02
 fission          .00000E+00
-  elapsed time    .20 min.
0 uranium-235    endf/b-iv mat 1261        updated 10/13/89          92235     temperature=  975.00
0resonance data for this nuclide
```

```
0mass number (a)          =  233.025          temperature(kelvin)      =  975.000
0potential scatter sigma  =   11.500          lumped nuclear density   = 6.9150812E-04
0spin factor (g)          = 15171.100         lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1   =   15.995          sigma(per absorber atom)= 2.4693810E+02
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2   =  238.049          sigma(per absorber atom)= 2.6500592E+02
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  12      -2.802867E+00  -1.745419E+00  -6.529980E-02
  13      -9.404264E+00  -4.671767E+00  -2.017245E-01
  14      -7.541845E+00  -4.596020E+00  -5.108717E-02
0excess resonance integrals
0                 resolved
0absorption      2.0486 4E+02
 fission         1.22258E+02
-  elapsed time    .22 min.
0u-236 1163 sigo=5+4 newklacs p-3 293k f-1/e-n(1.+5)                    92236    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  234.017          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.995          lumped nuclear density   = 3.1674365E-06
0spin factor (g)          = 6328.490          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1   =   15.995          sigma(per absorber atom)= 5.3911008E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2   =  237.934          sigma(per absorber atom)= 6.0137379E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  11      -1.742947E-02   .000000E+00  -3.756222E-02
  12      -4.166518E-02   .000000E+00  -5.612943E-02
  13      -5.275458E-02   .000000E+00  -3.181131E-03
  14      -3.376845E+00   .000000E+00  -2.969958E-01
0excess resonance integrals
0                 resolved
0absorption      3.2930 3E+02
 fission          .00000E+00
-  elapsed time    .22 min.
0 uranium-238    endf/b-iv mat 1262          updated 10/13/89          92238    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  236.006          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.599          lumped nuclear density   = 2.2067729E-02
0spin factor (g)          =  656.527          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1   =   15.995          sigma(per absorber atom)= 7.7379818E+00
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2   =  235.041          sigma(per absorber atom)= 3.3317560E-01
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
   9      -3.953677E-02   .000000E+00  -4.059601E-01
  10      -1.027990E+00  -1.759790E-05  -6.492478E+00
  11      -9.713745E+00   .000000E+00  -2.691004E+01
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  12      -4.305893E+01     .000000E+00   -4.999826E+01
  13      -5.402488E+01     .000000E+00   -1.769478E+01
  14      -1.045212E+02     .000000E+00   -6.060835E+00
0excess resonance integrals
0                 resolved
0absorption       1.79456E+01
 fission          5.03812E-04
-  elapsed time    .23 min.
0 neptunium-237  endf/b-iv mat 1263          updated 10/13/89          93237     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   235.012          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.500          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 10100.800          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11      -6.297421E-02   -1.837015E-06   -7.368062E-03
  12       4.699678E-02   -7.827351E-05    9.789990E-03
  13       4.846798E-02    9.304715E-05    1.906104E-03
  14       2.287751E-02    1.978009E-06   -4.934850E-04
0excess resonance integrals
0                 resolved
0absorption       2.95269E+02
 fission          1.38613E-01
-  elapsed time    .27 min.
0pu-238 1050 sigo=5+4 new-klacs p-3 298k f-1/e-m(1.+5)                    94238     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   236.167          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.890          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 13130.600          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11       4.300073E-04    7.349576E-05    3.254688E-04
  12       3.436531E-04    4.151627E-05    1.223577E-04
  13       4.169841E-01    7.581419E-02   -8.996852E-03
  14      -3.821973E-01   -6.987069E-02    8.538967E-03
0excess resonance integrals
0                 resolved
0absorption       8.25561E+01
 fission          9.08581E+00
-  elapsed time    .27 min.
0 plutonium-239  endf/b-iv mat 1264          updated 10/13/89          94239     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   236.999          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.200          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  6435.710          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
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```
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995                sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051                sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11       1.026091E-03    7.365740E-04    7.731064E-05
  12       3.649408E-03    1.987919E-03    3.495293E-04
  13       3.190807E-03    1.440402E-05    8.998066E-04
  14       1.640449E-02    1.127308E-02   -5.654235E-04
0excess resonance integrals
0                 resolved
0absorption      3.19726E+02
 fission         1.79269E+02
- elapsed time    .28 min.
0 plutonium-240  endf/b-iv mat 1265          updated 10/13/89          94240     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   237.992          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.599          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =   669.244          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995                sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051                sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   9      -9.114988E-06    1.994661E-07    6.593086E-05
  10       6.315603E-05    2.939710E-06    2.577517E-04
  11       4.433867E-04    2.762662E-06    4.575704E-04
  12       3.239271E-03    1.745970E-05    2.000425E-03
  13       1.275347E-03    7.819998E-06    8.856502E-05
  14        .000000E+00     .000000E+00     .000000E+00
  15       1.760503E-02    3.359997E-06    3.506874E-03
  16       3.385359E+00    6.461107E-04    4.328788E-01
  17       5.735987E+02    1.094729E-01    5.201967E+01
  18      -2.554376E+03   -4.875140E-01   -2.052582E+02
  19       1.057519E+03    2.018322E-01    8.031049E+01
  20      -9.453103E+01   -1.804166E-02    1.836000E+00
0excess resonance integrals
0                 resolved
0absorption      8.44126E+03
 fission         2.63833E+00
- elapsed time    .30 min.
0 plutonium-241  endf/b-iv mat 1266          updated 10/13/89          94241     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   238.978          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.939          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 16402.100          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995                sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051                sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
```

```
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  12      1.377094E-02    1.229498E-02    6.801242E-04
  13     -2.439721E-02   -2.559266E-02   -1.833407E-03
  14      7.042534E-02    6.269953E-02    1.419312E-03
  15      1.801109E-02    1.614762E-02   -4.699414E-04
0excess resonance integrals
0                 resolved
0absorption      5.09543E+02
 fission         4.27111E+02
- elapsed time    .32 min.
0 plutonium-242  endf/b-iv mat 1161          updated 10/13/89          94242     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   240.145          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.694          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          =  6606.710          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11      1.732151E-04     .000000E+00    2.955152E-04
  12      1.338541E-03     .000000E+00    2.003890E-03
  13      1.258568E-04     .000000E+00    4.973793E-06
  14      8.150769E-02     .000000E+00    1.527770E-02
  15      5.500306E-01     .000000E+00    5.579308E-03
  16      4.034138E-02     .000000E+00   -3.459574E-03
  17      1.550422E-02     .000000E+00   -1.848340E-03
  18      1.112562E-02     .000000E+00   -1.430774E-03
0excess resonance integrals
0                 resolved
0absorption      1.11245E+03
 fission          .00000E+00
- elapsed time    .32 min.
0am-241 1056 sigp-5+4 new-xlacs 218ngp p-3 293k                            95241     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   238.950          temperature(kelvin)      =   975.000
0potential scatter sigma  =     9.511          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 82058.203          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  13      4.924720E-01    1.212594E-02    4.967665E-03
  14     -4.285262E-01   -1.106696E-02   -4.417147E-03
0excess resonance integrals
0                 resolved
0absorption      1.93478E+02
 fission         1.07615E+00
- elapsed time    .32 min.
0am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                              95243     temperature=   975.00
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```
0resonance data for this nuclide
0mass number (a)          =  240.940          temperature(kelvin)      =  975.000
0potential scatter sigma  =    9.511          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 82052.602          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995             sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  258.051             sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  13      -6.597584E-03    .000000E+00    4.390141E-04
  14       2.233211E-02    .000000E+00    2.374156E-04
0excess resonance integrals
0                 resolved
0absorption      1.60152E+02
 fission          .00000E+00
- elapsed time    .32 min.
0 curium-244     endf/b-iv mat 1162          updated 10/13/89          96244     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =  242.133          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.320          lumped nuclear density   = 9.9999997E-21
0spin factor (g)          = 5251.150          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995             sigma(per absorber atom)= 1.7075969E+19
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  258.051             sigma(per absorber atom)= 1.8316216E+19
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11       2.590136E-04    7.087814E-06    3.065648E-04
  12       7.074901E-04    3.321512E-05    1.406014E-04
  13       2.721952E-03    1.336724E-04    7.130241E-04
  14       8.470870E-02    5.068042E-03    1.605959E-02
0excess resonance integrals
0                 resolved
0absorption      6.13904E+02
 fission         3.54222E+01
- elapsed time    .33 min.
- elapsed time    .33 min.
1     this xsdrn working tape was created 02/16/96 at 09:54:35
      the title of the parent case is as follows
      scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
          compiled for nrc     1/27/89
        tape id                    4321        number of nuclides          65
        number of neutron groups     27        number of gamma groups       0
        first thermal group          15        logical unit                 4
                                table of contents
       1/v cross sections normalized to 1.0 at 0.0253 ev                id     999
        hydrogen       endf/b-iv mat 1269/thrm1002   updated 10/13/89   id    1001
       b-10 1273 218ngp 042375 p-3 293k                                  id    5010
        boron-11       endf/b-iv mat 1160            updated 10/13/89   id    5011
        oxygen-16      endf/b-iv mat 1276            updated 10/13/89   id    8016
        oxygen-16      endf/b-iv mat 1276            updated 10/13/89   id       6
        kr-83          mt=102,103,103,105,106,107    updated 10/13/89   id   36083
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```
      kr-85          mt=  102                                          id    36085
      sr-90        mt=102                      updated 10/13/89        id    38090
       y-89        mt=102                      updated 10/13/89        id    39089
      zr-93          mt=  102                                          id    40093
      zr-94        mt=102                      updated 10/13/89        id    40094
      zr-95        mt=102                      updated 10/13/89        id    40095
      zircalloy    endf/b-iv mat 1284          updated 10/13/89        id    40302
      rb-94        mt=102                      updated 10/13/89        id    41094
      mo-95        mt=102                      updated 10/13/89        id    42095
      tc-99        mt=102                      updated 10/13/89        id    43099
      ru-101       mt=102                      updated 10/13/89        id    44101
      ru-106       mt=102                      updated 10/13/89        id    44106
      rh-103       mt=102                      updated 10/13/89        id    45103
      rh-105         mt=  102                                          id    45105
      pd-105       mt=102                      updated 10/13/89        id    46105
      pd-108       mt=102                      updated 10/13/89        id    46108
      silver-109   endf/b-iv mat 1139          updated 10/13/89        id    47109
      sb-124       mt=102                      updated 10/13/89        id    51124
      xe-131       mt=102,103,104,105,106      updated 10/13/89        id    54131
      xe-132       mt=102,103,104,105,106      updated 10/13/89        id    54132
      xenon-135    endf/b-iv mat 1294          updated 10/13/89        id    54135
      xe-136         mt=  102, 103, 104, 105, 107                      id    54136
      cesium-133   endf/b-iv mat 1141          updated 10/13/89        id    55133
      cs-134       mt=102                      updated 10/13/89        id    55134
      cs-135         mt=  102                                          id    55135
      cs-137       mt=102                      updated 10/13/89        id    55137
      ba-136       mt=102                      updated 10/13/89        id    56136
      la-139       mt=102                      updated 10/13/89        id    57139
      ce-144         mt=  102                                          id    58144
      pr-141       mt=102,103,104,105,106,107  updated 10/13/89        id    59141
      pr-143       mt=102                      updated 10/13/89        id    59143
      nd-143       mt=102                      updated 10/13/89        id    60143
      nd-145       mt=102                      updated 10/13/89        id    60145
      nd-147       mt=102                      updated 10/13/89        id    60147
      pm-147       mt=102                      updated 10/13/89        id    61147
      pm-148         mt=  102                                          id    61148
      sm-147       endf/b-v fission product    updated 10/13/89        id    62147
      sm-149       mt=102,103,107              updated 10/13/89        id    62149
      sm-150       mt=102                      updated 10/13/89        id    62150
      sm-151       mt=102,103,104,105,106,107  updated 10/13/89        id    62151
      sm-152       mt=102,103,104,105,106,107  updated 10/13/89        id    62152
      eu-153       mt=102,103,104,105,106,107  updated 10/13/89        id    63153
      eu-154       mt=102,103,104,105,106,107  updated 10/13/89        id    63154
      eu-155       mt=102,103,104,105,106,107  updated 10/13/89        id    63155
      gd-155       mt=102                      updated 10/13/89        id    64155
     u-234 1043 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)               id    92234
      uranium-235  endf/b-iv mat 1261          updated 10/13/89        id    92235
     u-236 1163 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)               id    92236
      uranium-238  endf/b-iv mat 1262          updated 10/13/89        id    92238
      neptunium-237 endf/b-iv mat 1263         updated 10/13/89        id    93237
     pu-238 1050 sigo=5+4 newclacs p-3 293k f-1/e-m(1.+5)              id    94238
      plutonium-239 endf/b-iv mat 1264         updated 10/13/89        id    94239
      plutonium-240 endf/b-iv mat 1265         updated 10/13/89        id    94240
      plutonium-241 endf/b-iv mat 1266         updated 10/13/89        id    94241
      plutonium-242 endf/b-iv mat 1161         updated 10/13/89        id    94242
     am-241 1056 sigo=5+4 newclacs 218ngp p-3 293k                     id    95241
     am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                      id    95243
      curium-244   endf/b-iv mat 1162          updated 10/13/89        id    96244
0      tape copy used      0 i/o's, and took      .00 seconds
1 xx        xx   ssssssssss    dddddddddddd    rrrrrrrrrr    mm       mm pppppppppp    mm        mm
```

```
  xx      xx  sssssssssss  ddddddddddd  rrrrrrrrrrr  mm      m  pppppppppp  mmm     mmm
   xx    xx   ss       ss  dd       dd  rr       rr  mmm     m  pp      pp  mmmm   mmmm
    xx  xx    ss           dd       dd  rr       rr  m m     m  pp      pp  mm mm  mm mm
     xx xx    ss           dd       dd  rr       rr  m  m    m  pp      pp  mm  mm mm  mm
      xxx     sssssssssss  dd       dd  rrrrrrrrrrr  m   m   m  pppppppppp  mm   mmm   mm
      xxx      sssssssssss dd       dd  rrrrrrrrrrr  m    m  m  pppppppppp  mm    m    mm
     xx xx             ss  dd       dd  rr      rr   m     m m  pp          mm         mm
    xx  xx             ss  dd       dd  rr       rr  m      mm  pp          mm         mm
   xx    xx   ss       ss  dd       dd  rr        rr m       m  pp          mm         mm
  xx      xx  sssssssssss  ddddddddddd  rr         rr m       m  pp          mm         mm
 xx        xx  sssssssss   ddddddddddd   rr         rr m       m  pp          mm         mm
0

 ddddddddddd   aaaaaaaa   w        w  iiiiiiiiiii   sssssssss
 ddddddddddd  aaaaaaaaaa  w        w  iiiiiiiiiii  sssssssssss
 dd       dd  aa      aa  w        w      ii       ss      ss
 dd       dd  aa      aa  w        w      ii       ss
 dd       dd  aa      aa  w        w      ii       ss
 dd       dd  aaaaaaaaaaa w        w      ii       sssssssss
 dd       dd  aaaaaaaaaaa  w      w       ii        sssssssss
 dd       dd  aa      aa    w    w        ii               ss
 dd       dd  aa      aa     w  w         ii               ss
 dd       dd  aa      aa      w w         ii       ss      ss
 ddddddddddd  aa      aa       ww     iiiiiiiiiii  sssssssssss
 ddddddddddd  aa      aa        v     iiiiiiiiiii   sssssssss
0

  000000    22222222222          //     11     666666666666          //  999999999   666666666
 00000000   22222222222         //     111     666666666666         //  999999999999 666666666
00      00 22        22         //    1111     66                  //  99      99  66
00      00         22          //      11     66                  //  99      99  66
00      00        22           //      11     66                  //  99      99  66
00      00      22            //       11     666666666666        //  999999999999 666666666
00      00    22             //        11     666666666666       //   999999999999 666666666
00      00  22              //         11     66      66        //          99  66      66
00      00 22               //          11     66      66       //           99  66      66
 00     00 22              //           11     66      66      //            99  66      66
  00000000 22222222222    //           11111111 666666666666  //  999999999999 666666666
   000000  22222222222   //            11111111  666666666   //   999999999   666666666
0

  000000    999999999                  555555555555 555555555555              2222222222  666666666
 00000000   999999999999               555555555555 555555555555             22222222222 666666666
00      00 99      99      :::        55           55           :::         22        22 66
00      00 99      99      :::        55           55           :::                 22 66
00      00 99      99      :::        55           55           :::                 22 66
00      00 999999999999               555555555555 555555555555                  22  666666666
00      00  999999999                 555555555555 555555555555                22   666666666
00      00          99      :::               55           55      :::          22   66      66
00      00          99      :::               55           55      :::        22     66      66
 00     00          99      :::        55     55     55     55      :::      22       66      66
  00000000 999999999999               555555555555 555555555555             22222222222 666666666
   000000  999999999999                555555555555 555555555555             22222222222  666666666
1
0                          sssssssssss  cccccccccc   aaaaaaaa   ll          eeeeeeeeeee
                          sssssssssss cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeee
                          ss       ss cc        cc aa      aa ll          ee
                          ss          cc           aa      aa ll          ee
                          ss          cc           aa      aa ll          ee
                          sssssssssss cc           aaaaaaaaaaa ll          eeeeeeee
```

```
 ssssssssssss  cc            aaaaaaaaaaaa  ll            eeeeeeeee
         ss    cc            aa        aa  ll            ee
         ss    cc            aa        aa  ll            ee
ss       ss    cc        cc  aa        aa  ll            ee
ssssssssssss   cccccccccccc  aa        aa  llllllllllll  eeeeeeeeeeee
 ssssssssss     cccccccccc   aa        aa  llllllllllll  eeeeeeeeeeee
```

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                program verification information                   *****
*****                                                                   *****
*****               code system:    scale  version:    4.2              *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****                 program:  c0c001                                  *****
*****                                                                   *****
*****            creation date:  04/27/95                               *****
*****                                                                   *****
*****                 library:  /nautronics/scale/exe                   *****
*****                                                                   *****
*****                                                                   *****
*****        this is not a   scale  configuration controlled code       *****
*****                                                                   *****
*****                 jobname:  davis                                   *****
*****                                                                   *****
*****        date of execution:  02/16/96                               *****
*****                                                                   *****
*****        time of execution:  09:55:27                               *****
*****                                                                   *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****************************************************************************
```

```
1
                    at 0 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0      -1q array has      1 entries.
0       1q array has     15 entries.
0       2q array has     10 entries.
0       3q array has     12 entries.
0       4q array has      9 entries.
0       5q array has     12 entries.
0direct access unit  9 requires    12 blocks of length  704 for cross section mixing.
1                   at 0 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0general problem description data block
0                          general problem data

 ige  1/2/3 = plane/cylinder/sphere      2      isn  quadrature order                  8
 izm  number of zones                    4      isct order of scattering               3
 im   number of spacial intervals       24      ievt 0/1/2/3/4/5/6=q/k/alpha/c/z/r/h   1
 ibl  0/1/2/3 = vacuum/refl/per/white    1      iim  inner iteration maximum          20
 ibr  right boundary condition           3      iom  outer iteration maximum          25
```

```
 mx  number of mixtures                 3        iclc -1/0/n--flat res/sr/cpt          0
 ms  mixing table length               65        ith  0/1 = forward/adjoint            0
 ign number of energy groups           27        iflu not used(always wgtd)            0
 nng number of neutron groups          27        iprt -2/-1/0/n=mixture xsec print    -2
 ngg number of gamma groups             0        idl  0/1/2/3=no/prt nd/pch n/both    53
 iftg number of first thermal group    15        ipbt -1/0/1=none/fine/all bal. prt     0
0                              special options

 ifg  0/1 = none/weighting calculation  1        ipn  0/1/2 diff. coef. param           0
 iqn  volumetric sources (0/n=no/yes)   0        idfm 0/1 = none/density factors 38*    1
 ipn  boundary sources (0/n=no/yes)     0        iaz  0/n = none/n activities by zone   0
 ifn  0/1/2 = input 33*/34*/use last   53        iai  0/1=none/activities by interval   0
 itmx maximum time (minutes)           10        ifct 0/1=no/yes upscatter scaling      0
 idt1 0/1/2/3=no/xsect/srce/flux--out   0        ipvt 0/1/2=no/k/alpha parametric srch  0
 isx  broad group fluxes                0        isen outer iteration acceleration      0
 ibln activity data unit                0        nbnd band rebaln parameter             0
 jbkl 0/1/2 buckling geometry           0
0                          weighting data (ifg=1)

 icon -1/0/1=cell/zone/region weight   -1        ihtf total xsect psn in brd gp tables  3
 igmf number of broad groups           27        ndsf psn g-g or file number            4
 itp  0/10/20/30/40 0/c/e/ac/a          0        nusf table length or max order         4
 ipp  -2/-1/0/n=wgted xsect print      -2        mscm extra 1-d x-sect positions        0
 iap  -1/n anisn xsect print           -1
0                          floating point parameters

 eps  overall convergence        1.00000E-04       dy   cyl/pla ht for buckling     .00000E+00
 ptc  point convergence          1.00000E-04       dz   plane depth for buckling    .00000E+00
 xnf  normalization factor       1.00000E+00       vsc  void streaming correction   .00000E+00
 ev   eigenvalue guess            .00000E+00       pv   ipvt=1/2--k/alpha           1.00000E+00
 evm  eigenvalue modifier         .00000E+00       eql  ev change eps for search    1.00000E-03
 bf   buckling factor=1.420892   1.42089E+00       xnpm new param mod for search    7.50000E-01
     this case will require       2535 locations for mixing
     this case has been allocated 200000 locations
1                   at 0 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0       13q array has     65 entries.
0       14q array has     65 entries.
0       15q array has     65 entries.
0                          data block 2 (mixing table, etc.)
0    nuclides        cccc                          mixing table                          extra
      on tape     identification            mixture  component    atom density        xsect id's
     1    999                                  1       92235      6.91508E-04
     2   1001                                  1       92234      5.55578E-06
     3   5010                                  1       92236      3.16744E-06
     4   5011                                  1       92238      2.20677E-02
     5   8016                                  1        8016      4.55359E-02
     6      6                                  3           6      2.09710E-02
     7  36083                                  1       36083      1.00000E-20
     8  36085                                  1       36085      1.00000E-20
     9  38090                                  1       38090      1.00000E-20
    10  39089                                  1       39089      1.00000E-20
    11  40093                                  1       42095      1.00000E-20
    12  40094                                  1       40093      1.00000E-20
    13  40095                                  1       40094      1.00000E-20
    14  40302                                  1       40095      1.00000E-20
    15  41094                                  1       41094      1.00000E-20
    16  42095                                  1       43099      1.00000E-20
    17  43099                                  1       45103      1.00000E-20
    18  44101                                  1       45105      1.00000E-20
    19  44106                                  1       44101      1.00000E-20
```

```
   20  45103                                  1      44106     1.00000E-20
   21  45105                                  1      46105     1.00000E-20
   22  46105                                  1      46108     1.00000E-20
   23  46108                                  1      47109     1.00000E-20
   24  47109                                  1      51124     1.00000E-20
   25  51124                                  1      54131     1.00000E-20
   26  54131                                  1      54132     1.00000E-20
   27  54132                                  1      54135     1.00000E-20
   28  54135                                  1      54136     1.00000E-20
   29  54136                                  1      55134     1.00000E-20
   30  55133                                  1      55135     1.00000E-20
   31  55134                                  1      55137     1.00000E-20
   32  55135                                  1      56136     1.00000E-20
   33  55137                                  1      57139     1.00000E-20
   34  56136                                  1      59141     1.00000E-20
   35  57139                                  1      59143     1.00000E-20
   36  58144                                  1      58144     1.00000E-20
   37  59141                                  1      60143     1.00000E-20
   38  59143                                  1      60145     1.00000E-20
   39  60143                                  1      61147     1.00000E-20
   40  60145                                  1      61148     1.00000E-20
   41  60147                                  1      60147     1.00000E-20
   42  61147                                  1      62147     1.00000E-20
   43  61148                                  1      62149     1.00000E-20
   44  62147                                  1      62150     1.00000E-20
   45  62149                                  1      62151     1.00000E-20
   46  62150                                  1      62152     1.00000E-20
   47  62151                                  1      64155     1.00000E-20
   48  62152                                  1      63153     1.00000E-20
   49  63153                                  1      63154     1.00000E-20
   50  63154                                  1      63155     1.00000E-20
   51  63155                                  2      40302     4.25156E-02
   52  64155                                  3       1001     4.19420E-02
   53  92234                                  3       5010     3.81515E-06
   54  92235                                  3       5011     1.54884E-05
   55  92236                                  1      55133     1.00000E-20
   56  92238                                  1      95237     1.00000E-20
   57  95237                                  1      94238     1.00000E-20
   58  94238                                  1      94239     1.00000E-20
   59  94239                                  1      94240     1.00000E-20
   60  94240                                  1      94241     1.00000E-20
   61  94241                                  1      94242     1.00000E-20
   62  94242                                  1      95241     1.00000E-20
   63  95241                                  1      95243     1.00000E-20
   64  95243                                  1      96244     1.00000E-20
   65  96244                                  1        999     1.00000E-20
- elapsed time    .00 min.
0  21649 locations will be used
0      35q array has     25 entries.
0      36q array has     24 entries.
0      38q array has     24 entries.
0      39q array has      4 entries.
0      40q array has      4 entries.
0      47q array has     27 entries.
0      51q array has     27 entries.
1                  at 0 d, sas2h: babcock wilcox 15x15, 3.00w%, 20gwd/mtu burn high temp
                          neutron group parameters
0  gp   energy      lethargy     weighted   broad gp     calc      group      right      left
       boundaries   boundaries   velocities  numbers      type      band       albedo     albedo
   1  2.00000E+07 -6.93147E-01  4.60581E+09    1          0         1       1.00000E+00
```

2	6.43400E+06	4.40989E-01	2.88737E+09	2	0	2	1.00000E+00
3	3.00000E+06	1.20397E+00	2.12201E+09	3	0	3	1.00000E+00
4	1.85000E+06	1.68740E+00	1.75673E+09	4	0	4	1.00000E+00
5	1.40000E+06	1.96611E+00	1.46535E+09	5	0	5	1.00000E+00
6	9.00000E+05	2.40795E+00	1.06620E+09	6	0	6	1.00000E+00
7	4.00000E+05	3.21888E+00	6.07557E+08	7	0	7	1.00000E+00
8	1.00000E+05	4.60517E+00	2.72415E+08	8	0	8	1.00000E+00
9	1.70000E+04	6.37713E+00	1.13526E+08	9	0	9	1.00000E+00
10	3.00000E+03	8.11173E+00	4.82126E+07	10	0	10	1.00000E+00
11	5.50000E+02	9.80818E+00	2.05946E+07	11	0	11	1.00000E+00
12	1.00000E+02	1.15129E+01	1.01086E+07	12	0	12	1.00000E+00
13	3.00000E+01	1.27169E+01	5.69595E+06	13	0	13	1.00000E+00
14	1.00000E+01	1.38155E+01	3.20957E+06	14	0	14	1.00000E+00
15	3.04999E+00	1.50180E+01	2.10601E+06	15	0	15	1.00000E+00
16	1.77000E+00	1.55471E+01	1.70522E+06	16	0	16	1.00000E+00
17	1.29999E+00	1.58557E+01	1.52545E+06	17	0	17	1.00000E+00
18	1.12999E+00	1.59959E+01	1.42867E+06	18	0	18	1.00000E+00
19	1.00000E+00	1.61181E+01	1.31002E+06	19	0	19	1.00000E+00
20	8.00000E-01	1.63412E+01	9.05898E+05	20	0	20	1.00000E+00
21	4.00000E-01	1.70844E+01	8.17974E+05	21	0	21	1.00000E+00
22	3.25000E-01	1.72420E+01	6.90070E+05	22	0	22	1.00000E+00
23	2.25000E-01	1.76098E+01	4.86953E+05	23	0	23	1.00000E+00
24	9.99999E-02	1.84207E+01	3.57766E+05	24	0	24	1.00000E+00
25	5.00000E-02	1.91138E+01	2.71895E+05	25	0	25	1.00000E+00
26	3.00000E-02	1.96247E+01	1.87283E+05	26	0	26	1.00000E+00
27	1.00000E-02	2.07233E+01	8.88201E+04	27	0	27	1.00000E+00
28	1.00000E-05	2.76310E+01					

1 at 0 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp

0

	mixture by zone	order p(l) by zone	activity table matl no.	activity table reaction	quadrature constants weights	quadrature constants directions	refl direc	wt x cos
1	1	3			0	-2.79004E-01	3	0
2	1	3			5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	2	3			5.06143E-02	1.97286E-01	2	9.98548E-03
4	3	3			0	-6.04419E-01	8	0
5					5.55953E-02	-5.58410E-01	8	-3.10450E-02
6					5.55953E-02	-2.31301E-01	7	-1.28598E-02
7					5.55953E-02	2.31301E-01	6	1.28598E-02
8					5.55953E-02	5.58410E-01	5	3.10450E-02
9					0	-8.50774E-01	15	0
10					5.22844E-02	-8.21784E-01	15	-4.29665E-02
11					5.22844E-02	-6.01588E-01	14	-3.14537E-02
12					5.22844E-02	-2.20196E-01	13	-1.15128E-02
13					5.22844E-02	2.20196E-01	12	1.15128E-02
14					5.22844E-02	6.01588E-01	11	3.14537E-02
15					5.22844E-02	8.21784E-01	10	4.29665E-02
16					0	-9.83082E-01	24	0
17					4.53355E-02	-9.64143E-01	24	-4.37099E-02
18					4.53355E-02	-8.17361E-01	23	-3.70655E-02
19					4.53355E-02	-5.46143E-01	22	-2.47597E-02
20					4.53355E-02	-1.91780E-01	21	-8.69444E-03
21					4.53355E-02	1.91780E-01	20	8.69444E-03
22					4.53355E-02	5.46143E-01	19	2.47597E-02
23					4.53355E-02	8.17361E-01	18	3.70655E-02
24					4.53355E-02	9.64143E-01	17	4.37099E-02

0constants for p(3) scattering

0angl	set 1	set 2	set 3	set 4	set 5
1	-2.79004E-01	8.83235E-01	6.74143E-02	-6.16919E-01	-1.71701E-02
2	-1.97286E-01	8.83235E-01	.00000E+00	-4.36228E-01	1.21411E-02
3	1.97286E-01	8.83235E-01	.00000E+00	4.36228E-01	-1.21411E-02
4	-6.04419E-01	4.52016E-01	3.16379E-01	-8.04435E-01	-1.74564E-01

5	-5.58410E-01	4.52016E-01	2.23714E-01	-7.43201E-01	-6.68028E-02
6	-2.31301E-01	4.52016E-01	-2.23713E-01	-3.07844E-01	1.61276E-01
7	2.31301E-01	4.52016E-01	-2.23713E-01	3.07844E-01	-1.61276E-01
8	5.58410E-01	4.52016E-01	2.23713E-01	7.43201E-01	6.68028E-02
9	-8.50774E-01	-8.57235E-02	6.26843E-01	-1.98456E-01	-4.86835E-01
10	-8.21784E-01	-8.57235E-02	5.42862E-01	-1.91694E-01	-3.44245E-01
11	-6.01588E-01	-8.57235E-02	.00000E+00	-1.40330E-01	3.44244E-01
12	-2.20198E-01	-8.57235E-02	-5.42862E-01	-5.13643E-02	3.44245E-01
13	2.20198E-01	-8.57235E-02	-5.42862E-01	5.13643E-02	-3.44245E-01
14	6.01588E-01	-8.57235E-02	.00000E+00	1.40330E-01	-3.44245E-01
15	8.21784E-01	-8.57235E-02	5.42862E-01	1.91694E-01	3.44245E-01
16	-9.83052E-01	-4.49528E-01	8.36885E-01	5.00703E-01	-7.51005E-01
17	-9.64143E-01	-4.49528E-01	7.73181E-01	4.91083E-01	-6.24438E-01
18	-8.17361E-01	-4.49528E-01	3.20262E-01	4.16320E-01	1.46514E-01
19	-5.46143E-01	-4.49528E-01	-3.20262E-01	2.78176E-01	7.36575E-01
20	-1.91780E-01	-4.49528E-01	-7.73181E-01	9.76824E-02	4.17236E-01
21	1.91780E-01	-4.49528E-01	-7.73181E-01	-9.76824E-02	-4.17236E-01
22	5.46143E-01	-4.49528E-01	-3.20262E-01	-2.78176E-01	-7.36575E-01
23	8.17361E-01	-4.49528E-01	3.20262E-01	-4.16320E-01	-1.46514E-01
24	9.64143E-01	-4.49528E-01	7.73181E-01	-4.91083E-01	6.24438E-01

1

int	radii	mid pts	zone no.	areas	volumes	dens fact	radius mod	spec(int)
1	0	1.29551E-02	1	0	2.10906E-03	1.00000E+00	0	
2	2.59102E-02	4.33406E-02	1	1.62798E-01	9.49518E-03	1.00000E+00	0	
3	6.07710E-02	8.75100E-02	1	3.81835E-01	2.94065E-02	1.00000E+00	0	
4	1.14269E-01	1.74155E-01	1	7.17848E-01	1.31104E-01	1.00000E+00	0	
5	2.34061E-01	2.93967E-01	1	1.47065E+00	2.21259E-01	1.00000E+00		
6	3.53873E-01	3.80612E-01	1	2.22345E+00	1.27890E-01	1.00000E+00		
7	4.07351E-01	4.24781E-01	1	2.55946E+00	9.30429E-02	1.00000E+00		
8	4.42212E-01	4.55167E-01	1	2.77850E+00	7.41004E-02	1.00000E+00		
9	4.68122E-01	4.68814E-01	2	2.94130E+00	4.07946E-03	0		
10	4.69507E-01	4.71481E-01	2	2.95000E+00	1.16988E-02	0		
11	4.73456E-01	4.75431E-01	2	2.97481E+00	1.17968E-02	0		
12	4.77405E-01	4.78098E-01	2	2.99962E+00	4.16023E-03	0		
13	4.78790E-01	4.83159E-01	3	3.00833E+00	2.65268E-02	1.00000E+00		
14	4.87528E-01	4.99987E-01	3	3.06329E+00	7.82768E-02	1.00000E+00		
15	5.12445E-01	5.24908E-01	3	3.21979E+00	8.21777E-02	1.00000E+00		
16	5.37362E-01	5.41731E-01	3	3.37634E+00	2.97427E-02	1.00000E+00		
17	5.46100E-01	5.53513E-01	4	3.43125E+00	5.15631E-02	1.00000E+00		
18	5.60926E-01	5.70900E-01	4	3.52440E+00	7.15548E-02	1.00000E+00		
19	5.80874E-01	5.96175E-01	4	3.64974E+00	1.14628E-01	1.00000E+00		
20	6.11475E-01	6.45755E-01	4	3.84201E+00	2.78169E-01	1.00000E+00		
21	6.80034E-01	7.14313E-01	4	4.27278E+00	3.07702E-01	1.00000E+00		
22	7.48592E-01	7.63893E-01	4	4.70354E+00	1.46875E-01	1.00000E+00		
23	7.79193E-01	7.89167E-01	4	4.89582E+00	9.89116E-02	1.00000E+00		
24	7.99141E-01	8.06554E-01	4	5.02115E+00	7.51357E-02	1.00000E+00		
25	8.13968E-01			5.11431E+00				

- elapsed time .00 min.

1

outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	197	1.90664E-05	1.22058E+00	-2.19260E-01	1.00000E+00	3.33668E-03	.00000E+00	.0000
2	292	-1.88981E-06	1.23107E+00	1.08980E-03	-1.73021E-02	2.88563E-02	.00000E+00	.0000
3	377	8.20433E-06	1.22188E+00	1.02605E-03	9.41305E-03	1.25031E-02	.00000E+00	.0167
4	451	-4.50866E-07	1.21741E+00	3.84249E-04	4.54793E-03	2.87685E-03	.00000E+00	.0167
5	509	1.88203E-06	1.21627E+00	7.21640E-05	1.07277E-03	4.13854E-04	.00000E+00	.0167
6	551	-1.33478E-05	1.21632E+00	1.05179E-05	1.45281E-04	6.29152E-05	.00000E+00	.0167

grp to grp	inner iters	mfd int.		max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	1	3.06407E-07	24	1.00000E+00	1
2	2	1	1	3.57448E-07	24	1.00000E+00	1
3	3	1	1	3.28814E-07	24	1.00000E+00	1

4	4	1	1	3.17300E-07	24	1.00000E+00	1
5	5	1	1	3.22693E-07	24	1.00000E+00	1
6	6	1	1	2.04244E-07	24	1.00000E+00	1
7	7	1	1	1.38378E-07	24	1.00000E+00	1
8	8	1	1	3.61431E-08	24	1.00000E+00	1
9	9	1	7	2.25372E-09	24	1.00000E+00	1
10	10	1	2	2.80847E-09	24	1.00000E+00	1
11	11	1	2	3.17741E-09	24	1.00000E+00	1
12	12	1	2	3.75443E-09	24	1.00000E+00	1
13	13	1	2	3.48470E-09	24	1.00000E+00	1
14	14	1	2	3.38799E-09	24	1.00000E+00	1
15	15	1	18	2.27172E-05	24	1.00010E+00	1
16	16	1	20	3.39167E-05	24	1.00009E+00	1
17	17	1	19	4.61487E-05	24	1.00009E+00	1
18	18	1	19	5.17709E-05	24	1.00010E+00	1
19	19	1	20	4.88440E-05	24	1.00011E+00	1
20	20	1	20	4.79851E-05	24	1.00018E+00	1
21	21	1	20	8.31927E-05	24	1.00017E+00	1
22	22	1	20	3.24259E-05	24	1.00008E+00	1
23	23	1	24	9.90472E-06	24	1.00000E+00	1
24	24	1	24	2.76203E-05	24	9.99989E-01	1
25	25	1	24	3.16361E-05	24	9.99992E-01	1
26	26	1	21	3.19527E-05	24	1.00003E+00	2
27	27	1	24	1.33300E-05	19	9.99999E-01	2

7 578 1.51990E-05 1.21590E+00 2.13601E-06 2.19379E-05 8.19833E-06 .00000E+00 .0167

final monitor

lambda 1.21611E+00 production/absorption 1.21611E+00 angular flux on 16

- elapsed time .02 min.

1 at 0 d, sas2h: babcock wilcox 15x15, 3.00w%, 20gd/mtu burn high temp

0 int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	.00000E+00	1.29551E-02	.00000E+00	2.10906E-03	3.57472E-03
2	1	2.59102E-02	4.33406E-02	1.62798E-01	9.49518E-03	1.60836E-02
3	1	6.07710E-02	8.75100E-02	3.81835E-01	2.94045E-02	4.99010E-02
4	1	1.14246E-01	1.74155E-01	7.17848E-01	1.31104E-01	2.24410E-01
5	1	2.34061E-01	2.93967E-01	1.47065E+00	2.21299E-01	3.86876E-01
6	1	3.53873E-01	3.80612E-01	2.22345E+00	1.27890E-01	2.28822E-01
7	1	4.07351E-01	4.24781E-01	2.55946E+00	9.30429E-02	1.69575E-01
8	1	4.42212E-01	4.55167E-01	2.77850E+00	7.41004E-02	1.37069E-01
9	2	4.68122E-01	4.68814E-01	2.94130E+00	4.07946E-03	.00000E+00
10	2	4.69507E-01	4.71481E-01	2.95000E+00	1.16988E-02	.00000E+00
11	2	4.73456E-01	4.75431E-01	2.97481E+00	1.17968E-02	.00000E+00
12	2	4.77405E-01	4.78098E-01	2.99962E+00	4.16023E-03	.00000E+00
13	3	4.78790E-01	4.83159E-01	3.00833E+00	2.65268E-02	.00000E+00
14	3	4.87528E-01	4.99987E-01	3.06325E+00	7.82768E-02	.00000E+00
15	3	5.12445E-01	5.24903E-01	3.21979E+00	8.21777E-02	.00000E+00
16	3	5.37362E-01	5.41731E-01	3.37534E+00	2.97427E-02	.00000E+00
17	4	5.46100E-01	5.53513E-01	3.43125E+00	5.15631E-02	.00000E+00
18	4	5.60926E-01	5.70900E-01	3.52440E+00	7.15548E-02	.00000E+00
19	4	5.80874E-01	5.96175E-01	3.64974E+00	1.14628E-01	.00000E+00
20	4	6.11475E-01	6.45755E-01	3.84201E+00	2.78169E-01	.00000E+00
21	4	6.80034E-01	7.14313E-01	4.27278E+00	3.07702E-01	.00000E+00
22	4	7.48592E-01	7.63893E-01	4.70854E+00	1.46875E-01	.00000E+00
23	4	7.79193E-01	7.89167E-01	4.89582E+00	9.89116E-02	.00000E+00
24	4	7.99141E-01	8.06654E-01	5.02115E+00	7.51357E-02	.00000E+00
25		8.13968E-01		5.11431E+00		

1 at 0 d, sas2h: babcock wilcox 15x15, 3.00w%, 20gd/mtu burn high temp

0 total flux

0 int.	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.68015E-01	1.30208E+00	1.66737E+00	1.03770E+00	1.57363E+00	3.08069E+00	2.90515E+00	2.07866E+00
2	1.68074E-01	1.30265E+00	1.66820E+00	1.03819E+00	1.57433E+00	3.03199E+00	2.90582E+00	2.07872E+00

3	1.68019E-01	1.30203E+00	1.66741E+00	1.03771E+00	1.57353E+00	3.03036E+00	2.90478E+00	2.07852E+00
4	1.67635E-01	1.29778E+00	1.66190E+00	1.03434E+00	1.56816E+00	3.01975E+00	2.89839E+00	2.07747E+00
5	1.66643E-01	1.28691E+00	1.64797E+00	1.02586E+00	1.55471E+00	2.99851E+00	2.88269E+00	2.07488E+00
6	1.65504E-01	1.27456E+00	1.63252E+00	1.01639E+00	1.53980E+00	2.96479E+00	2.86559E+00	2.07201E+00
7	1.64602E-01	1.26492E+00	1.62080E+00	1.00921E+00	1.52861E+00	2.94364E+00	2.85308E+00	2.06985E+00
8	1.63709E-01	1.25556E+00	1.60880E+00	1.00244E+00	1.51822E+00	2.92433E+00	2.84178E+00	2.06781E+00
9	1.63221E-01	1.25050E+00	1.60264E+00	9.98849E-01	1.51275E+00	2.91429E+00	2.83594E+00	2.06674E+00
10	1.63120E-01	1.24948E+00	1.60141E+00	9.98157E-01	1.51175E+00	2.91249E+00	2.83494E+00	2.06665E+00
11	1.62971E-01	1.24801E+00	1.59963E+00	9.97166E-01	1.51033E+00	2.90994E+00	2.83354E+00	2.06626E+00
12	1.62873E-01	1.24703E+00	1.59844E+00	9.96529E-01	1.50941E+00	2.90830E+00	2.83264E+00	2.06608E+00
13	1.62691E-01	1.24522E+00	1.59626E+00	9.95282E-01	1.50758E+00	2.90485E+00	2.83070E+00	2.06570E+00
14	1.62195E-01	1.24008E+00	1.58978E+00	9.91446E-01	1.50175E+00	2.89353E+00	2.82424E+00	2.06467E+00
15	1.61638E-01	1.23384E+00	1.58143E+00	9.86127E-01	1.49333E+00	2.87682E+00	2.81460E+00	2.06354E+00
16	1.61366E-01	1.23039E+00	1.57644E+00	9.82658E-01	1.48759E+00	2.86523E+00	2.80786E+00	2.06308E+00
17	1.61235E-01	1.22842E+00	1.57334E+00	9.80529E-01	1.48361E+00	2.85726E+00	2.80318E+00	2.06290E+00
18	1.61063E-01	1.22585E+00	1.56937E+00	9.77358E-01	1.47854E+00	2.84726E+00	2.79729E+00	2.06277E+00
19	1.60848E-01	1.22281E+00	1.56477E+00	9.73995E-01	1.47284E+00	2.83608E+00	2.79070E+00	2.06254E+00
20	1.60562E-01	1.21887E+00	1.55891E+00	9.69779E-01	1.46575E+00	2.82219E+00	2.78253E+00	2.06223E+00
21	1.60364E-01	1.21612E+00	1.55480E+00	9.66795E-01	1.46072E+00	2.81234E+00	2.77682E+00	2.06214E+00
22	1.60366E-01	1.21600E+00	1.55450E+00	9.66514E-01	1.46020E+00	2.81133E+00	2.77637E+00	2.06237E+00
23	1.60438E-01	1.21684E+00	1.55562E+00	9.67244E-01	1.46137E+00	2.81363E+00	2.77786E+00	2.06265E+00
24	1.60522E-01	1.21783E+00	1.55698E+00	9.68142E-01	1.46284E+00	2.81649E+00	2.77967E+00	2.06292E+00

0 int.	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.58406E+00	1.44107E+00	1.29878E+00	7.92536E-01	6.74146E-01	6.01091E-01	3.73477E-01	2.08862E-01
2	1.58398E+00	1.44096E+00	1.29867E+00	7.92302E-01	6.73929E-01	6.00810E-01	3.73446E-01	2.08845E-01
3	1.58417E+00	1.44118E+00	1.29904E+00	7.92847E-01	6.74374E-01	6.01452E-01	3.73522E-01	2.08881E-01
4	1.58523E+00	1.44245E+00	1.30172E+00	7.95911E-01	6.76866E-01	6.05077E-01	3.73959E-01	2.09085E-01
5	1.58787E+00	1.44556E+00	1.30831E+00	8.03477E-01	6.83016E-01	6.14053E-01	3.74947E-01	2.09582E-01
6	1.59082E+00	1.44895E+00	1.31552E+00	8.11807E-01	6.89775E-01	6.23996E-01	3.76032E-01	2.10122E-01
7	1.59306E+00	1.45144E+00	1.32083E+00	8.17982E-01	6.94773E-01	6.31395E-01	3.76814E-01	2.10517E-01
8	1.59517E+00	1.45369E+00	1.32567E+00	8.23652E-01	6.99354E-01	6.38211E-01	3.77512E-01	2.10873E-01
9	1.59630E+00	1.45486E+00	1.32817E+00	8.26597E-01	7.01734E-01	6.41755E-01	3.77870E-01	2.11058E-01
10	1.59649E+00	1.45505E+00	1.32857E+00	8.27072E-01	7.02125E-01	6.42326E-01	3.77951E-01	2.11089E-01
11	1.59678E+00	1.45532E+00	1.32915E+00	8.27749E-01	7.02684E-01	6.43142E-01	3.78017E-01	2.11135E-01
12	1.59697E+00	1.45549E+00	1.32952E+00	8.28188E-01	7.03046E-01	6.43670E-01	3.78073E-01	2.11164E-01
13	1.59736E+00	1.45585E+00	1.33028E+00	8.29082E-01	7.03785E-01	6.44744E-01	3.78188E-01	2.11224E-01
14	1.59840E+00	1.45700E+00	1.33271E+00	8.31881E-01	7.06099E-01	6.48127E-01	3.78556E-01	2.11413E-01
15	1.59957E+00	1.45864E+00	1.33613E+00	8.35743E-01	7.09292E-01	6.52781E-01	3.79078E-01	2.11674E-01
16	1.60013E+00	1.45972E+00	1.33858E+00	8.38234E-01	7.11351E-01	6.55778E-01	3.79424E-01	2.11843E-01
17	1.60044E+00	1.46054E+00	1.34006E+00	8.40064E-01	7.12830E-01	6.57961E-01	3.79615E-01	2.11947E-01
18	1.60089E+00	1.46164E+00	1.34236E+00	8.42566E-01	7.14852E-01	6.60936E-01	3.79829E-01	2.12077E-01
19	1.60148E+00	1.46290E+00	1.34498E+00	8.45446E-01	7.17144E-01	6.64366E-01	3.80081E-01	2.12229E-01
20	1.60225E+00	1.46448E+00	1.34830E+00	8.49115E-01	7.20089E-01	6.68739E-01	3.80389E-01	2.12419E-01
21	1.60285E+00	1.46562E+00	1.35068E+00	8.51730E-01	7.22160E-01	6.71838E-01	3.80546E-01	2.12529E-01
22	1.60291E+00	1.46573E+00	1.35090E+00	8.51959E-01	7.22375E-01	6.72081E-01	3.80463E-01	2.12501E-01
23	1.60275E+00	1.46544E+00	1.35031E+00	8.51279E-01	7.21707E-01	6.71247E-01	3.80320E-01	2.12434E-01
24	1.60255E+00	1.46509E+00	1.34956E+00	8.50440E-01	7.20997E-01	6.70228E-01	3.80175E-01	2.12363E-01

0 int.	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.08523E-02	7.68450E-02	1.43864E-01	4.69466E-01	1.45353E-01	2.97143E-01	9.02604E-01	6.43355E-01
2	9.08353E-02	7.68258E-02	1.43836E-01	4.69370E-01	1.45298E-01	2.97006E-01	9.02133E-01	6.42930E-01
3	9.08656E-02	7.68604E-02	1.43885E-01	4.69544E-01	1.45404E-01	2.97302E-01	9.03157E-01	6.44069E-01
4	9.10451E-02	7.70659E-02	1.44176E-01	4.70675E-01	1.46024E-01	2.98998E-01	9.09010E-01	6.50338E-01
5	9.14884E-02	7.75741E-02	1.44889E-01	4.73112E-01	1.47559E-01	3.03184E-01	9.23508E-01	6.65975E-01
6	9.19747E-02	7.81326E-02	1.45667E-01	4.75887E-01	1.49249E-01	3.07812E-01	9.39496E-01	6.83214E-01
7	9.23339E-02	7.85458E-02	1.46259E-01	4.77925E-01	1.50502E-01	3.11254E-01	9.51373E-01	6.96175E-01
8	9.26632E-02	7.89253E-02	1.46780E-01	4.79795E-01	1.51652E-01	3.14424E-01	9.62298E-01	7.08188E-01
9	9.28347E-02	7.91229E-02	1.47080E-01	4.80764E-01	1.52250E-01	3.16072E-01	9.67970E-01	7.14441E-01
10	9.28638E-02	7.91559E-02	1.47076E-01	4.80927E-01	1.52348E-01	3.16336E-01	9.68864E-01	7.15386E-01
11	9.29053E-02	7.92032E-02	1.47141E-01	4.81159E-01	1.52486E-01	3.16712E-01	9.70136E-01	7.16730E-01
12	9.29522E-02	7.92537E-02	1.47184E-01	4.81309E-01	1.52575E-01	3.16955E-01	9.70957E-01	7.17598E-01

13	9.29871E-02	7.92962E-02	1.47270E-01	4.81617E-01	1.52759E-01	3.17452E-01	9.72636E-01	7.19366E-01
14	9.31586E-02	7.94919E-02	1.47540E-01	4.82575E-01	1.53336E-01	3.19002E-01	9.77871E-01	7.24827E-01
15	9.33940E-02	7.97616E-02	1.47912E-01	4.83886E-01	1.54137E-01	3.21121E-01	9.84994E-01	7.32137E-01
16	9.35447E-02	7.99352E-02	1.48150E-01	4.84725E-01	1.54656E-01	3.22470E-01	9.89500E-01	7.36668E-01
17	9.36619E-02	8.00625E-02	1.48321E-01	4.85333E-01	1.55060E-01	3.23526E-01	9.93257E-01	7.40326E-01
18	9.37970E-02	8.02370E-02	1.48552E-01	4.86173E-01	1.55629E-01	3.25038E-01	9.98878E-01	7.47375E-01
19	9.39654E-02	8.04386E-02	1.48820E-01	4.87150E-01	1.56288E-01	3.26808E-01	1.00558E+00	7.55265E-01
20	9.41792E-02	8.06955E-02	1.49163E-01	4.88403E-01	1.57135E-01	3.29109E-01	1.01451E+00	7.65898E-01
21	9.43266E-02	8.08770E-02	1.49401E-01	4.89289E-01	1.57750E-01	3.30800E-01	1.02130E+00	7.74195E-01
22	9.43320E-02	8.08908E-02	1.49413E-01	4.89350E-01	1.57821E-01	3.31007E-01	1.02237E+00	7.75782E-01
23	9.42863E-02	8.08417E-02	1.49341E-01	4.89102E-01	1.57678E-01	3.30626E-01	1.02108E+00	7.74477E-01
24	9.42324E-02	8.07821E-02	1.49256E-01	4.88803E-01	1.57497E-01	3.30139E-01	1.01954E+00	7.72611E-01

0 int.

	grp. 25	grp. 26	grp. 27
1	2.61593E-01	1.55540E-01	1.98117E-02
2	2.61414E-01	1.55433E-01	1.98150E-02
3	2.62054E-01	1.56069E-01	2.00107E-02
4	2.65425E-01	1.59236E-01	2.08915E-02
5	2.73818E-01	1.67159E-01	2.31327E-02
6	2.83196E-01	1.76124E-01	2.57599E-02
7	2.90280E-01	1.83005E-01	2.78869E-02
8	2.95903E-01	1.89535E-01	3.00040E-02
9	3.00363E-01	1.92968E-01	3.11391E-02
10	3.00866E-01	1.93429E-01	3.12682E-02
11	3.01580E-01	1.94085E-01	3.14518E-02
12	3.02041E-01	1.94507E-01	3.15701E-02
13	3.02978E-01	1.95364E-01	3.18102E-02
14	3.05823E-01	1.97947E-01	3.25203E-02
15	3.09528E-01	2.01258E-01	3.33988E-02
16	3.11747E-01	2.03198E-01	3.38891E-02
17	3.13970E-01	2.05505E-01	3.46467E-02
18	3.17643E-01	2.09524E-01	3.60276E-02
19	3.22115E-01	2.14398E-01	3.76432E-02
20	3.28207E-01	2.21025E-01	3.97654E-02
21	3.33062E-01	2.26425E-01	4.15082E-02
22	3.34116E-01	2.27807E-01	4.20254E-02
23	3.33481E-01	2.27325E-01	4.19646E-02
24	3.32508E-01	2.26443E-01	4.17693E-02

- elapsed time .02 min.

1fine group summary for zone 1 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.13807E-02	.00000E+00	1.20349E-02	9.98292E-03	3.06431E-03	1.05147E-02	9.98827E-01
2	.00000E+00	1.89181E-01	2.19886E-03	1.63986E-01	6.50932E-02	1.34448E-02	1.12853E-01	1.00004E+00
3	.00000E+00	2.15085E-01	2.56537E-02	1.59961E-01	8.05577E-02	1.55674E-02	1.44563E-01	1.00001E+00
4	.00000E+00	1.24418E-01	3.85217E-02	1.04771E-01	6.76868E-02	7.46119E-03	8.77894E-02	1.00001E+00
5	.00000E+00	1.66841E-01	6.73968E-02	2.58878E-01	9.47626E-02	4.50099E-03	1.33976E-01	9.99991E-01
6	.00000E+00	1.79949E-01	1.34067E-01	6.53736E-01	5.44567E-02	7.18526E-03	2.52364E-01	1.00003E+00
7	.00000E+00	8.93229E-02	9.82619E-02	7.45743E-01	3.63484E-02	7.86084E-03	1.43354E-01	1.00001E+00
8	.00000E+00	1.37908E-02	4.25643E-02	6.31201E-01	2.14672E-02	1.43444E-02	2.05411E-02	1.00004E+00
9	.00000E+00	1.00142E-03	2.16884E-02	5.34272E-01	2.06097E-02	2.36016E-02	-2.15209E-02	9.99989E-01
10	.00000E+00	7.43875E-05	2.06315E-02	4.56925E-01	1.06293E-02	3.67080E-02	-2.66320E-02	1.00001E+00
11	.00000E+00	5.85240E-06	1.06302E-02	4.16452E-01	8.08901E-03	5.90627E-02	-5.65161E-02	1.00001E+00
12	.00000E+00	4.11122E-07	8.08908E-03	2.35668E-01	9.32623E-03	6.36957E-02	-6.49273E-02	9.99957E-01
13	.00000E+00	6.52825E-08	9.32624E-03	1.74157E-01	6.16830E-03	5.65834E-02	-5.34258E-02	1.00001E+00
14	.00000E+00	1.29573E-08	6.16830E-03	1.51972E-01	7.56523E-03	7.67766E-02	-7.81738E-02	1.00000E+00
15	.00000E+00	1.46205E-09	7.65500E-03	8.58051E-02	8.98340E-03	6.81610E-03	-8.14481E-03	1.00002E+00
16	.00000E+00	4.29309E-10	9.16672E-03	4.37935E-02	9.81815E-03	3.66138E-03	-4.31287E-03	1.00000E+00
17	.00000E+00	1.38258E-10	8.07550E-03	1.55718E-02	7.99007E-03	4.06731E-03	-3.98153E-03	9.99970E-01
18	.00000E+00	9.89890E-11	7.55144E-03	1.25548E-02	7.48546E-03	4.63627E-03	-4.56982E-03	9.99962E-01
19	.00000E+00	1.39949E-10	9.44175E-03	2.73846E-02	1.01027E-02	5.65122E-03	-6.31168E-03	9.99972E-01
20	.00000E+00	2.27572E-10	1.19658E-02	1.12578E-01	1.05948E-02	2.38759E-02	-2.25040E-02	9.99976E-01

21	.00000E+00	3.33092E-11	1.06521E-02	2.78215E-02	1.07506E-02	1.36800E-02	-1.37768E-02	9.99929E-01
22	.00000E+00	3.86463E-11	1.52934E-02	6.49242E-02	1.45572E-02	3.78728E-02	-3.71298E-02	9.99966E-01
23	.00000E+00	3.69501E-11	2.06823E-02	2.19015E-01	2.39756E-02	1.26019E-01	-1.29513E-01	9.99999E-01
24	.00000E+00	1.00579E-11	2.87408E-02	1.48197E-01	2.85378E-02	1.39738E-01	-1.38534E-01	1.00001E+00
25	.00000E+00	2.94413E-12	2.42538E-02	5.52382E-02	1.80605E-02	7.97872E-02	-7.35946E-02	1.00001E+00
26	.00000E+00	2.06444E-12	1.17637E-02	3.77369E-02	7.98684E-03	7.31048E-02	-6.98275E-02	9.99995E-01
27	.00000E+00	4.91967E-13	2.49714E-03	5.52789E-03	1.33605E-03	2.03787E-02	-1.92179E-02	1.00001E+00
28	.00000E+00	1.00000E+00	6.52922E-01	5.55571E+00	6.52922E-01	9.28144E-01	7.40392E-02	9.99998E-01

0 grp. rt bdy flux rt leakage lft bdy flux lft leakage n2n rate fiss rate flux*dr**2 total flux

1	1.65248E-01	1.05147E-02	1.67957E-01	.00000E+00	2.15356E-03	2.51447E-03	.00000E+00	1.14358E-01
2	1.25077E+00	1.12853E-01	1.30142E+00	.00000E+00	1.79132E-05	1.17117E-02	.00000E+00	8.82066E-01
3	1.60296E+00	1.44563E-01	1.66656E+00	.00000E+00	.00000E+00	1.45446E-02	.00000E+00	1.12969E+00
4	9.99032E-01	8.77894E-02	1.03721E+00	.00000E+00	.00000E+00	6.31230E-03	.00000E+00	7.03353E-01
5	1.51302E+00	1.33976E-01	1.57291E+00	.00000E+00	.00000E+00	1.88452E-03	.00000E+00	1.06583E+00
6	2.91477E+00	2.52364E-01	3.02952E+00	.00000E+00	.00000E+00	1.74220E-03	.00000E+00	2.05239E+00
7	2.83620E+00	1.43354E-01	2.90441E+00	.00000E+00	.00000E+00	1.81389E-03	.00000E+00	1.97957E+00
8	2.06679E+00	2.05411E-02	2.07854E+00	.00000E+00	.00000E+00	1.93179E-03	.00000E+00	1.42757E+00
9	1.59624E+00	-2.15209E-02	1.58416E+00	.00000E+00	.00000E+00	2.67782E-03	.00000E+00	1.09406E+00
10	1.45481E+00	-2.66320E-02	1.44119E+00	.00000E+00	.00000E+00	5.70145E-03	.00000E+00	9.96179E-01
11	1.32806E+00	-5.65161E-02	1.29904E+00	.00000E+00	.00000E+00	1.16778E-02	.00000E+00	9.02821E-01
12	8.26472E-01	-6.49273E-02	7.92828E-01	.00000E+00	.00000E+00	1.47800E-02	.00000E+00	5.55624E-01
13	7.01630E-01	-5.34258E-02	6.74398E-01	.00000E+00	.00000E+00	1.36248E-02	.00000E+00	4.72221E-01
14	6.41604E-01	-7.81738E-02	6.01440E-01	.00000E+00	.00000E+00	9.97957E-03	.00000E+00	4.25718E-01
15	3.77821E-01	-8.14481E-03	3.73485E-01	.00000E+00	.00000E+00	2.51433E-03	.00000E+00	2.58441E-01
16	2.11053E-01	-4.31287E-03	2.08868E-01	.00000E+00	.00000E+00	1.66606E-03	.00000E+00	1.44443E-01
17	9.28196E-02	-3.98153E-03	9.08647E-02	.00000E+00	.00000E+00	2.52477E-03	.00000E+00	6.31285E-02
18	7.91074E-02	-4.56982E-03	7.68607E-02	.00000E+00	.00000E+00	3.35695E-03	.00000E+00	5.35711E-02
19	1.47004E-01	-6.31168E-03	1.43881E-01	.00000E+00	.00000E+00	4.06104E-03	.00000E+00	9.99763E-02
20	4.80644E-01	-2.25040E-02	4.69502E-01	.00000E+00	.00000E+00	1.72805E-02	.00000E+00	3.26528E-01
21	1.52201E-01	-1.37768E-02	1.45395E-01	.00000E+00	.00000E+00	1.00277E-02	.00000E+00	1.02089E-01
22	3.15982E-01	-3.71298E-02	2.97291E-01	.00000E+00	.00000E+00	2.72668E-02	.00000E+00	2.10107E-01
23	9.67743E-01	-1.29513E-01	9.03188E-01	.00000E+00	.00000E+00	9.16735E-02	.00000E+00	6.40548E-01
24	7.14209E-01	-1.38534E-01	6.43952E-01	.00000E+00	.00000E+00	1.04029E-01	.00000E+00	4.63665E-01
25	3.00257E-01	-7.35946E-02	2.61867E-01	.00000E+00	.00000E+00	6.04430E-02	.00000E+00	1.91360E-01
26	1.92847E-01	-6.98275E-02	1.55752E-01	.00000E+00	.00000E+00	5.56009E-02	.00000E+00	1.17858E-01
27	3.11053E-02	-1.92179E-02	1.98489E-02	.00000E+00	.00000E+00	1.55149E-02	.00000E+00	1.67887E-02
28	2.39584E+01	7.40392E-02	2.39421E+01	.00000E+00	2.17148E-03	4.96856E-01	.00000E+00	1.64899E+01

1fine group summary for zone 2 by group including sum for all groups in line 28

0 grp. fix source fiss source in scatter slf scatter out scatter absorption leakage balance

1	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-3.72529E-09	1.00000E+00
2	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-5.21541E-08	1.00000E+00
3	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
4	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.49012E-08	1.00000E+00
5	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.49012E-08	1.00000E+00
6	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.19209E-07	1.00000E+00
7	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.04308E-07	9.99999E-01
8	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-4.84288E-08	1.00000E+00
9	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.86265E-08	1.00000E+00
10	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-4.28408E-08	1.00000E+00
11	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.11759E-08	1.00000E+00
12	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.98023E-08	1.00000E+00
13	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	4.47035E-08	9.99999E-01
14	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	7.45058E-09	1.00000E+00
15	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	9.31323E-10	1.00000E+00
16	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.86265E-09	1.00000E+00
17	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-4.65661E-09	1.00000E+00
18	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
19	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-4.65661E-09	1.00000E+00
20	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.11759E-08	1.00000E+00
21	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.86265E-09	1.00000E+00

22	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	3.72529E-09	1.00000E+00
23	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.49012E-08	1.00000E+00
24	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	2.98023E-08	1.00000E+00
25	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	2.98023E-08	1.00000E+00
26	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	7.45058E-09	1.00000E+00
27	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.86265E-09	1.00000E+00
28	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.58325E-07	1.00001E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dr**2	total flux
1	1.62348E-01	1.05147E-02	1.63248E-01	1.05147E-02	.00000E+00	.00000E+00	.00000E+00	5.17429E-03
2	1.24679E+00	1.12853E-01	1.25077E+00	1.12853E-01	.00000E+00	.00000E+00	.00000E+00	3.96290E-02
3	1.59817E+00	1.44563E-01	1.60296E+00	1.44563E-01	.00000E+00	.00000E+00	.00000E+00	5.07928E-02
4	9.96361E-01	8.77894E-02	9.99032E-01	8.77894E-02	.00000E+00	.00000E+00	.00000E+00	3.16611E-02
5	1.50918E+00	1.33978E-01	1.51302E+00	1.33978E-01	.00000E+00	.00000E+00	.00000E+00	4.79533E-02
6	2.90789E+00	2.52365E-01	2.91477E+00	2.52364E-01	.00000E+00	.00000E+00	.00000E+00	9.23885E-02
7	2.83241E+00	1.43355E-01	2.83620E+00	1.43354E-01	.00000E+00	.00000E+00	.00000E+00	8.99455E-02
8	2.06603E+00	2.05410E-02	2.06679E+00	2.05411E-02	.00000E+00	.00000E+00	.00000E+00	6.55779E-02
9	1.59702E+00	-2.15209E-02	1.59624E+00	-2.15209E-02	.00000E+00	.00000E+00	.00000E+00	5.06697E-02
10	1.45554E+00	-2.66320E-02	1.45481E+00	-2.66320E-02	.00000E+00	.00000E+00	.00000E+00	4.61806E-02
11	1.32961E+00	-5.65161E-02	1.32806E+00	-5.65161E-02	.00000E+00	.00000E+00	.00000E+00	4.21717E-02
12	8.28298E-01	-6.49273E-02	8.26472E-01	-6.49273E-02	.00000E+00	.00000E+00	.00000E+00	2.62580E-02
13	7.03136E-01	-5.34258E-02	7.01630E-01	-5.34258E-02	.00000E+00	.00000E+00	.00000E+00	2.22909E-02
14	6.43802E-01	-7.81738E-02	6.41604E-01	-7.81738E-02	.00000E+00	.00000E+00	.00000E+00	2.03973E-02
15	3.78054E-01	-8.14481E-03	3.77821E-01	-8.14481E-03	.00000E+00	.00000E+00	.00000E+00	1.19951E-02
16	2.11155E-01	-4.31287E-03	2.11053E-01	-4.31287E-03	.00000E+00	.00000E+00	.00000E+00	6.69989E-03
17	9.29315E-02	-3.98154E-03	9.28198E-02	-3.98153E-03	.00000E+00	.00000E+00	.00000E+00	2.94771E-03
18	7.92346E-02	-4.56982E-03	7.91074E-02	-4.56982E-03	.00000E+00	.00000E+00	.00000E+00	2.51278E-03
19	1.47180E-01	-6.31168E-03	1.47004E-01	-6.31168E-03	.00000E+00	.00000E+00	.00000E+00	4.66852E-03
20	4.81270E-01	-2.25040E-02	4.80644E-01	-2.25040E-02	.00000E+00	.00000E+00	.00000E+00	1.52660E-02
21	1.52574E-01	-1.37788E-02	1.52201E-01	-1.37788E-02	.00000E+00	.00000E+00	.00000E+00	4.83697E-03
22	3.16996E-01	-3.71298E-02	3.15982E-01	-3.71298E-02	.00000E+00	.00000E+00	.00000E+00	1.00449E-02
23	9.71172E-01	-1.29313E-01	9.67743E-01	-1.29313E-01	.00000E+00	.00000E+00	.00000E+00	3.07672E-02
24	7.17831E-01	-1.38536E-01	7.14209E-01	-1.38536E-01	.00000E+00	.00000E+00	.00000E+00	2.27242E-02
25	3.02163E-01	-7.35946E-02	3.00237E-01	-7.35946E-02	.00000E+00	.00000E+00	.00000E+00	9.55931E-03
26	1.94614E-01	-6.95275E-02	1.92847E-01	-6.95275E-02	.00000E+00	.00000E+00	.00000E+00	6.14885E-03
27	3.16001E-02	-1.92179E-02	3.11053E-02	-1.92179E-02	.00000E+00	.00000E+00	.00000E+00	9.95198E-04
28	2.39539E+01	7.40887E-02	2.39584E+01	7.40892E-02	.00000E+00	.00000E+00	.00000E+00	7.60257E-01

1fine group sumery for zone 3 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	3.58926E-03	2.69061E-03	1.37883E-05	-2.60843E-03	1.00001E+00
2	.00000E+00	.00000E+00	4.69909E-04	2.54049E-02	1.82293E-02	5.04709E-05	-1.78100E-02	1.00000E+00
3	.00000E+00	.00000E+00	2.57258E-03	4.97107E-02	1.57180E-02	1.35962E-04	-1.32804E-02	9.99998E-01
4	.00000E+00	.00000E+00	5.04472E-03	4.19119E-02	5.42668E-03	1.02889E-04	-4.84414E-04	9.99995E-01
5	.00000E+00	.00000E+00	1.08874E-02	8.14660E-02	5.15211E-03	1.51770E-04	5.58315E-03	1.00000E+00
6	.00000E+00	.00000E+00	1.82610E-02	2.34896E-01	3.20953E-03	3.19861E-04	1.47317E-02	1.00000E+00
7	.00000E+00	.00000E+00	1.21890E-02	2.35087E-01	1.18167E-03	3.44605E-04	1.06628E-02	9.99999E-01
8	.00000E+00	.00000E+00	2.14897E-03	1.58613E-01	7.62782E-03	2.94604E-04	-5.77395E-03	1.00002E+00
9	.00000E+00	.00000E+00	7.66074E-03	1.05026E-01	8.75504E-04	1.10747E-03	5.67798E-03	9.99991E-01
10	.00000E+00	.00000E+00	8.76669E-04	8.53285E-02	8.46587E-04	8.33265E-04	-8.05193E-04	1.00000E+00
11	.00000E+00	.00000E+00	8.46648E-04	7.67312E-02	8.66566E-04	1.33141E-03	-1.35131E-03	1.00000E+00
12	.00000E+00	.00000E+00	8.66572E-04	4.66180E-02	8.67312E-04	4.19054E-05	-4.22969E-05	1.00000E+00
13	.00000E+00	.00000E+00	8.67313E-04	3.95841E-02	8.07489E-04	6.01001E-05	-2.68221E-07	1.00000E+00
14	.00000E+00	.00000E+00	8.07490E-04	3.64751E-02	6.87378E-04	9.71530E-05	2.29552E-05	1.00000E+00
15	.00000E+00	.00000E+00	7.32160E-04	2.08075E-02	8.51337E-04	8.35362E-05	-2.08078E-04	1.00004E+00
16	.00000E+00	.00000E+00	9.56741E-04	1.11217E-02	9.63492E-04	5.24080E-05	-5.94230E-05	1.00005E+00
17	.00000E+00	.00000E+00	1.07629E-03	4.27625E-03	1.05261E-03	2.58339E-05	-2.28314E-06	1.00002E+00
18	.00000E+00	.00000E+00	1.11370E-03	3.43879E-03	1.11037E-03	2.35486E-05	-2.02870E-05	1.00001E+00
19	.00000E+00	.00000E+00	1.12015E-03	7.35449E-03	1.08509E-03	4.76470E-05	-1.28211E-05	1.00008E+00
20	.00000E+00	.00000E+00	1.33653E-03	2.64811E-02	1.12581E-03	1.96890E-04	1.18613E-05	1.00004E+00
21	.00000E+00	.00000E+00	1.53298E-03	7.08989E-03	1.69352E-03	7.81089E-05	-2.39557E-04	1.00002E+00
22	.00000E+00	.00000E+00	2.17055E-03	1.61308E-02	2.15576E-03	1.87947E-04	-1.73450E-04	1.00001E+00

23	.00000E+00	.00000E+00	3.02517E-03	5.22345E-02	3.83489E-03	7.91044E-04	-1.60043E-03	9.99998E-01
24	.00000E+00	.00000E+00	4.68155E-03	3.66019E-02	5.02305E-03	8.52627E-04	-1.19369E-03	9.99997E-01
25	.00000E+00	.00000E+00	4.51051E-03	1.39792E-02	3.59805E-03	4.75468E-04	4.37118E-04	9.99998E-01
26	.00000E+00	.00000E+00	1.87269E-03	1.00717E-02	1.33100E-03	4.39791E-04	1.02103E-04	9.99997E-01
27	.00000E+00	.00000E+00	3.85945E-04	1.88163E-03	9.69488E-07	1.37625E-04	2.47361E-04	1.00000E+00
28	.00000E+00	.00000E+00	8.80122E-02	1.43170E+00	8.80122E-02	8.27732E-03	-8.18214E-03	9.99999E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	rxn rate	fiss rate	flux*db**2	total flux
1	1.61312E-01	7.90628E-03	1.62848E-01	1.05147E-02	9.61326E-05	.00000E+00	.00000E+00	3.50942E-02
2	1.22961E+00	9.50427E-02	1.24679E+00	1.12853E-01	.00000E+00	.00000E+00	.00000E+00	2.68091E-01
3	1.57521E+00	1.31282E-01	1.59817E+00	1.44563E-01	.00000E+00	.00000E+00	.00000E+00	3.43632E-01
4	9.81750E-01	8.73049E-02	9.96361E-01	8.77894E-02	.00000E+00	.00000E+00	.00000E+00	2.14273E-01
5	1.48604E+00	1.39559E-01	1.50918E+00	1.33976E-01	.00000E+00	.00000E+00	.00000E+00	3.24507E-01
6	2.85208E+00	2.67096E-01	2.90789E+00	2.52365E-01	.00000E+00	.00000E+00	.00000E+00	6.25182E-01
7	2.80602E+00	1.54017E-01	2.85241E+00	1.43355E-01	.00000E+00	.00000E+00	.00000E+00	6.10973E-01
8	2.06254E+00	1.47671E-02	2.06603E+00	2.05410E-02	.00000E+00	.00000E+00	.00000E+00	4.47349E-01
9	1.60024E+00	-1.58430E-02	1.59700E+00	-2.15209E-02	.00000E+00	.00000E+00	.00000E+00	3.46532E-01
10	1.46001E+00	-2.74352E-02	1.45554E+00	-2.66320E-02	.00000E+00	.00000E+00	.00000E+00	3.15952E-01
11	1.33897E+00	-5.78674E-02	1.32961E+00	-5.65161E-02	.00000E+00	.00000E+00	.00000E+00	2.89215E-01
12	8.38878E-01	-6.49695E-02	8.28298E-01	-6.49273E-02	.00000E+00	.00000E+00	.00000E+00	1.80721E-01
13	7.11882E-01	-5.34261E-02	7.05136E-01	-5.34258E-02	.00000E+00	.00000E+00	.00000E+00	1.53386E-01
14	6.56651E-01	-7.81509E-02	6.43802E-01	-7.81738E-02	.00000E+00	.00000E+00	.00000E+00	1.40985E-01
15	3.79482E-01	-8.34788E-03	3.78054E-01	-8.14481E-03	.00000E+00	.00000E+00	.00000E+00	8.21012E-02
16	2.11870E-01	-4.37229E-03	2.11155E-01	-4.31287E-03	.00000E+00	.00000E+00	.00000E+00	4.58474E-02
17	9.35760E-02	-3.98382E-03	9.29315E-02	-3.98154E-03	.00000E+00	.00000E+00	.00000E+00	2.02160E-02
18	7.99731E-02	-4.59011E-03	7.92346E-02	-4.56982E-03	.00000E+00	.00000E+00	.00000E+00	1.72580E-02
19	1.48197E-01	-6.32450E-03	1.47180E-01	-6.31168E-03	.00000E+00	.00000E+00	.00000E+00	3.20170E-02
20	4.84860E-01	-2.24921E-02	4.81270E-01	-2.25040E-02	.00000E+00	.00000E+00	.00000E+00	1.04732E-01
21	1.54767E-01	-1.40164E-02	1.52574E-01	-1.37768E-02	.00000E+00	.00000E+00	.00000E+00	3.33214E-02
22	3.22794E-01	-3.73033E-02	3.16996E-01	-3.71298E-02	.00000E+00	.00000E+00	.00000E+00	6.93716E-02
23	9.90653E-01	-1.30913E-01	9.71172E-01	-1.29513E-01	.00000E+00	.00000E+00	.00000E+00	2.12720E-01
24	7.37816E-01	-1.39730E-01	7.17831E-01	-1.38536E-01	.00000E+00	.00000E+00	.00000E+00	1.57895E-01
25	3.12291E-01	-7.31575E-02	3.02163E-01	-7.35946E-02	.00000E+00	.00000E+00	.00000E+00	6.66844E-02
26	2.03660E-01	-6.92254E-02	1.94614E-01	-6.93275E-02	.00000E+00	.00000E+00	.00000E+00	4.32596E-02
27	3.40010E-02	-1.89705E-02	3.16001E-02	-1.92179E-02	.00000E+00	.00000E+00	.00000E+00	7.14200E-03
28	2.39254E+01	6.58578E-02	2.39539E+01	7.40887E-02	9.61326E-05	.00000E+00	.00000E+00	5.18846E+00

1fine group summary for zone 4 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	5.67143E-03	7.50661E-03	4.00069E-04	-7.90628E-03	9.99950E-01
2	.00000E+00	.00000E+00	4.30715E-03	7.47921E-02	9.83005E-02	1.05321E-03	-9.50428E-02	9.99962E-01
3	.00000E+00	.00000E+00	4.65988E-02	6.83678E-02	1.77880E-01	5.37362E-06	-1.31282E-01	9.99977E-01
4	.00000E+00	.00000E+00	6.94784E-02	4.56306E-02	1.56782E-01	3.21524E-06	-8.73049E-02	9.99988E-01
5	.00000E+00	.00000E+00	1.28846E-01	1.48151E-01	2.68404E-01	3.76652E-06	-1.39559E-01	9.99991E-01
6	.00000E+00	.00000E+00	2.73628E-01	4.54952E-01	5.40714E-01	1.14684E-05	-2.67096E-01	9.99998E-01
7	.00000E+00	.00000E+00	5.51713E-01	7.94789E-01	7.05714E-01	2.53392E-05	-1.54017E-01	9.99987E-01
8	.00000E+00	.00000E+00	7.34931E-01	9.99864E-01	7.49717E-01	4.69625E-05	-1.47671E-02	9.99912E-01
9	.00000E+00	.00000E+00	7.40183E-01	9.14471E-01	7.24178E-01	9.57405E-05	1.58429E-02	9.99890E-01
10	.00000E+00	.00000E+00	7.20995E-01	8.62845E-01	6.93424E-01	2.10831E-04	2.74352E-02	9.99896E-01
11	.00000E+00	.00000E+00	6.98564E-01	8.01997E-01	6.40283E-01	4.55433E-04	5.78673E-02	9.99941E-01
12	.00000E+00	.00000E+00	5.57567E-01	4.18158E-01	4.92015E-01	5.94990E-04	6.49696E-02	9.99979E-01
13	.00000E+00	.00000E+00	4.87977E-01	3.38160E-01	4.33667E-01	8.98228E-04	5.34261E-02	9.99969E-01
14	.00000E+00	.00000E+00	4.69838E-01	3.26656E-01	3.90215E-01	1.47835E-03	7.81508E-02	9.99988E-01
15	.00000E+00	.00000E+00	2.53350E-01	1.30086E-01	2.43703E-01	1.25614E-03	8.37078E-03	9.99922E-01
16	.00000E+00	.00000E+00	1.68220E-01	5.53113E-02	1.62952E-01	8.95343E-04	4.38508E-03	9.99925E-01
17	.00000E+00	.00000E+00	8.71688E-02	1.59025E-02	8.27359E-02	4.44195E-04	3.99135E-03	9.99924E-01
18	.00000E+00	.00000E+00	7.75862E-02	1.32844E-02	7.25884E-02	4.06450E-04	4.59729E-03	9.99923E-01
19	.00000E+00	.00000E+00	1.31159E-01	3.73658E-02	1.24014E-01	8.19018E-04	6.33721E-03	9.99913E-01
20	.00000E+00	.00000E+00	3.23868E-01	2.63568E-01	2.97999E-01	3.37195E-03	2.25337E-02	9.99888E-01
21	.00000E+00	.00000E+00	1.58104E-01	5.48634E-02	1.42725E-01	1.35939E-03	1.40880E-02	9.99885E-01
22	.00000E+00	.00000E+00	3.07794E-01	1.72985E-01	2.69202E-01	3.28812E-03	3.73215E-02	9.99944E-01
23	.00000E+00	.00000E+00	7.75988E-01	9.61250E-01	6.31227E-01	1.38581E-02	1.30921E-01	9.99977E-01

24	.00000E+00	.00000E+00	8.06292E-01	8.43719E-01	6.51274E-01	1.52960E-02	1.39736E-01	9.99984E-01
25	.00000E+00	.00000E+00	5.21382E-01	3.41671E-01	4.39561E-01	8.66600E-03	7.31598E-02	9.99991E-01
26	.00000E+00	.00000E+00	4.10999E-01	3.61002E-01	3.33434E-01	8.33987E-03	6.92573E-02	9.99972E-01
27	.00000E+00	.00000E+00	1.36260E-01	7.51161E-02	1.14432E-01	2.85820E-03	1.89708E-02	9.99995E-01
28	.00000E+00	.00000E+00	9.64465E+00	9.58063E+00	9.64465E+00	6.61818E-02	-6.56843E-02	9.99946E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*df**2	total flux
1	1.60565E-01	5.25118E-10	1.61312E-01	7.90628E-03	4.15137E-10	.00000E+00	.00000E+00	1.83768E-01
2	1.21835E+00	-5.67621E-08	1.22961E+00	9.50427E-02	.00000E+00	.00000E+00	.00000E+00	1.39494E+00
3	1.55768E+00	-3.72236E-08	1.57521E+00	1.31282E-01	.00000E+00	.00000E+00	.00000E+00	1.78401E+00
4	9.68612E-01	-1.06027E-09	9.81750E-01	8.73049E-02	.00000E+00	.00000E+00	.00000E+00	1.10975E+00
5	1.46360E+00	-6.34128E-08	1.48604E+00	1.39559E-01	.00000E+00	.00000E+00	.00000E+00	1.67724E+00
6	2.81799E+00	2.11228E-08	2.86208E+00	2.67096E-01	.00000E+00	.00000E+00	.00000E+00	3.22940E+00
7	2.78061E+00	-2.06552E-08	2.80602E+00	1.54017E-01	.00000E+00	.00000E+00	.00000E+00	3.18443E+00
8	2.06305E+00	-3.17984E-08	2.06294E+00	1.47671E-02	.00000E+00	.00000E+00	.00000E+00	2.36050E+00
9	1.60284E+00	-4.16572E-08	1.60024E+00	-1.58430E-02	.00000E+00	.00000E+00	.00000E+00	1.83391E+00
10	1.46491E+00	-5.43783E-08	1.46001E+00	-2.74352E-02	.00000E+00	.00000E+00	.00000E+00	1.67624E+00
11	1.34918E+00	-5.43663E-08	1.33897E+00	-5.78674E-02	.00000E+00	.00000E+00	.00000E+00	1.54336E+00
12	8.50000E-01	-2.03588E-08	8.38878E-01	-6.49696E-02	.00000E+00	.00000E+00	.00000E+00	9.72025E-01
13	7.20627E-01	3.52663E-08	7.11882E-01	-5.34261E-02	.00000E+00	.00000E+00	.00000E+00	8.24272E-01
14	6.69695E-01	-1.66829E-08	6.56651E-01	-7.81509E-02	.00000E+00	.00000E+00	.00000E+00	7.65587E-01
15	3.80070E-01	2.28811E-05	3.79482E-01	-8.34788E-03	.00000E+00	.00000E+00	.00000E+00	4.35291E-01
16	2.12311E-01	1.27901E-05	2.11870E-01	-4.37229E-03	.00000E+00	.00000E+00	.00000E+00	2.43095E-01
17	9.41972E-02	7.53311E-06	9.35760E-02	-3.98382E-03	.00000E+00	.00000E+00	.00000E+00	1.07795E-01
18	8.07441E-02	7.17857E-06	7.99731E-02	-4.59011E-03	.00000E+00	.00000E+00	.00000E+00	9.23698E-02
19	1.49198E-01	1.27066E-05	1.48197E-01	-6.32450E-03	.00000E+00	.00000E+00	.00000E+00	1.70731E-01
20	4.88569E-01	4.16091E-05	4.84860E-01	-2.24921E-02	.00000E+00	.00000E+00	.00000E+00	5.59046E-01
21	1.57378E-01	2.16381E-05	1.54767E-01	-1.40164E-02	.00000E+00	.00000E+00	.00000E+00	1.79906E-01
22	3.29861E-01	1.82521E-05	3.22794E-01	-3.73033E-02	.00000E+00	.00000E+00	.00000E+00	3.76862E-01
23	1.01843E+00	8.20884E-06	9.90653E-01	-1.30913E-01	.00000E+00	.00000E+00	.00000E+00	1.16216E+00
24	7.71623E-01	6.19712E-06	7.37816E-01	-1.39730E-01	.00000E+00	.00000E+00	.00000E+00	8.78121E-01
25	3.31975E-01	2.09127E-06	3.12291E-01	-7.31575E-02	.00000E+00	.00000E+00	.00000E+00	3.76664E-01
26	2.25941E-01	1.18510E-05	2.03660E-01	-6.92254E-02	.00000E+00	.00000E+00	.00000E+00	2.54277E-01
27	4.16513E-02	3.20933E-07	3.40010E-02	-1.89705E-02	.00000E+00	.00000E+00	.00000E+00	4.59747E-02
28	2.39693E+01	1.72942E-04	2.39254E+01	6.58576E-02	4.15137E-10	.00000E+00	.00000E+00	2.74217E+01

1fine group summary for system

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.13807E-02	.00000E+00	2.12956E-02	2.01801E-02	3.47816E-03	5.25118E-10	9.98822E-01
2	.00000E+00	1.89181E-01	6.97592E-03	2.64183E-01	1.81623E-01	1.45485E-02	-5.67621E-08	1.00002E+00
3	.00000E+00	2.15086E-01	7.48251E-02	2.78040E-01	2.74155E-01	1.57087E-02	-3.72236E-08	9.99987E-01
4	.00000E+00	1.24418E-01	1.13045E-01	1.92313E-01	2.29896E-01	7.56729E-03	-1.06027E-09	1.00000E+00
5	.00000E+00	1.65841E-01	2.07131E-01	4.88495E-01	3.68319E-01	4.65653E-03	-6.34128E-08	9.99989E-01
6	.00000E+00	1.79949E-01	4.29956E-01	1.34358E+00	5.98380E-01	7.51689E-03	2.11228E-08	1.00001E+00
7	.00000E+00	8.95229E-02	6.62144E-01	1.77562E+00	7.43244E-01	8.23079E-03	-2.06552E-08	9.99989E-01
8	.00000E+00	1.37908E-02	7.79644E-01	1.78948E+00	7.78812E-01	1.46869E-02	-3.17984E-08	9.99920E-01
9	.00000E+00	1.00142E-03	7.69382E-01	1.55377E+00	7.45662E-01	2.48048E-02	-4.16572E-08	9.99893E-01
10	.00000E+00	7.43875E-05	7.42503E-01	1.40510E+00	7.04900E-01	3.77521E-02	-5.43783E-08	9.99900E-01
11	.00000E+00	5.85240E-06	7.10041E-01	1.29518E+00	6.49258E-01	6.08495E-02	-5.43663E-08	9.99942E-01
12	.00000E+00	4.11122E-07	5.66523E-01	7.00444E-01	5.02208E-01	6.43302E-02	-2.03588E-08	9.99974E-01
13	.00000E+00	6.52825E-08	4.98170E-01	5.51901E-01	4.40643E-01	5.75417E-02	3.52663E-08	9.99971E-01
14	.00000E+00	1.29573E-08	4.76814E-01	5.15108E-01	3.98467E-01	7.83521E-02	-1.66829E-08	9.99989E-01
15	.00000E+00	1.46205E-09	2.61737E-01	2.36692E-01	2.53537E-01	8.19578E-03	2.28811E-05	9.99927E-01
16	.00000E+00	4.29309E-10	1.78343E-01	1.10226E-01	1.73734E-01	4.60914E-03	1.27901E-05	9.99931E-01
17	.00000E+00	1.38258E-10	9.63205E-02	3.57505E-02	9.17826E-02	4.53734E-03	7.53311E-06	9.99928E-01
18	.00000E+00	9.89890E-11	8.62513E-02	2.92780E-02	8.11842E-02	5.06627E-03	7.17857E-06	9.99926E-01
19	.00000E+00	1.39946E-10	1.41720E-01	7.21046E-02	1.35201E-01	6.51788E-03	1.27066E-05	9.99918E-01
20	.00000E+00	2.27572E-10	3.37170E-01	4.08425E-01	3.09720E-01	2.74447E-02	4.16091E-05	9.99892E-01
21	.00000E+00	3.33092E-11	1.70289E-01	8.97747E-02	1.55169E-01	1.51175E-02	2.16381E-05	9.99885E-01
22	.00000E+00	3.89463E-11	3.27263E-01	2.54089E-01	2.85915E-01	4.13489E-02	1.82521E-05	9.99943E-01
23	.00000E+00	3.69501E-11	7.99695E-01	1.23250E+00	6.59057E-01	1.40669E-01	8.20884E-06	9.99977E-01
24	.00000E+00	1.00573E-11	8.39715E-01	1.02852E+00	6.84834E-01	1.54886E-01	6.19712E-06	9.99985E-01

25	.00000E+00	2.94413E-12	5.50146E-01	4.10889E-01	4.61220E-01	8.89287E-02	2.09127E-06	9.99992E-01
26	.00000E+00	2.06444E-12	4.24636E-01	4.08811E-01	3.42752E-01	8.18845E-02	1.18510E-05	9.99971E-01
27	.00000E+00	4.91967E-13	1.39143E-01	8.25256E-02	1.15769E-01	2.33745E-02	3.20953E-07	9.99997E-01
28	.00000E+00	1.00000E+00	1.08856E+01	1.65680E+01	1.08856E+01	1.00260E+00	1.72916E-04	9.99956E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*cb**2	total flux
1	1.60565E-01	5.25118E-10	1.67957E-01	.00000E+00	2.24970E-03	2.51447E-03	.00000E+00	3.38394E-01
2	1.21835E+00	-5.67621E-08	1.30142E+00	.00000E+00	1.79132E-05	1.17117E-02	.00000E+00	2.58473E+00
3	1.55768E+00	-3.72236E-08	1.66656E+00	.00000E+00	.00000E+00	1.45446E-02	.00000E+00	3.30813E+00
4	9.68612E-01	-1.06027E-09	1.03721E+00	.00000E+00	.00000E+00	6.31230E-03	.00000E+00	2.05904E+00
5	1.46360E+00	-6.34128E-08	1.57291E+00	.00000E+00	.00000E+00	1.88452E-03	.00000E+00	3.11553E+00
6	2.81799E+00	2.11228E-08	3.02952E+00	.00000E+00	.00000E+00	1.74220E-03	.00000E+00	5.99936E+00
7	2.78061E+00	-2.06552E-08	2.90441E+00	.00000E+00	.00000E+00	1.81389E-03	.00000E+00	5.86492E+00
8	2.06305E+00	-3.17924E-08	2.07856E+00	.00000E+00	.00000E+00	1.93179E-03	.00000E+00	4.30099E+00
9	1.60244E+00	-4.16572E-08	1.58416E+00	.00000E+00	.00000E+00	2.67782E-03	.00000E+00	3.32517E+00
10	1.46491E+00	-5.43783E-08	1.44119E+00	.00000E+00	.00000E+00	5.70145E-03	.00000E+00	3.03455E+00
11	1.34918E+00	-5.43663E-08	1.29504E+00	.00000E+00	.00000E+00	1.16778E-02	.00000E+00	2.77757E+00
12	8.50000E-01	-2.03588E-08	7.92828E-01	.00000E+00	.00000E+00	1.47800E-02	.00000E+00	1.73463E+00
13	7.20627E-01	3.52663E-08	6.74396E-01	.00000E+00	.00000E+00	1.36248E-02	.00000E+00	1.47217E+00
14	6.69695E-01	-1.66829E-08	6.01440E-01	.00000E+00	.00000E+00	9.97957E-03	.00000E+00	1.35269E+00
15	3.80070E-01	2.28811E-05	3.73485E-01	.00000E+00	.00000E+00	2.51433E-03	.00000E+00	7.87828E-01
16	2.12311E-01	1.27901E-05	2.08868E-01	.00000E+00	.00000E+00	1.66606E-03	.00000E+00	4.40084E-01
17	9.41972E-02	7.53311E-06	9.08647E-02	.00000E+00	.00000E+00	2.52477E-03	.00000E+00	1.94087E-01
18	8.07441E-02	7.17857E-06	7.68607E-02	.00000E+00	.00000E+00	3.35695E-03	.00000E+00	1.65712E-01
19	1.49198E-01	1.27066E-05	1.43881E-01	.00000E+00	.00000E+00	4.06104E-03	.00000E+00	3.07393E-01
20	4.88569E-01	4.16091E-05	4.69502E-01	.00000E+00	.00000E+00	1.72805E-02	.00000E+00	1.00557E+00
21	1.57378E-01	2.16381E-05	1.45395E-01	.00000E+00	.00000E+00	1.00277E-02	.00000E+00	3.20153E-01
22	3.29861E-01	1.82521E-05	2.97291E-01	.00000E+00	.00000E+00	2.72668E-02	.00000E+00	6.66985E-01
23	1.01843E+00	8.20884E-05	9.03188E-01	.00000E+00	.00000E+00	9.16735E-02	.00000E+00	2.04620E+00
24	7.71623E-01	6.19712E-05	6.43952E-01	.00000E+00	.00000E+00	1.04029E-01	.00000E+00	1.52239E+00
25	3.31975E-01	2.09127E-06	2.61867E-01	.00000E+00	.00000E+00	6.04430E-02	.00000E+00	6.44267E-01
26	2.25941E-01	1.18510E-05	1.55752E-01	.00000E+00	.00000E+00	5.56009E-02	.00000E+00	4.21543E-01
27	4.16513E-02	3.20953E-07	1.98487E-02	.00000E+00	.00000E+00	1.55149E-02	.00000E+00	7.09007E-02
28	2.39693E+01	1.72942E-04	2.39421E+01	.00000E+00	2.26761E-03	4.98856E-01	.00000E+00	4.98604E+01

- elapsed time .02 min.

0direct access unit 9 requires 516 blocks of length 1456 for cross section weighting.

1 transport cross section weighting function

0zone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	2.26228E-03	2.44524E-02	3.14807E-02	1.91558E-02	2.98609E-02	5.60589E-02	3.19451E-02	4.59551E-03
2	3.53462E-03	3.75866E-02	4.85962E-02	2.95113E-02	4.50573E-02	8.48349E-02	4.81901E-02	6.90508E-03
3	2.87209E-03	3.23666E-02	4.29057E-02	2.72045E-02	4.24752E-02	8.06478E-02	4.61598E-02	5.50959E-03
4	9.91417E-04	1.19105E-02	1.64469E-02	1.09526E-02	1.74707E-02	3.34402E-02	1.95574E-02	1.97831E-03
5	1.64636E-03	1.85865E-02	2.46645E-02	1.56800E-02	2.44272E-02	4.66204E-02	2.67512E-02	3.28566E-03

0zone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	4.81624E-03	5.96728E-03	1.26299E-02	1.44556E-02	1.19054E-02	1.75290E-02	1.84194E-03	9.67101E-04
2	7.23449E-03	8.95263E-03	1.89985E-02	2.18260E-02	1.79596E-02	2.62789E-02	2.73820E-03	1.44998E-03
3	5.82794E-03	8.39654E-03	1.77648E-02	2.01806E-02	1.66006E-02	2.42867E-02	2.56194E-03	1.34920E-03
4	1.94925E-03	3.41518E-03	7.21395E-03	8.10619E-03	6.70527E-03	9.78968E-03	1.11069E-03	5.69366E-04
5	3.38196E-03	4.86239E-03	1.02835E-02	1.16727E-02	9.62716E-03	1.40532E-02	1.52847E-03	7.95542E-04

0zone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	8.86997E-04	1.01715E-03	1.41319E-03	5.03154E-03	3.06020E-03	8.23309E-03	2.86578E-02	3.04788E-02
2	1.33854E-03	1.53632E-03	2.12194E-03	7.56616E-03	4.63193E-03	1.24824E-02	4.34697E-02	4.66691E-02
3	1.23753E-03	1.42307E-03	1.96336E-03	6.99187E-03	4.31747E-03	1.15639E-02	4.04213E-02	4.32265E-02
4	5.01070E-04	5.73539E-04	7.96136E-04	2.82623E-03	1.74630E-03	4.67389E-03	1.66004E-02	1.76715E-02
5	7.18167E-04	8.23398E-04	1.14198E-03	4.06164E-03	2.49259E-03	6.68756E-03	2.34784E-02	2.50088E-02

0zone	grp. 25	grp. 26	grp. 27	grp. 28
1	1.60858E-02	1.49143E-02	3.92940E-03	3.82952E-01
2	2.47390E-02	2.33049E-02	6.46018E-03	5.84204E-01
3	2.28009E-02	2.15254E-02	5.93407E-03	5.38513E-01
4	9.22248E-03	8.56984E-03	2.17097E-03	2.16717E-01
5	1.31429E-02	1.22416E-02	3.20979E-03	3.10803E-01

INFORMATION ONLY

INFORMATION ONLY

1 at 0 d, sas2h: babcock wilcox 15x15, 3.00w%, 20gwd/mtu burn high temp

0cell averaged fluxes

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.66111E-01	1.28125E+00	1.64093E+00	1.02166E+00	1.54818E+00	2.98120E+00	2.87543E+00	2.07362E+00
2	1.63045E-01	1.24874E+00	1.60052E+00	9.97663E-01	1.51104E+00	2.91123E+00	2.83425E+00	2.06640E+00
3	1.61931E-01	1.23701E+00	1.58658E+00	9.88693E-01	1.49733E+00	2.88469E+00	2.81913E+00	2.06414E+00
4	1.60561E-01	1.21878E+00	1.55872E+00	9.69603E-01	1.46543E+00	2.82157E+00	2.78228E+00	2.06240E+00
5	1.62577E-01	1.24180E+00	1.58934E+00	9.89236E-01	1.49682E+00	2.88231E+00	2.81772E+00	2.06635E+00

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.58918E+00	1.44700E+00	1.31140E+00	8.07074E-01	6.85926E-01	6.18378E-01	3.75399E-01	2.09811E-01
2	1.59664E+00	1.45518E+00	1.32886E+00	8.27409E-01	7.02403E-01	6.42732E-01	3.77974E-01	2.11112E-01
3	1.59896E+00	1.45786E+00	1.33449E+00	8.33875E-01	7.07747E-01	6.50528E-01	3.78828E-01	2.11548E-01
4	1.60231E+00	1.46456E+00	1.34845E+00	8.49272E-01	7.20178E-01	6.68904E-01	3.80520E-01	2.12395E-01
5	1.59753E+00	1.45791E+00	1.33444E+00	8.33379E-01	7.07284E-01	6.49880E-01	3.78501E-01	2.11433E-01

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.16975E-02	7.78148E-02	1.45221E-01	4.74259E-01	1.48289E-01	3.05191E-01	9.30430E-01	6.73485E-01
2	9.28874E-02	7.91794E-02	1.47109E-01	4.81043E-01	1.52416E-01	3.16523E-01	9.69496E-01	7.16054E-01
3	9.32798E-02	7.96310E-02	1.47732E-01	4.83249E-01	1.53750E-01	3.20092E-01	9.81527E-01	7.28655E-01
4	9.41821E-02	8.07048E-02	1.49170E-01	4.88448E-01	1.57187E-01	3.29269E-01	1.01540E+00	7.67227E-01
5	9.32466E-02	7.96138E-02	1.47683E-01	4.83113E-01	1.53813E-01	3.20156E-01	9.83068E-01	7.31414E-01

Ozone	grp. 25	grp. 26	grp. 27
1	2.77960E-01	1.71195E-01	2.43865E-02
2	3.01221E-01	1.93755E-01	3.13594E-02
3	3.07893E-01	1.99607E-01	3.29544E-02
4	3.29096E-01	2.22165E-01	4.01688E-02
5	3.09529E-01	2.02525E-01	3.40632E-02

0flux disadventage factors (zone average/cell average-flux)

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.02174E+00	1.03177E+00	1.05246E+00	1.03278E+00	1.03431E+00	1.03431E+00	1.02048E+00	1.00852E+00
2	1.00288E+00	1.00559E+00	1.00703E+00	1.00852E+00	1.00951E+00	1.01008E+00	1.00587E+00	1.00003E+00
3	9.96024E-01	9.96149E-01	9.97629E-01	9.99451E-01	1.00034E+00	1.00083E+00	1.00050E+00	9.98930E-01
4	9.87597E-01	9.81465E-01	9.80731E-01	9.80154E-01	9.79031E-01	9.78927E-01	9.87424E-01	9.98087E-01
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	9.94772E-01	9.92519E-01	9.82728E-01	9.68436E-01	9.69804E-01	9.51526E-01	9.91804E-01	9.92329E-01
2	9.99440E-01	9.98130E-01	9.95816E-01	9.92837E-01	9.95099E-01	9.89001E-01	9.98606E-01	9.98484E-01
3	1.00089E+00	9.99962E-01	1.00003E+00	1.00060E+00	1.00066E+00	1.00100E+00	1.00086E+00	1.00054E+00
4	1.00299E+00	1.00456E+00	1.01050E+00	1.01907E+00	1.01823E+00	1.02927E+00	1.00481E+00	1.00456E+00
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.83387E-01	9.77403E-01	9.83331E-01	9.81756E-01	9.64088E-01	9.53259E-01	9.46465E-01	9.20796E-01
2	9.96116E-01	9.94544E-01	9.96113E-01	9.95714E-01	9.90920E-01	9.88654E-01	9.86194E-01	9.79000E-01
3	1.00086E+00	1.00022E+00	1.00083E+00	1.00028E+00	9.99592E-01	9.99802E-01	9.98432E-01	9.96092E-01
4	1.01003E+00	1.01370E+00	1.01007E+00	1.01104E+00	1.02193E+00	1.02847E+00	1.05289E+00	1.04896E+00
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 25	grp. 26	grp. 27
1	8.98010E-01	8.45308E-01	7.15919E-01
2	9.73157E-01	9.56697E-01	9.20623E-01
3	9.94067E-01	9.85598E-01	9.67144E-01
4	1.06322E+00	1.09698E+00	1.17924E+00
5	1.00000E+00	1.00000E+00	1.00000E+00

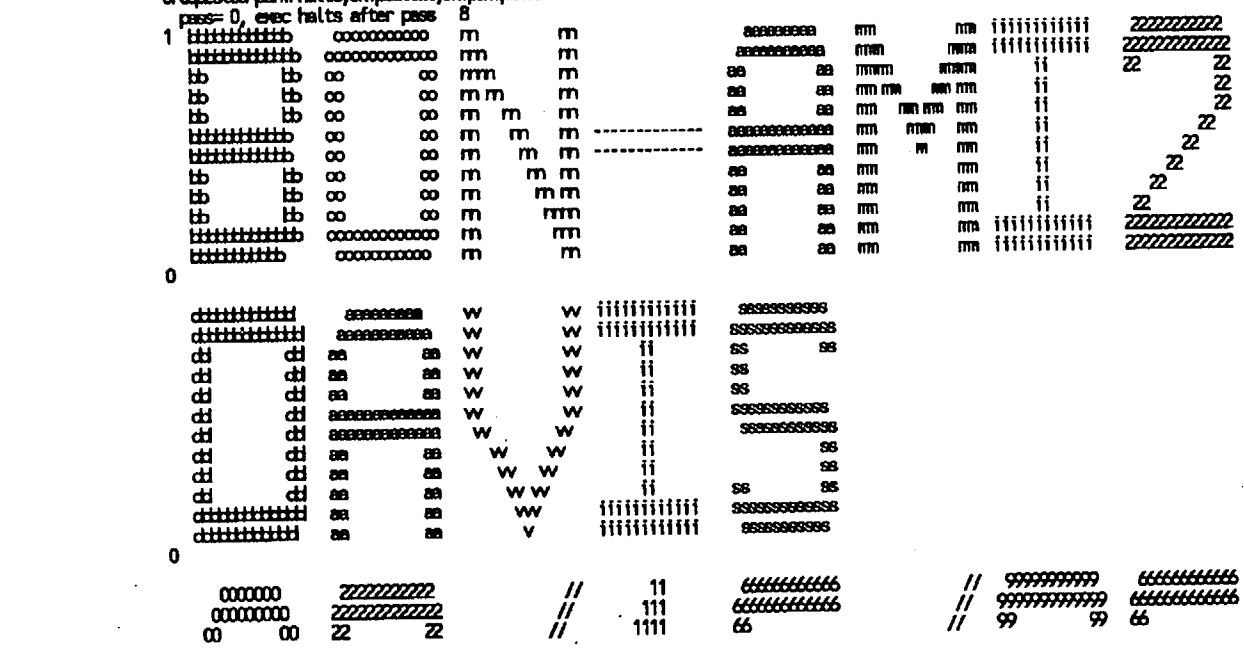
0cell averaged currents

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	2.26228E-03	2.44524E-02	3.14807E-02	1.91558E-02	2.98609E-02	5.60589E-02	3.19451E-02	4.59551E-03
2	3.53462E-03	3.79866E-02	4.85962E-02	2.95113E-02	4.50373E-02	8.48349E-02	4.81901E-02	6.90508E-03
3	2.87205E-03	3.23666E-02	4.29057E-02	2.72045E-02	4.24752E-02	8.06478E-02	4.61598E-02	5.50959E-03
4	9.91417E-04	1.19105E-02	1.64469E-02	1.09526E-02	1.74707E-02	3.34402E-02	1.95574E-02	1.97631E-03

5	1.64636E-03	1.85855E-02	2.46645E-02	1.56300E-02	2.44272E-02	4.66204E-02	2.67512E-02	3.28566E-03
Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	4.81624E-03	5.96728E-03	1.26299E-02	1.44556E-02	1.19054E-02	1.73250E-02	1.84194E-03	9.67101E-04
2	7.23449E-03	8.95265E-03	1.89985E-02	2.18260E-02	1.79596E-02	2.62789E-02	2.73820E-03	1.44995E-03
3	5.82794E-03	8.39654E-03	1.77648E-02	2.01806E-02	1.66006E-02	2.42867E-02	2.56194E-03	1.34920E-03
4	1.94925E-03	3.41518E-03	7.21395E-03	8.10619E-03	6.70527E-03	9.76968E-03	1.11059E-03	5.69366E-04
5	3.38196E-03	4.86239E-03	1.02835E-02	1.16727E-02	9.62716E-03	1.40832E-02	1.52847E-03	7.95542E-04
Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	8.86997E-04	1.01775E-03	1.41319E-03	5.03154E-03	3.06020E-03	8.25309E-03	2.86578E-02	3.04788E-02
2	1.33854E-03	1.53632E-03	2.12194E-03	7.56616E-03	4.63193E-03	1.24824E-02	4.34693E-02	4.65691E-02
3	1.25753E-03	1.42307E-03	1.96336E-03	6.99187E-03	4.31747E-03	1.15639E-02	4.04213E-02	4.32245E-02
4	5.01070E-04	5.73536E-04	7.96136E-04	2.82623E-03	1.74630E-03	4.67389E-03	1.66004E-02	1.76715E-02
5	7.18167E-04	8.23398E-04	1.14198E-03	4.06164E-03	2.49259E-03	6.68756E-03	2.34784E-02	2.50088E-02
Ozone	grp. 25	grp. 26	grp. 27					
1	1.60858E-02	1.49143E-02	3.92940E-03					
2	2.47390E-02	2.33049E-02	6.46018E-03					
3	2.28009E-02	2.15254E-02	5.93407E-03					
4	9.22248E-03	8.56924E-03	2.17097E-03					
5	1.31429E-02	1.22416E-02	3.20979E-03					

Ozone	volume	vol. fraction
1	6.88443E-01	3.30753E-01
2	3.17352E-02	1.52468E-02
3	2.16724E-01	1.04122E-01
4	1.14454E+00	5.49878E-01
5	2.08144E+00	1.00000E+00

- elapsed time .03 min.
0requested parm=halt8,skipcellwt,skipshipdata
pass= 0, exec halts after pass 8



```
00      00        22      //      11    66            //  99      99  66
00      00        22      //      11    66            //  99      99  66
00      00      22        //      11    6666666666    //  9999999999  6666666666
00      00    22          //      11    6666666666    //   99999999   66666666
00      00  22            //      11    66      66    //         99  66      66
00      00                //      11    66      66    //         99  66      66
00      00                //      11    66      66    //         99  66      66
00      00                //   11111111 6666666666    //  9999999999  6666666666
 00    00   22222222222   //   11111111  66666666     //   99999999   66666666
  000000    22222222222   //
0
  000000    99999999999           5555555555  5555555555          3333333333     11
 00000000   99999999999           5555555555  5555555555          3333333333    111
 00    00   99      99    :::    55          55          :::     33      33   1111
00      00  99      99    :::    55          55          :::             33     11
00      00  99      99    :::    55          55          :::             33     11
00      00  99999999999          5555555555  5555555555              333     11
00      00   99999999999          5555555555  5555555555              333     11
00      00          99     :::            55          55  :::             33     11
00      00          99     :::            55          55  :::             33     11
 00    00           99     :::    55      55  55      55  :::     33      33     11
 00000000   99999999999          5555555555  5555555555          3333333333 11111111
  000000    99999999999           5555555555  5555555555           3333333333 11111111
1
0
                        ssssssssss  cccccccccc   aaaaaaaa   ll      eeeeeeeeeeee
                       ssssssssssss cccccccccccc aaaaaaaaaa ll      eeeeeeeeeeee
                       ss      ss   cc      cc   aa      aa ll      ee
                       ss           cc           aa      aa ll      ee
                       ss           cc           aa      aa ll      ee
                       sssssssssss  cc           aaaaaaaaaaa ll     eeeeeeeee
                        sssssssssss cc           aaaaaaaaaaa ll     eeeeeeeee
                              ss    cc           aa      aa ll      ee
                              ss    cc           aa      aa ll      ee
                       ss     ss    cc      cc   aa      aa ll      ee
                       ssssssssssss cccccccccccc aa      aa llllllllllll eeeeeeeeeeee
                        ssssssssss   cccccccccc  aa      aa llllllllllll eeeeeeeeeeee
```

program verification information

code system: scale version: 4.2

program: c0c008

creation date: 04/27/95

library: /nautronics/scale/exe

```
*****  this is not a  scale  configuration controlled code  *****
*****                                                      *****
*****          jobname:  davis                             *****
*****                                                      *****
*****  date of execution:  02/16/96                        *****
*****                                                      *****
*****  time of execution:  09:55:31                        *****
*****                                                      *****
*****                                                      *****
**********************************************************************
**********************************************************************
**********************************************************************
```

```
1
0      -1q array has      1 entries.
0       0q array has      4 entries.
0       1q array has      6 entries.
0       2q array has      2 entries.
1logical assignments
0master library   12
 working library  17
 scratch file     18
 new library       1
0p r o b l e m   d e s c r i p t i o n
0igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                2
0izm--number of zones or material regions                       4
0ms--mixing table length                                       70
0ibl--shielded cross section edit option (0/1--no/yes)          0
0ibr--bondarenko factor edit option (0/1--no/yes)               0
0issqpt--dancoff factor option                                  0
0convergence criterion    1.00000E-03
0geometry correction factor for wigner rational approximation  1.350E+00
0       3q array has     70 entries.
0       4q array has     70 entries.
0       5q array has     70 entries.
0       6q array has      4 entries.
0       7q array has      4 entries.
0       8q array has      4 entries.
0       9q array has      4 entries.
0      10q array has     70 entries.
0      11q array has      4 entries.
0m i x i n g   t a b l e
0entry  mixture  isotope  number density  new identifier
    1        3     8016    2.09710E-02             201
    2        3     1001    4.19420E-02             202
    3        3     5010    3.81515E-06             203
    4        3     5011    1.54884E-05             204
    5        2    40802    4.25156E-02             205
    6        1    92235    2.28718E-04          200006
    7        1    92234    1.83759E-06          200007
    8        1    92236    1.04764E-06          200008
    9        1    92238    7.29892E-03          200009
   10        1     8016    1.50611E-02          200010
   11        1     8016    1.15315E-02          200011
   12        1    36083    3.30753E-21          200012
   13        1    36085    3.30753E-21          200013
   14        1    38090    3.30753E-21          200014
   15        1    39089    3.30753E-21          200015
   16        1    42095    3.30753E-21          200016
   17        1    40093    3.30753E-21          200017
   18        1    40094    3.30753E-21          200018
```

19	1	40095	3.30753E-21	200019
20	1	41094	3.30753E-21	200020
21	1	43099	3.30753E-21	200021
22	1	45103	3.30753E-21	200022
23	1	45105	3.30753E-21	200023
24	1	44101	3.30753E-21	200024
25	1	44106	3.30753E-21	200025
26	1	46105	3.30753E-21	200026
27	1	46108	3.30753E-21	200027
28	1	47109	3.30753E-21	200028
29	1	51124	3.30753E-21	200029
30	1	54131	3.30753E-21	200030
31	1	54132	3.30753E-21	200031
32	1	54135	3.30753E-21	200032
33	1	54136	3.30753E-21	200033
34	1	55134	3.30753E-21	200034
35	1	55135	3.30753E-21	200035
36	1	55137	3.30753E-21	200036
37	1	56136	3.30753E-21	200037
38	1	57139	3.30753E-21	200038
39	1	59141	3.30753E-21	200039
40	1	59143	3.30753E-21	200040
41	1	58144	3.30753E-21	200041
42	1	60143	3.30753E-21	200042
43	1	60145	3.30753E-21	200043
44	1	61147	3.30753E-21	200044
45	1	61148	3.30753E-21	200045
46	1	60147	3.30753E-21	200046
47	1	62147	3.30753E-21	200047
48	1	62149	3.30753E-21	200048
49	1	62150	3.30753E-21	200049
50	1	62151	3.30753E-21	200050
51	1	62152	3.30753E-21	200051
52	1	64155	3.30753E-21	200052
53	1	63153	3.30753E-21	200053
54	1	63154	3.30753E-21	200054
55	1	63155	3.30753E-21	200055
56	1	40802	4.42681E-03	200056
57	1	1001	2.30630E-02	200057
58	1	5010	2.09787E-06	200058
59	1	5011	8.51673E-06	200059
60	1	55133	3.30753E-21	200060
61	1	95237	3.30753E-21	200061
62	1	94238	3.30753E-21	200062
63	1	94239	3.30753E-21	200063
64	1	94240	3.30753E-21	200064
65	1	94241	3.30753E-21	200065
66	1	94242	3.30753E-21	200066
67	1	95241	3.30753E-21	200067
68	1	95243	3.30753E-21	200068
69	1	96244	3.30753E-21	200069
70	1	999	3.30753E-21	200070

0geometry and material description

0zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	3	6.32460E-01	6.07600E+02	7.90564E-01	0
2	2	6.73100E-01	6.50000E+02	1.28082E+01	0
3	3	8.14000E-01	6.07600E+02	3.54862E+00	0
4	1	2.96100E+00	9.75000E+02	2.32883E-01	0

8067 locations of 200000 available are required to make a new master containing the self-shielded values

0no nuclides in your problem have bondarenko factor data**bonami will copy from logical 12 to logical 1

0copy	999	1/v cross sectio	from	log	12	to	log	1	bondarenko	trigger 0
0copy	1001	hydrogen	from	log	12	to	log	18	bondarenko	trigger 0
0copy	1001	hydrogen	from	log	18	to	log	1	bondarenko	trigger 0
0copy	1001	hydrogen	from	log	18	to	log	1	bondarenko	trigger 0
0copy	5010	b-10 1273 218ngp	from	log	12	to	log	18	bondarenko	trigger 0
0copy	5010	b-10 1273 218ngp	from	log	18	to	log	1	bondarenko	trigger 0
0copy	5010	b-10 1273 218ngp	from	log	18	to	log	1	bondarenko	trigger 0
0copy	5011	boron-11	from	log	12	to	log	18	bondarenko	trigger 0
0copy	5011	boron-11	from	log	18	to	log	1	bondarenko	trigger 0
0copy	5011	boron-11	from	log	18	to	log	1	bondarenko	trigger 0
0copy	8016	oxygen-16	from	log	12	to	log	18	bondarenko	trigger 0
0copy	8016	oxygen-16	from	log	18	to	log	1	bondarenko	trigger 0
0copy	8016	oxygen-16	from	log	18	to	log	1	bondarenko	trigger 0
0copy	8016	oxygen-16	from	log	18	to	log	1	bondarenko	trigger 0
0copy	36083	kr-83	from	log	12	to	log	1	bondarenko	trigger 0
0copy	36085	kr-85	from	log	12	to	log	1	bondarenko	trigger 0
0copy	38090	sr-90	from	log	12	to	log	1	bondarenko	trigger 0
0copy	39089	y-89	from	log	12	to	log	1	bondarenko	trigger 0
0copy	40093	zr-93	from	log	12	to	log	1	bondarenko	trigger 0
0copy	40094	zr-94	from	log	12	to	log	1	bondarenko	trigger 0
0copy	40095	zr-95	from	log	12	to	log	1	bondarenko	trigger 0
0copy	40302	zircalloy	from	log	12	to	log	18	bondarenko	trigger 0
0copy	40302	zircalloy	from	log	18	to	log	1	bondarenko	trigger 0
0copy	40302	zircalloy	from	log	18	to	log	1	bondarenko	trigger 0
0copy	41094	nb-94	from	log	12	to	log	1	bondarenko	trigger 0
0copy	42095	mo-95	from	log	12	to	log	1	bondarenko	trigger 0
0copy	43099	tc-99	from	log	12	to	log	1	bondarenko	trigger 0
0copy	44101	ru-101	from	log	12	to	log	1	bondarenko	trigger 0
0copy	44106	ru-106	from	log	12	to	log	1	bondarenko	trigger 0
0copy	45103	rh-103	from	log	12	to	log	1	bondarenko	trigger 0
0copy	45105	rh-105	from	log	12	to	log	1	bondarenko	trigger 0
0copy	46105	pd-105	from	log	12	to	log	1	bondarenko	trigger 0
0copy	46108	pd-108	from	log	12	to	log	1	bondarenko	trigger 0
0copy	47109	silver-109	from	log	12	to	log	1	bondarenko	trigger 0
0copy	51124	sb-124	from	log	12	to	log	1	bondarenko	trigger 0
0copy	54131	xe-131	from	log	12	to	log	1	bondarenko	trigger 0
0copy	54132	xe-132	from	log	12	to	log	1	bondarenko	trigger 0
0copy	54135	xenon-135	from	log	12	to	log	1	bondarenko	trigger 0
0copy	54136	xe-136	from	log	12	to	log	1	bondarenko	trigger 0
0copy	55133	cesium-133	from	log	12	to	log	1	bondarenko	trigger 0
0copy	55134	cs-134	from	log	12	to	log	1	bondarenko	trigger 0
0copy	55135	cs-135	from	log	12	to	log	1	bondarenko	trigger 0
0copy	55137	cs-137	from	log	12	to	log	1	bondarenko	trigger 0
0copy	56136	ba-136	from	log	12	to	log	1	bondarenko	trigger 0
0copy	57139	la-139	from	log	12	to	log	1	bondarenko	trigger 0
0copy	58144	ce-144	from	log	12	to	log	1	bondarenko	trigger 0
0copy	59141	pr-141	from	log	12	to	log	1	bondarenko	trigger 0
0copy	59143	pr-143	from	log	12	to	log	1	bondarenko	trigger 0
0copy	60143	nd-143	from	log	12	to	log	1	bondarenko	trigger 0
0copy	60145	nd-145	from	log	12	to	log	1	bondarenko	trigger 0
0copy	60147	nd-147	from	log	12	to	log	1	bondarenko	trigger 0
0copy	61147	pm-147	from	log	12	to	log	1	bondarenko	trigger 0
0copy	61148	pm-148	from	log	12	to	log	1	bondarenko	trigger 0
0copy	62147	sm-147	from	log	12	to	log	1	bondarenko	trigger 0
0copy	62149	sm-149	from	log	12	to	log	1	bondarenko	trigger 0
0copy	62150	sm-150	from	log	12	to	log	1	bondarenko	trigger 0
0copy	62151	sm-151	from	log	12	to	log	1	bondarenko	trigger 0
0copy	62152	sm-152	from	log	12	to	log	1	bondarenko	trigger 0
0copy	63153	eu-153	from	log	12	to	log	1	bondarenko	trigger 0
0copy	63154	eu-154	from	log	12	to	log	1	bondarenko	trigger 0

```
0copy    63155   eu-155          from log 12 to log  1   bondarenko trigger 0
0copy    64155   gd-155          from log 12 to log  1   bondarenko trigger 0
0copy    92234  u-234 1043 sigo= from log 12 to log  1   bondarenko trigger 0
0copy    92235   uranium-235     from log 12 to log  1   bondarenko trigger 0
0copy    92236  u-236 1163 sigo= from log 12 to log  1   bondarenko trigger 0
0copy    92238   uranium-238     from log 12 to log  1   bondarenko trigger 0
0copy    93237   neptunium-237   from log 12 to log  1   bondarenko trigger 0
0copy    94238  pu-238 1050 sigo from log 12 to log  1   bondarenko trigger 0
0copy    94239   plutonium-239   from log 12 to log  1   bondarenko trigger 0
0copy    94240   plutonium-240   from log 12 to log  1   bondarenko trigger 0
0copy    94241   plutonium-241   from log 12 to log  1   bondarenko trigger 0
0copy    94242   plutonium-242   from log 12 to log  1   bondarenko trigger 0
0copy    95241  am-241 1056 sigp from log 12 to log  1   bondarenko trigger 0
0copy    95243  am-243 1057 218  from log 12 to log  1   bondarenko trigger 0
0copy    96244   curium-244      from log 12 to log  1   bondarenko trigger 0
1     scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
           compiled for nrc      1/27/89
              last updated       9/16/93
                 l.m.petrie  -   ornl
        tape id                          4321        number of nuclides              70
        number of neutron groups           27        number of gamma groups           0
        first thermal group                15        logical unit                     1
                                  table of contents
       1/v cross sections normalized to 1.0 at 0.0253 ev                          id  200070
        hydrogen        endf/b-iv mat 1269/thrmf1002   updated 10/13/89           id     202
        hydrogen        endf/b-iv mat 1269/thrmf1002   updated 10/13/89           id  200057
       b-10 1273 218ngp 042375 p-3 293k                                            id     203
       b-10 1273 218ngp 042375 p-3 293k                                            id  200058
        boron-11        endf/b-iv mat 1160             updated 10/13/89           id     204
        boron-11        endf/b-iv mat 1160             updated 10/13/89           id  200059
        oxygen-16       endf/b-iv mat 1276             updated 10/13/89           id     201
        oxygen-16       endf/b-iv mat 1276             updated 10/13/89           id  200010
        oxygen-16       endf/b-iv mat 1276             updated 10/13/89           id  200011
        kr-83           mt=102,103,103,105,106,107     updated 10/13/89           id  200012
        kr-85             mt=  102                                                id  200013
        sr-90           mt=102                         updated 10/13/89           id  200014
         y-89           mt=102                         updated 10/13/89           id  200015
        zr-93             mt=  102                                                id  200017
        zr-94           mt=102                         updated 10/13/89           id  200018
        zr-95           mt=102                         updated 10/13/89           id  200019
        zircalloy       endf/b-iv mat 1284             updated 10/13/89           id     205
        zircalloy       endf/b-iv mat 1284             updated 10/13/89           id  200056
        nb-94           mt=102                         updated 10/13/89           id  200020
        mo-95           mt=102                         updated 10/13/89           id  200016
        tc-99           mt=102                         updated 10/13/89           id  200021
        ru-101          mt=102                         updated 10/13/89           id  200024
        ru-106          mt=102                         updated 10/13/89           id  200025
        rh-103          mt=102                         updated 10/13/89           id  200022
        rh-105            mt=  102                                                id  200023
        pd-105          mt=102                         updated 10/13/89           id  200026
        pd-108          mt=102                         updated 10/13/89           id  200027
        silver-109      endf/b-iv mat 1139             updated 10/13/89           id  200028
        sb-124          mt=102                         updated 10/13/89           id  200029
        xe-131          mt=102,103,104,105,106         updated 10/13/89           id  200030
        xe-132          mt=102,103,104,105,106         updated 10/13/89           id  200031
        xenon-135       endf/b-iv mat 1294             updated 10/13/89           id  200032
        xe-136            mt=  102, 103, 104, 105, 107                            id  200033
        cesium-133      endf/b-iv mat 1141             updated 10/13/89           id  200060
        cs-134          mt=102                         updated 10/13/89           id  200034
```

```
      cs-135          mt= 102                                                  id   200035
      cs-137        mt=102                        updated 10/13/89             id   200036
      ba-136        mt=102                        updated 10/13/89             id   200037
      la-139        mt=102                        updated 10/13/89             id   200038
      ce-144          mt= 102                                                  id   200041
      pr-141        mt=102,103,104,105,106,107    updated 10/13/89             id   200039
      pr-143        mt=102                        updated 10/13/89             id   200040
      nd-143        mt=102                        updated 10/13/89             id   200042
      nd-145        mt=102                        updated 10/13/89             id   200043
      nd-147        mt=102                        updated 10/13/89             id   200046
      pm-147        mt=102                        updated 10/13/89             id   200044
      pm-148          mt= 102                                                  id   200045
      sm-147        endf/b-v fission product      updated 10/13/89             id   200047
      sm-149        mt=102,103,107                updated 10/13/89             id   200048
      sm-150        mt=102                        updated 10/13/89             id   200049
      sm-151        mt=102,103,104,105,106,107    updated 10/13/89             id   200050
      sm-152        mt=102,103,104,105,106,107    updated 10/13/89             id   200051
      eu-153        mt=102,103,104,105,106,107    updated 10/13/89             id   200053
      eu-154        mt=102,103,104,105,106,107    updated 10/13/89             id   200054
      eu-155        mt=102,103,104,105,106,107    updated 10/13/89             id   200055
      gd-155        mt=102                        updated 10/13/89             id   200052
     u-234 1043 sigo=5+4 nsxlacs p-3 295k f-1/e-m(1.+5)                        id   200007
      uranium-235   endf/b-iv mat 1261            updated 10/13/89             id   200006
     u-236 1163 sigo=5+4 nsxlacs p-3 295k f-1/e-m(1.+5)                        id   200008
      uranium-238   endf/b-iv mat 1262            updated 10/13/89             id   200009
      neptunium-237 endf/b-iv mat 1263            updated 10/13/89             id   200061
     pu-238 1050 sigo=5+4 nsxlacs p-3 295k f-1/e-m(1.+5)                       id   200062
      plutonium-239 endf/b-iv mat 1264            updated 10/13/89             id   200063
      plutonium-240 endf/b-iv mat 1265            updated 10/13/89             id   200064
      plutonium-241 endf/b-iv mat 1266            updated 10/13/89             id   200065
      plutonium-242 endf/b-iv mat 1161            updated 10/13/89             id   200066
     am-241 1056 sigo=5+4 nsxlacs 218ngp p-3 295k                              id   200067
     am-243 1057 218 gp wt f-1/e-m 090576 p3 295k                              id   200068
      curium-244    endf/b-iv mat 1162            updated 10/13/89             id   200069
0       tape copy used      0 i/o's, and took      .00 seconds
1
```

```
                m        m  iiiiiiiiiiii   tttttttttttt    aaaaaaaa    ww        ww  ll
                mm       m  iiiiiiiiiiii   tttttttttttt   aaaaaaaaaa   ww        ww  ll
                mmm      m      ii            tt        aa        aa   ww        ww  ll
                m m      m      ii            tt        aa        aa   ww        ww  ll
                m  m     m      ii            tt        aa        aa   ww        ww  ll
                m   m    m      ii            tt        aaaaaaaaaaaa   ww    w   ww  ll
                m    m   m      ii            tt        aaaaaaaaaaaa   ww   www  ww  ll
                m     m  m      ii            tt        aa        aa   ww  ww ww  ll
                m      m m      ii            tt        aa        aa   ww ww   ww ww  ll
                m       mm      ii            tt        aa        aa   www     www  ll
                m        m  iiiiiiiiiiii      tt        aa        aa   ww        ww  llllllllllll
                m        m  iiiiiiiiiiii      tt        aa        aa   ww        ww  llllllllllll
0
```

```
  dddddddddd     aaaaaaaa    w        w  iiiiiiiiiiii   ssssssssss
  ddddddddddd   aaaaaaaaaa   w        w  iiiiiiiiiiii  ssssssssssss
  dd        dd  aa        aa  w        w      ii       ss        ss
  dd        dd  aa        aa  w        w      ii       ss
  dd        dd  aa        aa  w        w      ii       ss
  dd        dd  aaaaaaaaaaaa  w        w      ii       ssssssssss
  dd        dd  aaaaaaaaaaaa   w      w       ii        ssssssssss
  dd        dd  aa        aa    w    w        ii                ss
  dd        dd  aa        aa     w  w         ii                ss
  dd        dd  aa        aa      w w         ii       ss       ss
  ddddddddddd   aa        aa       ww     iiiiiiiiiiii  ssssssssssss
```

INFORMATION ONLY

```
  dddddddddddd   aa      aa      v      iiiiiiiiiiii   ssssssssss
0

   000000     2222222222          //      11     666666666666          //  999999999999   666666666666
  00000000    2222222222222       //      111    666666666666          //  999999999999   666666666666
 00      00   22        22       //      1111   66                    //  99        99  66
00        00            22      //       11     66                    //  99        99  66
00        00            22     //        11     66                    //  99        99  66
00        00          22      //         11     666666666666          //  999999999999  666666666666
00        00        22       //          11     666666666666          //   99999999999  666666666666
00        00      22        //           11     66      66           //           99  66      66
00        00    22         //            11     66      66           //           99  66      66
 00      00   22           //             11     66      66           //           99  66      66
  00000000    2222222222222 //            11111111 666666666666      //  999999999999  666666666666
   000000     2222222222222 //            11111111  666666666666     //   99999999999   666666666666
0

   000000     999999999                   555555555555  555555555555          333333333   2222222222
  00000000    999999999999                555555555555  555555555555          333333333333 2222222222222
 00      00   99        99      :::       55            55            :::    33        33 22        22
00        00  99        99      :::       55            55            :::            33            22
00        00  99        99      :::       55            55            :::            33            22
00        00  999999999999                555555555555  555555555555                333          22
00        00   99999999999                555555555555  555555555555                333         22
00        00            99      :::                 55            55      :::            33        22
00        00            99      :::               55            55        :::            33       22
 00      00             99      :::       55      55    55      55        :::    33      33      22
  00000000    999999999999                555555555555  555555555555          333333333333 2222222222222
   000000     99999999999                  555555555555  555555555555          333333333333 2222222222222
1
0
                    ssssssssss   cccccccccc    aaaaaaaa    ll          eeeeeeeeeeee
                   ssssssssssss cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeeee
                   ss      ss   cc        cc  aa      aa  ll          ee
                   ss           cc            aa      aa  ll          ee
                   ss           cc            aa      aa  ll          ee
                   ssssssssss   cc            aaaaaaaaaaaa ll         eeeeeeee
                    ssssssssss  cc            aaaaaaaaaaaa ll         eeeeeeee
                          ss    cc            aa      aa  ll          ee
                          ss    cc            aa      aa  ll          ee
                   ss      ss   cc        cc  aa      aa  ll          ee
                   ssssssssssss cccccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
                    ssssssssss   cccccccccc   aa      aa  llllllllllll eeeeeeeeeeee
```

```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   scale  version:   4.2         *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****                                                       *****
*****          program:  c0c002                             *****
```

INFORMATION ONLY

```
*****                                                                  *****
*****        creation date:  04/27/95                                  *****
*****                                                                  *****
*****              library:  /neutronics/scale/exe                     *****
*****                                                                  *****
*****                                                                  *****
*****   this is not a   scale  configuration controlled code           *****
*****                                                                  *****
*****              jobname:  davis                                     *****
*****                                                                  *****
*****   date of execution:  02/16/96                                   *****
*****                                                                  *****
*****   time of execution:  09:55:32                                   *****
*****                                                                  *****
*****                                                                  *****
************************************************************************
************************************************************************
************************************************************************
1
0       -1q array has      1 entries.
0        0q array has      4 entries.
0        1q array has     12 entries.
0select  5 nuclides from the master  library on logical  1
        65 nuclides from the working library on logical  3
         0 nuclides from the working library on logical  0
           to create the new working library on logical  4

         1 resonance calculations have been requested
         0 output option for ampx formatted cross section data
0the storage allocated for this case is 200000 words
0        2q array has     70 entries.
0        3q array has     15 entries.
0        4q array has      5 entries.
0 general information concerning cross section library
    tape identification number                 4349
    number of nuclides on tape                   65
    number of neutron energy groups              27
    first thermal neutron energy group           15
    number of gamma energy groups                 0
0   direct access unit number  9 requires  72 blocks of length  1484 words
- xsdrn tape   4321
                        scale 4.2 - 27 group neutron burnup library
                           based on endf-b version 4 data with endf-b version 5 fission products
                              compiled for nrc      1/27/89
                                 last updated      9/16/93
                                    l.m.petrie   -   ornl
-  work tape   4349

 xsdrn weighted tape--parent case entitled-- at 0 d, sas2h: babcock wilcox 15x15,
  3.00wt%, 20gwd/mtu burn high temp


0 nuclides from xsdrn tape
     1     hydrogen        endf/b-iv mat 1269/thrmf1002   updated 10/13/89          202
     2    b-10 1273 218ngp 042375 p-3 293k                                            203
     3     boron-11        endf/b-iv mat 1160             updated 10/13/89          204
     4     oxygen-16       endf/b-iv mat 1276             updated 10/13/89          201
     5     zircalloy       endf/b-iv mat 1284             updated 10/13/89          206
0 nuclides from  work tape
```

```
 6  1/v cross sections normalized to 1.0 at 0.0253 ev                          999
 7   hydrogen      endf/b-iv mat 1269/thrm1002     updated 10/13/89            1001
 8  b-10 1273 218hgp 042375 p-3 293k                                            5010
 9   boron-11      endf/b-iv mat 1160              updated 10/13/89            5011
10   oxygen-16     endf/b-iv mat 1276              updated 10/13/89            8016
11   oxygen-16     endf/b-iv mat 1276              updated 10/13/89               6
12   kr-83         mt=102,103,103,105,106,107      updated 10/13/89           36083
13   kr-85           mt=  102                                                 36085
14   sr-90         mt=102                          updated 10/13/89           38090
15    y-89         mt=102                          updated 10/13/89           39089
16   zr-93           mt=  102                                                 40093
17   zr-94         mt=102                          updated 10/13/89           40094
18   zr-95         mt=102                          updated 10/13/89           40095
19   zircalloy     endf/b-iv mat 1284              updated 10/13/89           40302
20   rb-94         mt=102                          updated 10/13/89           41094
21   mo-95         mt=102                          updated 10/13/89           42095
22   tc-99         mt=102                          updated 10/13/89           43099
23   ru-101        mt=102                          updated 10/13/89           44101
24   ru-106        mt=102                          updated 10/13/89           44106
25   rh-103        mt=102                          updated 10/13/89           45103
26   rh-105          mt=  102                                                 45105
27   pd-105        mt=102                          updated 10/13/89           46105
28   pd-108        mt=102                          updated 10/13/89           46108
29   silver-109    endf/b-iv mat 1139              updated 10/13/89           47109
30   sb-124        mt=102                          updated 10/13/89           51124
31   xe-131        mt=102,103,104,105,106          updated 10/13/89           54131
32   xe-132        mt=102,103,104,105,106          updated 10/13/89           54132
33   xenon-135     endf/b-iv mat 1294              updated 10/13/89           54135
34   xe-136          mt=  102, 103, 104, 105, 107                             54136
35   cesium-133    endf/b-iv mat 1141              updated 10/13/89           55133
36   cs-134        mt=102                          updated 10/13/89           55134
37   cs-135          mt=  102                                                 55135
38   cs-137        mt=102                          updated 10/13/89           55137
39   ba-136        mt=102                          updated 10/13/89           56136
40   la-139        mt=102                          updated 10/13/89           57139
41   ce-144          mt=  102                                                 58144
42   pr-141        mt=102,103,104,105,106,107      updated 10/13/89           59141
43   pr-143        mt=102                          updated 10/13/89           59143
44   nd-143        mt=102                          updated 10/13/89           60143
45   nd-145        mt=102                          updated 10/13/89           60145
46   nd-147        mt=102                          updated 10/13/89           60147
47   pm-147        mt=102                          updated 10/13/89           61147
48   pm-148          mt=  102                                                 61148
49   sm-147        endf/b-v fission product        updated 10/13/89           62147
50   sm-149        mt=102,103,107                  updated 10/13/89           62149
51   sm-150        mt=102                          updated 10/13/89           62150
52   sm-151        mt=102,103,104,105,106,107      updated 10/13/89           62151
53   sm-152        mt=102,103,104,105,106,107      updated 10/13/89           62152
54   eu-153        mt=102,103,104,105,106,107      updated 10/13/89           63153
55   eu-154        mt=102,103,104,105,106,107      updated 10/13/89           63154
56   eu-155        mt=102,103,104,105,106,107      updated 10/13/89           63155
57   gd-155        mt=102                          updated 10/13/89           64155
58  u-234 1043 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                         92234
59   uranium-235   endf/b-iv mat 1261              updated 10/13/89           92235
60  u-236 1163 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                         92236
61   uranium-238   endf/b-iv mat 1262              updated 10/13/89           92238
62   neptunium-237 endf/b-iv mat 1263              updated 10/13/89           93237
63  pu-238 1050 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                         94238
64   plutonium-239 endf/b-iv mat 1264              updated 10/13/89           94239
65   plutonium-240 endf/b-iv mat 1265              updated 10/13/89           94240
```

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   66    plutonium-241  endf/b-iv mat 1266          updated 10/13/89          94241
   67    plutonium-242  endf/b-iv mat 1161          updated 10/13/89          94242
   68    am-241 1056 sigp=544 newdacs 218hgp p-3 293k                         95241
   69    am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                         95243
   70    curium-244     endf/b-iv mat 1162          updated 10/13/89          96244
0 hydrogen       endf/b-iv mat 1269/thrm1002   updated 10/13/89          202    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0b-10 1273 218hgp 042375 p-3 293k                                          203    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 boron-11       endf/b-iv mat 1160            updated 10/13/89          204    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 oxygen-16      endf/b-iv mat 1276            updated 10/13/89          201    temperature=   607.60
0 zircalloy      endf/b-iv mat 1284            updated 10/13/89          205    temperature=   650.00
0resonance data for this nuclide
0mass number (a)          =    90.436          temperature(kelvin)      =   650.000
0potential scatter sigma  =     6.385          lumped nuclear density   = 4.2515602E-02
0spin factor (g)          =     1.079          lump dimension (a-bar)   = 6.7309999E-01
0inner radius             = 6.3246000E-01      dancoff correction (c)   = 1.6805907E-01
0the absorber will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs       res fiss      res scat
   8     -1.156752E-03   .000000E+00  -7.806033E-01
   9     -4.625978E-02   .000000E+00  -2.073270E+00
  10     -5.962230E-02   .000000E+00  -1.351984E+00
  11     -1.761672E-01   .000000E+00  -7.350731E-01
0excess resonance integrals
0                 resolved
0absorption      2.98402E-01
 fission          .00000E+00
-  elapsed time    .00 min.
-  elapsed time    .02 min.
1     this xsdrn working tape was created 02/16/96 at 09:55:32
      the title of the parent case is as follows
      xsdrn weighted tape--parent case entitled-- at 0 d, sas2h: babcock wilcox 15x15,
       3.00wt%, 20gwd/mtu burn high temp

        tape id                          8670        number of nuclides                70
        number of neutron groups           27        number of gamma groups             0
        first thermal group                15        logical unit                       4
                                   table of contents
       hydrogen       endf/b-iv mat 1269/thrm1002   updated 10/13/89          id     202
      b-10 1273 218hgp 042375 p-3 293k                                         id     203
       boron-11       endf/b-iv mat 1160            updated 10/13/89          id     204
       oxygen-16      endf/b-iv mat 1276            updated 10/13/89          id     201
       zircalloy      endf/b-iv mat 1284            updated 10/13/89          id     205
      1/v cross sections normalized to 1.0 at 0.0253 ev                        id     999
       hydrogen       endf/b-iv mat 1269/thrm1002   updated 10/13/89          id    1001
      b-10 1273 218hgp 042375 p-3 293k                                         id    5010
       boron-11       endf/b-iv mat 1160            updated 10/13/89          id    5011
       oxygen-16      endf/b-iv mat 1276            updated 10/13/89          id    8016
       oxygen-16      endf/b-iv mat 1276            updated 10/13/89          id       6
       kr-83          mt=102,103,103,105,106,107    updated 10/13/89          id   36083
       kr-85            mt=  102                                               id   36085
       sr-90          mt=102                        updated 10/13/89          id   38090
        y-89          mt=102                        updated 10/13/89          id   39089
       zr-93            mt=  102                                               id   40093
       zr-94          mt=102                        updated 10/13/89          id   40094
       zr-95          mt=102                        updated 10/13/89          id   40095
       zircalloy      endf/b-iv mat 1284            updated 10/13/89          id   40902
```

```
        nb-94          mt=102                          updated 10/13/89              id    41094
        mo-95          mt=102                          updated 10/13/89              id    42095
        tc-99          mt=102                          updated 10/13/89              id    43099
        ru-101         mt=102                          updated 10/13/89              id    44101
        ru-106         mt=102                          updated 10/13/89              id    44106
        rh-103         mt=102                          updated 10/13/89              id    45103
        rh-105           mt=  102                                                    id    45105
        pd-105         mt=102                          updated 10/13/89              id    46105
        pd-108         mt=102                          updated 10/13/89              id    46108
        silver-109     endf/b-iv mat 1139              updated 10/13/89              id    47109
        sb-124         mt=102                          updated 10/13/89              id    51124
        xe-131         mt=102,103,104,105,106          updated 10/13/89              id    54131
        xe-132         mt=102,103,104,105,106          updated 10/13/89              id    54132
        xenon-135      endf/b-iv mat 1294              updated 10/13/89              id    54135
        xe-136           mt=  102, 103, 104, 105, 107                                id    54136
        cesium-133     endf/b-iv mat 1141              updated 10/13/89              id    55133
        cs-134         mt=102                          updated 10/13/89              id    55134
        cs-135           mt=  102                                                    id    55135
        cs-137         mt=102                          updated 10/13/89              id    55137
        ba-136         mt=102                          updated 10/13/89              id    56136
        la-139         mt=102                          updated 10/13/89              id    57139
        ce-144           mt=  102                                                    id    58144
        pr-141         mt=102,103,104,105,106,107      updated 10/13/89              id    59141
        pr-143         mt=102                          updated 10/13/89              id    59143
        nd-143         mt=102                          updated 10/13/89              id    60143
        nd-145         mt=102                          updated 10/13/89              id    60145
        nd-147         mt=102                          updated 10/13/89              id    60147
        pm-147         mt=102                          updated 10/13/89              id    61147
        pm-148           mt=  102                                                    id    61148
        sm-147         endf/b-v fission product        updated 10/13/89              id    62147
        sm-149         mt=102,103,107                  updated 10/13/89              id    62149
        sm-150         mt=102                          updated 10/13/89              id    62150
        sm-151         mt=102,103,104,105,106,107      updated 10/13/89              id    62151
        sm-152         mt=102,103,104,105,106,107      updated 10/13/89              id    62152
        eu-153         mt=102,103,104,105,106,107      updated 10/13/89              id    63153
        eu-154         mt=102,103,104,105,106,107      updated 10/13/89              id    63154
        eu-155         mt=102,103,104,105,106,107      updated 10/13/89              id    63155
        gd-155         mt=102                          updated 10/13/89              id    64155
       u-234 1043 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                           id    92234
        uranium-235    endf/b-iv mat 1261              updated 10/13/89              id    92235
       u-236 1163 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                           id    92236
        uranium-238    endf/b-iv mat 1262              updated 10/13/89              id    92238
        neptunium-237  endf/b-iv mat 1263              updated 10/13/89              id    93237
       pu-238 1050 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                           id    94238
        plutonium-239  endf/b-iv mat 1264              updated 10/13/89              id    94239
        plutonium-240  endf/b-iv mat 1265              updated 10/13/89              id    94240
        plutonium-241  endf/b-iv mat 1266              updated 10/13/89              id    94241
        plutonium-242  endf/b-iv mat 1161              updated 10/13/89              id    94242
       am-241 1056 sigo=5+4 newxlacs 218ngp p-3 293k                                 id    95241
       am-243 1057 218 gp wt f-1/e-m 090576 p3 293k                                  id    95243
        curium-244     endf/b-iv mat 1162              updated 10/13/89              id    96244
0         tape copy used      0 i/o's, and took      .00 seconds
1 xx          xx   sssssssssss   ddddddddddd   rrrrrrrrrrr   mm        mm  pppppppppp   mmm         mmm
   xx        xx   sssssssssssss  ddddddddddddd  rrrrrrrrrrrr  mm        mm  pppppppppppp  mmm         mmm
     xx     xx   ss         ss   dd        dd   rr        rr  mmm       mm  pp        pp  mmmm       mmmm
      xx   xx    ss              dd        dd   rr        rr  mm mm     mm  pp        pp  mm mm     mm mm
       xx xx     ss              dd        dd   rr        rr  mm  mm    mm  pp        pp  mm  mm   mm mm
        xxx      sssssssssss     dd        dd   rrrrrrrrrrrr  mm   mm   mm  pppppppppppp  mm   mmm   mm
        xxx       sssssssssss    dd        dd   rrrrrrrrrrr   mm    mm  mm  pppppppppppp  mm    m    mm
       xx xx                ss   dd        dd   rr      rr    mm     mm mm  pp            mm         mm
```

```
   xx  xx          ss  dd      dd  rr      rr  rr     rr rr  pp          mm        mm
  xx    xx  ss      ss  dd      dd  rr      rr  rr     rrrr  pp          mm        mm
 xx      xx  ssssssssss  dddddddddd  rr      rr  rr      rr  pp          mm        mm
xx        xx  ssssssssss  dddddddddd  rr      rr  rr      rr  pp          mm        mm
0

dddddddddd    aaaaaaaa    w        w  iiiiiiiiiii   ssssssssss
dddddddddd   aaaaaaaaaa   w        w  iiiiiiiiiii  ssssssssssss
dd      dd  aa      aa    w        w      ii       ss      ss
dd      dd  aa      aa    w        w      ii       ss
dd      dd  aa      aa    w        w      ii       ss
dd      dd  aaaaaaaaaaaa  w        w      ii       ssssssssss
dd      dd  aaaaaaaaaaaa   w      w       ii        ssssssssss
dd      dd  aa      aa      w    w        ii                ss
dd      dd  aa      aa       w  w         ii                ss
dd      dd  aa      aa        w w         ii       ss      ss
dddddddddd  aa      aa         ww     iiiiiiiiiii  ssssssssss
dddddddddd  aa      aa          v     iiiiiiiiiii   ssssssssss
0

  000000    22222222222          //      11     666666666666          //  999999999   666666666
 00000000   22222222222         //      111     666666666666         //  999999999999 666666666666
 00    00   22        22        //     1111     66                  //  99      99  66
00      00          22         //       11     66                  //  99      99  66
00      00         22         //        11     66                  //  99      99  66
00      00       22          //         11     666666666666        //  999999999999 666666666666
00      00     22           //          11     666666666666       //   999999999999 666666666666
00      00   22            //           11     66      66        //           99  66      66
00      00 22             //            11     66      66       //            99  66      66
 00    00  22            //             11     66      66      //             99  66      66
 00000000  22222222222  //              11111111 666666666666 //            999999999999 666666666666
  000000   22222222222 //               11111111  666666666666 //            999999999   666666666
0

  000000    999999999                  555555555555 555555555555              333333333   333333333
 00000000   999999999999               555555555555 555555555555             333333333333 333333333333
 00    00   99      99      :::        55           55           :::         33      33  33      33
00      00  99      99      :::        55           55           :::                 33          33
00      00  99      99      :::        55           55           :::                 33          33
00      00  999999999999               555555555555 555555555555                333         333
00      00   999999999999              555555555555 555555555555                333         333
00      00          99      :::                 55           55      :::             33          33
00      00          99      :::                 55           55      :::             33          33
 00    00           99      :::        55       55 55       55      :::         33      33  33      33
 00000000  999999999999                555555555555 555555555555             333333333333 333333333333
  000000   999999999999                 555555555555  555555555555              333333333   333333333
1
0

                        ssssssssss   cccccccccc    aaaaaaaa   ll          eeeeeeeeeeee
                       ssssssssssss cccccccccccc  aaaaaaaaaa ll          eeeeeeeeeeee
                       ss      ss   cc      cc    aa      aa ll          ee
                       ss           cc            aa      aa ll          ee
                       ss           cc            aa      aa ll          ee
                       ssssssssss   cc            aaaaaaaaaaaa ll        eeeeeeee
                        ssssssssss  cc            aaaaaaaaaaaa ll        eeeeeeee
                                ss  cc            aa      aa ll          ee
                                ss  cc            aa      aa ll          ee
                       ss       ss  cc      cc    aa      aa ll          ee
                       ssssssssssss cccccccccccc aa      aa lllllllllllll eeeeeeeeeeee
                        ssssssssss   cccccccccc  aa      aa lllllllllllll eeeeeeeeeeee
```

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                 program verification information                   *****
*****                                                                   *****
*****                 code system:    scale  version:    4.2            *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****                 program:  c0c001                                  *****
*****                                                                   *****
*****             creation date:  04/27/95                              *****
*****                                                                   *****
*****                 library:  /neutronics/scale/exe                   *****
*****                                                                   *****
*****                                                                   *****
*****       this is not a   scale  configuration controlled code        *****
*****                                                                   *****
*****                 jobname:  davis                                   *****
*****                                                                   *****
*****       date of execution:  02/16/96                                *****
*****                                                                   *****
*****       time of execution:  09:55:33                                *****
*****                                                                   *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****************************************************************************
1
                    at 0 d, second part of sas2h pass to make library
0       -1q array has     1 entries.
0        0q array has    11 entries.
0        1q array has    15 entries.
0        2q array has    10 entries.
0        3q array has    12 entries.
0        4q array has     9 entries.
0        5q array has    12 entries.
0direct access unit   9 requires    12 blocks of length  704 for cross section mixing.
1                   at 0 d, second part of sas2h pass to make library
0general problem description data block
0                              general problem data

 ige  1/2/3 = plane/cylinder/sphere      2        isn  quadrature order                  8
 izm  number of zones                    4        isct order of scattering               3
 im   number of special intervals       28        ievt 0/1/2/3/4/5/6=q/k/alpha/c/z/r/h   1
 ibl  0/1/2/3 = vacuum/refl/per/white    1        iim  inner iteration maximum          20
 ibr  right boundary condition           3        iom  outer iteration maximum          25
 mxx  number of mixtures                 3        iclc -1/0/n--flat res/sn/cpt           0
 ms   mixing table length               70        ith  0/1 = forward/adjoint             0
 igm  number of energy groups           27        iflu not used(always wgtd)             0
 nng  number of neutron groups          27        iprt -2/-1/0/n=mixture xsec print     -2
 ngg  number of gamma groups             0        idl  0/1/2/3=no/prt nd/pch n/both     14
 iftg number of first thermal group     15        ipbt -1/0/1=none/fine/all bal. prt     0
```

```
0                                   special options

 ifg  0/1 = none/weighting calculation   1        ipn  0/1/2 diff. coef. param          0
 iqm  volumetric sources (0/n=no/yes)    0        idfm 0/1 = none/density factors 38*   0
 ipm  boundary sources (0/n=no/yes)      0        iaz  0/n = none/n activities by zone  0
 ifn  0/1/2 = input 33*/34*/use last    14        iai  0/1=none/activities by interval  0
 itmx maximum time (minutes)            10        ifct 0/1=no/yes upscatter scaling     0
 idt1 0/1/2/3=no/xsect/srce/flux--out    0        ipvt 0/1/2=no/k/alpha parametric srch 0
 isx  broad group fluxes                 0        isen outer iteration acceleration     0
 ibln activity data unit                 0        rbnd band rebaln parameter            0
 jtkl 0/1/2 buckling geometry            0
0                                 weighting data (ifg=1)

 icon -1/0/1=cell/zone/region weight    -1        ihtf total xsect psn in brd gp tables  3
 igmf number of broad groups             3        ndsf psn g-g or file number            4
 itp  0/10/20/30/40 0/c/e/ec/a           0        nusf table length or max order         6
 ipp  -2/-1/0/n=wgted xsect print       -2        mom extra 1-d x-sect positions         0
 iap  -1/n anisn xsect print            -1
0                                 floating point parameters

 eps  overall convergence        1.00000E-04      dy   cyl/pla ht for buckling     .00000E+00
 ptc  point convergence          1.00000E-04      dz   plane depth for buckling  2.00000E+02
 xnf  normalization factor       1.00000E+00      vsc  void streaming correction  .00000E+00
 ev   eigenvalue guess            .00000E+00      pv   ipvt=1/2--k/alpha          1.00000E+00
 evm  eigenvalue modifier         .00000E+00      eql  ev change eps for search  1.00000E-03
 bf   buckling factor=1.420892   1.42089E+00      xfpm new param mod for search  7.50000E-01
     this case will require       2611 locations for mixing
     this case has been allocated 200000 locations
1                   at 0 d, second part of sas2h pass to make library
0       13q array has     70 entries.
0       14q array has     70 entries.
0       15q array has     70 entries.
0                                 data block 2 (mixing table, etc.)
0     nuclides        cccc                          mixing table                          extra
       on tape     identification            mixture  component     atom density       xsect id's
    1     202                                   3        201       2.09770E-02
    2     203                                   3        202       4.19420E-02
    3     204                                   3        203       3.81515E-06
    4     201                                   3        204       1.54884E-05
    5     205                                   2        205       4.25156E-02
    6     999                                   1      92235       2.28718E-04
    7    1001                                   1      92234       1.83759E-06
    8    5010                                   1      92236       1.04764E-06
    9    5011                                   1      92238       7.29896E-03
   10    8016                                   1       8016       1.50611E-02
   11       6                                   1          6       1.15315E-02
   12   36083                                   1      36083       3.30753E-21
   13   36085                                   1      36085       3.30753E-21
   14   38090                                   1      38090       3.30753E-21
   15   39089                                   1      39089       3.30753E-21
   16   40093                                   1      42095       3.30753E-21
   17   40094                                   1      40093       3.30753E-21
   18   40095                                   1      40094       3.30753E-21
   19   40502                                   1      40095       3.30753E-21
   20   41094                                   1      41094       3.30753E-21
   21   42095                                   1      43099       3.30753E-21
   22   43099                                   1      45103       3.30753E-21
   23   44101                                   1      45105       3.30753E-21
   24   44106                                   1      44101       3.30753E-21
   25   45103                                   1      44106       3.30753E-21
```

```
   26  45105                                  1      46105     3.30753E-21
   27  46105                                  1      46108     3.30753E-21
   28  46108                                  1      47109     3.30753E-21
   29  47109                                  1      51124     3.30753E-21
   30  51124                                  1      54131     3.30753E-21
   31  54131                                  1      54132     3.30753E-21
   32  54132                                  1      54135     3.30753E-21
   33  54135                                  1      54136     3.30753E-21
   34  54136                                  1      55134     3.30753E-21
   35  55133                                  1      55135     3.30753E-21
   36  55134                                  1      55137     3.30753E-21
   37  55135                                  1      56136     3.30753E-21
   38  55137                                  1      57139     3.30753E-21
   39  56136                                  1      59141     3.30753E-21
   40  57139                                  1      59143     3.30753E-21
   41  58144                                  1      58144     3.30753E-21
   42  59141                                  1      60143     3.30753E-21
   43  59143                                  1      60145     3.30753E-21
   44  60143                                  1      61147     3.30753E-21
   45  60145                                  1      61148     3.30753E-21
   46  60147                                  1      60147     3.30753E-21
   47  61147                                  1      62147     3.30753E-21
   48  61148                                  1      62149     3.30753E-21
   49  62147                                  1      62150     3.30753E-21
   50  62149                                  1      62151     3.30753E-21
   51  62150                                  1      62152     3.30753E-21
   52  62151                                  1      64155     3.30753E-21
   53  62152                                  1      63153     3.30753E-21
   54  63153                                  1      63154     3.30753E-21
   55  63154                                  1      63155     3.30753E-21
   56  63155                                  1      40302     4.42681E-03
   57  64155                                  1       1001     2.30630E-02
   58  92234                                  1       5010     2.09787E-06
   59  92235                                  1       5011     8.51673E-06
   60  92236                                  1      55133     3.30753E-21
   61  92238                                  1      93237     3.30753E-21
   62  93237                                  1      94238     3.30753E-21
   63  94238                                  1      94239     3.30753E-21
   64  94239                                  1      94240     3.30753E-21
   65  94240                                  1      94241     3.30753E-21
   66  94241                                  1      94242     3.30753E-21
   67  94242                                  1      95241     3.30753E-21
   68  95241                                  1      95243     3.30753E-21
   69  95243                                  1      96244     3.30753E-21
   70  96244                                  1        999     3.30753E-21
-  elapsed time    .00 min.
0  24259 locations will be used
0      35q array has      29 entries.
0      36q array has      28 entries.
0      39q array has       4 entries.
0      40q array has       4 entries.
0      47q array has      27 entries.
0      51q array has      27 entries.
1                    at 0 cd, second part of sas2h pass to make library
                          neutron group parameters
0  gp    energy      lethargy    weighted   broad gp     calc      group     right     left
       boundaries   boundaries  velocities   numbers      type      band     albedo    albedo
    1  2.00000E+07 -6.93147E-01 4.60581E+09     1          0         1     1.00000E+00
    2  6.43400E+06  4.40989E-01 2.88737E+09     1          0         2     1.00000E+00
    3  3.00000E+06  1.20397E+00 2.12201E+09     1          0         3     1.00000E+00
```

4	1.85000E+06	1.68740E+00	1.75673E+09	1	0	4	1.00000E+00
5	1.40000E+06	1.96611E+00	1.46535E+09	1	0	5	1.00000E+00
6	9.00000E+05	2.40795E+00	1.06620E+09	2	0	6	1.00000E+00
7	4.00000E+05	3.21888E+00	6.07557E+08	2	0	7	1.00000E+00
8	1.00000E+05	4.60517E+00	2.72415E+08	2	0	8	1.00000E+00
9	1.70000E+04	6.37713E+00	1.13526E+08	2	0	9	1.00000E+00
10	3.00000E+03	8.11173E+00	4.82126E+07	2	0	10	1.00000E+00
11	5.50000E+02	9.80818E+00	2.05946E+07	2	0	11	1.00000E+00
12	1.00000E+02	1.15129E+01	1.01036E+07	2	0	12	1.00000E+00
13	3.00000E+01	1.27169E+01	5.69595E+06	2	0	13	1.00000E+00
14	1.00000E+01	1.38155E+01	3.20957E+06	2	0	14	1.00000E+00
15	3.04999E+00	1.50030E+01	2.10601E+06	2	0	15	1.00000E+00
16	1.77000E+00	1.55471E+01	1.70522E+06	2	0	16	1.00000E+00
17	1.29999E+00	1.58657E+01	1.52545E+06	2	0	17	1.00000E+00
18	1.12999E+00	1.59959E+01	1.42867E+06	2	0	18	1.00000E+00
19	1.00000E+00	1.61181E+01	1.31002E+06	2	0	19	1.00000E+00
20	8.00000E-01	1.63412E+01	9.05898E+05	2	0	20	1.00000E+00
21	4.00000E-01	1.70344E+01	8.17974E+05	3	0	21	1.00000E+00
22	3.25000E-01	1.72420E+01	6.90070E+05	3	0	22	1.00000E+00
23	2.25000E-01	1.76098E+01	4.86933E+05	3	0	23	1.00000E+00
24	9.99999E-02	1.84207E+01	3.57766E+05	3	0	24	1.00000E+00
25	5.00000E-02	1.91138E+01	2.71895E+05	3	0	25	1.00000E+00
26	3.00000E-02	1.96247E+01	1.87283E+05	3	0	26	1.00000E+00
27	1.00000E-02	2.07233E+01	8.88201E+04	3	0	27	1.00000E+00
28	1.00000E-05	2.76310E+01					

1 at 0 d, second part of sas2h pass to make library

0

	mixture by zone	order p(l) by zone	activity table matl no.	reaction	quadrature constants weights	directions	refl direc	wt x cos
1	3	3			0	-2.79004E-01	3	0
2	2	3			5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	3	3			5.06143E-02	1.97286E-01	2	9.98548E-03
4	1	3			0	-6.04419E-01	8	0
5					5.55953E-02	-5.58410E-01	8	-3.10450E-02
6					5.55953E-02	-2.31301E-01	7	-1.28698E-02
7					5.55953E-02	2.31301E-01	6	1.28698E-02
8					5.55953E-02	5.58410E-01	5	3.10450E-02
9					0	-8.50774E-01	15	0
10					5.22844E-02	-8.21784E-01	15	-4.29665E-02
11					5.22844E-02	-6.01588E-01	14	-3.14537E-02
12					5.22844E-02	-2.20196E-01	13	-1.15128E-02
13					5.22844E-02	2.20196E-01	12	1.15128E-02
14					5.22844E-02	6.01588E-01	11	3.14537E-02
15					5.22844E-02	8.21784E-01	10	4.29665E-02
16					0	-9.83032E-01	24	0
17					4.53355E-02	-9.64143E-01	24	-4.37099E-02
18					4.53355E-02	-8.17361E-01	23	-3.70555E-02
19					4.53355E-02	-5.46143E-01	22	-2.47597E-02
20					4.53355E-02	-1.91780E-01	21	-8.69444E-03
21					4.53355E-02	1.91780E-01	20	8.69444E-03
22					4.53355E-02	5.46143E-01	19	2.47597E-02
23					4.53355E-02	8.17361E-01	18	3.70555E-02
24					4.53355E-02	9.64143E-01	17	4.37099E-02

0constants for p(3) scattering

0angl	set 1	set 2	set 3	set 4	set 5
1	-2.79004E-01	8.83235E-01	6.74143E-02	-6.16919E-01	-1.71701E-02
2	-1.97286E-01	8.83235E-01	.00000E+00	-4.36228E-01	1.21411E-02
3	1.97286E-01	8.83235E-01	.00000E+00	4.36228E-01	-1.21411E-02
4	-6.04419E-01	4.52016E-01	3.16379E-01	-8.04435E-01	-1.74564E-01
5	-5.58410E-01	4.52016E-01	2.23714E-01	-7.43201E-01	-6.68028E-02
6	-2.31301E-01	4.52016E-01	-2.23713E-01	-3.07844E-01	1.61278E-01

7	2.31301E-01	4.52016E-01	-2.23713E-01	3.07844E-01	-1.61276E-01
8	5.58410E-01	4.52016E-01	2.23713E-01	7.43201E-01	6.68028E-02
9	-8.50774E-01	-8.57236E-02	6.26843E-01	-1.98456E-01	-4.86835E-01
10	-8.21784E-01	-8.57236E-02	5.42862E-01	-1.91694E-01	-3.44265E-01
11	-6.01588E-01	-8.57236E-02	.00000E+00	-1.40830E-01	3.44244E-01
12	-2.20196E-01	-8.57236E-02	-5.42862E-01	-5.13643E-02	3.44265E-01
13	2.20196E-01	-8.57236E-02	-5.42862E-01	5.13643E-02	-3.44265E-01
14	6.01588E-01	-8.57236E-02	.00000E+00	1.40830E-01	-3.44265E-01
15	8.21784E-01	-8.57236E-02	5.42862E-01	1.91694E-01	3.44265E-01
16	-9.83032E-01	-4.49528E-01	8.36885E-01	5.00708E-01	-7.51005E-01
17	-9.66143E-01	-4.49528E-01	7.73181E-01	4.91083E-01	-6.26438E-01
18	-8.17361E-01	-4.49528E-01	3.20262E-01	4.16320E-01	1.46514E-01
19	-5.46143E-01	-4.49528E-01	-3.20262E-01	2.78176E-01	7.36575E-01
20	-1.91780E-01	-4.49528E-01	-7.73181E-01	9.76824E-02	4.17236E-01
21	1.91780E-01	-4.49528E-01	-7.73181E-01	-9.76824E-02	-4.17236E-01
22	5.46143E-01	-4.49528E-01	-3.20262E-01	-2.78176E-01	-7.36575E-01
23	8.17361E-01	-4.49528E-01	3.20262E-01	-4.16320E-01	-1.46514E-01
24	9.66143E-01	-4.49528E-01	7.73181E-01	-4.91083E-01	6.26438E-01

1 int	radii	mid pts	zone no.	areas	volumes	dens fact	radius mod	spec(int)
1	0	1.97644E-02	1	0	4.90881E-03		0	
2	3.95287E-02	5.92931E-02	1	2.48366E-01	1.47264E-02		0	
3	7.90575E-02	1.18586E-01	1	4.96733E-01	5.89067E-02		0	
4	1.58115E-01	1.97644E-01	1	9.93466E-01	9.81762E-02		0	
5	2.37172E-01	2.76701E-01	1	1.49020E+00	1.37447E-01			
6	3.16230E-01	3.55759E-01	1	1.98693E+00	1.76717E-01			
7	3.95288E-01	4.34816E-01	1	2.48366E+00	2.15988E-01			
8	4.74345E-01	5.13874E-01	1	2.98040E+00	2.55258E-01			
9	5.53403E-01	5.73167E-01	1	3.47713E+00	1.42355E-01			
10	5.92931E-01	6.12696E-01	1	3.72550E+00	1.52173E-01			
11	6.32460E-01	6.42620E-01	2	3.97386E+00	8.20460E-02			
12	6.52780E-01	6.62940E-01	2	4.10154E+00	8.46405E-02			
13	6.73100E-01	6.96583E-01	3	4.22921E+00	2.05562E-01			
14	7.20067E-01	7.43550E-01	3	4.52431E+00	2.19422E-01			
15	7.67033E-01	7.90517E-01	3	4.81941E+00	2.33282E-01			
16	8.14000E-01	8.62795E-01	4	5.11451E+00	5.29051E-01			
17	9.11591E-01	9.60386E-01	4	5.72769E+00	5.88891E-01			
18	1.00918E+00	1.10677E+00	4	6.34088E+00	1.35731E+00			
19	1.20436E+00	1.30195E+00	4	7.56724E+00	1.59667E+00			
20	1.39955E+00	1.49714E+00	4	8.79360E+00	1.83603E+00			
21	1.59473E+00	1.69232E+00	4	1.00200E+01	2.07540E+00			
22	1.78991E+00	1.88750E+00	4	1.12463E+01	2.31478E+00			
23	1.98509E+00	2.08268E+00	4	1.24727E+01	2.55412E+00			
24	2.18027E+00	2.27786E+00	4	1.36991E+01	2.79349E+00			
25	2.37545E+00	2.47305E+00	4	1.49254E+01	3.03285E+00			
26	2.57064E+00	2.66823E+00	4	1.61518E+01	3.27221E+00			
27	2.76582E+00	2.81461E+00	4	1.73781E+01	1.72587E+00			
28	2.86341E+00	2.91220E+00	4	1.79913E+01	1.78571E+00			
29	2.96100E+00			1.86045E+01				

- elapsed time .00 min.

1 outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	298	1.04391E-06	1.25444E+00	-2.24723E-01	1.00000E+00	4.94988E-02	.00000E+00	.0000
2	422	1.08560E-06	1.23658E+00	3.25266E-03	1.64749E-02	3.07640E-02	.00000E+00	.0167
3	541	4.33274E-06	1.22463E+00	1.56369E-03	1.30333E-02	1.22907E-02	.00000E+00	.0167
4	642	5.48531E-06	1.21957E+00	5.17811E-04	5.66449E-03	2.68604E-03	.00000E+00	.0167
5	721	-6.68063E-06	1.21831E+00	1.04339E-04	1.26694E-03	3.03774E-04	.00000E+00	.0167
6	773	-2.39859E-06	1.21809E+00	1.96049E-05	1.22027E-04	1.80469E-05	.00000E+00	.0333

grp	to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	17	1.97858E-05	28	9.99998E-01	1

2	2	1	17	2.43694E-05	28	9.99998E-01	1
3	3	1	17	2.22065E-05	28	9.99998E-01	1
4	4	1	17	2.15955E-05	28	9.99998E-01	1
5	5	1	17	2.15005E-05	28	9.99998E-01	1
6	6	1	17	1.48570E-05	28	9.99999E-01	1
7	7	1	17	7.95796E-06	28	9.99997E-01	2
8	8	1	15	1.63517E-06	20	1.00000E+00	2
9	9	1	27	6.04249E-06	28	1.00001E+00	3
10	10	1	26	1.45127E-06	28	1.00000E+00	3
11	11	1	26	1.07523E-06	28	1.00000E+00	3
12	12	1	26	3.17028E-07	28	1.00000E+00	3
13	13	1	26	2.02823E-06	28	9.99998E-01	3
14	14	1	25	6.37018E-07	28	1.00000E+00	3
15	15	1	2	2.21687E-05	28	1.00002E+00	2
16	16	1	2	2.88768E-05	28	1.00002E+00	2
17	17	1	2	4.23906E-05	28	1.00008E+00	2
18	18	1	2	4.95055E-05	28	1.00012E+00	3
19	19	1	2	5.41915E-05	28	1.00013E+00	3
20	20	1	2	7.96373E-05	28	1.00011E+00	3
21	21	2	28	3.55246E-05	28	9.99984E-01	3
22	22	2	17	1.12423E-05	16	9.99999E-01	3
23	23	2	15	3.65537E-05	28	1.00001E+00	4
24	24	2	10	4.08816E-05	9	1.00000E+00	4
25	25	2	26	3.01312E-05	28	1.00008E+00	5
26	26	2	16	2.66475E-05	28	1.00000E+00	6
27	27	2	28	1.69354E-05	28	1.00000E+00	8

7 807 3.15920E-06 1.21799E+00 4.31073E-06 2.13203E-06 -6.07809E-06 .00000E+00 .0333

final monitor

lambda 1.21804E+00 production/absorption 1.23409E+00 angular flux on 16

- elapsed time .03 min.

1 at 0 d, second part of search pass to make library

0 int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	.00000E+00	1.97644E-02	.00000E+00	4.90881E-03	.00000E+00
2	1	3.95287E-02	5.92931E-02	2.48366E-01	1.47264E-02	.00000E+00
3	1	7.90575E-02	1.18586E-01	4.96733E-01	5.89057E-02	.00000E+00
4	1	1.58115E-01	1.97644E-01	9.93466E-01	9.81762E-02	.00000E+00
5	1	2.37172E-01	2.76701E-01	1.49020E+00	1.37447E-01	.00000E+00
6	1	3.16230E-01	3.55759E-01	1.98693E+00	1.76717E-01	.00000E+00
7	1	3.95288E-01	4.34816E-01	2.48366E+00	2.15988E-01	.00000E+00
8	1	4.74346E-01	5.13874E-01	2.98040E+00	2.55258E-01	.00000E+00
9	1	5.53403E-01	5.73167E-01	3.47713E+00	1.42355E-01	.00000E+00
10	1	5.92931E-01	6.12698E-01	3.72550E+00	1.52173E-01	.00000E+00
11	2	6.32460E-01	6.42620E-01	3.97386E+00	8.20460E-02	.00000E+00
12	2	6.52780E-01	6.62940E-01	4.10154E+00	8.46405E-02	.00000E+00
13	3	6.73100E-01	6.96583E-01	4.22921E+00	2.05562E-01	.00000E+00
14	3	7.20067E-01	7.43550E-01	4.52431E+00	2.19422E-01	.00000E+00
15	3	7.67033E-01	7.90517E-01	4.81941E+00	2.33282E-01	.00000E+00
16	4	8.14000E-01	8.62795E-01	5.11451E+00	5.29051E-01	2.75743E-02
17	4	9.11591E-01	9.60386E-01	5.72769E+00	5.88891E-01	3.00622E-02
18	4	1.00918E+00	1.10677E+00	6.34088E+00	1.35731E+00	6.79756E-02
19	4	1.20436E+00	1.30195E+00	7.56724E+00	1.59667E+00	7.84531E-02
20	4	1.39955E+00	1.49714E+00	8.79360E+00	1.85603E+00	8.90244E-02
21	4	1.59473E+00	1.69232E+00	1.00200E+01	2.07540E+00	9.96516E-02
22	4	1.78991E+00	1.88750E+00	1.12463E+01	2.31476E+00	1.10339E-01
23	4	1.98509E+00	2.08268E+00	1.24727E+01	2.55412E+00	1.21093E-01
24	4	2.18027E+00	2.27786E+00	1.36991E+01	2.79349E+00	1.31928E-01
25	4	2.37545E+00	2.47305E+00	1.49254E+01	3.03285E+00	1.42861E-01
26	4	2.57064E+00	2.66823E+00	1.61518E+01	3.27221E+00	1.53922E-01
27	4	2.76582E+00	2.81461E+00	1.73781E+01	1.72587E+00	8.11563E-02
28	4	2.86341E+00	2.91220E+00	1.79913E+01	1.78571E+00	8.40025E-02

29 2.96100E+00 1.86045E+01

1 at 0 d, second part of ses2h pass to make library

0 total flux

0 int.	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.18199E-02	8.76944E-02	1.10876E-01	6.84605E-02	1.02328E-01	1.92543E-01	1.92954E-01	1.46861E-01
2	1.18151E-02	8.76446E-02	1.10812E-01	6.84223E-02	1.02275E-01	1.93456E-01	1.92914E-01	1.46855E-01
3	1.18156E-02	8.76570E-02	1.10833E-01	6.84401E-02	1.02310E-01	1.92526E-01	1.92967E-01	1.46866E-01
4	1.18218E-02	8.77348E-02	1.10944E-01	6.85183E-02	1.02440E-01	1.92770E-01	1.93124E-01	1.46895E-01
5	1.18329E-02	8.78717E-02	1.11138E-01	6.86511E-02	1.02667E-01	1.93170E-01	1.93374E-01	1.46939E-01
6	1.18481E-02	8.80608E-02	1.11405E-01	6.88342E-02	1.02955E-01	1.93722E-01	1.93715E-01	1.46995E-01
7	1.18674E-02	8.83016E-02	1.11748E-01	6.90715E-02	1.03344E-01	1.94442E-01	1.94160E-01	1.47065E-01
8	1.18906E-02	8.86030E-02	1.12183E-01	6.93789E-02	1.03851E-01	1.95382E-01	1.94740E-01	1.47148E-01
9	1.19101E-02	8.88682E-02	1.12574E-01	6.96604E-02	1.04320E-01	1.96254E-01	1.95279E-01	1.47217E-01
10	1.19234E-02	8.90760E-02	1.12900E-01	6.99082E-02	1.04742E-01	1.97042E-01	1.95768E-01	1.47266E-01
11	1.19346E-02	8.92482E-02	1.13173E-01	7.01161E-02	1.05096E-01	1.97720E-01	1.96188E-01	1.47310E-01
12	1.19467E-02	8.93763E-02	1.13345E-01	7.02263E-02	1.05266E-01	1.98059E-01	1.96392E-01	1.47354E-01
13	1.19722E-02	8.96096E-02	1.13612E-01	7.03620E-02	1.05457E-01	1.98402E-01	1.96587E-01	1.47422E-01
14	1.20096E-02	8.99812E-02	1.14061E-01	7.06172E-02	1.05834E-01	1.99066E-01	1.96970E-01	1.47514E-01
15	1.20536E-02	9.04591E-02	1.14679E-01	7.10033E-02	1.06434E-01	2.00145E-01	1.97603E-01	1.47614E-01
16	1.21220E-02	9.12252E-02	1.15686E-01	7.16477E-02	1.07452E-01	2.01996E-01	1.98703E-01	1.47784E-01
17	1.21897E-02	9.19899E-02	1.16695E-01	7.22967E-02	1.08485E-01	2.03903E-01	1.99855E-01	1.47980E-01
18	1.22440E-02	9.26139E-02	1.17526E-01	7.28356E-02	1.09363E-01	2.05554E-01	2.00883E-01	1.48185E-01
19	1.22918E-02	9.31712E-02	1.18277E-01	7.33253E-02	1.10165E-01	2.07098E-01	2.01861E-01	1.48398E-01
20	1.23201E-02	9.35094E-02	1.18740E-01	7.36294E-02	1.10669E-01	2.08095E-01	2.02509E-01	1.48554E-01
21	1.23381E-02	9.37289E-02	1.19044E-01	7.38308E-02	1.11006E-01	2.08778E-01	2.02962E-01	1.48671E-01
22	1.23498E-02	9.38737E-02	1.19248E-01	7.39663E-02	1.11235E-01	2.09253E-01	2.03282E-01	1.48759E-01
23	1.23573E-02	9.39679E-02	1.19382E-01	7.40560E-02	1.11388E-01	2.09577E-01	2.03504E-01	1.48822E-01
24	1.23617E-02	9.40249E-02	1.19465E-01	7.41112E-02	1.11483E-01	2.09784E-01	2.03648E-01	1.48864E-01
25	1.23637E-02	9.40517E-02	1.19505E-01	7.41381E-02	1.11531E-01	2.09891E-01	2.03724E-01	1.48886E-01
26	1.23634E-02	9.40497E-02	1.19504E-01	7.41376E-02	1.11531E-01	2.09899E-01	2.03731E-01	1.48887E-01
27	1.23618E-02	9.40300E-02	1.19478E-01	7.41200E-02	1.11502E-01	2.09844E-01	2.03693E-01	1.48874E-01
28	1.23594E-02	9.40005E-02	1.19438E-01	7.40950E-02	1.11457E-01	2.09752E-01	2.03625E-01	1.48853E-01

0 int.	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.15771E-01	1.06876E-01	1.00623E-01	6.51792E-02	5.58608E-02	5.37706E-02	2.95248E-02	1.63404E-02
2	1.15771E-01	1.06878E-01	1.00628E-01	6.51842E-02	5.58656E-02	5.37771E-02	2.95269E-02	1.63413E-02
3	1.15769E-01	1.06869E-01	1.00507E-01	6.51603E-02	5.58440E-02	5.37465E-02	2.95208E-02	1.63384E-02
4	1.15764E-01	1.06846E-01	1.00456E-01	6.51029E-02	5.57920E-02	5.36729E-02	2.95057E-02	1.63312E-02
5	1.15757E-01	1.06812E-01	1.00379E-01	6.50153E-02	5.57132E-02	5.35609E-02	2.92833E-02	1.63206E-02
6	1.15746E-01	1.06765E-01	1.00274E-01	6.48964E-02	5.56067E-02	5.34092E-02	2.92536E-02	1.63064E-02
7	1.15733E-01	1.06708E-01	1.00136E-01	6.47405E-02	5.54678E-02	5.32107E-02	2.92162E-02	1.62884E-02
8	1.15718E-01	1.06621E-01	9.99534E-02	6.45351E-02	5.52850E-02	5.29501E-02	2.91690E-02	1.62656E-02
9	1.15706E-01	1.06543E-01	9.97814E-02	6.43434E-02	5.51173E-02	5.27073E-02	2.91266E-02	1.62448E-02
10	1.15705E-01	1.06470E-01	9.96228E-02	6.41690E-02	5.49648E-02	5.24869E-02	2.90895E-02	1.62264E-02
11	1.15710E-01	1.06413E-01	9.94972E-02	6.40321E-02	5.48436E-02	5.23127E-02	2.90570E-02	1.62106E-02
12	1.15704E-01	1.06392E-01	9.94501E-02	6.39785E-02	5.47985E-02	5.22427E-02	2.90392E-02	1.62027E-02
13	1.15659E-01	1.06363E-01	9.93868E-02	6.38965E-02	5.47224E-02	5.21391E-02	2.90042E-02	1.61953E-02
14	1.15587E-01	1.06297E-01	9.92394E-02	6.37191E-02	5.45725E-02	5.19175E-02	2.89994E-02	1.61819E-02
15	1.15508E-01	1.06187E-01	9.89998E-02	6.34399E-02	5.43382E-02	5.15708E-02	2.89618E-02	1.61609E-02
16	1.15399E-01	1.06007E-01	9.86031E-02	6.29802E-02	5.39517E-02	5.09961E-02	2.88931E-02	1.61242E-02
17	1.15301E-01	1.05828E-01	9.82065E-02	6.25207E-02	5.35600E-02	5.04191E-02	2.88113E-02	1.60830E-02
18	1.15230E-01	1.05676E-01	9.78673E-02	6.21280E-02	5.32160E-02	4.99233E-02	2.87235E-02	1.60407E-02
19	1.15175E-01	1.05537E-01	9.75508E-02	6.17619E-02	5.28896E-02	4.94592E-02	2.86307E-02	1.59967E-02
20	1.15148E-01	1.05448E-01	9.73461E-02	6.15255E-02	5.26738E-02	4.91575E-02	2.85612E-02	1.59643E-02
21	1.15135E-01	1.05387E-01	9.72088E-02	6.13610E-02	5.25212E-02	4.89467E-02	2.85080E-02	1.59395E-02
22	1.15128E-01	1.05345E-01	9.71024E-02	6.12439E-02	5.24111E-02	4.87959E-02	2.84675E-02	1.59207E-02
23	1.15124E-01	1.05315E-01	9.70304E-02	6.11604E-02	5.23329E-02	4.86885E-02	2.84377E-02	1.59068E-02
24	1.15121E-01	1.05295E-01	9.69814E-02	6.11040E-02	5.22786E-02	4.86154E-02	2.84172E-02	1.58973E-02
25	1.15119E-01	1.05282E-01	9.69521E-02	6.10702E-02	5.22470E-02	4.85722E-02	2.84057E-02	1.58920E-02
26	1.15114E-01	1.05278E-01	9.69427E-02	6.10595E-02	5.22380E-02	4.85594E-02	2.84089E-02	1.58912E-02
27	1.15114E-01	1.05280E-01	9.69485E-02	6.10663E-02	5.22458E-02	4.85694E-02	2.84089E-02	1.58936E-02

28	1.15113E-01	1.05286E-01	9.69644E-02	6.10848E-02	5.22649E-02	4.85946E-02	2.84181E-02	1.58979E-02

0 int.	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	7.32821E-03	6.33269E-03	1.16362E-02	3.84160E-02	1.29140E-02	2.85902E-02	9.63479E-02	7.90104E-02
2	7.32866E-03	6.33313E-03	1.16369E-02	3.84179E-02	1.29147E-02	2.85912E-02	9.63424E-02	7.89938E-02
3	7.32681E-03	6.33116E-03	1.16338E-02	3.84070E-02	1.29078E-02	2.85688E-02	9.62227E-02	7.88498E-02
4	7.32230E-03	6.32641E-03	1.16266E-02	3.83811E-02	1.28921E-02	2.85181E-02	9.59597E-02	7.85386E-02
5	7.31549E-03	6.31923E-03	1.16157E-02	3.83422E-02	1.28684E-02	2.84423E-02	9.55695E-02	7.80782E-02
6	7.30633E-03	6.30951E-03	1.16011E-02	3.82899E-02	1.28364E-02	2.83405E-02	9.50495E-02	7.74641E-02
7	7.29447E-03	6.29685E-03	1.15821E-02	3.82222E-02	1.27947E-02	2.82092E-02	9.43869E-02	7.66820E-02
8	7.27904E-03	6.28027E-03	1.15574E-02	3.81342E-02	1.27402E-02	2.80401E-02	9.35498E-02	7.56970E-02
9	7.26478E-03	6.26488E-03	1.15347E-02	3.80530E-02	1.26894E-02	2.78852E-02	9.27971E-02	7.48153E-02
10	7.25186E-03	6.25076E-03	1.15142E-02	3.79997E-02	1.26430E-02	2.77471E-02	9.21427E-02	7.40540E-02
11	7.24139E-03	6.23951E-03	1.14978E-02	3.79215E-02	1.26072E-02	2.76429E-02	9.16678E-02	7.35237E-02
12	7.23687E-03	6.23496E-03	1.14906E-02	3.78980E-02	1.25948E-02	2.76071E-02	9.15230E-02	7.33901E-02
13	7.23119E-03	6.22879E-03	1.14815E-02	3.78654E-02	1.25759E-02	2.75458E-02	9.12413E-02	7.30552E-02
14	7.21944E-03	6.21553E-03	1.14626E-02	3.77962E-02	1.25325E-02	2.74096E-02	9.06127E-02	7.22862E-02
15	7.20087E-03	6.19439E-03	1.14331E-02	3.76881E-02	1.24625E-02	2.72012E-02	8.96953E-02	7.11792E-02
16	7.17006E-03	6.15962E-03	1.13843E-02	3.75118E-02	1.23501E-02	2.68713E-02	8.82917E-02	6.95356E-02
17	7.13836E-03	6.12455E-03	1.13340E-02	3.73322E-02	1.22389E-02	2.65415E-02	8.68739E-02	6.79058E-02
18	7.10954E-03	6.09364E-03	1.12879E-02	3.71691E-02	1.21417E-02	2.62450E-02	8.55179E-02	6.63638E-02
19	7.08140E-03	6.06415E-03	1.12430E-02	3.70104E-02	1.20491E-02	2.59570E-02	8.41519E-02	6.48211E-02
20	7.06211E-03	6.04431E-03	1.12119E-02	3.69012E-02	1.19871E-02	2.57596E-02	8.31760E-02	6.37302E-02
21	7.04802E-03	6.03009E-03	1.11892E-02	3.68215E-02	1.19427E-02	2.56154E-02	8.24431E-02	6.29187E-02
22	7.03762E-03	6.01972E-03	1.11724E-02	3.67627E-02	1.19101E-02	2.55082E-02	8.18871E-02	6.23087E-02
23	7.03008E-03	6.01225E-03	1.11602E-02	3.67197E-02	1.18864E-02	2.54290E-02	8.14695E-02	6.18533E-02
24	7.02494E-03	6.00714E-03	1.11518E-02	3.66901E-02	1.18699E-02	2.53729E-02	8.11678E-02	6.15239E-02
25	7.02200E-03	6.00417E-03	1.11469E-02	3.66725E-02	1.18596E-02	2.53371E-02	8.09888E-02	6.13180E-02
26	7.02137E-03	6.00338E-03	1.11457E-02	3.66681E-02	1.18569E-02	2.53220E-02	8.08720E-02	6.11854E-02
27	7.02239E-03	6.00468E-03	1.11480E-02	3.66724E-02	1.18572E-02	2.53238E-02	8.08630E-02	6.11594E-02
28	7.02445E-03	6.00653E-03	1.11511E-02	3.66826E-02	1.18619E-02	2.53371E-02	8.09154E-02	6.11972E-02

0 int.	grp. 25	grp. 26	grp. 27
1	3.56378E-02	2.56275E-02	4.85640E-03
2	3.56251E-02	2.56130E-02	4.85290E-03
3	3.55450E-02	2.55415E-02	4.83822E-03
4	3.53744E-02	2.53902E-02	4.80707E-03
5	3.51216E-02	2.51643E-02	4.75985E-03
6	3.47836E-02	2.48597E-02	4.69498E-03
7	3.43531E-02	2.44682E-02	4.60974E-03
8	3.38127E-02	2.39724E-02	4.49912E-03
9	3.33318E-02	2.35288E-02	4.39859E-03
10	3.29220E-02	2.31477E-02	4.31152E-03
11	3.26476E-02	2.29017E-02	4.25873E-03
12	3.25894E-02	2.28550E-02	4.25538E-03
13	3.23989E-02	2.26812E-02	4.20561E-03
14	3.19450E-02	2.22411E-02	4.08455E-03
15	3.13140E-02	2.16129E-02	3.90221E-03
16	3.03968E-02	2.07082E-02	3.63369E-03
17	2.95052E-02	1.98611E-02	3.40450E-03
18	2.86691E-02	1.91154E-02	3.23675E-03
19	2.78430E-02	1.84023E-02	3.08811E-03
20	2.72680E-02	1.79259E-02	3.00019E-03
21	2.68464E-02	1.75972E-02	2.94218E-03
22	2.65338E-02	1.73591E-02	2.90272E-03
23	2.63031E-02	1.71880E-02	2.87507E-03
24	2.61373E-02	1.70675E-02	2.85604E-03
25	2.60257E-02	1.69870E-02	2.84349E-03
26	2.59633E-02	1.69408E-02	2.83629E-03
27	2.59454E-02	1.69244E-02	2.83357E-03
28	2.59575E-02	1.69278E-02	2.83344E-03

- elapsed time .03 min.

1fine group summary for zone 1 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	4.60370E-04	6.09337E-04	5.07372E-05	-6.60049E-04	9.99962E-01
2	.00000E+00	.00000E+00	3.49626E-04	5.95317E-03	7.82435E-03	1.70120E-04	-7.64465E-03	9.99976E-01
3	.00000E+00	.00000E+00	3.71088E-03	5.38673E-03	1.40126E-02	9.14396E-05	-1.03930E-02	9.99985E-01
4	.00000E+00	.00000E+00	5.48493E-03	3.57253E-03	1.22749E-02	4.16912E-05	-6.83155E-03	9.99994E-01
5	.00000E+00	.00000E+00	1.01291E-02	1.14843E-02	2.08060E-02	4.94905E-05	-1.07265E-02	1.00000E+00
6	.00000E+00	.00000E+00	2.13346E-02	3.44620E-02	4.09583E-02	8.42046E-05	-1.97082E-02	1.00001E+00
7	.00000E+00	.00000E+00	4.21123E-02	6.09891E-02	5.41094E-02	6.11908E-05	-1.20581E-02	9.99995E-01
8	.00000E+00	.00000E+00	5.63040E-02	7.82869E-02	5.87010E-02	3.63752E-05	-2.42834E-03	9.99914E-01
9	.00000E+00	.00000E+00	5.77401E-02	7.25211E-02	5.74300E-02	2.92392E-05	2.87403E-04	9.99887E-01
10	.00000E+00	.00000E+00	5.70144E-02	6.90088E-02	5.54588E-02	3.59781E-05	1.52560E-03	9.99895E-01
11	.00000E+00	.00000E+00	5.57524E-02	6.53608E-02	5.21816E-02	5.49608E-05	3.51954E-03	9.99938E-01
12	.00000E+00	.00000E+00	4.52588E-02	3.49724E-02	4.11494E-02	6.02369E-05	4.05021E-03	9.99978E-01
13	.00000E+00	.00000E+00	4.04233E-02	2.85746E-02	3.66450E-02	8.46469E-05	3.69489E-03	9.99969E-01
14	.00000E+00	.00000E+00	3.94219E-02	2.84977E-02	3.40426E-02	1.37530E-04	5.24222E-03	9.99988E-01
15	.00000E+00	.00000E+00	2.18148E-02	1.09688E-02	2.05489E-02	1.13809E-04	1.15256E-03	9.99978E-01
16	.00000E+00	.00000E+00	1.43447E-02	4.65579E-03	1.37170E-02	7.78467E-05	5.50388E-04	9.99978E-01
17	.00000E+00	.00000E+00	7.40583E-03	1.35166E-03	7.08265E-03	3.86930E-05	3.34613E-04	9.99983E-01
18	.00000E+00	.00000E+00	6.59488E-03	1.13732E-03	6.21456E-03	3.55873E-05	3.44854E-04	9.99982E-01
19	.00000E+00	.00000E+00	1.11652E-02	3.18589E-03	1.05671E-02	7.13098E-05	5.27021E-04	9.99978E-01
20	.00000E+00	.00000E+00	2.76967E-02	2.26336E-02	2.55903E-02	2.95190E-04	1.81139E-03	9.99994E-01
21	.00000E+00	.00000E+00	1.38756E-02	4.89838E-03	1.27430E-02	1.22844E-04	1.00926E-03	1.00004E+00
22	.00000E+00	.00000E+00	2.85411E-02	1.62509E-02	2.52899E-02	3.12136E-04	2.93663E-03	1.00009E+00
23	.00000E+00	.00000E+00	7.80827E-02	9.79401E-02	6.43146E-02	1.42175E-03	1.23333E-02	1.00017E+00
24	.00000E+00	.00000E+00	8.54159E-02	9.23651E-02	7.12974E-02	1.68040E-03	1.24262E-02	1.00014E+00
25	.00000E+00	.00000E+00	5.71760E-02	3.90471E-02	5.02342E-02	9.92412E-04	5.94429E-03	1.00009E+00
26	.00000E+00	.00000E+00	4.56459E-02	4.34833E-02	4.01626E-02	1.00562E-03	4.47523E-03	1.00006E+00
27	.00000E+00	.00000E+00	1.54627E-02	9.41508E-03	1.43429E-02	3.58375E-04	7.61410E-04	1.00000E+00
28	.00000E+00	.00000E+00	8.48258E-01	8.46811E-01	8.48258E-01	7.51361E-03	-7.52357E-03	1.00001E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*db**2	total flux
1	1.19298E-02	-6.60049E-04	1.18238E-02	.00000E+00	3.36981E-11	.00000E+00	1.82622E-05	1.49171E-02
2	8.91860E-02	-7.64465E-03	8.77366E-02	.00000E+00	.00000E+00	.00000E+00	8.62881E-05	1.11032E-01
3	1.13078E-01	-1.03930E-02	1.10252E-01	.00000E+00	.00000E+00	.00000E+00	9.10163E-05	1.40537E-01
4	7.00480E-02	-6.83155E-03	6.84948E-02	.00000E+00	.00000E+00	.00000E+00	4.14375E-05	8.68850E-02
5	1.04982E-01	-1.07265E-02	1.02378E-01	.00000E+00	.00000E+00	.00000E+00	4.91986E-05	1.30015E-01
6	1.97494E-01	-1.97082E-02	1.92627E-01	.00000E+00	.00000E+00	.00000E+00	8.33365E-05	2.44622E-01
7	1.96049E-01	-1.20581E-02	1.92997E-01	.00000E+00	.00000E+00	.00000E+00	5.98475E-05	2.44161E-01
8	1.47290E-01	-2.42834E-03	1.46868E-01	.00000E+00	.00000E+00	.00000E+00	3.26982E-05	1.84821E-01
9	1.15707E-01	2.87403E-04	1.15770E-01	.00000E+00	.00000E+00	.00000E+00	2.16466E-05	1.45436E-01
10	1.06428E-01	1.52560E-03	1.06873E-01	.00000E+00	.00000E+00	.00000E+00	1.91161E-05	1.34063E-01
11	9.95311E-02	3.51934E-03	1.00514E-01	.00000E+00	.00000E+00	.00000E+00	1.78442E-05	1.25780E-01
12	6.40691E-02	4.05021E-03	6.51703E-02	.00000E+00	.00000E+00	.00000E+00	1.04751E-05	8.12948E-02
13	5.48775E-02	3.69489E-03	5.58525E-02	.00000E+00	.00000E+00	.00000E+00	8.74647E-06	6.96511E-02
14	5.23609E-02	5.24222E-03	5.37589E-02	.00000E+00	.00000E+00	.00000E+00	8.55773E-06	6.67904E-02
15	2.90675E-02	1.15256E-03	2.95207E-02	.00000E+00	.00000E+00	.00000E+00	4.51887E-06	3.67085E-02
16	1.62154E-02	5.50388E-04	1.63385E-02	.00000E+00	.00000E+00	.00000E+00	2.27851E-06	2.04652E-02
17	7.24423E-03	3.34613E-04	7.32720E-03	.00000E+00	.00000E+00	.00000E+00	9.37779E-07	9.16227E-03
18	6.24242E-03	3.44854E-04	6.33167E-03	.00000E+00	.00000E+00	.00000E+00	7.89624E-07	7.90811E-03
19	1.15018E-02	5.27021E-04	1.16344E-02	.00000E+00	.00000E+00	.00000E+00	1.52219E-06	1.45478E-02
20	3.79339E-02	1.81139E-03	3.84083E-02	.00000E+00	.00000E+00	.00000E+00	5.62688E-06	4.80074E-02
21	1.26162E-02	1.00926E-03	1.29119E-02	.00000E+00	.00000E+00	.00000E+00	1.47280E-06	1.60624E-02
22	2.76680E-02	2.93663E-03	2.85845E-02	.00000E+00	.00000E+00	.00000E+00	3.23650E-06	3.54039E-02
23	9.17714E-02	1.23333E-02	9.63274E-02	.00000E+00	.00000E+00	.00000E+00	9.76650E-06	1.18411E-01
24	7.36238E-02	1.24262E-02	7.89950E-02	.00000E+00	.00000E+00	.00000E+00	5.89247E-06	9.61312E-02
25	3.26920E-02	5.94429E-03	3.56328E-02	.00000E+00	.00000E+00	.00000E+00	2.03839E-06	4.30461E-02
26	2.29329E-02	4.47523E-03	2.56260E-02	.00000E+00	.00000E+00	.00000E+00	1.07109E-06	3.06280E-02
27	4.26245E-03	7.61410E-04	4.85670E-03	.00000E+00	.00000E+00	.00000E+00	1.25901E-07	5.76249E-03
28	1.79680E+00	-7.52357E-03	1.80409E+00	.00000E+00	3.36981E-11	.00000E+00	5.87150E-04	2.26224E+00

1fine group summary for zone 2 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	2.08564E-04	1.52597E-04	2.28919E-06	-1.49446E-04	1.00002E+00
2	.00000E+00	.00000E+00	2.66507E-05	1.41076E-03	1.01229E-03	1.35879E-05	-9.99266E-04	1.00000E+00
3	.00000E+00	.00000E+00	1.43570E-04	2.73107E-03	8.63535E-04	1.99849E-05	-7.39940E-04	9.99999E-01
4	.00000E+00	.00000E+00	2.79114E-04	2.28785E-03	2.96227E-04	1.30011E-05	-3.01311E-05	1.00000E+00
5	.00000E+00	.00000E+00	6.01541E-04	4.40145E-03	2.78358E-04	1.68062E-05	3.06284E-04	1.00001E+00
6	.00000E+00	.00000E+00	1.00347E-03	1.23934E-02	1.69532E-04	2.70429E-05	8.09959E-04	1.00001E+00
7	.00000E+00	.00000E+00	6.62953E-04	1.25895E-02	6.32815E-05	2.68049E-05	5.72767E-04	1.00001E+00
8	.00000E+00	.00000E+00	1.16440E-04	9.20079E-03	4.43053E-04	2.20949E-05	-3.48723E-04	1.00001E+00
9	.00000E+00	.00000E+00	4.44842E-04	6.35120E-03	5.29442E-05	7.66081E-05	3.15298E-04	9.99989E-01
10	.00000E+00	.00000E+00	5.30082E-05	4.97591E-03	4.98697E-05	5.91964E-05	-5.55519E-05	9.99996E-01
11	.00000E+00	.00000E+00	4.98730E-05	4.43879E-03	5.01296E-05	8.96966E-05	-9.04498E-05	9.99999E-01
12	.00000E+00	.00000E+00	5.01299E-05	2.75207E-03	5.12013E-05	5.65411E-06	-6.73398E-06	1.00000E+00
13	.00000E+00	.00000E+00	5.12014E-05	2.35809E-03	4.81085E-05	6.31865E-06	-3.21912E-06	1.00000E+00
14	.00000E+00	.00000E+00	4.81085E-05	2.25443E-03	4.24849E-05	8.60956E-06	-2.99001E-06	1.00000E+00
15	.00000E+00	.00000E+00	4.51235E-05	1.22678E-03	5.02074E-05	6.35311E-06	-1.14634E-05	1.00002E+00
16	.00000E+00	.00000E+00	5.64988E-05	6.55314E-04	5.67709E-05	3.88394E-06	-4.17326E-06	1.00003E+00
17	.00000E+00	.00000E+00	6.36239E-05	2.55243E-04	6.28287E-05	1.89734E-06	-1.11171E-06	1.00002E+00
18	.00000E+00	.00000E+00	6.65004E-05	2.07160E-04	6.68911E-05	1.72471E-06	-2.12574E-06	1.00002E+00
19	.00000E+00	.00000E+00	6.74950E-05	4.40094E-04	6.49519E-05	3.41502E-06	-8.73522E-07	1.00003E+00
20	.00000E+00	.00000E+00	8.12622E-05	1.59775E-03	6.79260E-05	1.37364E-05	-5.14090E-07	1.00006E+00
21	.00000E+00	.00000E+00	9.59079E-05	4.46910E-04	1.06751E-04	5.53980E-06	-1.63880E-05	1.00001E+00
22	.00000E+00	.00000E+00	1.44652E-04	1.07068E-03	1.43093E-04	1.38245E-05	-1.22739E-05	1.00000E+00
23	.00000E+00	.00000E+00	2.16892E-04	3.74901E-03	2.75240E-04	6.12530E-05	-1.19589E-04	1.00000E+00
24	.00000E+00	.00000E+00	3.53050E-04	2.83832E-03	3.85516E-04	6.96707E-05	-1.06273E-04	1.00001E+00
25	.00000E+00	.00000E+00	3.59770E-04	1.13977E-03	2.95361E-04	4.03348E-05	2.60305E-05	1.00001E+00
26	.00000E+00	.00000E+00	1.52652E-04	8.88045E-04	1.17357E-04	3.98662E-05	-4.57093E-06	1.00000E+00
27	.00000E+00	.00000E+00	3.40292E-05	1.86949E-04	9.63229E-03	1.38700E-05	2.00606E-05	1.00000E+00
28	.00000E+00	.00000E+00	5.26785E-03	8.30512E-02	5.26785E-03	6.63045E-04	-6.58410E-04	1.00006E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dy**2	total flux
1	1.19541E-02	-8.09496E-04	1.19258E-02	-6.60049E-04	5.45214E-06	.00000E+00	1.50719E-06	1.99036E-03
2	8.94422E-02	-8.64391E-03	8.91850E-02	-7.64465E-03	.00000E+00	.00000E+00	1.07852E-05	1.48873E-02
3	1.13422E-01	-1.11329E-02	1.13078E-01	-1.03930E-02	.00000E+00	.00000E+00	1.25152E-05	1.88789E-02
4	7.02645E-02	-6.86168E-03	7.00480E-02	-6.83155E-03	.00000E+00	.00000E+00	7.38470E-06	1.16966E-02
5	1.05325E-01	-1.04202E-02	1.04982E-01	-1.07265E-02	.00000E+00	.00000E+00	8.60640E-06	1.75325E-02
6	1.98171E-01	-1.89013E-02	1.97494E-01	-1.97082E-02	.00000E+00	.00000E+00	1.01663E-05	3.29860E-02
7	1.96458E-01	-1.14853E-02	1.96049E-01	-1.20581E-02	.00000E+00	.00000E+00	8.35036E-06	3.27192E-02
8	1.47377E-01	-2.77706E-03	1.47290E-01	-2.42834E-03	.00000E+00	.00000E+00	5.27056E-06	2.45889E-02
9	1.15696E-01	6.02701E-04	1.15707E-01	2.87403E-04	.00000E+00	.00000E+00	4.57772E-06	1.92868E-02
10	1.06386E-01	1.47005E-03	1.06428E-01	1.52560E-03	.00000E+00	.00000E+00	4.89844E-06	1.77358E-02
11	9.94369E-02	3.42889E-03	9.95311E-02	3.51934E-03	.00000E+00	.00000E+00	4.74734E-06	1.66809E-02
12	6.39618E-02	4.04347E-03	6.40691E-02	4.05021E-03	.00000E+00	.00000E+00	3.20386E-06	1.06688E-02
13	5.47775E-02	3.69167E-03	5.48775E-02	3.69489E-03	.00000E+00	.00000E+00	2.73818E-06	9.13745E-03
14	5.22205E-02	5.23923E-03	5.23606E-02	5.24222E-03	.00000E+00	.00000E+00	2.60480E-06	8.71390E-03
15	2.90319E-02	1.14109E-03	2.90675E-02	1.15256E-03	.00000E+00	.00000E+00	1.42658E-06	4.84190E-03
16	1.61995E-02	5.46215E-04	1.62154E-02	5.50388E-04	.00000E+00	.00000E+00	7.95959E-07	2.70142E-03
17	7.23519E-03	3.33501E-04	7.24423E-03	3.34613E-04	.00000E+00	.00000E+00	3.55364E-07	1.20666E-03
18	6.23331E-03	3.42730E-04	6.24242E-03	3.44854E-04	.00000E+00	.00000E+00	3.06085E-07	1.03966E-03
19	1.14877E-02	5.26147E-04	1.15018E-02	5.27021E-04	.00000E+00	.00000E+00	5.63813E-07	1.91590E-03
20	3.78869E-02	1.81087E-03	3.79339E-02	1.81139E-03	.00000E+00	.00000E+00	1.85696E-06	6.31902E-03
21	1.25913E-02	9.92869E-04	1.26162E-02	1.00928E-03	.00000E+00	.00000E+00	6.16223E-07	2.10041E-03
22	2.75965E-02	2.92435E-03	2.76680E-02	2.93663E-03	.00000E+00	.00000E+00	1.34918E-06	4.60467E-03
23	9.14823E-02	1.22137E-02	9.17714E-02	1.23333E-02	.00000E+00	.00000E+00	4.45761E-06	1.52675E-02
24	7.33567E-02	1.23199E-02	7.36238E-02	1.24262E-02	.00000E+00	.00000E+00	3.55316E-06	1.22441E-02
25	3.25755E-02	5.97032E-03	3.26920E-02	5.94429E-03	.00000E+00	.00000E+00	1.56841E-06	5.43699E-03
26	2.28595E-02	4.47066E-03	2.29325E-02	4.47523E-03	.00000E+00	.00000E+00	1.08873E-06	3.81430E-03
27	4.25575E-03	7.81470E-04	4.26345E-03	7.61410E-04	.00000E+00	.00000E+00	1.96335E-07	7.09589E-04
28	1.79768E+00	-8.18191E-03	1.79880E+00	-7.52357E-03	5.45214E-06	.00000E+00	1.05491E-04	2.99575E-01

1fine group summary for zone 3 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance

1	.00000E+00	.00000E+00	.00000E+00	2.44059E-04	3.23052E-04	2.68976E-05	-3.49917E-04	9.99989E-01
2	.00000E+00	.00000E+00	1.85349E-04	3.17788E-03	4.17648E-03	9.08064E-05	-4.08184E-03	9.99995E-01
3	.00000E+00	.00000E+00	1.98045E-03	2.87953E-03	7.49146E-03	4.88857E-05	-5.55975E-03	9.99994E-01
4	.00000E+00	.00000E+00	2.93133E-03	1.91291E-03	6.57256E-03	2.23235E-05	-3.66353E-03	9.99998E-01
5	.00000E+00	.00000E+00	5.41861E-03	6.15920E-03	1.11588E-02	2.85426E-05	-5.78656E-03	1.00000E+00
6	.00000E+00	.00000E+00	1.14259E-02	1.84767E-02	2.19597E-02	4.51461E-05	-1.05752E-02	1.00001E+00
7	.00000E+00	.00000E+00	2.25729E-02	3.23781E-02	2.87493E-02	3.25115E-05	-6.20877E-03	9.99996E-01
8	.00000E+00	.00000E+00	2.99674E-02	4.11331E-02	3.08424E-02	1.91121E-05	-8.91483E-04	9.99920E-01
9	.00000E+00	.00000E+00	3.04006E-02	3.79886E-02	3.00439E-02	1.52962E-05	3.44866E-04	9.99890E-01
10	.00000E+00	.00000E+00	2.98601E-02	3.60117E-02	2.89408E-02	1.87749E-05	9.03647E-04	9.99900E-01
11	.00000E+00	.00000E+00	2.91134E-02	3.39528E-02	2.70906E-02	2.85335E-05	1.99609E-03	9.99945E-01
12	.00000E+00	.00000E+00	2.35226E-02	1.80317E-02	2.12165E-02	3.10580E-05	2.27558E-03	9.99982E-01
13	.00000E+00	.00000E+00	2.08951E-02	1.47278E-02	1.88874E-02	4.36284E-05	1.96470E-03	9.99974E-01
14	.00000E+00	.00000E+00	2.03396E-02	1.45667E-02	1.74010E-02	7.02989E-05	2.86865E-03	9.99991E-01
15	.00000E+00	.00000E+00	1.11856E-02	5.70869E-03	1.06853E-02	5.91801E-05	4.41317E-04	9.99979E-01
16	.00000E+00	.00000E+00	7.40269E-03	2.42316E-03	7.13886E-03	4.04103E-05	2.23601E-04	9.99979E-01
17	.00000E+00	.00000E+00	3.83129E-03	7.00802E-04	3.64624E-03	2.00613E-05	1.65049E-04	9.99984E-01
18	.00000E+00	.00000E+00	3.41253E-03	5.88105E-04	3.21353E-03	1.84021E-05	1.80459E-04	9.99983E-01
19	.00000E+00	.00000E+00	5.77524E-03	1.65072E-03	5.47860E-03	3.69712E-05	2.59800E-04	9.99979E-01
20	.00000E+00	.00000E+00	1.43202E-02	1.17247E-02	1.32564E-02	1.52915E-04	9.11078E-04	9.99991E-01
21	.00000E+00	.00000E+00	7.14958E-03	2.51352E-03	6.53883E-03	6.30850E-05	5.47494E-04	1.00003E+00
22	.00000E+00	.00000E+00	1.45695E-02	8.27243E-03	1.28737E-02	1.58891E-04	1.53611E-03	1.00005E+00
23	.00000E+00	.00000E+00	3.90628E-02	4.92649E-02	3.23509E-02	7.15155E-04	5.99209E-03	1.00009E+00
24	.00000E+00	.00000E+00	4.22981E-02	4.56231E-02	3.52168E-02	8.30021E-04	6.24587E-03	1.00010E+00
25	.00000E+00	.00000E+00	2.80714E-02	1.90249E-02	2.44756E-02	4.83533E-04	3.11048E-03	1.00006E+00
26	.00000E+00	.00000E+00	2.22987E-02	2.07057E-02	1.91245E-02	4.78853E-04	2.69480E-03	1.00002E+00
27	.00000E+00	.00000E+00	7.50638E-03	4.36414E-03	6.64831E-03	1.66116E-04	6.91940E-04	1.00000E+00
28	.00000E+00	.00000E+00	4.35501E-01	4.34130E-01	4.35501E-01	3.74336E-03	-3.74358E-03	1.00000E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dv**2	total flux
1	1.20783E-02	-1.15941E-03	1.19541E-02	-8.09496E-04	1.78646E-11	.00000E+00	9.68147E-06	7.90807E-03
2	9.07332E-02	-1.27258E-02	8.94422E-02	-8.64391E-03	.00000E+00	.00000E+00	4.60588E-05	5.92666E-02
3	1.15039E-01	-1.66927E-02	1.13422E-01	-1.11329E-02	.00000E+00	.00000E+00	4.86594E-05	7.51344E-02
4	7.12318E-02	-1.05252E-02	7.02645E-02	-6.86168E-03	.00000E+00	.00000E+00	2.21887E-05	4.65225E-02
5	1.06791E-01	-1.61868E-02	1.05323E-01	-1.04202E-02	.00000E+00	.00000E+00	2.68860E-05	6.97294E-02
6	2.00791E-01	-2.94765E-02	1.98171E-01	-1.89013E-02	.00000E+00	.00000E+00	4.46803E-05	1.31154E-01
7	1.97982E-01	-1.76941E-02	1.96458E-01	-1.14853E-02	.00000E+00	.00000E+00	3.14792E-05	1.29727E-01
8	1.47669E-01	-3.66854E-03	1.47377E-01	-2.77709E-03	.00000E+00	.00000E+00	1.71801E-05	9.71079E-02
9	1.15468E-01	9.47567E-04	1.15696E-01	6.02701E-04	.00000E+00	.00000E+00	1.13242E-05	7.60833E-02
10	1.06121E-01	2.37370E-03	1.06386E-01	1.47005E-03	.00000E+00	.00000E+00	9.97560E-06	6.99597E-02
11	9.88555E-02	5.42498E-03	9.94369E-02	3.42889E-03	.00000E+00	.00000E+00	9.26398E-06	6.53001E-02
12	6.32728E-02	6.31905E-03	6.39618E-02	4.04347E-03	.00000E+00	.00000E+00	5.40098E-06	4.19154E-02
13	5.41988E-02	5.65638E-03	5.47775E-02	3.69167E-03	.00000E+00	.00000E+00	4.50808E-06	3.58995E-02
14	5.13627E-02	8.10778E-03	5.22205E-02	5.23925E-03	.00000E+00	.00000E+00	4.37432E-06	3.41401E-02
15	2.89394E-02	1.58241E-03	2.90319E-02	1.14109E-03	.00000E+00	.00000E+00	2.34975E-06	1.90856E-02
16	1.61482E-02	7.69816E-04	1.61995E-02	5.46215E-04	.00000E+00	.00000E+00	1.18582E-06	1.06498E-02
17	7.18959E-03	4.98650E-04	7.25519E-03	3.33501E-04	.00000E+00	.00000E+00	4.86213E-07	4.75039E-03
18	6.18150E-03	5.23189E-04	6.23331E-03	3.42730E-04	.00000E+00	.00000E+00	4.08313E-07	4.08926E-03
19	1.14150E-02	7.85947E-04	1.14877E-02	5.26147E-04	.00000E+00	.00000E+00	7.89195E-07	7.54244E-03
20	3.76202E-02	2.72195E-03	3.78869E-02	1.81087E-03	.00000E+00	.00000E+00	2.91485E-06	2.48689E-02
21	1.24205E-02	1.54036E-03	1.25913E-02	9.92869E-04	.00000E+00	.00000E+00	7.55743E-07	8.24225E-03
22	2.70778E-02	4.46046E-03	2.75968E-02	2.92435E-03	.00000E+00	.00000E+00	1.64753E-06	1.80222E-02
23	8.91589E-02	1.82058E-02	9.14823E-02	1.22137E-02	.00000E+00	.00000E+00	4.91265E-06	5.95619E-02
24	7.05374E-02	1.85668E-02	7.33667E-02	1.23199E-02	.00000E+00	.00000E+00	2.91054E-06	4.74834E-02
25	3.09493E-02	9.08080E-03	3.25755E-02	5.97032E-03	.00000E+00	.00000E+00	9.95167E-07	2.09734E-02
26	2.12447E-02	7.16545E-03	2.28593E-02	4.47065E-03	.00000E+00	.00000E+00	5.10028E-07	1.45843E-02
27	3.79067E-03	1.47341E-03	4.25575E-03	7.81470E-04	.00000E+00	.00000E+00	5.83584E-08	2.67107E-03
28	1.79426E+00	-1.19255E-02	1.79768E+00	-8.18191E-03	1.78646E-11	.00000E+00	3.11083E-04	1.18257E+00

1fine group summary for zone 4 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.12780E-02	.00000E+00	1.97669E-02	1.87315E-02	3.50125E-03	1.15985E-03	9.98896E-01

2	.00000E+00	1.88887E-01	6.47514E-03	2.43892E-01	1.67674E-01	1.49760E-02	1.27250E-02	1.00002E+00
3	.00000E+00	2.14687E-01	6.90926E-02	2.54748E-01	2.51189E-01	1.62006E-02	1.66918E-02	9.99991E-01
4	.00000E+00	1.24456E-01	1.03752E-01	1.75581E-01	2.09894E-01	7.78824E-03	1.05246E-02	1.00000E+00
5	.00000E+00	1.65945E-01	1.89665E-01	4.43213E-01	3.34177E-01	5.25480E-03	1.61857E-02	9.99991E-01
6	.00000E+00	1.80122E-01	3.88153E-01	1.19094E+00	5.30399E-01	8.39576E-03	2.94745E-02	1.00002E+00
7	.00000E+00	8.94322E-02	5.91875E-01	1.56615E+00	6.55144E-01	8.48104E-03	1.76916E-02	9.99995E-01
8	.00000E+00	1.38095E-02	6.89078E-01	1.57541E+00	6.85649E-01	1.36262E-02	3.66836E-03	9.99921E-01
9	.00000E+00	1.00281E-03	6.77766E-01	1.36995E+00	6.57448E-01	2.23407E-02	-9.43830E-04	9.99888E-01
10	.00000E+00	7.44912E-05	6.54568E-01	1.24239E+00	6.25274E-01	3.38081E-02	-2.37267E-03	9.99868E-01
11	.00000E+00	5.86056E-06	6.27477E-01	1.15377E+00	5.78853E-01	5.45917E-02	-5.42428E-03	9.99940E-01
12	.00000E+00	4.11695E-07	5.03904E-01	6.30554E-01	4.52098E-01	5.81387E-02	-6.31912E-03	9.99974E-01
13	.00000E+00	6.53735E-08	4.46764E-01	5.00998E-01	4.00002E-01	5.24317E-02	-5.65701E-03	9.99972E-01
14	.00000E+00	1.29553E-08	4.30986E-01	4.74158E-01	3.66794E-01	7.23046E-02	-8.10798E-03	9.99990E-01
15	.00000E+00	1.46409E-09	2.39500E-01	2.17918E-01	2.33428E-01	7.65784E-03	-1.58008E-03	9.99977E-01
16	.00000E+00	4.25908E-10	1.63661E-01	1.01593E-01	1.60126E-01	4.30729E-03	-7.67970E-04	9.99976E-01
17	.00000E+00	1.38451E-10	8.85328E-02	3.30364E-02	8.48148E-02	4.21698E-03	-4.97260E-04	9.99981E-01
18	.00000E+00	9.91271E-11	7.95631E-02	2.71108E-02	7.51751E-02	4.71118E-03	-5.19885E-04	9.99953E-01
19	.00000E+00	1.40145E-10	1.30522E-01	6.67880E-02	1.25232E-01	6.07616E-03	-7.78759E-04	9.99946E-01
20	.00000E+00	2.27889E-10	3.11565E-01	3.74954E-01	2.88577E-01	2.57076E-02	-2.71367E-03	9.99981E-01
21	.00000E+00	3.33557E-11	1.60058E-01	8.51752E-02	1.47219E-01	1.43790E-02	-1.54242E-03	1.00001E+00
22	.00000E+00	3.87002E-11	3.15268E-01	2.48135E-01	2.79270E-01	4.04630E-02	-4.46053E-03	9.99985E-01
23	.00000E+00	3.70016E-11	7.99109E-01	1.25953E+00	6.73384E-01	1.43952E-01	-1.81996E-02	9.99966E-01
24	.00000E+00	1.00713E-11	8.60207E-01	1.07621E+00	7.16591E-01	1.62198E-01	-1.85610E-02	9.99976E-01
25	.00000E+00	2.94824E-12	5.70970E-01	4.33195E-01	4.86258E-01	9.37998E-02	-9.07487E-03	9.99979E-01
26	.00000E+00	2.06732E-12	4.41694E-01	4.32114E-01	3.62289E-01	8.65731E-02	-7.16413E-03	9.99992E-01
27	.00000E+00	4.92653E-13	1.45249E-01	8.70195E-02	1.22073E-01	2.46495E-02	-1.47329E-03	9.99997E-01
28	.00000E+00	1.00000E+00	9.68526E+00	1.52831E+01	9.68526E+00	9.90529E-01	1.19633E-02	9.99964E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	r2n rate	fiss rate	flux*cdf**2	total flux
1	1.23580E-02	-6.64037E-08	1.20783E-02	-1.15941E-03	2.08820E-03	2.33398E-03	2.72749E-04	3.14103E-01
2	9.39823E-02	-7.17095E-07	9.07332E-02	-1.27258E-02	1.65374E-05	1.08121E-02	1.54485E-03	2.38621E+00
3	1.19413E-01	-8.72858E-07	1.15039E-01	-1.66927E-02	.00000E+00	1.33262E-02	1.80780E-03	3.03101E+00
4	7.40762E-02	-5.89581E-07	7.12318E-02	-1.05252E-02	.00000E+00	5.76311E-03	8.79525E-04	1.87990E+00
5	1.11429E-01	-1.06623E-06	1.06791E-01	-1.61868E-02	.00000E+00	1.70983E-03	1.02591E-03	2.82673E+00
6	2.09694E-01	-1.90959E-06	2.00791E-01	-2.94785E-02	.00000E+00	1.54427E-03	1.73112E-03	5.31778E+00
7	2.03589E-01	-2.45783E-06	1.97982E-01	-1.78941E-02	.00000E+00	1.59888E-03	1.22588E-03	5.16972E+00
8	1.48840E-01	-1.85387E-07	1.47669E-01	-3.66854E-03	.00000E+00	1.70070E-03	6.97047E-04	3.78549E+00
9	1.15112E-01	3.73622E-06	1.15465E-01	9.47567E-04	.00000E+00	2.36108E-03	4.70373E-04	2.93179E+00
10	1.05290E-01	1.02529E-06	1.06121E-01	2.37370E-03	.00000E+00	5.04123E-03	4.27740E-04	2.68316E+00
11	9.69750E-02	7.00472E-07	9.88655E-02	5.42698E-03	.00000E+00	1.04025E-02	3.86016E-04	2.47430E+00
12	6.10973E-02	-7.44237E-08	6.32728E-02	6.31905E-03	.00000E+00	1.33053E-02	2.27420E-04	1.56155E+00
13	5.22776E-02	-6.29925E-07	5.41988E-02	5.65638E-03	.00000E+00	1.23682E-02	1.97250E-04	1.33639E+00
14	4.85115E-02	-2.05207E-07	5.13627E-02	8.10778E-03	.00000E+00	9.18611E-03	1.80553E-04	1.24516E+00
15	2.84229E-02	2.37714E-06	2.89394E-02	1.58241E-03	.00000E+00	2.31490E-03	1.12122E-04	7.25340E-01
16	1.59001E-02	1.84514E-06	1.61482E-02	7.69816E-04	.00000E+00	1.53556E-03	5.91769E-05	4.05614E-01
17	7.02551E-03	1.28993E-06	7.18959E-03	4.98550E-04	.00000E+00	2.33310E-03	2.40450E-05	1.75853E-01
18	6.00693E-03	3.80411E-06	6.18150E-03	5.23189E-04	.00000E+00	3.10847E-03	1.99208E-05	1.53446E-01
19	1.11514E-02	7.18973E-06	1.14150E-02	7.85947E-04	.00000E+00	3.76158E-03	3.88964E-05	2.84726E-01
20	3.66847E-02	8.27838E-06	3.76202E-02	2.72195E-03	.00000E+00	1.61008E-02	1.36356E-04	9.36926E-01
21	1.18652E-02	-2.05195E-06	1.24205E-02	1.54036E-03	.00000E+00	9.51397E-03	3.60080E-05	3.03750E-01
22	2.53461E-02	-6.47962E-08	2.70778E-02	4.46046E-03	.00000E+00	2.66331E-02	7.51289E-05	6.50858E-01
23	8.09522E-02	6.20171E-06	8.91589E-02	1.82058E-02	.00000E+00	9.36691E-02	2.21487E-04	2.09074E+00
24	6.12274E-02	4.77858E-06	7.05374E-02	1.85698E-02	.00000E+00	1.08853E-01	1.29882E-04	1.59299E+00
25	2.59679E-02	5.93926E-06	3.09473E-02	9.08080E-03	.00000E+00	6.37241E-02	4.35942E-05	6.79842E-01
26	1.69522E-02	1.32238E-06	2.12447E-02	7.16545E-03	.00000E+00	5.87701E-02	2.11954E-05	4.45571E-01
27	2.83361E-03	1.54423E-07	3.79067E-03	1.47341E-03	.00000E+00	1.63597E-02	2.15556E-06	7.47615E-02
28	1.78306E+00	3.77761E-05	1.79426E+00	-1.19255E-02	2.10474E-03	4.98131E-01	1.19978E-02	4.54677E+01

1fine group summary for system

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.12780E-02	.00000E+00	2.06749E-02	1.98165E-02	3.58115E-03	-6.64037E-08	9.98895E-01
2	.00000E+00	1.88887E-01	7.03677E-03	2.54434E-01	1.80687E-01	1.52505E-02	-7.17095E-07	1.00002E+00

3	.00000E+00	2.14987E-01	7.49275E-02	2.65745E-01	2.73567E-01	1.63609E-02	-8.72858E-07	9.99990E-01
4	.00000E+00	1.24456E-01	1.12447E-01	1.83355E-01	2.29038E-01	7.86526E-03	-5.89581E-07	1.00000E+00
5	.00000E+00	1.65945E-01	2.05818E-01	4.65258E-01	3.66420E-01	5.34764E-03	-1.06623E-06	9.99990E-01
6	.00000E+00	1.80122E-01	4.21921E-01	1.25627E+00	5.93489E-01	8.55015E-03	-1.90959E-06	1.00002E+00
7	.00000E+00	8.94322E-02	6.57227E-01	1.67105E+00	7.38066E-01	8.60154E-03	-2.45783E-06	9.99998E-01
8	.00000E+00	1.38095E-02	7.75466E-01	1.70404E+00	7.75655E-01	1.37038E-02	-1.85387E-07	9.99920E-01
9	.00000E+00	1.00281E-03	7.66351E-01	1.48576E+00	7.44975E-01	2.24618E-02	3.73623E-06	9.99888E-01
10	.00000E+00	7.44912E-05	7.41496E-01	1.35238E+00	7.07723E-01	3.39221E-02	1.02529E-06	9.99898E-01
11	.00000E+00	5.86056E-06	7.12392E-01	1.25750E+00	6.57675E-01	5.47849E-02	7.00472E-07	9.99940E-01
12	.00000E+00	4.11695E-07	5.72736E-01	6.86310E-01	5.14515E-01	5.82357E-02	-7.44237E-08	9.99974E-01
13	.00000E+00	6.53735E-08	5.08133E-01	5.46658E-01	4.55582E-01	5.25663E-02	-6.29925E-07	9.99972E-01
14	.00000E+00	1.29553E-08	4.90795E-01	5.19477E-01	4.18280E-01	7.25209E-02	-2.05207E-07	9.99989E-01
15	.00000E+00	1.46409E-09	2.72546E-01	2.35818E-01	2.64712E-01	7.85718E-03	2.37714E-06	9.99977E-01
16	.00000E+00	4.29908E-10	1.85465E-01	1.09527E-01	1.81088E-01	4.42923E-03	1.84514E-06	9.99976E-01
17	.00000E+00	1.38451E-10	9.98335E-02	3.53441E-02	9.55565E-02	4.27758E-03	1.28998E-06	9.99982E-01
18	.00000E+00	9.91271E-11	8.94369E-02	2.90434E-02	8.46701E-02	4.76650E-03	3.80411E-06	9.99956E-01
19	.00000E+00	1.40145E-10	1.47530E-01	7.20627E-02	1.41343E-01	6.18785E-03	7.18973E-06	9.99950E-01
20	.00000E+00	2.27889E-10	3.53663E-01	4.10910E-01	3.27491E-01	2.61694E-02	8.27838E-06	9.99983E-01
21	.00000E+00	3.33657E-11	1.81179E-01	9.30840E-02	1.66608E-01	1.45704E-02	-2.05195E-06	1.00001E+00
22	.00000E+00	3.87002E-11	3.56523E-01	2.73729E-01	3.17577E-01	4.09479E-02	-6.47962E-08	9.99996E-01
23	.00000E+00	3.70016E-11	9.16472E-01	1.41028E+00	7.70325E-01	1.46150E-01	6.20171E-06	9.99989E-01
24	.00000E+00	1.00713E-11	9.88274E-01	1.21704E+00	8.23495E-01	1.64778E-01	4.77858E-06	9.99996E-01
25	.00000E+00	2.94824E-12	6.56578E-01	4.92406E-01	5.61261E-01	9.53161E-02	5.95396E-06	9.99992E-01
26	.00000E+00	2.06732E-12	5.09791E-01	4.97191E-01	4.21693E-01	8.80974E-02	1.32258E-06	9.99999E-01
27	.00000E+00	4.92653E-13	1.68252E-01	1.00986E-01	1.43064E-01	2.51879E-02	1.54423E-07	9.99998E-01
28	.00000E+00	1.00000E+00	1.09743E+01	1.66471E+01	1.09743E+01	1.00245E+00	3.77442E-05	9.99969E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dr**2	total flux
1	1.23580E-02	-6.64037E-08	1.18258E-02	.00000E+00	2.09365E-03	2.33396E-03	3.02200E-04	3.38918E-01
2	9.39823E-02	-7.17095E-07	8.77366E-02	.00000E+00	1.65374E-05	1.08121E-02	1.68802E-03	2.57140E+00
3	1.19413E-01	-8.72858E-07	1.10952E-01	.00000E+00	.00000E+00	1.33262E-02	1.95999E-03	3.26556E+00
4	7.40752E-02	-5.89581E-07	6.84948E-02	.00000E+00	.00000E+00	5.76311E-03	9.50338E-04	2.02500E+00
5	1.11429E-01	-1.06623E-06	1.02378E-01	.00000E+00	.00000E+00	1.70983E-03	1.11410E-03	3.04401E+00
6	2.09694E-01	-1.90959E-06	1.92627E-01	.00000E+00	.00000E+00	1.54427E-03	1.86980E-03	5.72664E+00
7	2.03589E-01	-2.45783E-06	1.92997E-01	.00000E+00	.00000E+00	1.59888E-03	1.32498E-03	5.57633E+00
8	1.48840E-01	-1.85387E-07	1.46868E-01	.00000E+00	.00000E+00	1.70070E-03	7.52198E-04	4.09298E+00
9	1.15112E-01	3.73622E-06	1.15770E-01	.00000E+00	.00000E+00	2.36108E-03	5.07921E-04	3.17260E+00
10	1.05290E-01	1.02529E-06	1.06873E-01	.00000E+00	.00000E+00	5.04123E-03	4.61730E-04	2.90492E+00
11	9.69750E-02	7.00472E-07	1.00516E-01	.00000E+00	.00000E+00	1.04025E-02	4.17871E-04	2.68196E+00
12	6.10973E-02	-7.44237E-08	6.51703E-02	.00000E+00	.00000E+00	1.33053E-02	2.46500E-04	1.69543E+00
13	5.22778E-02	-6.29925E-07	5.58525E-02	.00000E+00	.00000E+00	1.23682E-02	2.13243E-04	1.45108E+00
14	4.86115E-02	-2.05207E-07	5.37589E-02	.00000E+00	.00000E+00	9.18611E-03	1.96090E-04	1.35481E+00
15	2.84229E-02	2.37714E-06	2.98207E-02	.00000E+00	.00000E+00	2.31490E-03	1.20417E-04	7.85971E-01
16	1.59001E-02	1.84514E-06	1.63386E-02	.00000E+00	.00000E+00	1.53656E-03	6.34372E-05	4.39428E-01
17	7.02561E-03	1.28993E-06	7.32720E-03	.00000E+00	.00000E+00	2.33310E-03	2.58243E-05	1.94472E-01
18	6.00893E-03	3.80411E-06	6.33167E-03	.00000E+00	.00000E+00	3.10847E-03	2.14248E-05	1.66483E-01
19	1.11514E-02	7.18973E-06	1.16344E-02	.00000E+00	.00000E+00	3.76158E-03	4.17716E-05	3.08732E-01
20	3.66847E-02	8.27838E-06	3.84083E-02	.00000E+00	.00000E+00	1.61008E-02	1.46754E-04	1.01612E+00
21	1.18652E-02	-2.05195E-06	1.29119E-02	.00000E+00	.00000E+00	9.51397E-03	3.88527E-05	3.30155E-01
22	2.53461E-02	-6.47962E-08	2.85845E-02	.00000E+00	.00000E+00	2.66331E-02	8.13618E-05	7.08928E-01
23	8.09522E-02	6.20171E-06	9.63274E-02	.00000E+00	.00000E+00	9.36691E-02	2.40624E-04	2.28398E+00
24	6.12274E-02	4.77858E-06	7.89950E-02	.00000E+00	.00000E+00	1.08853E-01	1.42088E-04	1.74885E+00
25	2.59679E-02	5.95396E-06	3.56328E-02	.00000E+00	.00000E+00	6.37241E-02	4.81941E-05	7.48698E-01
26	1.69522E-02	1.32258E-06	2.56260E-02	.00000E+00	.00000E+00	5.87701E-02	2.38652E-05	4.94598E-01
27	2.83361E-03	1.54423E-07	4.85670E-03	.00000E+00	.00000E+00	1.63997E-02	2.53615E-06	8.39046E-02
28	1.78306E+00	3.77761E-05	1.80409E+00	.00000E+00	2.11019E-03	4.98131E-01	1.30016E-02	4.92118E+01

- elapsed time .03 min.

0direct access unit 9 requires 556 blocks of length 216 for cross section weighting.

1 transport cross section weighting function

0zone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.05800E-03	4.90074E-03	5.23101E-03	2.49702E-03	3.18128E-03	5.53412E-03	3.72450E-03	1.74270E-03

2	6.44558E-04	4.84076E-03	5.72652E-03	3.42789E-03	4.29945E-03	6.17429E-03	4.34711E-03	2.14750E-03
3	1.08468E-03	5.31306E-03	5.81350E-03	2.90628E-03	3.86953E-03	6.80402E-03	4.39517E-03	1.82342E-03
4	7.45609E-04	4.17379E-03	4.88188E-03	2.37843E-03	2.82768E-03	4.80678E-03	3.32958E-03	1.79588E-03
5	7.67354E-04	4.23822E-03	4.92519E-03	2.40280E-03	2.87762E-03	4.89597E-03	3.37922E-03	1.79624E-03

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.11186E-03	1.01521E-03	1.09810E-03	8.72879E-04	7.75523E-04	9.87936E-04	3.12593E-04	1.53467E-04
2	1.78909E-03	1.95226E-03	2.04432E-03	1.59830E-03	1.40199E-03	1.63645E-03	6.25509E-04	3.39600E-04
3	1.12149E-03	1.05890E-03	1.30638E-03	1.21988E-03	1.08690E-03	1.48015E-03	3.71550E-04	1.82336E-04
4	1.19533E-03	1.09857E-03	1.08044E-03	6.77667E-04	6.01603E-04	6.36550E-04	3.11361E-04	1.61723E-04
5	1.19150E-03	1.09436E-03	1.04628E-03	7.05103E-04	6.25980E-04	6.78794E-04	3.14757E-04	1.62915E-04

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	7.55757E-05	7.17018E-05	1.20655E-04	4.27531E-04	1.85248E-04	5.24162E-04	2.16734E-03	2.12216E-03
2	1.61434E-04	1.46426E-04	2.55703E-04	8.51725E-04	3.43534E-04	8.89215E-04	3.46637E-03	3.32368E-03
3	1.00487E-04	1.00282E-04	1.59534E-04	5.60242E-04	2.78847E-04	8.01077E-04	3.27563E-03	3.25927E-03
4	6.92857E-05	5.99060E-05	1.11534E-04	3.88514E-04	1.25667E-04	3.11337E-04	1.16175E-03	9.75384E-04
5	7.08741E-05	6.19527E-05	1.13965E-04	3.97203E-04	1.33401E-04	3.36248E-04	1.27209E-03	1.09745E-03

Ozone	grp. 25	grp. 26	grp. 27	grp. 28
1	9.99428E-04	7.23432E-04	1.11046E-04	4.17261E-02
2	1.57751E-03	1.17131E-03	2.03199E-04	5.53857E-02
3	1.60282E-03	1.23236E-03	2.33226E-04	5.14809E-02
4	4.15738E-04	2.55398E-04	3.17970E-05	3.45521E-02
5	4.77769E-04	3.05638E-04	4.12637E-05	3.54101E-02

1broad group parameters

grp	upper energy	mid energy	velocity	fiss spec
1	2.0000E+07	2.6244E+06	1.9614E+09	7.1555E-01
2	9.0000E+05	1.5088E+05	9.4943E+06	2.8445E-01
3	4.0000E-01	1.2730E-01	3.6885E+05	1.2464E-10
4	1.0000E-05			

1 at 0 d, second part of sas2h pass to make library

0cell averaged fluxes

Ozone	grp. 1	grp. 2	grp. 3
1	3.84661E-01	1.14066E+00	2.74893E-01
2	3.89867E-01	1.14233E+00	2.65034E-01
3	3.92791E-01	1.14281E+00	2.60592E-01
4	4.09936E-01	1.14647E+00	2.29278E-01
5	4.08252E-01	1.14609E+00	2.32524E-01

0flux disadventage factors (zone average/cell average-flux)

Ozone	grp. 1	grp. 2	grp. 3
1	9.42216E-01	9.95260E-01	1.18523E+00
2	9.54967E-01	9.96723E-01	1.14080E+00
3	9.62129E-01	9.97140E-01	1.12168E+00
4	1.00413E+00	1.00033E+00	9.86890E-01
5	1.00000E+00	1.00000E+00	1.00000E+00

0cell averaged currents

Ozone	grp. 1	grp. 2	grp. 3
1	1.68681E-02	1.80243E-02	6.83381E-03
2	1.89392E-02	2.54717E-02	1.09748E-02
3	1.89870E-02	2.17707E-02	1.07231E-02
4	1.50074E-02	1.62677E-02	3.27705E-03
5	1.52112E-02	1.65351E-02	3.66386E-03

Ozone	volume	vol. fraction
1	1.25665E+00	4.56234E-02
2	1.66687E-01	6.05165E-03
3	6.58365E-01	2.38987E-02
4	2.54624E+01	9.24426E-01
5	2.75440E+01	1.00000E+00

```
- elapsed time   .03 min.
1  cccccccccc    cccccccccc   uu        uu  ppppppppp   ll          eeeeeeeeeeee
   cccccccccccc  cccccccccccc uu        uu  pppppppppp  ll          eeeeeeeeeeee
   cc        cc  cc        cc uu        uu  pp      pp  ll          ee
   cc            cc        cc uu        uu  pp      pp  ll          ee
   cc            cc        cc uu        uu  pp      pp  ll          ee
   cc            cc        cc uu        uu  pppppppppp  ll          eeeeeeeee
   cc            cc        cc uu        uu  ppppppppp   ll          eeeeeeeee
   cc            cc        cc uu        uu  pp          ll          ee
   cc            cc        cc uu        uu  pp          ll          ee
   cc        cc  cc        cc uu        uu  pp          ll          ee
   cccccccccccc  cccccccccccc uuuuuuuuuuuu  pp          llllllllllll eeeeeeeeeeee
    cccccccccc    cccccccccc   uuuuuuuuuu   pp          llllllllllll eeeeeeeeeeee
0

   dddddddddd     aaaaaaaa    w        w  iiiiiiiiiii   sssssssss
   dddddddddd    aaaaaaaaaa   w        w  iiiiiiiiiii  sssssssssss
   dd        dd  aa      aa   w        w      ii      ss       ss
   dd        dd  aa      aa   w        w      ii      ss
   dd        dd  aa      aa   w        w      ii      ss
   dd        dd  aaaaaaaaaaaa w        w      ii      sssssssssss
   dd        dd  aaaaaaaaaaaa  w      w       ii       sssssssssss
   dd        dd  aa      aa     w    w        ii               ss
   dd        dd  aa      aa      w  w         ii               ss
   dd        dd  aa      aa       w w         ii      ss       ss
   dddddddddd    aa      aa        ww     iiiiiiiiiii  sssssssssss
   dddddddddd    aa      aa         v     iiiiiiiiiii   sssssssss
0

    000000     2222222222          //     11     666666666666          //  999999999   666666666666
   00000000    2222222222         //     111     666666666666         //  999999999999 666666666666
  00      00   22      22        //     1111     66                  //  99      99   66
 00        00          22       //       11     66                 //   99      99   66
 00        00          22      //        11     66                //    99      99   66
 00        00        22       //         11     666666666666     //     999999999999 666666666666
 00        00      22        //          11     666666666666    //      999999999999 666666666666
 00        00    22         //           11     66      66     //                99   66      66
 00        00  22          //            11     66      66    //                 99   66      66
  00      00   22         //             11     66      66   //                  99   66      66
   00000000    2222222222 //            11111111 666666666666 //          999999999999 666666666666
    000000     2222222222 //            11111111  666666666666 //          999999999999  666666666666
0

    000000     999999999                 555555555555 555555555555                 333333333   7777777777777
   00000000    999999999                 555555555555 555555555555                 333333333   7777777777777
  00      00   99      99       :::      55           55           :::             33      33  77      77
 00        00  99      99       :::      55           55           :::                     33         77
 00        00  99      99       :::      55           55           :::                     33         77
 00        00  999999999                 555555555555 555555555555                   333          77
 00        00   999999999                555555555555 555555555555                   333          77
 00        00          99       :::              55           55   :::                33          77
 00        00          99       :::              55           55   :::                33          77
  00      00           99       :::      55      55   55      55   :::             33      33      77
   00000000    999999999                 555555555555 555555555555                 333333333       77
    000000     999999999                  555555555555 555555555555                 333333333       77
1
0                                 ssssssssss   cccccccccc    aaaaaaaa    ll          eeeeeeeeeeee
                                 ssssssssssss cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeeee
                                 ss       ss  cc        cc  aa      aa  ll          ee
                                 ss           cc            aa      aa  ll          ee
```

```
ss          cc          aa      aa  ll          ee
sssssssssss cc          aaaaaaaaaaa ll          eeeeeeeee
 sssssssssss cc         aaaaaaaaaaa ll          eeeeeeeee
        ss  cc          aa      aa  ll          ee
        ss  cc          aa      aa  ll          ee
ss      ss  cc      cc  aa      aa  ll          ee
sssssssssss cccccccccccc aa     aa  llllllllllll eeeeeeeeeeee
 sssssssss   cccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
```

```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   scale  version:   4.2         *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program:  c0c005                             *****
*****                                                       *****
*****     creation date:  04/27/95                          *****
*****                                                       *****
*****          library:  /neutronics/scale/exe              *****
*****                                                       *****
*****                                                       *****
*****  this is not a  scale  configuration controlled code  *****
*****                                                       *****
*****          jobname:  davis                              *****
*****                                                       *****
*****  date of execution:  02/16/96                         *****
*****                                                       *****
*****  time of execution:  09:55:37                         *****
*****                                                       *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****************************************************************
```

```
1
0      -1q array has     1 entries.
0       0q array has     1 entries.
0       0q array has     1 entries.
0       1q array has     1 entries.
0       1q array has     1 entries.
0       1q array has     1 entries.
0       1q array has     1 entries.
0       1q array has     1 entries.
0       1q array has     1 entries.
0       2q array has     1 entries.
0        * core allocated to array-data (by -196 or default) was   200000 words. *
1         * broad 3-group flux weighting factors *
0
0              therm =    .5135
0              res   =    .3373
```

```
0                fast =  2.5480
0 user requested (see jadb) that all nuclide transitions available from ampx data be updated,
0 including those not present in prior origen library.
1cross sections, available from ampx (normalized to thermal flux), barns

                10010 to  10020  2.66896E-01
                10010 tot-cap    2.66896E-01
                50100 to  40100  1.81165E-02
                50100 to  10010  1.81165E-02
                50100 to  40090  2.64465E-03
                50100 to  10020  2.64465E-03
                50100 to  30070  3.07004E+03
                50100 to  20040  3.07018E+03
                50100 to  10030  6.74369E-02
                50100 tot-cap    3.07013E+03
                50110 to  50100  7.48316E-06
                50110 to  50120  4.05557E-03
                50110 to  40110  9.54925E-07
                50110 to  10010  9.54925E-07
                50110 to  40090  8.52174E-06
                50110 to  10030  8.52174E-06
                50110 to  30080  1.11247E-04
                50110 to  20040  1.11247E-04
                50110 tot-cap    4.18378E-03
                80160 to  80170  1.42557E-04
                80160 to  70160  6.54764E-05
                80160 to  10010  6.54764E-05
                80160 to  70150  1.23488E-05
                80160 to  10020  1.23488E-05
                80160 to  60130  1.89717E-02
                80160 to  20040  1.89717E-02
                80160 to  80161  2.87156E-03
                80160 tot-cap    1.91921E-02
               360830 to 360820  1.48692E-02
               360830 to 360810  1.56982E-09
               360830 to 360840  1.43253E+02
               360830 to 350830  6.24822E-04
               360830 to  10010  6.24822E-04
               360830 to 350820  4.91091E-06
               360830 to  10020  4.91091E-06
               360830 to 350810  1.71646E-06
               360830 to  10030  1.71646E-06
               360830 to 340810  2.77794E-08
               360830 to  20030  2.77794E-08
               360830 to 340800  3.26687E-05
               360830 to  20040  3.26687E-05
               360830 tot-cap    1.43268E+02
               360850 to 360860  1.27987E+00
               360850 tot-cap    1.27987E+00
               380900 to 380910  5.96492E-01
               380900 tot-cap    5.96492E-01
               390830 to 390900  9.19218E-01
               390830 tot-cap    9.19218E-01
               400980 to 400940  1.05458E+01
               400980 tot-cap    1.05458E+01
               400940 to 400950  1.49821E-01
               400940 tot-cap    1.49821E-01
               400950 to 400960  1.76090E+00
               400950 tot-cap    1.76090E+00
               410940 to 410950  3.13074E+01
```

```
410940 tot-cap    3.13074E+01
420950 to 420960  3.20135E+01
420950 tot-cap    3.20135E+01
430990 to 430980  4.51155E-03
430990 to 431000  7.36808E+01
430990 tot-cap    7.36853E+01
441010 to 441020  2.21494E+01
441010 tot-cap    2.21494E+01
441060 to 441070  6.80340E-01
441060 tot-cap    6.80340E-01
451030 to 451020  1.63392E-03
451030 to 451040  3.16604E+02
451030 tot-cap    3.16605E+02
451050 to 451060  7.55330E+03
451050 tot-cap    7.55330E+03
461050 to 461060  2.77114E+01
461050 tot-cap    2.77114E+01
461080 to 461090  5.41240E+01
461080 tot-cap    5.41240E+01
471090 to 471080  3.79956E-03
471090 to 471100  3.03309E+02
471090 to 461090  2.18946E-04
471090 to  10010  2.18946E-04
471090 to 451060  1.78860E-04
471090 to  20040  1.78860E-04
471090 to 471091  4.86547E-01
471090 tot-cap    3.03314E+02
511240 to 511250  1.00854E+01
511240 tot-cap    1.00854E+01
541310 to 541300  4.60710E-02
541310 to 541290  9.63355E-06
541310 to 541320  2.22180E+02
541310 to 531310  2.84678E-05
541310 to  10010  2.84678E-05
541310 to 531300  3.86852E-07
541310 to  10020  3.86852E-07
541310 to 531290  3.96165E-07
541310 to  10030  3.96165E-07
541310 to 521280  1.32134E-05
541310 to  20040  1.32134E-05
541310 tot-cap    2.22226E+02
541320 to 541310  7.44257E-03
541320 to 541300  1.57851E-05
541320 to 541330  7.67510E-01
541320 to 531320  5.73290E-06
541320 to  10010  5.73290E-06
541320 to 531310  2.39875E-07
541320 to  10020  2.39875E-07
541320 to 531300  3.22992E-08
541320 to  10030  3.22992E-08
541320 to 521290  6.99477E-07
541320 to  20040  6.99477E-07
541320 tot-cap    7.74975E-01
541350 to 541360  1.45451E+06
541350 tot-cap    1.45451E+06
541360 to 541350  1.27310E-02
541360 to 541340  3.88836E-05
541360 to 541370  1.14774E-01
541360 to 531360  2.35156E-07
541360 to  10010  2.35156E-07
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541360 to 531350  8.75217E-08
541360 to  10020  8.75217E-08
541360 to 531340  1.97727E-08
541360 to  10030  1.97727E-08
541360 to 521330  1.97201E-07
541360 to  20040  1.97201E-07
541360 tot-cap    1.27544E-01
551330 to 551320  5.96169E-03
551330 to 551340  8.49278E+01
551330 to 541330  6.64118E-04
551330 to  10010  6.64118E-04
551330 to 531300  1.01880E-05
551330 to  20040  1.01880E-05
551330 tot-cap    8.49345E+01
551340 to 551350  1.16499E+02
551340 tot-cap    1.16499E+02
551350 to 551360  1.74991E+01
551350 tot-cap    1.74991E+01
551370 to 551380  1.89455E-01
551370 tot-cap    1.89455E-01
561360 to 561370  7.40243E-01
561360 tot-cap    7.40243E-01
571390 to 571400  7.23852E+00
571390 tot-cap    7.23852E+00
581440 to 581450  1.07527E+00
581440 tot-cap    1.07527E+00
591410 to 591400  4.27200E-03
591410 to 591390  1.22745E-06
591410 to 571370  1.85273E-06
591410 to  20040  3.83396E-05
591410 to 581400  1.30563E-05
591410 to  10010  3.75300E-05
591410 to 591420  1.05570E+01
591410 to 581410  3.53579E-05
591410 to  10020  1.08842E-05
591410 to 581390  1.14145E-06
591410 to  10030  1.14145E-06
591410 to 571390  1.10237E-03
591410 to  20030  1.10237E-03
591410 to 571380  3.64869E-05
591410 tot-cap    1.05613E+01
591430 to 591440  8.62961E+01
591430 tot-cap    8.62961E+01
601430 to 601420  6.54806E-02
601430 to 601410  6.67121E-06
601430 to 581390  1.50245E-05
601430 to  20040  4.19139E-04
601430 to 591420  2.79256E-06
601430 to  10010  2.90234E-05
601430 to 601440  1.92236E+02
601430 to 591430  2.79713E-05
601430 to  10020  1.74047E-06
601430 to 591410  2.50801E-06
601430 to  10030  2.50801E-06
601430 to 581410  1.20500E-03
601430 to  20030  1.20500E-03
601430 to 581400  4.04115E-04
601430 tot-cap    1.92302E+02
601450 to 601440  8.41167E-02
601450 to 601430  8.51763E-05
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601450	to 581410	6.15051E-06
601450	to 20040	1.55137E-04
601450	to 591440	1.59998E-06
601450	to 10010	1.04520E-05
601450	to 601460	6.65327E+01
601450	to 591450	9.81384E-06
601450	to 10020	9.61787E-07
601450	to 591430	1.51627E-06
601450	to 10030	1.51627E-06
601450	to 581430	3.08714E-09
601450	to 20030	3.08714E-09
601450	to 581420	1.48986E-04
601450	tot-cap	6.66170E+01
601470	to 601480	1.51802E+02
601470	tot-cap	1.51802E+02
611470	to 611460	2.29508E-02
611470	to 611450	7.16100E-05
611470	to 591430	6.41668E-06
611470	to 20040	5.99075E-05
611470	to 601460	8.79970E-06
611470	to 10010	2.01743E-05
611470	to 611480	4.92318E+02
611470	to 601470	1.79798E-05
611470	to 10020	6.60469E-05
611470	to 601450	2.49569E-06
611470	to 10030	2.49569E-06
611470	to 591450	3.74953E-09
611470	to 20030	3.74953E-09
611470	to 591440	5.34908E-05
611470	tot-cap	4.92341E+02
611480	to 611490	1.05385E+04
611480	tot-cap	1.05385E+04
621470	to 621460	5.98828E-02
621470	to 621450	5.39103E-03
621470	to 601430	4.80610E-05
621470	to 20040	9.47967E-04
621470	to 611460	1.08664E-04
621470	to 10010	1.57037E-04
621470	to 621480	1.87417E+02
621470	to 611470	1.38720E-04
621470	to 10020	9.03379E-05
621470	to 611450	9.70023E-05
621470	to 10030	9.70023E-05
621470	to 601450	4.46326E-06
621470	to 20030	4.46326E-06
621470	to 601440	8.99905E-04
621470	to 621471	1.27230E+00
621470	tot-cap	1.87483E+02
621490	to 621480	3.38650E-02
621490	to 621470	2.68719E-05
621490	to 621500	4.49490E+04
621490	to 611490	3.53511E-04
621490	to 10010	3.53511E-04
621490	to 601460	3.53511E-04
621490	to 20040	3.53511E-04
621490	tot-cap	4.49491E+04
621500	to 621510	1.16371E+02
621500	tot-cap	1.16371E+02
621510	to 621500	1.13963E-01
621510	to 621490	1.01117E-04

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621510 to 601470  1.15091E-05
621510 to  20040  9.05073E-05
621510 to 611500  1.38459E-06
621510 to  10010  1.08487E-05
621510 to 621520  4.75106E+03
621510 to 611510  1.00028E-05
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621510 to  10030  9.78974E-07
621510 to 601490  1.00853E-09
621510 to  20030  1.00853E-09
621510 to 601480  7.89982E-05
621510 tot-cap    4.75117E+03
621520 to 621510  1.35406E-02
621520 to 621500  9.14946E-05
621520 to 601480  2.04655E-06
621520 to  20040  8.50518E-06
621520 to 611510  5.86501E-07
621520 to  10010  1.73075E-06
621520 to 621530  6.22065E+02
621520 to 611520  1.53744E-06
621520 to  10020  3.95192E-07
621520 to 611500  1.02260E-07
621520 to  10030  1.02260E-07
621520 to 601500  3.09906E-10
621520 to  20030  3.09906E-10
621520 to 601490  6.45864E-06
621520 tot-cap    6.22079E+02
631530 to 631520  1.31512E-02
631530 to 631510  1.96388E-05
631530 to 611490  3.38063E-05
631530 to  20040  4.75442E-04
631530 to 621520  5.51433E-06
631530 to  10010  4.72410E-05
631530 to 631540  5.24135E+02
631530 to 621530  4.53653E-05
631530 to  10020  3.62861E-06
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631530 to 611500  4.41636E-04
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631540 to 631530  2.10237E-02
631540 to 631520  7.55216E-06
631540 to 611500  7.34312E-11
631540 to  20040  5.64502E-04
631540 to 621530  1.65340E-06
631540 to  10010  9.02816E-04
631540 to 631550  9.65321E+02
631540 to 621540  9.02815E-04
631540 to  10020  1.65248E-06
631540 to 621520  2.80047E-06
631540 to  10030  2.80047E-06
631540 to 611520  1.18657E-08
631540 to  20030  1.18657E-08
631540 to 611510  5.64502E-04
631540 tot-cap    9.65344E+02
631550 to 631540  1.72613E-02
631550 to 631530  4.83354E-05
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631550	to 611510	1.30274E-06
631550	to 20040	6.41203E-06
631550	to 621540	2.63564E-06
631550	to 10010	5.55710E-06
631550	to 631560	2.46919E+03
631550	to 621550	4.27488E-06
631550	to 10020	1.35322E-06
631550	to 621530	4.47964E-07
631550	to 10030	4.47964E-07
631550	to 611530	1.01533E-10
631550	to 20030	1.01533E-10
631550	to 611520	5.10925E-06
631550	tot-cap	2.46921E+03
641550	to 641560	1.65647E+04
641550	tot-cap	1.65647E+04
922340	to 922330	4.52222E-03
922340	fission	3.36683E+00
922340	nu-sigf	8.84026E+00
922340	to 922320	6.55695E-05
922340	to 922350	1.54966E+02
922340	to 922341	2.28357E+00
922340	tot-cap	1.58337E+02
922350	to 922340	2.08089E-02
922350	fission	3.45274E+02
922350	nu-sigf	8.35906E+02
922350	to 922330	1.97518E-05
922350	to 922360	7.79041E+01
922350	to 922351	6.49553E-02
922350	tot-cap	4.23199E+02
922360	to 922350	2.30871E-02
922360	fission	1.43625E+00
922360	nu-sigf	3.93370E+00
922360	to 922340	3.07009E-04
922360	to 922370	6.53622E+01
922360	to 922361	2.49832E+00
922360	tot-cap	6.68208E+01
922380	to 922370	4.60235E-02
922380	fission	7.16463E-01
922380	nu-sigf	2.01392E+00
922380	to 922360	2.97346E-04
922380	to 922390	6.85788E+00
922380	tot-cap	7.62061E+00
932370	to 932360	1.04888E-02
932370	fission	3.90501E+00
932370	nu-sigf	1.17476E+01
932370	to 932350	4.01271E-05
932370	to 932380	2.56347E+02
932370	to 932371	5.85573E-01
932370	tot-cap	2.60862E+02
942380	to 942370	1.68594E-03
942380	fission	1.85098E+01
942380	nu-sigf	5.23282E+01
942380	to 942360	9.43537E-06
942380	to 942390	2.54280E+02
942380	to 942381	2.27351E+00
942380	tot-cap	2.72791E+02
942390	to 942380	8.96190E-03
942390	fission	8.64299E+02
942390	nu-sigf	2.48458E+03
942390	to 942370	1.51904E-05

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                    942390 to 942360  1.50585E-03
                    942390 to 942400  4.90677E+02
                    942390 tot-cap    1.35499E+03
                    942400 to 942390  4.19874E-03
                    942400 fission    4.59747E+00
                    942400 nu-sigf    1.43440E+01
                    942400 to 942380  4.09730E-05
                    942400 to 942410  1.93411E+03
                    942400 tot-cap    1.93871E+03
                    942410 to 942400  5.38011E-02
                    942410 fission    8.86980E+02
                    942410 nu-sigf    2.60217E+03
                    942410 to 942390  8.76709E-05
                    942410 to 942420  2.95973E+02
                    942410 tot-cap    1.18301E+03
                    942420 to 942410  1.71166E-02
                    942420 fission    3.37854E+00
                    942420 nu-sigf    1.05719E+01
                    942420 to 942400  2.08084E-04
                    942420 to 942430  2.62084E+02
                    942420 tot-cap    2.65480E+02
                    952410 fission    1.08184E+01
                    952410 nu-sigf    3.47448E+01
                    952410 to 952420  9.79069E+02
                    952410 tot-cap    9.89887E+02
                    952430 fission    2.60540E+00
                    952430 nu-sigf    8.75092E+00
                    952430 to 952440  3.44795E+02
                    952430 tot-cap    3.47400E+02
                    962440 to 962430  4.11346E-03
                    962440 fission    1.19573E+01
                    962440 nu-sigf    4.00144E+01
                    962440 to 962420  4.10210E-05
                    962440 to 962450  1.12244E+02
                    962440 to 962441  2.90118E+00
                    962440 tot-cap    1.24206E+02
Othe reaction   50100 to  30070 was not used, because  50100 is not in library., (in subr pool)
                                        in the search of library number 3
Othe reaction   50100 to  40090 was not used, because  50100 is not in library., (in subr pool)
                                        in the search of library number 3
Othe reaction   50110 to  40090 was not used, because  50110 is not in library., (in subr pool)
                                        in the search of library number 3
Othe reaction   50100 to  40100 was not used, because  50100 is not in library., (in subr pool)
                                        in the search of library number 3
Othe reaction   80160 to  80161 was not used, because  80161 is not in library., (in subr pool)
Othe reaction  621470 to 621471 was not used, because 621471 is not in library., (in subr pool)
Othe fission product transitions for  922340 were not used.  library fissile nuclides are
   922330   922350   942410   922380   942390
Ouse substitute nuclide in block 8 data.  or, update with new fission yield data.
Othe reaction  922340 to 922341 was not used, because  922341 is not in library., (in subr pool)
Othe reaction  922350 to 922351 was not used, because  922351 is not in library., (in subr pool)
Othe fission product transitions for  922360 were not used.  library fissile nuclides are
   922330   922350   942410   922380   942390
Ouse substitute nuclide in block 8 data.  or, update with new fission yield data.
Othe reaction  922360 to 922361 was not used, because  922361 is not in library., (in subr pool)
Othe fission product transitions for  952370 were not used.  library fissile nuclides are
   922330   922350   942410   922380   942390
Ouse substitute nuclide in block 8 data.  or, update with new fission yield data.
Othe reaction  952370 to 952371 was not used, because  952371 is not in library., (in subr pool)
Othe fission product transitions for  942380 were not used.  library fissile nuclides are
```

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  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  942380 to 942381 was not used, because  942381 is not in library., (in subr pool)
0the fission product transitions for  942400 were not used.  library fissile nuclides are
  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  942420 were not used.  library fissile nuclides are
  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  952410 were not used.  library fissile nuclides are
  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  952430 were not used.  library fissile nuclides are
  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  962440 were not used.  library fissile nuclides are
  922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  962440 to 962441 was not used, because  962441 is not in library., (in subr pool)
1
0                        case completed.  date,   2/16/1996
0 * normal termination *
1  oooooooooo   rrrrrrrrrrr   iiiiiiiiiiii   gggggggggg   eeeeeeeeeeee  m        m  ssssssssss
   oooooooooooo rrrrrrrrrrrr  iiiiiiiiiiii   gggggggggggg eeeeeeeeeeee  mm       m  ssssssssssss
   oo        oo rr        rr      ii       gg        gg ee           mmm      m  ss        ss
   oo        oo rr        rr      ii       gg           ee           m m      m  ss
   oo        oo rr        rr      ii       gg           ee           m  m     m  ss
   oo        oo rrrrrrrrrrrr      ii       gg   ggggggg eeeeeeee     m   m    m  ssssssssss
   oo        oo rrrrrrrrrrr       ii       gg   ggggggg eeeeeeee     m    m   m   ssssssssss
   oo        oo rr       rr       ii       gg        gg ee           m     m m           ss
   oo        oo rr        rr      ii       gg        gg ee           m      mm           ss
   oo        oo rr         rr     ii       gg        gg ee           m       mm  ss       ss
   oooooooooooo rr          rr iiiiiiiiiiii gggggggggggg eeeeeeeeeeee m        m  ssssssssssss
    oooooooooo  rr          rr iiiiiiiiiiii  gggggggggg  eeeeeeeeeeee m        m   ssssssssss
0

   dddddddddddd    aaaaaaaa    w        w iiiiiiiiiiii   ssssssssss
   dddddddddddd   aaaaaaaaaa   w        w iiiiiiiiiiii  ssssssssssss
   dd        dd aa        aa  w        w     ii       ss        ss
   dd        dd aa        aa  w        w     ii       ss
   dd        dd aa        aa  w        w     ii       ss
   dd        dd aaaaaaaaaaaa  w        w     ii       ssssssssssss
   dd        dd aaaaaaaaaaaa   w      w      ii        ssssssssssss
   dd        dd aa        aa    w    w       ii                ss
   dd        dd aa        aa     w  w        ii                ss
   dd        dd aa        aa      w w        ii       ss       ss
   dddddddddddd aa        aa       ww     iiiiiiiiiiii  ssssssssssss
   dddddddddddd aa        aa        v     iiiiiiiiiiii   ssssssssss
0

    000000      zzzzzzzzzz          //      11      66666666666          //  99999999999   66666666666
   00000000     zzzzzzzzzzz         //     111      66666666666          //  99999999999   66666666666
  00      00   zz        zz         //    1111      66                   //  99        99  66
 00        00            zz        //      11      66                   //  99        99  66
 00        00           zz         //      11      66                   //  99        99  66
 00        00          zz          //      11      66666666666          //  99999999999   66666666666
 00        00        zz            //      11      66666666666          //   99999999999  66666666666
 00        00      zz              //      11      66        66         //           99  66        66
 00        00    zz                //      11      66        66         //           99  66        66
  00      00   zz                  //      11      66        66         //           99  66        66
```

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     0000000    2222222222222   //          11111111    666666666666   //        9999999999999   666666666666
0

     0000000     99999999999                55555555555 55555555555                     44   55555555555
    00000000    999999999999                55555555555 55555555555                    444   55555555555
   00      00   99        99       :::      55          55              :::          4444   55
  00        00  99        99       :::      55          55              :::         44 44   55
  00        00  99        99       :::      55          55              :::        44  44   55
  00        00  999999999999               55555555555 55555555555                44   44   55555555555
  00        00   99999999999               55555555555 55555555555               44    44   55555555555
  00        00           99       :::              55          55       :::      44444444444          55
  00        00           99       :::              55          55       :::      44444444444          55
   00      00            99       :::      55      55  55      55       :::              44   55      55
    00000000    999999999999               55555555555 55555555555                     44   55555555555
     0000000    99999999999                 5555555555  5555555555                     44    5555555555
1
0                          99999999999    ccccccccccc    aaaaaaaa    ll          eeeeeeeeeeeee
                          999999999999   cccccccccccc   aaaaaaaaaa  ll          eeeeeeeeeeeee
                          99        99   cc        cc   aa      aa  ll          ee
                          99             cc             aa      aa  ll          ee
                          99             cc             aa      aa  ll          ee
                          999999999999   cc             aaaaaaaaaaa ll          eeeeeeeee
                           99999999999   cc             aaaaaaaaaaa ll          eeeeeeeee
                                    99   cc             aa      aa  ll          ee
                                    99   cc             aa      aa  ll          ee
                          99        99   cc        cc   aa      aa  ll          ee
                          999999999999   cccccccccccc   aa      aa  llllllllllll eeeeeeeeeeeee
                           99999999999    cccccccccc    aa      aa  llllllllllll eeeeeeeeeeeee
```

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                 program verification information                   *****
*****                                                                   *****
*****                 code system:    scale  version:    4.2            *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****            program:  c0c004                                       *****
*****                                                                   *****
*****      creation date:  04/27/95                                     *****
*****                                                                   *****
*****            library:  /neutronics/scale/exe                        *****
*****                                                                   *****
*****                                                                   *****
*****  this is not a   scale  configuration controlled code             *****
*****                                                                   *****
*****            jobname:  davis                                        *****
*****                                                                   *****
*****  date of execution:  02/16/96                                     *****
*****                                                                   *****
*****  time of execution:  09:55:45                                     *****
```

```
                    *****                                                    *****
                    *****                                                    *****
                    ************************************************************
                    ************************************************************
                    ************************************************************
1
0       -1q array has      1 entries.
0        0q array has      1 entries.
0        0q array has      1 entries.
0        0q array has      1 entries.
0        0q array has      1 entries.
0         dbl. prec. machine word applied has, at least, a 16 significant figure accuracy.
0             short-lived split test fraction, qm =    9.1188E-04
0             half-norm of matrix used, axn =    7.0000E+00
0             4-place-accuracy-retention ratio, ratio4 =    6.4516E-13
0        1q array has     20 entries.
0        3q array has      1 entries.
0        3q array has      1 entries.
0        3q array has      1 entries.
0        3q array has      1 entries.
0        4q array has      1 entries.
0       54q array has     12 entries.
1library information...

         cross-section data taken from position number  1 of library on unit 15.

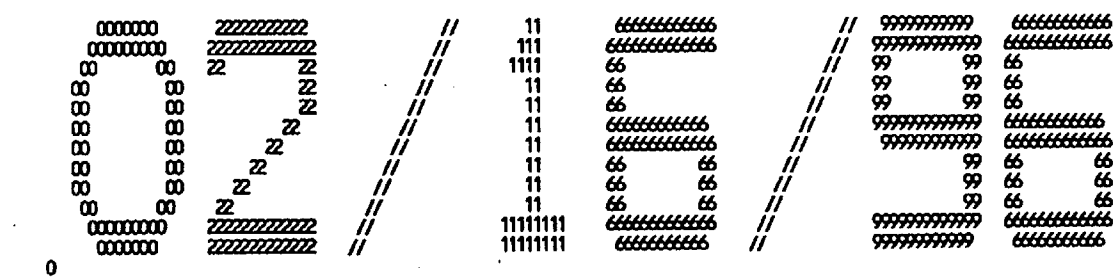
         pass   0
         *scale-system control module sas2 library*
         used a time-dependent neutron spectrum, for each of the above passes
           pass 0 applies start-up fuel densiities
           pass n applies mid time densities of nth library interval
         first library updated was...
         pass   1
         pass   0
         *scale-system control module sas2 library*
         used a time-dependent neutron spectrum, for each of the above passes
           pass 0 applies start-up fuel densiities
           pass n applies mid time densities of nth library interval
         first library updated was...
         ************************************************************************
         *                                                                      *
         *              prelim lwr origen-s binary working library--id = 1143   *
         *          made from modified card-image origen-s libraries of scale 4.2 *
         *       data from the light element, actinide, and fission product libraries *
         *         decay data, including gamma and total energy, are from endf/b-vi *
         *                                                                      *
         *       neutron flux spectrum factors and cross sections were produced from *
         *      the 'presas2' case updating all nuclides on the scale 'burnup' library *
         *                                                                      *
         *                  fission product yields are from endf/b-v            *
         *                                                                      *
         *              photon libraries use an 18-energy-group structure       *
         *             the photon data are from the master photon data base,    *
         *              produced to include bremsstrahlung from uo2 matrix      *
         *                                                                      *
         *        see information above this box (if present) for later updates *
         *                                                                      *
         ************************************************************************
         *                                                                      *
0        ************************************************************************
```

```
0                .other identification and sizes of library.
0                 data set name:  ft15f001
0              2/16/1996    date library was produced
0                   1697    total number of nuclides in library
                     689    number of light-element nuclides
                     129    number of actinide nuclides
                     879    number of fission product nuclides
0                   7955    number of nonzero off-diagonal matrix elements
0        ***********************************************************************
1
    sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp                    actinides        page   1
     power= 8.466E-05mw, burnup=6.7727E-03mwd, flux= 1.72E+13n/cm**2-sec
0                                          nuclide concentrations, gram atoms
                                           basis = converted to atoms/(barn-cm)
          charge    20.0 d    40.0 d    60.0 d    80.0 d
    u230   .00E+00  1.00E-23  3.36E-23  6.45E-23  9.96E-23
    u231   .00E+00  6.20E-22  1.50E-21  2.40E-21  3.31E-21
    u232   .00E+00  1.09E-14  2.21E-14  3.36E-14  4.55E-14
    u233   .00E+00  1.14E-12  2.26E-12  3.35E-12  4.42E-12
    u234  5.54E-06  5.53E-06  5.50E-06  5.48E-06  5.45E-06
    u235  6.92E-04  6.83E-04  6.74E-04  6.66E-04  6.58E-04
    u236  3.17E-06  4.75E-06  6.32E-06  7.86E-06  9.37E-06
    u237   .00E+00  1.63E-08  1.97E-08  2.14E-08  2.28E-08
    u238  2.21E-02  2.21E-02  2.21E-02  2.21E-02  2.20E-02
    u239   .00E+00  5.29E-09  5.31E-09  5.29E-09  5.27E-09
    u240   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
    u241   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
   np235   .00E+00  9.63E-18  5.61E-17  1.48E-16  2.86E-16
  np236m   .00E+00  3.36E-16  9.23E-16  1.57E-15  2.26E-15
   np236   .00E+00  6.61E-16  3.86E-15  1.08E-14  2.03E-14
   np237   .00E+00  2.15E-08  5.89E-08  1.01E-07  1.45E-07
   np238   .00E+00  1.95E-11  6.16E-11  1.05E-10  1.60E-10
   np239   .00E+00  7.60E-07  7.66E-07  7.63E-07  7.61E-07
  np240m   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
   np240   .00E+00  1.20E-11  1.21E-11  1.20E-11  1.19E-11
   np241   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
   pu236   .00E+00  8.39E-16  5.07E-15  1.36E-14  2.67E-14
   pu237   .00E+00  6.58E-16  2.80E-15  6.02E-15  9.96E-15
   pu238   .00E+00  4.28E-11  3.08E-10  8.58E-10  1.73E-09
   pu239   .00E+00  3.66E-06  7.94E-06  1.20E-05  1.60E-05
   pu240   .00E+00  2.60E-08  1.11E-07  2.51E-07  4.39E-07
   pu241   .00E+00  4.63E-10  4.08E-09  1.39E-08  3.27E-08
   pu242   .00E+00  9.67E-13  1.75E-11  9.09E-11  2.87E-10
   pu243   .00E+00  1.12E-16  2.04E-15  1.06E-14  3.32E-14
   pu244   .00E+00  6.19E-40  1.61E-36  1.48E-34  3.62E-33
   pu245   .00E+00   .00E+00   .00E+00  7.64E-41  2.75E-39
   pu246   .00E+00   .00E+00  1.40E-45  1.26E-43  3.79E-42
   am239   .00E+00  3.92E-24  7.04E-23  3.65E-22  1.15E-21
   am240   .00E+00  9.80E-22  2.26E-20  1.29E-19  4.25E-19
   am241   .00E+00  2.90E-13  5.18E-12  2.69E-11  8.48E-11
  am242m   .00E+00  2.55E-16  9.12E-15  7.03E-14  2.91E-13
   am242   .00E+00  3.39E-16  6.10E-15  3.16E-14  9.92E-14
   am243   .00E+00  1.42E-15  5.23E-14  4.14E-13  1.76E-12
  am244m   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
   am244   .00E+00  4.41E-19  1.63E-17  1.29E-16  5.47E-16
   am245   .00E+00   .00E+00  1.04E-40  9.67E-39  2.34E-37
   am246   .00E+00   .00E+00   .00E+00   .00E+00   .00E+00
  totals  2.28E-02  2.28E-02  2.28E-02  2.27E-02  2.27E-02
0  flux             1.72E+13  1.73E+13  1.72E+13  1.72E+13
0 .results on logical unit no. 71, position  1, for time step  4, subcase 1. (run position 1, case position 1)
```

```
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0 .results on logical unit no. 71, position 2, for time step 4, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0 .results on logical unit no. 71, position 3, for time step 0, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0 .results on logical unit no. 71, position 4, for time step 1, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0    .terminated logical unit no. 71 with zero flag record.
1 * normal termination of execution *
0                                  table of contents for material tables
0                                    case or subcase printed     page

                                                 1                1
0rdset          33
          15          4          1         27          6          0          0          0          0          0
           0          0          0          0          0          2         -1       1698        690        130
         880       7935          0          5         99          2         16         96         18         18
          18          0         71
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       57q array has      4 entries.
0        1q array has     20 entries.
0        1q array has     10 entries.
     l90   92270
     l116  55405
     l32   33663 nudata (library) storage size
     l44   33734
     l103  70769
0       58q array has      4 entries.
0       60q array has      4 entries.
0       66q array has      1 entries.
0       73q array has      4 entries.
0       74q array has      4 entries.
0       75q array has      4 entries.
     l140  61885
     used   94591 in size   200000
0jqpt           12
           0          0          0          0          0          0          0          0          0          0
           0          0
0therm           4
  5.134568E-01 3.372767E-01 2.548021E+00 1.000000E-31
0non            5
        7935         20          6         18       1697
0mm             19
           4          4          0          0          1          1          0          0          0          0
          21        100          4          4          3         74          4          1          0
0tconst         5
  8.640000E+04 1.000000E-20  .000000E+00  .000000E+00 1.000000E-08
0nzero          4
           0        689        129        879
0pow            3
   .000000E+00  .000000E+00  .000000E+00
0 lirp          9
           6          0         51         26          2       3000       1000       1697         94
```

```
 n-gamma, fission and total mev/fission =          4.2823E+00     1.9427E+02     1.9856E+02
 start of interval flux =        1.73556E+13
 n-gamma, fission and total mev/fission =          4.6423E+00     1.9435E+02     1.9899E+02
 start of interval flux =        1.73046E+13
 n-gamma, fission and total mev/fission =          4.6996E+00     1.9444E+02     1.9914E+02
 start of interval flux =        1.72419E+13
 n-gamma, fission and total mev/fission =          4.7478E+00     1.9452E+02     1.9927E+02
 start of interval flux =        1.71873E+13
0 case or subcase    1  sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0       56q array has     20 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has     20 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has     20 entries.
0       56q array has     20 entries.
0requested parm=halt8,skipcellwt,skipshipdata
  pass= 1, exec halts after pass   8
```



```
0
```

```
0
```



```
0
```

```
  0000000     9999999999                 5555555555555  5555555555555                    44    88888888888
 00000000     9999999999                 5555555555555  5555555555555                   444    88888888888
00     00    99      99      :::        55             55              :::            4444    88      88
00     00    99      99      :::        55             55              :::           44 44    88      88
00     00    99      99      :::        55             55              :::          44  44    88      88
00     00    9999999999                 5555555555     5555555555                  44   44    88888888
00     00     9999999999                555555555555   555555555555                44    44    88888888
00     00            99      :::                55             55      :::         44444444444  88      88
00     00            99      :::                55             55      :::         44444444444  88      88
00     00            99      :::        55      55     55      55      :::                44    88      88
 00000000     9999999999                 555555555555   555555555555                       44    88888888888
  0000000     9999999999                  5555555555     5555555555                        44    88888888888
1
0
                    ssssssssss    cccccccccc    aaaaaaaa    ll          eeeeeeeeeeee
                   ssssssssssss  cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeeee
                   ss        ss  cc        cc  aa      aa  ll          ee
                   ss            cc            aa      aa  ll          ee
                   ss            cc            aa      aa  ll          ee
                   ssssssssss    cc            aaaaaaaaaaaa ll         eeeeeeee
                    ssssssssss   cc            aaaaaaaaaaaa ll         eeeeeeee
                            ss   cc            aa      aa  ll          ee
                            ss   cc            aa      aa  ll          ee
                   ss        ss  cc        cc  aa      aa  ll          ee
                   ssssssssssss  cccccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
                    ssssssssss   cccccccccc    aa      aa  llllllllllll eeeeeeeeeeee
```

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                 program verification information                   *****
*****                                                                   *****
*****                 code system:    scale  version:    4.2            *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****                 program:  c0c008                                  *****
*****                                                                   *****
*****             creation date:  04/27/95                              *****
*****                                                                   *****
*****                 library:  /neutronics/scale/exe                   *****
*****                                                                   *****
*****                                                                   *****
*****        this is not a   scale  configuration controlled code       *****
*****                                                                   *****
*****                 jobname:  davis                                   *****
*****                                                                   *****
*****        date of execution:  02/16/96                               *****
*****                                                                   *****
*****        time of execution:  09:55:48                               *****
*****                                                                   *****
*****                                                                   *****
*****************************************************************************
```

```
                    ****************************************************************
                    ****************************************************************
1
0       -1q array has      1 entries.
0        0q array has      4 entries.
0        1q array has      6 entries.
0        2q array has      2 entries.
1logical assignments
0master library   12
 working library   0
 scratch file     18
 new library       1
0p r o b l e m   d e s c r i p t i o n
0igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                2
0izm--number of zones or material regions                       4
0ms--mixing table length                                       66
0ibl--shielded cross section edit option (0/1--no/yes)          0
0ibr--bondarenko factor edit option (0/1--no/yes)               0
0iassopt--dancoff factor option                                 0
0convergence criterion    1.00000E-03
0geometry correction factor for wigner rational approximation  1.350E+00
0        3q array has     66 entries.
0        4q array has     66 entries.
0        5q array has     66 entries.
0        6q array has      4 entries.
0        7q array has      4 entries.
0        8q array has      4 entries.
0        9q array has      4 entries.
0       10q array has     66 entries.
0       11q array has      4 entries.
0m i x i n g   t a b l e
0entry  mixture   isotope  number density  new identifier
   1       1       92235    6.57647E-04        92235
   2       1       92234    5.45374E-06        92234
   3       1       92236    9.37010E-06        92236
   4       1       92238    2.20477E-02        92238
   5       1        8016    4.55359E-02         8016
   6       3        8016    2.09710E-02            6
   7       1       36083    1.57183E-07        36083
   8       1       36085    7.63106E-08        36085
   9       1       38090    1.70684E-06        38090
  10       1       39089    5.60000E-07        39089
  11       1       42095    2.50288E-07        42095
  12       1       40093    1.24307E-06        40093
  13       1       40094    1.91444E-06        40094
  14       1       40095    1.29859E-06        40095
  15       1       41094    5.36198E-13        41094
  16       1       43099    1.77703E-06        43099
  17       1       45103    4.59914E-07        45103
  18       1       45105    1.10044E-08        45105
  19       1       44101    1.56724E-06        44101
  20       1       44106    1.80396E-07        44106
  21       1       46105    3.66502E-07        46105
  22       1       46108    4.74250E-08        46108
  23       1       47109    2.91333E-08        47109
  24       1       51124    9.07957E-12        51124
  25       1       54131    7.49268E-07        54131
  26       1       54132    1.26842E-06        54132
  27       1       54135    6.32256E-09        54135
  28       1       54136    3.00300E-06        54136
```

INFORMATION COPY

29	1	55134	8.18674E-09	55134
30	1	55135	9.06121E-07	55135
31	1	55137	1.90508E-06	55137
32	1	56136	2.19836E-09	56136
33	1	57139	1.91454E-06	57139
34	1	59141	9.07627E-07	59141
35	1	59143	4.07108E-07	59143
36	1	58144	1.48283E-06	58144
37	1	60143	1.31604E-06	60143
38	1	60145	1.17029E-06	60145
39	1	61147	5.25252E-07	61147
40	1	61148	1.26721E-09	61148
41	1	60147	1.34940E-07	60147
42	1	62147	1.30142E-08	62147
43	1	62149	6.35746E-08	62149
44	1	62150	2.60260E-07	62150
45	1	62151	1.03932E-07	62151
46	1	62152	1.16691E-07	62152
47	1	64155	1.02921E-10	64155
48	1	63153	5.54702E-08	63153
49	1	63154	1.61916E-09	63154
50	1	63155	1.09678E-08	63155
51	2	40302	4.25156E-02	40302
52	3	1001	4.19420E-02	1001
53	3	5010	3.81515E-06	5010
54	3	5011	1.54884E-05	5011
55	1	55133	1.82872E-06	55133
56	1	93237	1.45033E-07	93237
57	1	94238	1.72916E-09	94238
58	1	94239	1.59534E-05	94239
59	1	94240	4.39198E-07	94240
60	1	94241	3.26785E-08	94241
61	1	94242	2.86985E-10	94242
62	1	95241	8.48261E-11	95241
63	1	95243	1.76207E-12	95243
64	1	96244	1.17608E-14	96244
65	1	999	1.00000E-20	999
66	4	999	1.00000E-20	66

0geometry and material description

0zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	1	4.68122E-01	9.75000E+02	9.05844E-01	0
2	4	4.78790E-01	2.93000E+02	5.49010E-01	0
3	2	5.46100E-01	6.50000E+02	.00000E+00	0
4	3	8.13968E-01	6.07600E+02	.00000E+00	0

7711 locations of 200000 available are required to make a new master containing the self-shielded values

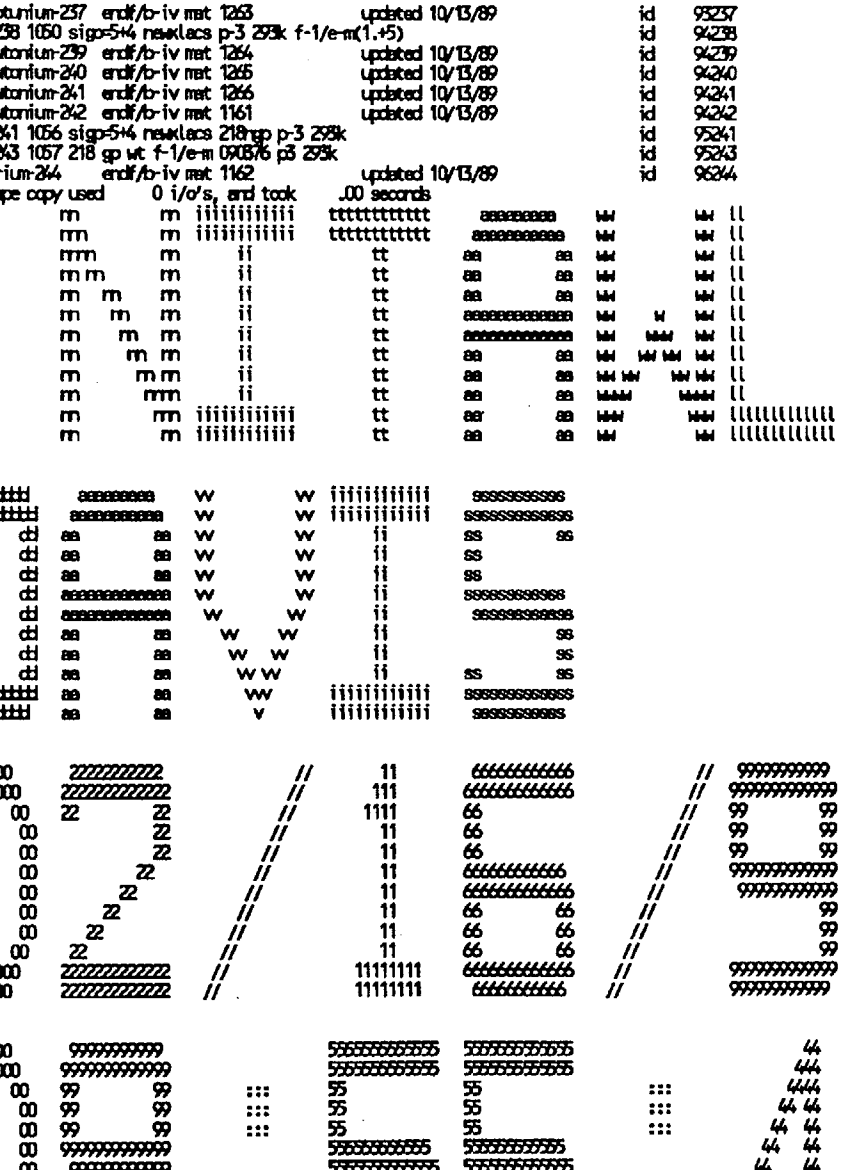
0no nuclides in your problem have bondarenko factor data**bonawl will copy from logical 12 to logical 1

0copy	999	1/v cross sectio	from log 12 to log 18	bondarenko trigger 0
0copy	999	1/v cross sectio	from log 18 to log 1	bondarenko trigger 0
0copy	999	1/v cross sectio	from log 18 to log 1	bondarenko trigger 0
0copy	1001	hydrogen	from log 12 to log 1	bondarenko trigger 0
0copy	5010	b-10 1273 218ngp	from log 12 to log 1	bondarenko trigger 0
0copy	5011	boron-11	from log 12 to log 1	bondarenko trigger 0
0copy	8016	oxygen-16	from log 12 to log 18	bondarenko trigger 0
0copy	8016	oxygen-16	from log 18 to log 1	bondarenko trigger 0
0copy	8016	oxygen-16	from log 18 to log 1	bondarenko trigger 0
0copy	36083	kr-83	from log 12 to log 1	bondarenko trigger 0
0copy	36085	kr-85	from log 12 to log 1	bondarenko trigger 0
0copy	38090	sr-90	from log 12 to log 1	bondarenko trigger 0
0copy	39089	y-89	from log 12 to log 1	bondarenko trigger 0
0copy	40093	zr-93	from log 12 to log 1	bondarenko trigger 0

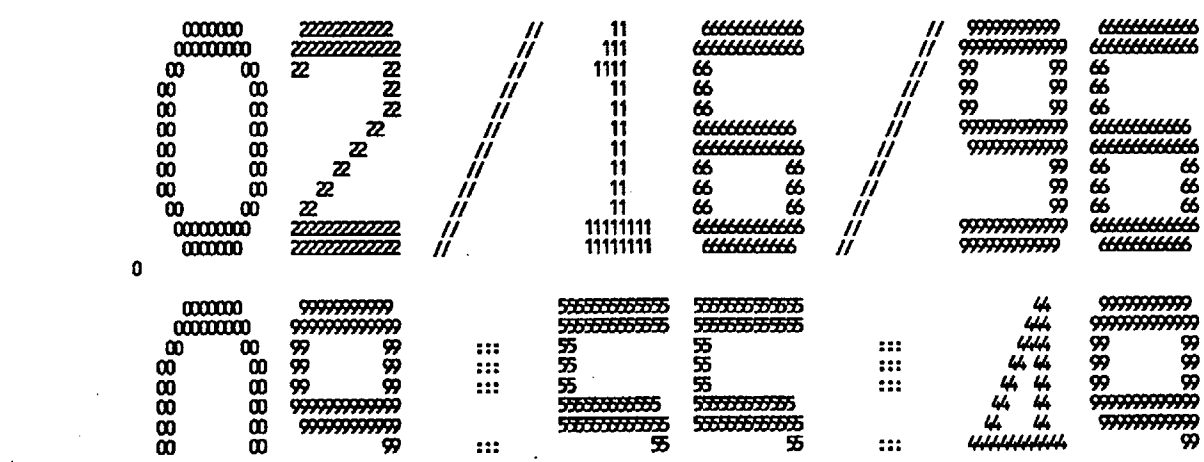
```
0copy   40094  zr-94          from log 12 to log  1   bondarenko trigger 0
0copy   40095  zr-95          from log 12 to log  1   bondarenko trigger 0
0copy   40302  zircalloy       from log 12 to log  1   bondarenko trigger 0
0copy   41094  nb-94          from log 12 to log  1   bondarenko trigger 0
0copy   42095  mo-95          from log 12 to log  1   bondarenko trigger 0
0copy   43099  tc-99          from log 12 to log  1   bondarenko trigger 0
0copy   44101  ru-101         from log 12 to log  1   bondarenko trigger 0
0copy   44106  ru-106         from log 12 to log  1   bondarenko trigger 0
0copy   45103  rh-103         from log 12 to log  1   bondarenko trigger 0
0copy   45105  rh-105         from log 12 to log  1   bondarenko trigger 0
0copy   46105  pd-105         from log 12 to log  1   bondarenko trigger 0
0copy   46108  pd-108         from log 12 to log  1   bondarenko trigger 0
0copy   47109  silver-109     from log 12 to log  1   bondarenko trigger 0
0copy   51124  sb-124         from log 12 to log  1   bondarenko trigger 0
0copy   54131  xe-131         from log 12 to log  1   bondarenko trigger 0
0copy   54132  xe-132         from log 12 to log  1   bondarenko trigger 0
0copy   54135  xenon-135      from log 12 to log  1   bondarenko trigger 0
0copy   54136  xe-136         from log 12 to log  1   bondarenko trigger 0
0copy   55133  cesium-133     from log 12 to log  1   bondarenko trigger 0
0copy   55134  cs-134         from log 12 to log  1   bondarenko trigger 0
0copy   55135  cs-135         from log 12 to log  1   bondarenko trigger 0
0copy   55137  cs-137         from log 12 to log  1   bondarenko trigger 0
0copy   56136  ba-136         from log 12 to log  1   bondarenko trigger 0
0copy   57139  la-139         from log 12 to log  1   bondarenko trigger 0
0copy   58144  ce-144         from log 12 to log  1   bondarenko trigger 0
0copy   59141  pr-141         from log 12 to log  1   bondarenko trigger 0
0copy   59143  pr-143         from log 12 to log  1   bondarenko trigger 0
0copy   60143  nd-143         from log 12 to log  1   bondarenko trigger 0
0copy   60145  nd-145         from log 12 to log  1   bondarenko trigger 0
0copy   60147  nd-147         from log 12 to log  1   bondarenko trigger 0
0copy   61147  pm-147         from log 12 to log  1   bondarenko trigger 0
0copy   61148  pm-148         from log 12 to log  1   bondarenko trigger 0
0copy   62147  sm-147         from log 12 to log  1   bondarenko trigger 0
0copy   62149  sm-149         from log 12 to log  1   bondarenko trigger 0
0copy   62150  sm-150         from log 12 to log  1   bondarenko trigger 0
0copy   62151  sm-151         from log 12 to log  1   bondarenko trigger 0
0copy   62152  sm-152         from log 12 to log  1   bondarenko trigger 0
0copy   63153  eu-153         from log 12 to log  1   bondarenko trigger 0
0copy   63154  eu-154         from log 12 to log  1   bondarenko trigger 0
0copy   63155  eu-155         from log 12 to log  1   bondarenko trigger 0
0copy   64155  gd-155         from log 12 to log  1   bondarenko trigger 0
0copy   92234  u-234 1043 sigp= from log 12 to log  1   bondarenko trigger 0
0copy   92235  uranium-235    from log 12 to log  1   bondarenko trigger 0
0copy   92236  u-236 1163 sigp= from log 12 to log  1   bondarenko trigger 0
0copy   92238  uranium-238    from log 12 to log  1   bondarenko trigger 0
0copy   93237  neptunium-237  from log 12 to log  1   bondarenko trigger 0
0copy   94238  pu-238 1050 sigp from log 12 to log  1   bondarenko trigger 0
0copy   94239  plutonium-239  from log 12 to log  1   bondarenko trigger 0
0copy   94240  plutonium-240  from log 12 to log  1   bondarenko trigger 0
0copy   94241  plutonium-241  from log 12 to log  1   bondarenko trigger 0
0copy   94242  plutonium-242  from log 12 to log  1   bondarenko trigger 0
0copy   95241  am-241 1056 sigp from log 12 to log  1   bondarenko trigger 0
0copy   95243  am-243 1057 218  from log 12 to log  1   bondarenko trigger 0
0copy   96244  curium-244     from log 12 to log  1   bondarenko trigger 0
1     scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
          compiled for nrc      1/27/89
            last updated        9/16/93
              l.m.petrie  -  ornl
        tape id                          4321          number of nuclides          66
```

```
 number of neutron groups          27        number of gamma groups          0
 first thermal group               15        logical unit                    1
                          table of contents
1/v cross sections normalized to 1.0 at 0.0253 ev                    id    999
1/v cross sections normalized to 1.0 at 0.0253 ev                    id     66
 hydrogen       endf/b-iv mat 1269/thrmf1002   updated 10/13/89      id   1001
b-10 1273 218ngp 042375 p-3 293k                                     id   5010
 boron-11       endf/b-iv mat 1160             updated 10/13/89      id   5011
 oxygen-16      endf/b-iv mat 1276             updated 10/13/89      id   8016
 oxygen-16      endf/b-iv mat 1276             updated 10/13/89      id      6
 kr-83          mt=102,103,103,105,106,107     updated 10/13/89      id  36083
 kr-85            mt=  102                                           id  36085
 sr-90          mt=102                         updated 10/13/89      id  38090
  y-89          mt=102                         updated 10/13/89      id  39089
 zr-93            mt=  102                                           id  40093
 zr-94          mt=102                         updated 10/13/89      id  40094
 zr-95          mt=102                         updated 10/13/89      id  40095
 zircalloy      endf/b-iv mat 1284             updated 10/13/89      id  40302
 nb-94          mt=102                         updated 10/13/89      id  41094
 mo-95          mt=102                         updated 10/13/89      id  42095
 tc-99          mt=102                         updated 10/13/89      id  43099
 ru-101         mt=102                         updated 10/13/89      id  44101
 ru-106         mt=102                         updated 10/13/89      id  44106
 rh-103         mt=102                         updated 10/13/89      id  45103
 rh-105           mt=  102                                           id  45105
 pd-105         mt=102                         updated 10/13/89      id  46105
 pd-108         mt=102                         updated 10/13/89      id  46108
 silver-109     endf/b-iv mat 1139             updated 10/13/89      id  47109
 sb-124         mt=102                         updated 10/13/89      id  51124
 xe-131         mt=102,103,104,105,106         updated 10/13/89      id  54131
 xe-132         mt=102,103,104,105,106         updated 10/13/89      id  54132
 xenon-135      endf/b-iv mat 1254             updated 10/13/89      id  54135
 xe-136           mt=  102, 103, 104, 105, 107                       id  54136
 cesium-133     endf/b-iv mat 1141             updated 10/13/89      id  55133
 cs-134         mt=102                         updated 10/13/89      id  55134
 cs-135           mt=  102                                           id  55135
 cs-137         mt=102                         updated 10/13/89      id  55137
 ba-136         mt=102                         updated 10/13/89      id  56136
 la-139         mt=102                         updated 10/13/89      id  57139
 ce-144           mt=  102                                           id  58144
 pr-141         mt=102,103,104,105,106,107     updated 10/13/89      id  59141
 pr-143         mt=102                         updated 10/13/89      id  59143
 nd-143         mt=102                         updated 10/13/89      id  60143
 nd-145         mt=102                         updated 10/13/89      id  60145
 nd-147         mt=102                         updated 10/13/89      id  60147
 pm-147         mt=102                         updated 10/13/89      id  61147
 pm-148           mt=  102                                           id  61148
 sm-147         endf/b-v fission product       updated 10/13/89      id  62147
 sm-149         mt=102,103,107                 updated 10/13/89      id  62149
 sm-150         mt=102                         updated 10/13/89      id  62150
 sm-151         mt=102,103,104,105,106,107     updated 10/13/89      id  62151
 sm-152         mt=102,103,104,105,106,107     updated 10/13/89      id  62152
 eu-153         mt=102,103,104,105,106,107     updated 10/13/89      id  63153
 eu-154         mt=102,103,104,105,106,107     updated 10/13/89      id  63154
 eu-155         mt=102,103,104,105,106,107     updated 10/13/89      id  63155
 gd-155         mt=102                         updated 10/13/89      id  64155
u-234 1043 sigo=5+4 newxlacs p-3 293k f-1/e-x(1.+5)                  id  92234
 uranium-235    endf/b-iv mat 1261             updated 10/13/89      id  92235
u-236 1163 sigo=5+4 newxlacs p-3 293k f-1/e-x(1.+5)                  id  92236
 uranium-238    endf/b-iv mat 1262             updated 10/13/89      id  92238
```

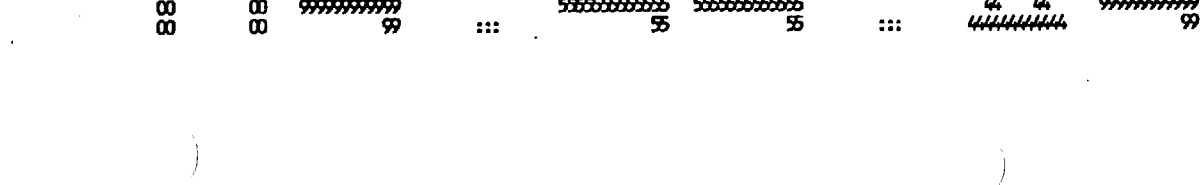
```
 neptunium-237  endf/b-iv mat 1263          updated 10/13/89          id   93237
pu-238 1050 sigp-5+4 newklacs p-3 293k f-1/e-m(1.+5)                   id   94238
 plutonium-239  endf/b-iv mat 1264          updated 10/13/89          id   94239
 plutonium-240  endf/b-iv mat 1265          updated 10/13/89          id   94240
 plutonium-241  endf/b-iv mat 1266          updated 10/13/89          id   94241
 plutonium-242  endf/b-iv mat 1161          updated 10/13/89          id   94242
am-241 1056 sigp-5+4 newklacs 218ngp p-3 293k                          id   95241
am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                           id   95243
 curium-244     endf/b-iv mat 1162          updated 10/13/89          id   96244
0     tape copy used      0 i/o's, and took     .00 seconds
1
```



```
0
```



```
0
```



```
0
```

```
  00       00          99       :::            55          55       :::     44444444444          99
   00     00           99       :::     55     55   55     55       :::            44           99
    000000000   999999999999              555555555555 555555555555                44   999999999999
     0000000    999999999999               5555555555   5555555555                 44    999999999999
1
0                          SSSSSSSSSS   CCCCCCCCCC    AAAAAAAA    LL          EEEEEEEEEEEE
                          SSSSSSSSSSSS CCCCCCCCCCCC  AAAAAAAAAA  LL          EEEEEEEEEEEE
                          SS        SS CC        CC  AA      AA  LL          EE
                          SS           CC            AA      AA  LL          EE
                          SS           CC            AA      AA  LL          EE
                          SSSSSSSSSSSS CC            AAAAAAAAAAAA LL          EEEEEEEEE
                           SSSSSSSSSSS CC            AAAAAAAAAAAA LL          EEEEEEEEE
                                    SS CC            AA      AA  LL          EE
                                    SS CC            AA      AA  LL          EE
                          SS        SS CC        CC  AA      AA  LL          EE
                          SSSSSSSSSSSS CCCCCCCCCCCC  AA      AA  LLLLLLLLLLLL EEEEEEEEEEEE
                           SSSSSSSSSS   CCCCCCCCCC   AA      AA  LLLLLLLLLLLL EEEEEEEEEEEE
```

program verification information

code system: scale version: 4.2

program: c0x002

creation date: 04/27/95

library: /neutronics/scale/exe

this is not a scale configuration controlled code

jobname: davis

date of execution: 02/16/96

time of execution: 09:55:49

```
1
0      -1q array has      1 entries.
0       0q array has      9 entries.
0       1q array has     12 entries.
0select 65 nuclides from the master  library on logical  1
        0 nuclides from the working library on logical  2
        0 nuclides from the working library on logical  3
```

```
          to create the new working library on logical  4

        61 resonance calculations have been requested
         0 output option for ampx formatted cross section data
0the storage allocated for this case is 200000 words
0        2q array has      65 entries.
0        3q array has     915 entries.
0        4q array has      65 entries.
0 general information concerning cross section library
    tape identification number                4321
    number of nuclides on tape                  66
    number of neutron energy groups             27
    first thermal neutron energy group          15
    number of gamma energy groups                0
0   direct access unit number  9 requires 117 blocks of length  1484 words
- xsdrn tape   4321
                        scale 4.2 - 27 group neutron burnup library
                          based on endf-b version 4 data with endf-b version 5 fission products
                             compiled for nrc      1/27/89
                                last updated       9/16/93
                                   l.m.petrie   -   ornl
0 nuclides from xsdrn tape
     1    1/v cross sections normalized to 1.0 at 0.0253 ev                                  999
     2     hydrogen        endf/b-iv mat 1269/thrm1002    updated 10/13/89                  1001
     3    b-10 1273 218ngp 042575 p-3 293k                                                   5010
     4     boron-11        endf/b-iv mat 1160             updated 10/13/89                  5011
     5     oxygen-16       endf/b-iv mat 1276             updated 10/13/89                  8016
     6     oxygen-16       endf/b-iv mat 1276             updated 10/13/89                     6
     7     kr-83           mt=102,103,103,105,106,107     updated 10/13/89                 36083
     8     kr-85             mt=  102                                                       36085
     9     sr-90           mt=102                         updated 10/13/89                 38090
    10      y-89           mt=102                         updated 10/13/89                 39089
    11     zr-93             mt=  102                                                       40093
    12     zr-94           mt=102                         updated 10/13/89                 40094
    13     zr-95           mt=102                         updated 10/13/89                 40095
    14     zircalloy       endf/b-iv mat 1284             updated 10/13/89                 40302
    15     nb-94           mt=102                         updated 10/13/89                 41094
    16     mo-95           mt=102                         updated 10/13/89                 42095
    17     tc-99           mt=102                         updated 10/13/89                 43099
    18     ru-101          mt=102                         updated 10/13/89                 44101
    19     ru-106          mt=102                         updated 10/13/89                 44106
    20     rh-103          mt=102                         updated 10/13/89                 45103
    21     rh-105            mt=  102                                                       45105
    22     pd-105          mt=102                         updated 10/13/89                 46105
    23     pd-108          mt=102                         updated 10/13/89                 46108
    24     silver-109      endf/b-iv mat 1139             updated 10/13/89                 47109
    25     sb-124          mt=102                         updated 10/13/89                 51124
    26     xe-131          mt=102,103,104,105,106         updated 10/13/89                 54131
    27     xe-132          mt=102,103,104,105,106         updated 10/13/89                 54132
    28     xenon-135       endf/b-iv mat 1294             updated 10/13/89                 54135
    29     xe-136            mt=  102, 103, 104, 105, 107                                   54136
    30     cesium-133      endf/b-iv mat 1141             updated 10/13/89                 55133
    31     cs-134          mt=102                         updated 10/13/89                 55134
    32     cs-135            mt=  102                                                       55135
    33     cs-137          mt=102                         updated 10/13/89                 55137
    34     ba-136          mt=102                         updated 10/13/89                 56136
    35     la-139          mt=102                         updated 10/13/89                 57139
    36     ce-144            mt=  102                                                       58144
    37     pr-141          mt=102,103,104,105,106,107     updated 10/13/89                 59141
    38     pr-143          mt=102                         updated 10/13/89                 59143
```

```
   39    nd-143        mt=102                          updated 10/13/89          60143
   40    nd-145        mt=102                          updated 10/13/89          60145
   41    nd-147        mt=102                          updated 10/13/89          60147
   42    pm-147        mt=102                          updated 10/13/89          61147
   43    pm-148          mt=  102                                                61148
   44    sm-147        endf/b-v fission product        updated 10/13/89          62147
   45    sm-149        mt=102,103,107                  updated 10/13/89          62149
   46    sm-150        mt=102                          updated 10/13/89          62150
   47    sm-151        mt=102,103,104,105,106,107      updated 10/13/89          62151
   48    sm-152        mt=102,103,104,105,106,107      updated 10/13/89          62152
   49    eu-153        mt=102,103,104,105,106,107      updated 10/13/89          63153
   50    eu-154        mt=102,103,104,105,106,107      updated 10/13/89          63154
   51    eu-155        mt=102,103,104,105,106,107      updated 10/13/89          63155
   52    gd-155        mt=102                          updated 10/13/89          64155
   53   u-234 1043 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                      92234
   54    uranium-235   endf/b-iv mat 1261             updated 10/13/89          92235
   55   u-236 1163 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                      92236
   56    uranium-238   endf/b-iv mat 1262             updated 10/13/89          92238
   57    neptunium-237 endf/b-iv mat 1263             updated 10/13/89          93237
   58   pu-238 1050 sigo=5+4 newxlacs p-3 293k f-1/e-m(1.+5)                      94238
   59    plutonium-239 endf/b-iv mat 1264             updated 10/13/89          94239
   60    plutonium-240 endf/b-iv mat 1265             updated 10/13/89          94240
   61    plutonium-241 endf/b-iv mat 1266             updated 10/13/89          94241
   62    plutonium-242 endf/b-iv mat 1161             updated 10/13/89          94242
   63   am-241 1056 sigo=5+4 newxlacs 218ngp p-3 293k                            95241
   64   am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                             95243
   65    curium-244    endf/b-iv mat 1162             updated 10/13/89          96244
01/v cross sections normalized to 1.0 at 0.0253 ev                   999    temperature=   975.00
0 hydrogen        endf/b-iv mat 1269/thrm1002    updated 10/13/89          1001    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0b-10 1273 218ngp 042375 p-3 293k                                        5010    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 boron-11        endf/b-iv mat 1160             updated 10/13/89          5011    temperature=   607.60
                          thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 oxygen-16       endf/b-iv mat 1276             updated 10/13/89          8016    temperature=   975.00
0 oxygen-16       endf/b-iv mat 1276             updated 10/13/89             6    temperature=   607.60
0 kr-83           mt=102,103,103,105,106,107     updated 10/13/89         36083    temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =    82.202          temperature(kelvin)      =   975.000
0potential scatter sigma  =     7.004          lumped nuclear density   = 1.571829E-07
0spin factor (g)          =  4988.190          lump dimension (a-bar)   = 4.681220E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.426926E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.086375E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 1.212056E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  11      -7.007637E-05    .000000E+00   -1.064840E-04
  12       2.169253E-02    .000000E+00    9.918883E-03
  13      -5.551231E-02    .000000E+00   -2.176956E-02
  14       4.784844E-05    .000000E+00   -1.725850E-05
0excess resonance integrals
0                 resolved
0absorption      1.45215E+02
 fission          .00000E+00
- elapsed time    .00 min.
0 kr-85            mt=  102                                              36085    temperature=   975.00
```

```
0 sr-90          mt=102                    updated 10/13/89          38090    temperature=  975.00
0  y-89          mt=102                    updated 10/13/89          39089    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =    88.142          temperature(kelvin)      =   975.000
0potential scatter sigma  =     3.644          lumped nuclear density   = 5.5999971E-07
0spin factor (g)          =    78.664          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 3.0492819E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 3.4020478E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   9      1.147057E-06     .000000E+00    1.964017E-04
  10     -8.969451E-07     .000000E+00   -2.405887E-06
0excess resonance integrals
0                 resolved
0absorption      1.46522E-01
 fission          .00000E+00
-  elapsed time    .00 min.
0 zr-93            mt=  102                                          40093    temperature=  975.00
0 zr-94          mt=102                    updated 10/13/89          40094    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =    93.100          temperature(kelvin)      =   975.000
0potential scatter sigma  =     3.779          lumped nuclear density   = 1.9144359E-06
0spin factor (g)          =   180.853          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 8.9195828E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 9.9514734E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   8      1.752696E-07     .000000E+00    1.280213E-04
   9     -2.632779E-06     .000000E+00   -2.404757E-04
0excess resonance integrals
0                 resolved
0absorption      3.44332E-02
 fission          .00000E+00
-  elapsed time    .00 min.
0 zr-95          mt=102                    updated 10/13/89          40095    temperature=  975.00
0 zircalloy      endf/b-iv mat 1284        updated 10/13/89          40302    temperature=  650.00
0resonance data for this nuclide
0mass number (a)          =    90.436          temperature(kelvin)      =   650.000
0potential scatter sigma  =     6.385          lumped nuclear density   = 4.2515602E-02
0spin factor (g)          =     1.079          lump dimension (a-bar)   = 5.4610002E-01
0inner radius             = 4.7878999E-01      dancoff correction (c)   = 5.0864637E-01
0the absorber will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   8     -1.780596E-03     .000000E+00   -1.286907E+00
   9     -5.893373E-02     .000000E+00   -2.695297E+00
  10     -6.999985E-02     .000000E+00   -1.601321E+00
  11     -1.883937E-01     .000000E+00   -7.920912E-01
0excess resonance integrals
```

```
0                resolved
0absorption      2.28539E-01
 fission          .00000E+00
- elapsed time    .02 min.
0 rb-94        mt=102                    updated 10/13/89          41094     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =    93.101          temperature(kelvin)        =   975.000
0potential scatter sigma  =     3.779          lumped nuclear density     = 5.3619826E-13
0spin factor (g)          = 43808.801          lump dimension (a-bar)     = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)     = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 3.1846371E+11
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 3.5530621E+11
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  13       1.043534E-02     .000000E+00    9.254236E-04
  14       9.836719E-03     .000000E+00   -4.064797E-04
0excess resonance integrals
0                resolved
0absorption      9.15001E+01
 fission          .00000E+00
- elapsed time    .02 min.
0 mo-95        mt=102                    updated 10/13/89          42095     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =    94.091          temperature(kelvin)        =   975.000
0potential scatter sigma  =     3.806          lumped nuclear density     = 2.5028831E-07
0spin factor (g)          =   607.724          lump dimension (a-bar)     = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)     = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 6.8225200E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 7.6118050E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  10      -1.314701E-04     .000000E+00   -5.604130E-05
  11       9.917398E-05     .000000E+00   -1.432015E-04
  12      -6.555217E-02     .000000E+00   -7.786971E-02
  13       1.614598E-04     .000000E+00   -2.769205E-05
0excess resonance integrals
0                resolved
0absorption      1.03129E+02
 fission          .00000E+00
- elapsed time    .02 min.
0 tc-99        mt=102                    updated 10/13/89          43099     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =    98.150          temperature(kelvin)        =   975.000
0potential scatter sigma  =     6.000          lumped nuclear density     = 1.7770319E-06
0spin factor (g)          = 4527.940           lump dimension (a-bar)     = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)     = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 9.6092641E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 1.0720943E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
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0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11      -2.032939E-03    .000000E+00   -9.781914E-04
  12      -3.433435E-04    .000000E+00   -3.992052E-06
  13      -3.315390E-02    .000000E+00   -1.799115E-03
  14      -7.441444E-01    .000000E+00   -2.450169E-02
  15       1.072025E-02    .000000E+00   -5.412184E-04
  16       4.836158E-03    .000000E+00   -2.802598E-04
  17       2.074484E-04    .000000E+00   -1.191909E-05
0excess resonance integrals
0                  resolved
0absorption      3.34362E+02
 fission          .00000E+00
- elapsed time    .03 min.
0 ru-101        mt=102                    updated 10/13/89          44101     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  100.039          temperature(kelvin)       =  975.000
0potential scatter sigma  =    3.965          lumped nuclear density    = 1.5672425E-06
0spin factor (g)          =  8785.290          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1      =   15.995          sigma(per absorber atom)= 1.0895549E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2      =  237.953          sigma(per absorber atom)= 1.2156036E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11      -3.530341E-02    .000000E+00   -3.627792E-03
  12       3.445391E-02    .000000E+00    1.693120E-03
  13      -3.580828E-02    .000000E+00   -9.759386E-04
  14       2.380160E-04    .000000E+00   -4.197040E-05
0excess resonance integrals
0                  resolved
0absorption      7.99648E+01
 fission          .00000E+00
- elapsed time    .03 min.
0 ru-106        mt=102                    updated 10/13/89          44106     temperature=  975.00
0 rh-103        mt=102                    updated 10/13/89          45103     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  102.021          temperature(kelvin)       =  975.000
0potential scatter sigma  =    5.408          lumped nuclear density    = 4.5991399E-07
0spin factor (g)          =     .500          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1      =   15.995          sigma(per absorber atom)= 3.7128614E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2      =  237.953          sigma(per absorber atom)= 4.1423959E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
   9       1.322985E-03    .000000E+00    2.155805E-03
  10      -1.406820E-03    .000000E+00   -2.137499E-03
  11      -4.716894E-04    .000000E+00   -6.208842E-04
  12       5.042953E-05    .000000E+00   -1.266816E-05
  13        .000000E+00    .000000E+00    .000000E+00
  14        .000000E+00    .000000E+00    .000000E+00
  15       2.330571E-01    .000000E+00    3.442109E-03
  16       4.040019E+01    .000000E+00   -2.952411E-02
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  17      -1.811418E+02      .000000E+00   -1.294069E-01
  18       8.811710E+01      .000000E+00    2.621466E-01
  19       1.161989E+01      .000000E+00   -1.825308E-03
  20       1.097992E+00      .000000E+00   -2.562609E-03
  21       2.166123E-01      .000000E+00    1.924473E-03
  22       2.583952E-01      .000000E+00    2.928609E-03
  23      -9.881767E-02      .000000E+00    1.799271E-03
0excess resonance integrals
0                  resolved
0absorption       1.16621E+03
 fission           .00000E+00
-  elapsed time    .07 min.
0 rh-105            mt=  102                                    46105     temperature=   975.00
0 pd-105          mt=102                  updated 10/13/89      46105     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   104.004          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.069          lumped nuclear density   = 3.665016E-07
0spin factor (g)          = 15210.000          lump dimension (a-bar)   = 4.681220E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.426926E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 4.659179E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 5.198191E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss         res scat
  12      -4.449027E-02      .000000E+00   -3.682612E-04
  13       5.071309E-02      .000000E+00    4.354690E-04
  14       7.783609E-04      .000000E+00   -8.185214E-05
0excess resonance integrals
0                  resolved
0absorption       6.13337E+01
 fission           .00000E+00
-  elapsed time    .07 min.
0 pd-108          mt=102                  updated 10/13/89      46108     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   106.977          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.146          lumped nuclear density   = 4.742692E-08
0spin factor (g)          = 21175.100          lump dimension (a-bar)   = 4.681220E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.426926E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 3.600290E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 4.017179E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss         res scat
  11       1.170738E-04      .000000E+00    3.533151E-04
  12      -3.023156E-02      .000000E+00   -2.297723E-02
  13       6.979191E-03      .000000E+00    1.813165E-03
  14       8.561563E-02      .000000E+00   -3.205774E-05
  15      -1.840067E-01      .000000E+00    8.089946E-05
  16       2.946583E-04      .000000E+00   -9.255608E-06
0excess resonance integrals
0                  resolved
0absorption       2.14081E+02
 fission           .00000E+00
-  elapsed time    .07 min.
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0 silver-109     endf/b-iv mat 1139          updated 10/13/89          47109     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   107.969          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.988          lumped nuclear density   = 2.9133252E-08
0spin factor (g)          =  1441.870          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 5.8613330E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 6.5394200E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10       3.559254E-05    .000000E+00    8.195275E-05
  11       4.112723E-04    .000000E+00    2.003312E-04
  12      -6.966888E-01    .000000E+00   -3.053876E-02
  13       7.673391E-01    .000000E+00    3.380763E-02
  14       1.471428E-01    .000000E+00   -2.159536E-03
0excess resonance integrals
0                 resolved
0absorption      1.4038E+03
 fission          .0000E+00
-  elapsed time    .08 min.
0 sb-124        mt=102                       updated 10/13/89          51124     temperature=  975.00
0 xe-131        mt=102,103,104,105,106       updated 10/13/89          54131     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   129.781          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.301          lumped nuclear density   = 7.4926834E-07
0spin factor (g)          =   246.825          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 2.2790192E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 2.5426748E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
   9       9.295499E-08    .000000E+00    2.277645E-07
  10      -9.651885E-07    .000000E+00    8.448204E-06
  11      -1.101953E-04    .000000E+00   -1.165399E-04
  12      -3.101842E-03    .000000E+00   -2.983734E-04
  13      -6.808714E+00    .000000E+00   -1.607342E+01
  14       1.129630E-02    .000000E+00    1.579549E-02
0excess resonance integrals
0                 resolved
0absorption      8.3249E+02
 fission          .0000E+00
-  elapsed time    .08 min.
0 xe-132        mt=102,103,104,105,106       updated 10/13/89          54132     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   130.771          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.301          lumped nuclear density   = 1.2684194E-06
0spin factor (g)          =   675.899          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.3462400E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 1.5019841E+05
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0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  9      -1.566102E-06     .000000E+00   -4.532205E-06
 10      -5.907378E-04     .000000E+00   -7.536434E-03
 11       3.346802E-08     .000000E+00   -9.308126E-07
0excess resonance integrals
0                  resolved
0absorption       9.83393E-01
 fission           .00000E+00
- elapsed time    .08 min.
0 xenon-135      endf/b-iv mat 1294          updated 10/13/89          54135    temperature=  975.00
0 xe-136           mt=  102, 103, 104, 105, 107                        54136    temperature=  975.00
0 cesium-133     endf/b-iv mat 1141          updated 10/13/89          55133    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   131.764          temperature(kelvin)      =   975.000
0potential scatter sigma  =     7.100          lumped nuclear density   = 1.8287258E-06
0spin factor (g)          =   374.437          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 9.3376414E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 1.0015845E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  9      -8.437516E-06     .000000E+00    9.105389E-06
 10      -1.919221E-04     .000000E+00   -4.047224E-04
 11      -9.040843E-03     .000000E+00   -1.602248E-02
 12      -1.364221E-02     .000000E+00   -1.943838E-03
 13      -2.195588E-02     .000000E+00   -1.204872E-03
 14      -1.053674E+00     .000000E+00   -4.706611E-02
 15       5.631141E-03     .000000E+00   -4.066079E-04
 16       2.777963E-03     .000000E+00   -2.215676E-04
 17       2.352220E-03     .000000E+00   -1.830804E-04
 18       2.215081E-03     .000000E+00   -1.679524E-04
 19       1.316858E-03     .000000E+00   -9.664818E-05
0excess resonance integrals
0                  resolved
0absorption       3.66270E+02
 fission           .00000E+00
- elapsed time    .10 min.
0 cs-134         mt=102                      updated 10/13/89          55134    temperature=  975.00
0 cs-135           mt=  102                                            55135    temperature=  975.00
0 cs-137         mt=102                      updated 10/13/89          55137    temperature=  975.00
0 ba-136         mt=102                      updated 10/13/89          56136    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =   134.737          temperature(kelvin)      =   975.000
0potential scatter sigma  =     4.835          lumped nuclear density   = 2.1983582E-09
0spin factor (g)          =  1247.690          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 7.7676008E+07
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 8.6662208E+07
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
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0group        res abs        res fiss       res scat
  10       1.385397E-06    .000000E+00    6.006004E-07
  11       2.594320E-05    .000000E+00    2.223017E-05
0excess resonance integrals
0                 resolved
0absorption      1.38477E+00
 fission          .00000E+00
- elapsed time    .10 min.
0 la-139        mt=102                    updated 10/13/89          57139     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =  137.713          temperature(kelvin)       =  975.000
0potential scatter sigma  =    4.906          lumped nuclear density    = 1.9146427E-06
0spin factor (g)          =  145.865          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 8.9190852E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 9.9509180E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
   9       5.121917E-05    .000000E+00    7.292469E-03
  10      -8.648757E-05    .000000E+00   -9.333951E-03
  11        .000000E+00    .000000E+00     .000000E+00
  12      -6.327806E-03    .000000E+00   -3.860514E-03
0excess resonance integrals
0                 resolved
0absorption      8.14388E+00
 fission          .00000E+00
- elapsed time    .12 min.
0 ce-144        mt=  102                                            58144     temperature=   975.00
0 pr-141        mt=102,103,104,105,106,107  updated 10/13/89        59141     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =  139.697          temperature(kelvin)       =  975.000
0potential scatter sigma  =    4.953          lumped nuclear density    = 9.0762717E-07
0spin factor (g)          = 1026.500          lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.8813869E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.953          sigma(per absorber atom)= 2.0990400E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  10      -3.360278E-04    .000000E+00   -1.134887E-02
  11      -5.860446E-03    .000000E+00   -7.827497E-02
  12      -7.141109E-05    .000000E+00   -5.150514E-06
0excess resonance integrals
0                 resolved
0absorption      1.22945E+01
 fission          .00000E+00
- elapsed time    .12 min.
0 pr-143        mt=102                    updated 10/13/89          59143     temperature=   975.00
0 nd-143        mt=102                    updated 10/13/89          60143     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =  141.682          temperature(kelvin)       =  975.000
0potential scatter sigma  =    5.000          lumped nuclear density    = 1.3160375E-06
0spin factor (g)          = 1964.860          lump dimension (a-bar)    = 4.6812201E-01
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0inner radius            =  .0000000E+00          dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1     =    15.995              sigma(per absorber atom)= 1.2975291E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2     =   237.953              sigma(per absorber atom)= 1.4476378E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  10      -1.795914E-05     .000000E+00    2.725170E-05
  11      -3.079928E-02     .000000E+00   -3.612095E-01
  12      -1.958079E-02     .000000E+00   -9.719688E-03
0excess resonance integrals
0                  resolved
0absorption       5.16188E+01
 fission           .00000E+00
-  elapsed time    .12 min.
0 nd-145         mt=102                    updated 10/13/89          60145     temperature=   975.00
0resonance data for this nuclide
0mass number (a)         =   143.668          temperature(kelvin)       =   975.000
0potential scatter sigma =     5.047          lumped nuclear density    = 1.1702858E-06
0spin factor (g)         =  1007.250          lump dimension (a-bar)    = 4.6812201E-01
0inner radius            =  .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1     =    15.995          sigma(per absorber atom)= 1.4591281E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2     =   237.953          sigma(per absorber atom)= 1.6279319E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  10      -3.951190E-04     .000000E+00   -6.503459E-03
  11      -7.208139E-03     .000000E+00   -2.112537E-02
  12      -1.811622E-01     .000000E+00   -1.149293E+00
  13       9.661075E-05     .000000E+00    2.032520E-04
  14      -1.255845E-01     .000000E+00   -3.369452E-03
  15       5.915707E-03     .000000E+00   -4.636812E-04
  16       1.326696E-03     .000000E+00   -1.451393E-04
  17       9.642720E-04     .000000E+00   -1.064030E-04
  18       8.539658E-04     .000000E+00   -9.313533E-05
  19       7.634105E-04     .000000E+00   -8.069882E-05
  20       2.839218E-05     .000000E+00   -2.919774E-06
0excess resonance integrals
0                  resolved
0absorption       2.09875E+02
 fission           .00000E+00
-  elapsed time    .13 min.
0 nd-147         mt=102                    updated 10/13/89          60147     temperature=   975.00
0 pm-147         mt=102                    updated 10/13/89          61147     temperature=   975.00
0resonance data for this nuclide
0mass number (a)         =   145.653          temperature(kelvin)       =   975.000
0potential scatter sigma =     5.093          lumped nuclear density    = 5.2525246E-07
0spin factor (g)         = 21589.500          lump dimension (a-bar)    = 4.6812201E-01
0inner radius            =  .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1     =    15.995          sigma(per absorber atom)= 3.2510022E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2     =   237.953          sigma(per absorber atom)= 3.6271047E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
```

```
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12      -2.040409E-02    .000000E+00   -7.208586E-03
  13      -5.404604E-03    .000000E+00   -5.833069E-04
  14      -1.221971E+01    .000000E+00   -5.349689E+00
  15       4.140149E-02    .000000E+00    6.998098E-03
  16       1.698019E-02    .000000E+00    1.746873E-03
  17       1.369755E-02    .000000E+00    1.150426E-03
  18       1.253780E-02    .000000E+00    9.649097E-04
  19       6.999617E-04    .000000E+00    5.070222E-05
0excess resonance integrals
0                resolved
0absorption     2.10647E+03
 fission         .00000E+00
- elapsed time   .13 min.
0 pm-148          mt=  102                                          61148    temperature=  975.00
0 sm-147       endf/b-v fission product      updated 10/13/89        62147    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  145.653          temperature(kelvin)      =  975.000
0potential scatter sigma  =    5.095          lumped nuclear density   = 1.3014213E-08
0spin factor (g)          =     .000          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.3121015E+07
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  257.953          sigma(per absorber atom)= 1.4638962E+07
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11       2.967257E-01    .000000E+00    1.149734E+00
  12       1.258913E+00    .000000E+00   -1.239840E+00
  13      -1.807624E+00    .000000E+00   -4.074593E-01
  14      -6.597064E-02    .000000E+00    1.964657E-03
  15       3.121567E-01    .000000E+00   -1.931211E-03
  16       7.287992E-03    .000000E+00   -3.738814E-04
  17       4.281415E-03    .000000E+00   -2.401535E-04
  18       3.510378E-03    .000000E+00   -1.997170E-04
  19       2.910571E-03    .000000E+00   -1.649401E-04
  20       8.435346E-04    .000000E+00   -4.627653E-05
0excess resonance integrals
0                resolved
0absorption     7.25125E+02
 fission         .00000E+00
- elapsed time   .15 min.
                          thermal scattering matrix number   3 at a temperature of    900.03 was selected.
0 sm-149       mt=102,103,107          updated 10/13/89          62149    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  147.638          temperature(kelvin)      =  975.000
0potential scatter sigma  =    3.260          lumped nuclear density   = 6.3574589E-08
0spin factor (g)          = 10407.900          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 2.6859740E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  257.953          sigma(per absorber atom)= 2.9967095E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
```

```
  11      8.546689E-03     .000000E+00   3.071200E-02
  12     -5.072578E-02     .000000E+00  -1.737960E-01
  13      2.521316E-02     .000000E+00   3.150472E-03
  14      2.713762E-02     .000000E+00  -5.009187E-03
0excess resonance integrals
0                 resolved
0absorption       8.04371E+02
 fission           .00000E+00
-  elapsed time    .15 min.
0 sm-150        mt=102                    updated 10/13/89          62150     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   148.629          temperature(kelvin)      =   975.000
0potential scatter sigma  =     5.162          lumped nuclear density   = 2.6025995E-07
0spin factor (g)          =  4376.420          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 6.5611206E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 7.3201650E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  10      -1.683061E-04     .000000E+00  -1.087799E-03
  11      -1.614389E-03     .000000E+00  -2.032840E-02
  12      -4.965373E-03     .000000E+00  -1.511098E-03
  13      -4.439732E-01     .000000E+00  -3.559171E-01
  14       1.066895E-04     .000000E+00  -6.433339E-05
0excess resonance integrals
0                 resolved
0absorption       2.94529E+02
 fission           .00000E+00
-  elapsed time    .15 min.
0 sm-151        mt=102,103,104,105,106,107   updated 10/13/89          62151     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   149.623          temperature(kelvin)      =   975.000
0potential scatter sigma  =     5.185          lumped nuclear density   = 1.0395211E-07
0spin factor (g)          = 75574.703          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 1.6429986E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953          sigma(per absorber atom)= 1.8330675E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  14      -5.597873E-02     .000000E+00  -1.154314E-02
  15       1.502008E+01     .000000E+00   7.627277E-02
  16      -2.169632E+01     .000000E+00  -6.130017E-02
  17       1.743943E+02     .000000E+00   8.344538E-01
  18      -3.199297E+02     .000000E+00  -1.775551E+00
  19       6.259717E+01     .000000E+00   3.869825E-01
  20       1.142084E+00     .000000E+00  -1.454869E-04
  21      -7.117520E-02     .000000E+00   1.244099E-02
  22       6.952579E-02     .000000E+00   3.839905E-03
  23      -1.091952E-02     .000000E+00   3.374090E-04
0excess resonance integrals
0                 resolved
0absorption       2.05794E+03
```

```
 fission          .00000E+00
- elapsed time    .15 min.
0 sm-152        mt=102,103,104,105,106,107     updated 10/13/89              62152     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   150.615              temperature(kelvin)       =   975.000
0potential scatter sigma  =     5.208              lumped nuclear density    = 1.1669065E-07
0spin factor (g)          =   863.594              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00           dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.4633536E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953              sigma(per absorber atom)= 1.6326464E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  9       2.403188E-06     .000000E+00    1.159107E-04
 10      -6.514932E-06     .000000E+00   -7.579467E-04
 11      -8.335952E-04     .000000E+00   -3.378294E-03
 12      -7.662735E-03     .000000E+00   -2.555129E-02
 13       4.286644E-02     .000000E+00    1.043012E-01
 14      -8.078294E+00     .000000E+00   -1.606656E+01
0excess resonance integrals
0                 resolved
0absorption      2.89993E+03
 fission          .00000E+00
- elapsed time    .17 min.
0 eu-153        mt=102,103,104,105,106,107     updated 10/13/89              63153     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   151.607              temperature(kelvin)       =   975.000
0potential scatter sigma  =     9.731              lumped nuclear density    = 5.5470167E-08
0spin factor (g)          = 12265.900              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00           dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 3.0784060E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   237.953              sigma(per absorber atom)= 3.4345413E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
 12      -2.597126E-01     .000000E+00   -5.056223E-02
 13      -2.789283E-02     .000000E+00    2.309569E-03
 14      -4.507891E-01     .000000E+00    5.321742E-03
 15       3.539744E+00     .000000E+00   -1.128980E-02
 16      -3.288790E+00     .000000E+00    8.160900E-03
 17       1.505626E-01     .000000E+00   -3.437863E-03
 18       7.726877E-02     .000000E+00   -2.231234E-03
 19       5.055485E-02     .000000E+00   -1.541142E-03
 20      -1.253799E-01     .000000E+00   -1.275125E-03
0excess resonance integrals
0                 resolved
0absorption      1.35650E+03
 fission          .00000E+00
- elapsed time    .18 min.
0 eu-154        mt=102,103,104,105,106,107     updated 10/13/89              63154     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   152.601              temperature(kelvin)       =   975.000
0potential scatter sigma  =     9.731              lumped nuclear density    = 1.6191551E-09
0spin factor (g)          = 19135.801              lump dimension (a-bar)    = 4.6812201E-01
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```
0inner radius          =  .0000000E+00        dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1   =   15.995             sigma(per absorber atom)= 1.0546222E+08
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2   =  237.953             sigma(per absorber atom)= 1.1766295E+08
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs       res fiss      res scat
  12     -3.844891E-01   .000000E+00  -6.008866E-02
  13     -2.935247E-01   .000000E+00  -2.422147E-02
  14      3.601668E-01   .000000E+00   1.521403E-02
  15      2.296982E-01   .000000E+00   2.126992E-02
  16      7.321141E+00   .000000E+00   9.281096E-02
  17     -1.436011E+02   .000000E+00  -1.874634E+00
  18      1.138977E+02   .000000E+00   1.860143E+00
  19     -1.014543E+02   .000000E+00   1.187191E+00
0excess resonance integrals
0                 resolved
0absorption      2.13752E+03
 fission          .00000E+00
- elapsed time    .18 min.
0 eu-155        mt=102,103,104,105,106,107    updated 10/13/89          63155    temperature=  975.00
0 gd-155        mt=102                        updated 10/13/89          64155    temperature=  975.00
0resonance data for this nuclide
0mass number (a)        =  153.992          temperature(kelvin)       =  975.000
0potential scatter sigma =   5.277          lumped nuclear density    = 1.0292096E-10
0spin factor (g)        = 12700.100         lump dimension (a-bar)    = 4.6812201E-01
0inner radius           = .0000000E+00      dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1   =   15.995             sigma(per absorber atom)= 1.6591342E+09
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2   =  237.953             sigma(per absorber atom)= 1.8510764E+09
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs       res fiss      res scat
  12     -1.439253E+00   .000000E+00  -1.839414E-01
  13      1.541435E+00   .000000E+00   1.985424E-01
  14      2.192417E-01   .000000E+00   9.810260E-03
  15     -3.289537E-01   .000000E+00   4.624879E-05
  16      1.477360E+00   .000000E+00  -4.148879E-03
  17      1.568859E-01   .000000E+00  -1.479158E-03
  18      9.605154E-02   .000000E+00  -1.078060E-03
  19      6.295321E-02   .000000E+00  -8.026583E-04
  20      1.670435E-02   .000000E+00   1.626720E-04
  21       .000000E+00   .000000E+00    .000000E+00
  22       .000000E+00   .000000E+00    .000000E+00
  23       .000000E+00   .000000E+00    .000000E+00
  24       .000000E+00   .000000E+00    .000000E+00
  25     -2.127644E+03   .000000E+00  -1.621878E+00
  26     -5.206572E+03   .000000E+00   1.961425E+00
  27     -1.659929E+03   .000000E+00   7.392391E-01
0excess resonance integrals
0                 resolved
0absorption      3.97085E+04
 fission          .00000E+00
- elapsed time    .20 min.
0u-234 1043 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)          92234    temperature=  975.00
0resonance data for this nuclide
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```
0mass number (a)          =  232.029          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.021          lumped nuclear density   = 5.4537390E-06
0spin factor (g)          = 6948.450          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995            sigma(per absorber atom)= 3.1310574E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.955            sigma(per absorber atom)= 3.4922141E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  11     -2.611689E-02    .000000E+00   -7.612181E-02
  12     -2.126682E-01    .000000E+00   -8.919528E-02
  13      7.759202E-04    .000000E+00   -6.469444E-04
  14     -2.071877E+01    .000000E+00   -3.392051E+00
0excess resonance integrals
0                 resolved
0absorption      5.79095E+02
 fission          .00000E+00
-  elapsed time    .20 min.
0 uranium-235    endf/b-iv mat 1261          updated 10/13/89          92235     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  233.025          temperature(kelvin)      =  975.000
0potential scatter sigma  =   11.500          lumped nuclear density   = 6.5764709E-04
0spin factor (g)          = 15171.100         lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995            sigma(per absorber atom)= 2.5965250E+02
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  238.049            sigma(per absorber atom)= 2.7865057E+02
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  12     -2.678189E+00   -1.667779E+00   -6.244083E-02
  13     -9.037070E+00   -4.490606E+00   -1.940758E-01
  14     -7.249037E+00   -4.421912E+00   -4.915668E-02
0excess resonance integrals
0                 resolved
0absorption      2.05799E+02
 fission         1.22777E+02
-  elapsed time    .22 min.
0u-236 1163 sigo=5+4 newdacs p-3 293k f-1/e-m(1.+5)                         92236     temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  234.017          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.995          lumped nuclear density   = 9.3700974E-06
0spin factor (g)          = 6328.490          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995            sigma(per absorber atom)= 1.8223898E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  237.934            sigma(per absorber atom)= 2.0328641E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  11     -4.831673E-02    .000000E+00   -1.159988E-01
  12     -2.168180E-01    .000000E+00   -1.716520E-01
  13     -5.450143E-02    .000000E+00   -3.220878E-03
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  14      -9.747294E+00     .000000E+00   -8.535867E-01
0excess resonance integrals
0                  resolved
0absorption       3.21073E+02
 fission           .00000E+00
- elapsed time     .22 min.
0 uranium-238    endf/b-iv mat 1262            updated 10/13/89              92238     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   236.006              temperature(kelvin)       =   975.000
0potential scatter sigma  =    10.599              lumped nuclear density    = 2.2047726E-02
0spin factor (g)          =   666.527              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00           dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 7.7450018E+00
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   235.041              sigma(per absorber atom)= 3.3347785E-01
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
   9      -3.951845E-02     .000000E+00   -4.057914E-01
  10      -1.027710E+00   -1.758659E-05   -6.491040E+00
  11      -9.712980E+00     .000000E+00   -2.690844E+01
  12      -4.305748E+01     .000000E+00   -4.999686E+01
  13      -5.402344E+01     .000000E+00   -1.769432E+01
  14      -1.045185E+02     .000000E+00   -6.060695E+00
0excess resonance integrals
0                  resolved
0absorption       1.79540E+01
 fission          5.08833E-04
- elapsed time     .23 min.
0 neptunium-237  endf/b-iv mat 1263            updated 10/13/89              93237     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   235.012              temperature(kelvin)       =   975.000
0potential scatter sigma  =    10.500              lumped nuclear density    = 1.4503298E-07
0spin factor (g)          = 10100.800              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00           dancoff correction (c)    = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.1773851E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051              sigma(per absorber atom)= 1.2628999E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs          res fiss        res scat
  11      -6.300456E-02   -1.849998E-06   -7.370356E-03
  12       4.587611E-02   -7.972195E-06    9.689518E-03
  13       4.458425E-02    9.277667E-06    1.734402E-03
  14       1.792238E-02    1.408881E-06   -5.424600E-04
0excess resonance integrals
0                  resolved
0absorption       2.95257E+02
 fission          1.38610E-01
- elapsed time     .27 min.
0pu-238 1050 sigo=5+4 nsx=lacs p-3 295k f-1/e-m(1.+5)                          94238     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   236.167              temperature(kelvin)       =   975.000
0potential scatter sigma  =    10.890              lumped nuclear density    = 1.7291568E-09
0spin factor (g)          = 13130.600              lump dimension (a-bar)    = 4.6812201E-01
0inner radius             = .0000000E+00           dancoff correction (c)    = 3.4269261E-01
```

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0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 9.8753152E+07
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051              sigma(per absorber atom)= 1.0592570E+08
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11       4.118560E-04    7.149554E-05    3.083266E-04
  12       3.330833E-04    4.031993E-05    1.176153E-04
  13       4.169017E-01    7.581078E-02   -9.008851E-03
  14      -3.821986E-01   -6.987093E-02    8.538968E-03
0excess resonance integrals
0                 resolved
0absorption      8.25559E+01
 fission         9.08580E+00
-  elapsed time    .27 min.
0 plutonium-239  endf/b-iv mat 1264          updated 10/13/89          94239     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   236.999          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.200          lumped nuclear density   = 1.5953416E-05
0spin factor (g)          =  6435.710          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 1.0703645E+04
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051              sigma(per absorber atom)= 1.1481062E+04
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
  11      -3.307465E-02   -1.302456E-02   -1.037173E-02
  12      -3.050663E-01   -1.139565E-01   -4.043588E-02
  13      -1.019066E+00   -6.017618E-01   -1.484912E-02
  14      -3.148845E-01   -1.654496E-01   -3.384406E-03
0excess resonance integrals
0                 resolved
0absorption      3.17688E+02
 fission         1.78181E+02
-  elapsed time    .28 min.
0 plutonium-240  endf/b-iv mat 1265          updated 10/13/89          94240     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   237.992          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.599          lumped nuclear density   = 4.3919763E-07
0spin factor (g)          =   669.244          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995              sigma(per absorber atom)= 3.8879919E+05
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051              sigma(per absorber atom)= 4.1708809E+05
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss        res scat
   9      -1.008772E-05    1.570376E-07    5.930699E-05
  10      -4.365462E-05   -3.644221E-06   -2.292318E-04
  11      -2.966925E-03   -1.695186E-05   -4.080039E-03
  12      -4.489477E-02   -2.454242E-04   -4.435378E-02
  13      -4.563928E-03   -2.798445E-05   -3.368801E-04
  14       .000000E+00     .000000E+00     .000000E+00
```

```
  15      1.759898E-02   3.358843E-06   3.504733E-03
  16      3.373545E+00   6.438660E-04   4.311619E-01
  17      5.702000E+02   1.088252E-01   5.169532E+01
  18     -2.762740E+03  -5.272812E-01  -2.215981E+02
  19      1.044371E+03   1.995225E-01   7.956591E+01
  20     -9.244925E+01  -1.764439E-02   1.799040E+00
0excess resonance integrals
0                 resolved
0absorption      8.26108E+03
 fission         2.60355E+00
-  elapsed time    .30 min.
0 plutonium-241  endf/b-iv mat 1266          updated 10/13/89          94241     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   238.978          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.999          lumped nuclear density   = 3.2676517E-08
0spin factor (g)          = 16402.100          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 5.2257610E+06
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 5.6053140E+06
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  12      1.372528E-02   1.225321E-02   6.796907E-04
  13     -2.660113E-02  -2.718522E-02  -1.892098E-03
  14      6.810925E-02   6.103687E-02   1.410021E-03
  15      1.801013E-02   1.614669E-02  -4.699224E-04
0excess resonance integrals
0                 resolved
0absorption      5.09537E+02
 fission         4.27107E+02
-  elapsed time    .32 min.
0 plutonium-242  endf/b-iv mat 1161          updated 10/13/89          94242     temperature=   975.00
0resonance data for this nuclide
0mass number (a)          =   240.145          temperature(kelvin)      =   975.000
0potential scatter sigma  =    10.694          lumped nuclear density   = 2.8698505E-10
0spin factor (g)          =  6606.710          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             =  .0000000E+00      dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =    15.995          sigma(per absorber atom)= 5.9501248E+08
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =   238.051          sigma(per absorber atom)= 6.3822893E+08
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group        res abs        res fiss       res scat
  11      1.679452E-04   .000000E+00   2.904724E-04
  12      1.326794E-03   .000000E+00   1.980113E-03
  13      1.259602E-04   .000000E+00   4.977790E-06
  14      8.150859E-02   .000000E+00   1.527816E-02
  15      5.440519E-01   .000000E+00   5.107752E-03
  16      4.034123E-02   .000000E+00  -3.459572E-03
  17      1.550421E-02   .000000E+00  -1.848309E-03
  18      1.112563E-02   .000000E+00  -1.430716E-03
0excess resonance integrals
0                 resolved
0absorption      1.11244E+03
 fission          .00000E+00
```

```
- elapsed time    .32 min.
0am-241 1056 sigp=5+4 new-lacs 218ngp p-3 295k                          95241    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  238.950          temperature(kelvin)      =  975.000
0potential scatter sigma  =    9.511          lumped nuclear density   = 8.4826070E-11
0spin factor (g)          = 82058.203          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 2.0130566E+09
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  238.051          sigma(per absorber atom)= 2.1592673E+09
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  13      4.924914E-01   1.213001E-02   4.968112E-03
  14     -4.283253E-01  -1.106702E-02  -4.417265E-03
0excess resonance integrals
0                 resolved
0absorption      1.93478E+02
 fission         1.07615E+00
-  elapsed time    .32 min.
0am-243 1057 218 gp wt f-1/e-m 090376 p3 295k                           95243    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  240.940          temperature(kelvin)      =  975.000
0potential scatter sigma  =    9.511          lumped nuclear density   = 1.7620729E-12
0spin factor (g)          = 82052.602          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 9.6908411E+10
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  238.051          sigma(per absorber atom)= 1.0894698E+11
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  13     -6.599347E-03   .000000E+00   4.388259E-04
  14      2.233646E-02   .000000E+00   2.374185E-04
0excess resonance integrals
0                 resolved
0absorption      1.60152E+02
 fission          .00000E+00
-  elapsed time    .32 min.
0 curium-244     endf/b-iv mat 1162          updated 10/13/89            96244    temperature=  975.00
0resonance data for this nuclide
0mass number (a)          =  242.133          temperature(kelvin)      =  975.000
0potential scatter sigma  =   10.320          lumped nuclear density   = 1.1760777E-14
0spin factor (g)          =  5251.150          lump dimension (a-bar)   = 4.6812201E-01
0inner radius             = .0000000E+00       dancoff correction (c)   = 3.4269261E-01
0the absorber will be treated by the nordheim integral method.
0mass of moderator-1    =   15.995          sigma(per absorber atom)= 1.4519421E+13
0moderator-1 will be treated by the nordheim integral method.
0mass of moderator-2    =  238.051          sigma(per absorber atom)= 1.5573983E+13
0moderator-2 will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group       res abs        res fiss       res scat
  11      2.589577E-04   7.065153E-06   3.064346E-04
  12      7.070909E-04   3.316988E-05   1.405958E-04
  13      2.721886E-03   1.336778E-04   7.128943E-04
```

```
  14      8.471698E-02    5.068537E-03    1.607083E-02
0excess resonance integrals
0                 resolved
0absorption       6.13904E+02
 fission          3.54222E+01
-  elapsed time    .33 min.
-  elapsed time    .33 min.
1     this xsdrn working tape was created 02/16/96 at 09:55:49
      the title of the parent case is as follows
      scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
          compiled for nrc     1/27/89
        tape id                          4321        number of nuclides                65
        number of neutron groups           27        number of gamma groups             0
        first thermal group                15        logical unit                       4
                                   table of contents
      1/v cross sections normalized to 1.0 at 0.0253 ev                          id     999
       hydrogen        endf/b-iv mat 1269/thrmf1002   updated 10/13/89           id    1001
      b-10 1273 218ngp 042375 p-3 293k                                            id    5010
       boron-11        endf/b-iv mat 1160             updated 10/13/89           id    5011
       oxygen-16       endf/b-iv mat 1276             updated 10/13/89           id    8016
       oxygen-16       endf/b-iv mat 1276             updated 10/13/89           id       6
       kr-83           mt=102,103,103,105,106,107     updated 10/13/89           id   36083
       kr-85             mt=  102                                                id   36085
       sr-90           mt=102                         updated 10/13/89           id   38090
        y-89           mt=102                         updated 10/13/89           id   39089
       zr-93             mt=  102                                                id   40093
       zr-94           mt=102                         updated 10/13/89           id   40094
       zr-95           mt=102                         updated 10/13/89           id   40095
       zircalloy       endf/b-iv mat 1284             updated 10/13/89           id   40302
       nb-94           mt=102                         updated 10/13/89           id   41094
       mo-95           mt=102                         updated 10/13/89           id   42095
       tc-99           mt=102                         updated 10/13/89           id   43099
       ru-101          mt=102                         updated 10/13/89           id   44101
       ru-106          mt=102                         updated 10/13/89           id   44106
       rh-103          mt=102                         updated 10/13/89           id   45103
       rh-105            mt=  102                                                id   45105
       pd-105          mt=102                         updated 10/13/89           id   46105
       pd-108          mt=102                         updated 10/13/89           id   46108
       silver-109      endf/b-iv mat 1139             updated 10/13/89           id   47109
       sb-124          mt=102                         updated 10/13/89           id   51124
       xe-131          mt=102,103,104,105,106         updated 10/13/89           id   54131
       xe-132          mt=102,103,104,105,106         updated 10/13/89           id   54132
       xenon-135       endf/b-iv mat 1294             updated 10/13/89           id   54135
       xe-136            mt=  102, 103, 104, 105, 107                            id   54136
       cesium-133      endf/b-iv mat 1141             updated 10/13/89           id   55133
       cs-134          mt=102                         updated 10/13/89           id   55134
       cs-135            mt=  102                                                id   55135
       cs-137          mt=102                         updated 10/13/89           id   55137
       ba-136          mt=102                         updated 10/13/89           id   56136
       la-139          mt=102                         updated 10/13/89           id   57139
       ce-144            mt=  102                                                id   58144
       pr-141          mt=102,103,104,105,106,107     updated 10/13/89           id   59141
       pr-143          mt=102                         updated 10/13/89           id   59143
       nd-143          mt=102                         updated 10/13/89           id   60143
       nd-145          mt=102                         updated 10/13/89           id   60145
       nd-147          mt=102                         updated 10/13/89           id   60147
       pm-147          mt=102                         updated 10/13/89           id   61147
       pm-148            mt=  102                                                id   61148
       sm-147          endf/b-v fission product       updated 10/13/89           id   62147
```

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      sm-149        mt=102,103,107                updated 10/13/89          id   62149
      sm-150        mt=102                        updated 10/13/89          id   62150
      sm-151        mt=102,103,104,105,106,107    updated 10/13/89          id   62151
      sm-152        mt=102,103,104,105,106,107    updated 10/13/89          id   62152
      eu-153        mt=102,103,104,105,106,107    updated 10/13/89          id   63153
      eu-154        mt=102,103,104,105,106,107    updated 10/13/89          id   63154
      eu-155        mt=102,103,104,105,106,107    updated 10/13/89          id   63155
      gd-155        mt=102                        updated 10/13/89          id   64155
     u-234 1043 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                     id   92234
      uranium-235   endf/b-iv mat 1261            updated 10/13/89          id   92235
     u-236 1163 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                     id   92236
      uranium-238   endf/b-iv mat 1262            updated 10/13/89          id   92238
      neptunium-237 endf/b-iv mat 1263            updated 10/13/89          id   93237
     pu-238 1050 sigo=5+4 newlacs p-3 293k f-1/e-m(1.+5)                    id   94238
      plutonium-239 endf/b-iv mat 1264            updated 10/13/89          id   94239
      plutonium-240 endf/b-iv mat 1265            updated 10/13/89          id   94240
      plutonium-241 endf/b-iv mat 1266            updated 10/13/89          id   94241
      plutonium-242 endf/b-iv mat 1161            updated 10/13/89          id   94242
     am-241 1056 sigo=5+4 newlacs 218ngp p-3 293k                           id   95241
     am-243 1057 218 gp wt f-1/e-m 090576 p3 293k                           id   95243
      curium-244    endf/b-iv mat 1162            updated 10/13/89          id   96244
0       tape copy used      0 i/o's, and took     .00 seconds
1 xx        xx   sssssssssss   ddddddddddd   rrrrrrrrrrr   m       m  ppppppppppp   mm        mm
  xx        xx   sssssssssssss  ddddddddddd  rrrrrrrrrrrr  mm      m  ppppppppppp   mmm       mmm
   xx      xx    ss        ss   dd       dd  rr       rr   mmm     m  pp       pp   mmmm     mmmm
    xx    xx     ss            dd       dd  rr       rr   m m     m  pp       pp   mm mm   mm mm
     xx xx       ss            dd       dd  rr       rr   m  m    m  pp       pp   mm  mm mm  mm
      xxx        sssssssssss   dd       dd  rrrrrrrrrrr   m   m   m  ppppppppppp   mm   mmm   mm
      xxx         sssssssssss  dd       dd  rrrrrrrrrrr   m    m  m  ppppppppppp   mm    m    mm
     xx xx                ss   dd       dd  rr      rr    m     m m  pp             mm         mm
    xx   xx               ss   dd       dd  rr       rr   m      mm  pp             mm         mm
   xx     xx    ss        ss   dd       dd  rr        rr  m       m  pp             mm         mm
  xx        xx   sssssssssss   ddddddddddd   rr        rr  m       m  pp             mm         mm
 xx          xx   sssssssssss   ddddddddddd   rr        rr  m       m  pp             mm         mm
0

 ddddddddddd     aaaaaaaa    w        w  iiiiiiiiiiii   sssssssssss
 ddddddddddd    aaaaaaaaaa   w        w  iiiiiiiiiiii  sssssssssssss
 dd       dd   aa      aa    w        w      ii       ss        ss
 dd       dd   aa      aa    w        w      ii       ss
 dd       dd   aa      aa    w        w      ii       ss
 dd       dd   aaaaaaaaaaaa  w        w      ii       sssssssssss
 dd       dd   aaaaaaaaaaaa   w      w       ii        sssssssssss
 dd       dd   aa      aa     w    w        ii                ss
 dd       dd   aa      aa      w  w         ii                ss
 dd       dd   aa      aa       w w         ii       ss       ss
 ddddddddddd   aa      aa        ww     iiiiiiiiiiii  sssssssssssss
 ddddddddddd   aa      aa         v     iiiiiiiiiiii   sssssssssss
0

   000000     2222222222          //     11     666666666666        //  999999999    666666666666
  00000000    2222222222          //    111     666666666666        //  999999999    666666666666
 00      00   22        22        //   1111     66                  //  99        99 66
00        00          22          //     11     66                  //  99        99 66
00        00          22          //     11     66                  //  99        99 66
00        00        22            //     11     666666666666        //  999999999999 666666666666
00        00      22              //     11     666666666666        //   999999999999 666666666666
00        00    22                //     11     66        66        //            99 66        66
00        00  22                  //     11     66        66        //            99 66        66
 00      00   22                  //     11     66        66        //            99 66        66
```

```
    000000000    2222222222222   //          11111111    6666666666666   //        9999999999999  6666666666666
     0000000     2222222222222   //          11111111     666666666666   //         999999999999   666666666666
0

     0000000      999999999                  555555555555  666666666666                    44    333333333333
    000000000    99999999999                 555555555555  666666666666                   444    333333333333
   00      00    99       99       :::       55            66              :::          444    33        33
  00        00   99       99       :::       55            66              :::         44 44            33
  00        00   99       99       :::       55            66              :::        44  44            33
  00        00   99999999999                 555555555555  666666666666               44   44          333
  00        00    99999999999                555555555555  666666666666               44   44          333
  00        00            99       :::                55  66        66    :::        44444444444          33
  00        00            99       :::                55  66        66    :::        44444444444          33
   00      00             99       :::       55       55  66        66    :::            44    33        33
    000000000    99999999999                 555555555555  666666666666                   44    333333333333
     0000000     99999999999                  5555555555   666666666666                   44     3333333333
1
0                          ssssssssss    cccccccccc    aaaaaaaa    ll          eeeeeeeeeeee
                          ssssssssssss  cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeeee
                          ss        ss  cc        cc  aa      aa  ll          ee
                          ss            cc            aa      aa  ll          ee
                          ss            cc            aa      aa  ll          ee
                          ssssssssssss  cc            aaaaaaaaaaaa ll         eeeeeeeeee
                           ssssssssssss cc            aaaaaaaaaaaa ll         eeeeeeeeee
                                     ss cc            aa      aa  ll          ee
                                     ss cc            aa      aa  ll          ee
                          ss        ss  cc        cc  aa      aa  ll          ee
                          ssssssssssss  cccccccccccc  aa      aa  llllllllllll eeeeeeeeeeee
                           ssssssssss    cccccccccc   aa      aa  llllllllllll eeeeeeeeeeee
```

```
*****************************************************************************
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                 program verification information                   *****
*****                                                                   *****
*****                 code system:    scale  version:    4.2            *****
*****                                                                   *****
*****************************************************************************
*****************************************************************************
*****                                                                   *****
*****                                                                   *****
*****            program:  c0c001                                       *****
*****                                                                   *****
*****      creation date:  04/27/95                                     *****
*****                                                                   *****
*****            library:  /neutronics/scale/exe                        *****
*****                                                                   *****
*****                                                                   *****
*****  this is not a   scale  configuration controlled code             *****
*****                                                                   *****
*****            jobname:  davis                                        *****
*****                                                                   *****
*****  date of execution:  02/16/96                                     *****
*****                                                                   *****
*****  time of execution:  09:56:43                                     *****
```

```
                    *****                                                                  *****
                    *****                                                                  *****
                    ***********************************************************************
                    ***********************************************************************
                    ***********************************************************************
1
                    80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0      -1q array has     1 entries.
0       1q array has    15 entries.
0       2q array has    10 entries.
0       3q array has    12 entries.
0       4q array has     9 entries.
0       5q array has    12 entries.
0direct access unit   9 requires    12 blocks of length  704 for cross section mixing.
1                   80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0general problem description data block
0                              general problem data

 ige  1/2/3 = plane/cylinder/sphere      2        isn  quadrature order                    8
 izm  number of zones                    4        isct order of scattering                 3
 im   number of spacial intervals       24        ievt 0/1/2/3/4/5/6=q/k/alpha/c/z/r/h     1
 ibl  0/1/2/3 = vacuum/refl/per/white    1        iim  inner iteration maximum            20
 ibr  right boundary condition           3        iom  outer iteration maximum            25
 mxx  number of mixtures                 3        iclc -1/0/n--flat res/sn/qpt             0
 ms   mixing table length               65        ith  0/1 = forward/adjoint               0
 ign  number of energy groups           27        iflu not used(always wgtd)               0
 nng  number of neutron groups          27        iprt -2/-1/0/n=mixture xsec print       -2
 ngg  number of gamma groups             0        idl  0/1/2/3=no/prt nd/pch n/both       53
 iftg number of first thermal group     15        ipbt -1/0/1=none/fine/all bal. prt       0
0                            special options

 ifg  0/1 = none/weighting calculation   1        ipn  0/1/2 diff. coef. param             0
 iqm  volumetric sources (0/n=no/yes)    0        idfm 0/1 = none/density factors 38*      1
 ipm  boundary sources (0/n=no/yes)      0        iaz  0/n = none/n activities by zone     0
 ifn  0/1/2 = input 33*/34*/use last    53        iai  0/1=none/activities by interval     0
 itmx maximum time (minutes)            10        ifct 0/1=no/yes upscatter scaling        0
 idt1 0/1/2/3=no/xsect/srce/flux--out    0        ipvt 0/1/2=no/k/alpha parametric srch    0
 isx  broad group fluxes                 0        isen outer iteration acceleration        0
 ibln activity data unit                 0        nbnd band rebaln parameter               0
 jbkl 0/1/2 buckling geometry            0
0                         weighting data (ifg=1)

 icon -1/0/1=cell/zone/region weight    -1        ihtf total xsect pan in brd gp tables    3
 igmf number of broad groups            27        nxsf pan g-g or file number              4
 itp  0/10/20/30/40 0/c/e/ac/a           0        nusf table length or max order           4
 ipp  -2/-1/0/n=wgted xsect print       -2        mxm  extra 1-d x-sect positions          0
 iap  -1/n anisn xsect print            -1
0                         floating point parameters

 eps  overall convergence        1.00000E-04      dy   cyl/pla ht for buckling     .00000E+00
 ptc  point convergence          1.00000E-04      dz   plane depth for buckling    .00000E+00
 xnf  normalization factor       1.00000E+00      vac  void streaming correction   .00000E+00
 ev   eigenvalue guess            .00000E+00      pv   ipvt=1/2--k/alpha           1.00000E+00
 evm  eigenvalue modifier         .00000E+00      eql  ev change eps for search   1.00000E-03
 bf   buckling factor=1.420892   1.42089E+00      xrpm new param mod for search   7.50000E-01
     this case will require      2535 locations for mixing
     this case has been allocated 200000 locations
1                   80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0      13q array has    65 entries.
0      14q array has    65 entries.
```

0 15q array has 65 entries.
0 data block 2 (mixing table, etc.)

0	nuclides on tape	cccc identification	mixture	mixing table component	atom density	extra xsect id's
1	999		1	92235	6.57647E-04	
2	1001		1	92234	5.45374E-06	
3	5010		1	92236	9.37010E-06	
4	5011		1	92238	2.20477E-02	
5	8016		1	8016	4.55359E-02	
6	6		3	6	2.09710E-02	
7	36083		1	36083	1.57183E-07	
8	36085		1	36085	7.63106E-08	
9	38090		1	38090	1.70684E-06	
10	39089		1	39089	5.60000E-07	
11	40093		1	42095	2.50288E-07	
12	40094		1	40093	1.24307E-06	
13	40095		1	40094	1.91444E-06	
14	40802		1	40095	1.29859E-06	
15	41094		1	41094	5.36198E-13	
16	42095		1	43099	1.77703E-06	
17	43099		1	45103	4.59914E-07	
18	44101		1	45105	1.10044E-08	
19	44106		1	44101	1.56724E-06	
20	45103		1	44106	1.80396E-07	
21	45105		1	46105	3.66502E-07	
22	46105		1	46108	4.74250E-08	
23	46108		1	47109	2.91333E-08	
24	47109		1	51124	9.07937E-12	
25	51124		1	54131	7.49268E-07	
26	54131		1	54132	1.26842E-06	
27	54132		1	54135	6.32256E-09	
28	54135		1	54136	3.00300E-06	
29	54136		1	55134	8.18674E-09	
30	55133		1	55135	9.06121E-07	
31	55134		1	55137	1.90508E-06	
32	55135		1	56136	2.19836E-09	
33	55137		1	57139	1.91454E-06	
34	56136		1	59141	9.07627E-07	
35	57139		1	59143	4.07103E-07	
36	58144		1	58144	1.48283E-06	
37	59141		1	60143	1.31604E-06	
38	59143		1	60145	1.17029E-06	
39	60143		1	61147	5.25252E-07	
40	60145		1	61148	1.26721E-09	
41	60147		1	60147	1.34940E-07	
42	61147		1	62147	1.30142E-08	
43	61148		1	62149	6.35746E-08	
44	62147		1	62150	2.60260E-07	
45	62149		1	62151	1.03952E-07	
46	62150		1	62152	1.16691E-07	
47	62151		1	64155	1.02921E-10	
48	62152		1	63153	5.54702E-08	
49	63153		1	63154	1.61916E-09	
50	63154		1	63155	1.09678E-08	
51	63155		2	40802	4.25156E-02	
52	64155		3	1001	4.19420E-02	
53	92234		3	5010	3.81515E-06	
54	92235		3	5011	1.54884E-05	
55	92236		1	55133	1.82872E-06	
56	92238		1	95237	1.45033E-07	

57	95237	1	94238	1.72916E-09
58	94238	1	94239	1.59534E-05
59	94239	1	94240	4.39198E-07
60	94240	1	94241	3.26785E-08
61	94241	1	94242	2.86985E-10
62	94242	1	95241	8.48261E-11
63	95241	1	95243	1.76207E-12
64	95243	1	96244	1.17608E-14
65	96244	1	999	1.00000E-20

- elapsed time .00 min.
0 21649 locations will be used
0 35q array has 25 entries.
0 36q array has 24 entries.
0 38q array has 24 entries.
0 39q array has 4 entries.
0 40q array has 4 entries.
0 47q array has 27 entries.
0 51q array has 27 entries.
1 80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp

neutron group parameters

0 gp	energy boundaries	lethargy boundaries	weighted velocities	broad gp numbers	calc type	group band	right albedo	left albedo
1	2.00000E+07	-6.93147E-01	4.60581E+09	1	0	1	1.00000E+00	
2	6.43400E+06	4.40989E-01	2.88737E+09	2	0	2	1.00000E+00	
3	3.00000E+06	1.20397E+00	2.12201E+09	3	0	3	1.00000E+00	
4	1.85000E+06	1.68740E+00	1.75673E+09	4	0	4	1.00000E+00	
5	1.40000E+06	1.96611E+00	1.46535E+09	5	0	5	1.00000E+00	
6	9.00000E+05	2.40795E+00	1.06620E+09	6	0	6	1.00000E+00	
7	4.00000E+05	3.21888E+00	6.07557E+08	7	0	7	1.00000E+00	
8	1.00000E+05	4.60517E+00	2.72415E+08	8	0	8	1.00000E+00	
9	1.70000E+04	6.37713E+00	1.13526E+08	9	0	9	1.00000E+00	
10	3.00000E+03	8.11173E+00	4.82126E+07	10	0	10	1.00000E+00	
11	5.50000E+02	9.80818E+00	2.05946E+07	11	0	11	1.00000E+00	
12	1.00000E+02	1.15129E+01	1.01036E+07	12	0	12	1.00000E+00	
13	3.00000E+01	1.27169E+01	5.69595E+06	13	0	13	1.00000E+00	
14	1.00000E+01	1.38155E+01	3.20957E+06	14	0	14	1.00000E+00	
15	3.04999E+00	1.50080E+01	2.10601E+06	15	0	15	1.00000E+00	
16	1.77000E+00	1.55471E+01	1.70522E+06	16	0	16	1.00000E+00	
17	1.29999E+00	1.58557E+01	1.52545E+06	17	0	17	1.00000E+00	
18	1.12999E+00	1.59959E+01	1.42867E+06	18	0	18	1.00000E+00	
19	1.00000E+00	1.61181E+01	1.31002E+06	19	0	19	1.00000E+00	
20	8.00000E-01	1.63412E+01	9.05898E+05	20	0	20	1.00000E+00	
21	4.00000E-01	1.70344E+01	8.17974E+05	21	0	21	1.00000E+00	
22	3.25000E-01	1.72620E+01	6.90070E+05	22	0	22	1.00000E+00	
23	2.25000E-01	1.76098E+01	4.86953E+05	23	0	23	1.00000E+00	
24	9.99999E-02	1.84207E+01	3.57766E+05	24	0	24	1.00000E+00	
25	5.00000E-02	1.91138E+01	2.71895E+05	25	0	25	1.00000E+00	
26	3.00000E-02	1.95247E+01	1.87283E+05	26	0	26	1.00000E+00	
27	1.00000E-02	2.07233E+01	8.88201E+04	27	0	27	1.00000E+00	
28	1.00000E-05	2.76310E+01						

1 80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp

0	mixture by zone	order p(l) by zone	activity table matl no.	reaction	quadrature constants weights	directions	refl direc	wt x cos
1	1	3			0	-2.79004E-01	3	0
2	1	3			5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	2	3			5.06143E-02	1.97286E-01	2	9.98548E-03
4	3	3			0	-6.04419E-01	8	0
5					5.55953E-02	-5.58410E-01	8	-3.10450E-02
6					5.55953E-02	-2.31301E-01	7	-1.28595E-02
7					5.55953E-02	2.31301E-01	6	1.28595E-02

8	5.55953E-02	5.58410E-01	5	3.10450E-02
9	0	-8.50774E-01	15	0
10	5.22844E-02	-8.21784E-01	15	-4.29665E-02
11	5.22844E-02	-6.01588E-01	14	-3.14537E-02
12	5.22844E-02	-2.20196E-01	13	-1.15128E-02
13	5.22844E-02	2.20196E-01	12	1.15128E-02
14	5.22844E-02	6.01588E-01	11	3.14537E-02
15	5.22844E-02	8.21784E-01	10	4.29665E-02
16	0	-9.83032E-01	24	0
17	4.53355E-02	-9.64143E-01	24	-4.37099E-02
18	4.53355E-02	-8.17361E-01	23	-3.70555E-02
19	4.53355E-02	-5.46143E-01	22	-2.47597E-02
20	4.53355E-02	-1.91780E-01	21	-8.69444E-03
21	4.53355E-02	1.91780E-01	20	8.69444E-03
22	4.53355E-02	5.46143E-01	19	2.47597E-02
23	4.53355E-02	8.17361E-01	18	3.70555E-02
24	4.53355E-02	9.64143E-01	17	4.37099E-02

0constants for p(3) scattering

0angl	set 1	set 2	set 3	set 4	set 5
1	-2.79004E-01	8.83235E-01	6.74143E-02	-6.16919E-01	-1.71701E-02
2	-1.97286E-01	8.83235E-01	.00000E+00	-4.36228E-01	1.21411E-02
3	1.97286E-01	8.83235E-01	.00000E+00	4.36228E-01	-1.21411E-02
4	-6.04419E-01	4.52016E-01	3.16379E-01	-8.04436E-01	-1.74564E-01
5	-5.58410E-01	4.52016E-01	2.23714E-01	-7.43201E-01	-6.68028E-02
6	-2.31301E-01	4.52016E-01	-2.23713E-01	-3.07844E-01	1.61278E-01
7	2.31301E-01	4.52016E-01	-2.23713E-01	3.07844E-01	-1.61278E-01
8	5.58410E-01	4.52016E-01	2.23713E-01	7.43201E-01	6.68028E-02
9	-8.50774E-01	-8.57235E-02	6.26843E-01	-1.98456E-01	-4.86839E-01
10	-8.21784E-01	-8.57235E-02	5.42862E-01	-1.91694E-01	-3.44245E-01
11	-6.01588E-01	-8.57235E-02	.00000E+00	-1.40530E-01	3.44245E-01
12	-2.20196E-01	-8.57235E-02	-5.42862E-01	-5.13643E-02	3.44245E-01
13	2.20196E-01	-8.57235E-02	-5.42862E-01	5.13643E-02	-3.44245E-01
14	6.01588E-01	-8.57235E-02	.00000E+00	1.40530E-01	-3.44245E-01
15	8.21784E-01	-8.57235E-02	5.42862E-01	1.91694E-01	3.44245E-01
16	-9.83032E-01	-4.49528E-01	8.36885E-01	5.00703E-01	-7.51005E-01
17	-9.64143E-01	-4.49528E-01	7.73181E-01	4.91083E-01	-6.26438E-01
18	-8.17361E-01	-4.49528E-01	3.20862E-01	4.16320E-01	1.46514E-01
19	-5.46143E-01	-4.49528E-01	-3.20862E-01	2.78176E-01	7.36575E-01
20	-1.91780E-01	-4.49528E-01	-7.73181E-01	9.76824E-02	4.17256E-01
21	1.91780E-01	-4.49528E-01	-7.73181E-01	-9.76824E-02	-4.17256E-01
22	5.46143E-01	-4.49528E-01	-3.20862E-01	-2.78176E-01	-7.36575E-01
23	8.17361E-01	-4.49528E-01	3.20862E-01	-4.16320E-01	-1.46514E-01
24	9.64143E-01	-4.49528E-01	7.73181E-01	-4.91083E-01	6.26438E-01

1 int	radii	mid pts	zone no.	areas	volumes	dens fact	radius rod	spec(int)
1	0	1.29551E-02	1	0	2.10906E-03	1.00000E+00	0	
2	2.59102E-02	4.33406E-02	1	1.62798E-01	9.49318E-03	1.00000E+00	0	
3	6.07710E-02	8.75100E-02	1	3.81835E-01	2.94045E-02	1.00000E+00	0	
4	1.14249E-01	1.74155E-01	1	7.17848E-01	1.31104E-01	1.00000E+00	0	
5	2.34061E-01	2.93967E-01	1	1.47065E+00	2.21299E-01	1.00000E+00		
6	3.53873E-01	3.80612E-01	1	2.22545E+00	1.27890E-01	1.00000E+00		
7	4.07351E-01	4.24781E-01	1	2.55946E+00	9.30429E-02	1.00000E+00		
8	4.42212E-01	4.55167E-01	1	2.77850E+00	7.41004E-02	1.00000E+00		
9	4.68122E-01	4.68814E-01	2	2.94130E+00	4.07946E-03	0		
10	4.69507E-01	4.71481E-01	2	2.95000E+00	1.16988E-02	0		
11	4.73456E-01	4.75431E-01	2	2.97481E+00	1.17968E-02	0		
12	4.77405E-01	4.78098E-01	2	2.99962E+00	4.16023E-03	0		
13	4.78790E-01	4.83159E-01	3	3.00833E+00	2.65268E-02	1.00000E+00		
14	4.87528E-01	4.99187E-01	3	3.06323E+00	7.82768E-02	1.00000E+00		
15	5.12445E-01	5.24903E-01	3	3.21979E+00	8.21777E-02	1.00000E+00		
16	5.37362E-01	5.41731E-01	3	3.37634E+00	2.97427E-02	1.00000E+00		

```
   17 5.46100E-01 5.53513E-01      4      3.43125E+00 5.15631E-02 1.00000E+00
   18 5.60926E-01 5.70900E-01      4      3.52440E+00 7.15548E-02 1.00000E+00
   19 5.80874E-01 5.96175E-01      4      3.64974E+00 1.14628E-01 1.00000E+00
   20 6.11475E-01 6.45755E-01      4      3.84201E+00 2.78169E-01 1.00000E+00
   21 6.80034E-01 7.14313E-01      4      4.27278E+00 3.07702E-01 1.00000E+00
   22 7.48592E-01 7.63893E-01      4      4.70854E+00 1.46875E-01 1.00000E+00
   23 7.79193E-01 7.89167E-01      4      4.89582E+00 9.89116E-02 1.00000E+00
   24 7.99141E-01 8.06554E-01      4      5.02115E+00 7.51357E-02 1.00000E+00
   25 8.13968E-01                         5.11431E+00
- elapsed time     .00 min.
1 outer inner 1 - balance   eigenvalue 1 - source   1 - scatter 1 - upscat    search        time
  iter iters                            ratio       ratio       ratio       parameter      (min)
    1   147 2.05396E-05 1.15254E+00 -1.69535E-01 1.00000E+00 -5.15655E-02 .00000E+00      .0000
    2   224 -1.01925E-05 1.16913E+00 -8.23960E-04 -1.94420E-02 -4.23725E-03 .00000E+00      .0000
    3   284 9.99778E-06 1.17018E+00 -6.02814E-05 -1.40603E-03 -7.20483E-04 .00000E+00      .0000
    4   330 -9.17736E-06 1.17066E+00 -8.10909E-06 -2.39247E-04 -1.18746E-04 .00000E+00      .0167
    5   358 -1.26134E-05 1.17074E+00 -1.63350E-06 -3.91102E-05 -1.71441E-05 .00000E+00      .0167
                                                                grp to grp inner  mfd   max. flux  msf  max. scale coarse
                                                                           iters  int.  difference int.   factor   mesh
                                                                  1       1     1     1  4.99248E-08  24 1.00000E+00    1
                                                                  2       2     1     1  5.87108E-08  24 1.00000E+00    1
                                                                  3       3     1     1  5.47128E-08  24 1.00000E+00    1
                                                                  4       4     1     1  5.34388E-08  24 1.00000E+00    1
                                                                  5       5     1     1  5.75189E-08  24 1.00000E+00    1
                                                                  6       6     1     1  3.76123E-08  24 1.00000E+00    1
                                                                  7       7     1     1  2.81291E-08  24 1.00000E+00    1
                                                                  8       8     1     1  6.92915E-09  24 1.00000E+00    1
                                                                  9       9     1     2  3.52378E-09  24 1.00000E+00    1
                                                                 10      10     1     1  3.58770E-09  24 1.00000E+00    1
                                                                 11      11     1     1  3.62354E-09  24 1.00000E+00    1
                                                                 12      12     1     2  8.81806E-10  24 1.00000E+00    1
                                                                 13      13     1    24  1.33697E-09  24 1.00000E+00    1
                                                                 14      14     1    24  1.52826E-09  24 1.00000E+00    1
                                                                 15      15     1    24  2.88251E-05  24 9.99989E-01    1
                                                                 16      16     1    24  3.60887E-05  24 9.99993E-01    1
                                                                 17      17     1    24  4.82099E-05  24 9.99997E-01    1
                                                                 18      18     1    24  5.34601E-05  24 9.99998E-01    1
                                                                 19      19     1    24  4.87907E-05  24 9.99994E-01    1
                                                                 20      20     1    24  4.32702E-05  24 9.99978E-01    1
                                                                 21      21     1    18  2.04876E-05  24 9.99950E-01    1
                                                                 22      22     1    24  3.74352E-05  24 9.99995E-01    1
                                                                 23      23     1    24  2.78780E-06  24 1.00000E+00    1
                                                                 24      24     1    24  1.01146E-05  24 1.00000E+00    1
                                                                 25      25     1    24  1.09008E-05  24 1.00000E+00    1
                                                                 26      26     1     1  5.53232E-06  21 1.00000E+00    2
                                                                 27      27     1     2  1.83999E-06  24 1.00000E+00    2
    6   385 3.06809E-07 1.17058E+00 -2.09826E-07 -5.63458E-06 -2.91083E-06 .00000E+00      .0167
          final monitor
                 lambda 1.17058E+00        production/absorption 1.17058E+00        angular flux on  16
- elapsed time     .02 min.
1                   80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gd/mtu burn high temp
0 int. zone number     radius   int. midpoint    area       volume    prod density
    1       1        .00000E+00 1.29551E-02  .00000E+00 2.10909E-03 3.43615E-03
    2       1       2.59102E-02 4.33406E-02 1.62798E-01 9.49318E-03 1.54601E-02
    3       1       6.07710E-02 8.75100E-02 3.81835E-01 2.94045E-02 4.79692E-02
    4       1       1.14249E-01 1.74155E-01 7.17848E-01 1.31104E-01 2.15784E-01
    5       1       2.34061E-01 2.95967E-01 1.47085E+00 2.21299E-01 3.72264E-01
    6       1       3.53873E-01 3.80612E-01 2.22345E+00 1.27890E-01 2.20345E-01
    7       1       4.07351E-01 4.24781E-01 2.55946E+00 9.30429E-02 1.63191E-01
    8       1       4.42212E-01 4.55167E-01 2.77850E+00 7.41004E-02 1.32131E-01
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9	2	4.68122E-01	4.68814E-01	2.94130E+00	4.07946E-03	.00000E+00
10	2	4.69507E-01	4.71481E-01	2.95000E+00	1.16988E-02	.00000E+00
11	2	4.73456E-01	4.75431E-01	2.97481E+00	1.17968E-02	.00000E+00
12	2	4.77405E-01	4.78098E-01	2.99962E+00	4.16023E-03	.00000E+00
13	3	4.78790E-01	4.83159E-01	3.00833E+00	2.65268E-02	.00000E+00
14	3	4.87528E-01	4.99987E-01	3.06323E+00	7.82768E-02	.00000E+00
15	3	5.12445E-01	5.24903E-01	3.21979E+00	8.21777E-02	.00000E+00
16	3	5.37362E-01	5.41731E-01	3.37634E+00	2.97427E-02	.00000E+00
17	4	5.46100E-01	5.53513E-01	3.43125E+00	5.15631E-02	.00000E+00
18	4	5.60926E-01	5.70900E-01	3.52440E+00	7.15548E-02	.00000E+00
19	4	5.80874E-01	5.96175E-01	3.64974E+00	1.14628E-01	.00000E+00
20	4	6.11475E-01	6.45755E-01	3.84201E+00	2.78169E-01	.00000E+00
21	4	6.80034E-01	7.14313E-01	4.27278E+00	3.07702E-01	.00000E+00
22	4	7.48592E-01	7.63893E-01	4.70354E+00	1.46875E-01	.00000E+00
23	4	7.79193E-01	7.89167E-01	4.89582E+00	9.89116E-02	.00000E+00
24	4	7.99141E-01	8.06554E-01	5.02115E+00	7.51357E-02	.00000E+00
25		8.13968E-01		5.11431E+00		

1 80 d, sas2h: babcock wilcox 15x15, 3.00w%, 20gd/mtu burn high temp

0 total flux

0 int.	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.69674E-01	1.30668E+00	1.66967E+00	1.03835E+00	1.57396E+00	3.03068E+00	2.90513E+00	2.07895E+00
2	1.69735E-01	1.30730E+00	1.67060E+00	1.03885E+00	1.57467E+00	3.03199E+00	2.90580E+00	2.07901E+00
3	1.69679E-01	1.30668E+00	1.66971E+00	1.03837E+00	1.57386E+00	3.03036E+00	2.90478E+00	2.07892E+00
4	1.69259E-01	1.30244E+00	1.66423E+00	1.03502E+00	1.56852E+00	3.01978E+00	2.89835E+00	2.07777E+00
5	1.68296E-01	1.29157E+00	1.65033E+00	1.02656E+00	1.55512E+00	2.99359E+00	2.88272E+00	2.07517E+00
6	1.67150E-01	1.27921E+00	1.63471E+00	1.01712E+00	1.54025E+00	2.96494E+00	2.86568E+00	2.07230E+00
7	1.66239E-01	1.26955E+00	1.62269E+00	1.00995E+00	1.52908E+00	2.94381E+00	2.85316E+00	2.07014E+00
8	1.65338E-01	1.26016E+00	1.61118E+00	1.00318E+00	1.51870E+00	2.92453E+00	2.84187E+00	2.06810E+00
9	1.64845E-01	1.25508E+00	1.60501E+00	9.99591E-01	1.51324E+00	2.91449E+00	2.83604E+00	2.06703E+00
10	1.64743E-01	1.25406E+00	1.60378E+00	9.98899E-01	1.51224E+00	2.91269E+00	2.83505E+00	2.06685E+00
11	1.64593E-01	1.25258E+00	1.60200E+00	9.97908E-01	1.51081E+00	2.91015E+00	2.83364E+00	2.06665E+00
12	1.64493E-01	1.25160E+00	1.60083E+00	9.97264E-01	1.50989E+00	2.90851E+00	2.83274E+00	2.06657E+00
13	1.64309E-01	1.24978E+00	1.59863E+00	9.96024E-01	1.50807E+00	2.90506E+00	2.83080E+00	2.06599E+00
14	1.63808E-01	1.24462E+00	1.59214E+00	9.92187E-01	1.50224E+00	2.89374E+00	2.82435E+00	2.06495E+00
15	1.63245E-01	1.23836E+00	1.58378E+00	9.88869E-01	1.49382E+00	2.87704E+00	2.81472E+00	2.06383E+00
16	1.62970E-01	1.23490E+00	1.57878E+00	9.83399E-01	1.48809E+00	2.86546E+00	2.80795E+00	2.06332E+00
17	1.62838E-01	1.23291E+00	1.57568E+00	9.81070E-01	1.48410E+00	2.85749E+00	2.80331E+00	2.06318E+00
18	1.62664E-01	1.23084E+00	1.57171E+00	9.78059E-01	1.47903E+00	2.84750E+00	2.79742E+00	2.06305E+00
19	1.62447E-01	1.22728E+00	1.56710E+00	9.74735E-01	1.47334E+00	2.83632E+00	2.79084E+00	2.06282E+00
20	1.62158E-01	1.22333E+00	1.56124E+00	9.70519E-01	1.46625E+00	2.82263E+00	2.78267E+00	2.06251E+00
21	1.61958E-01	1.22057E+00	1.55712E+00	9.67535E-01	1.46122E+00	2.81259E+00	2.77696E+00	2.06241E+00
22	1.61960E-01	1.22045E+00	1.55683E+00	9.67253E-01	1.46070E+00	2.81158E+00	2.77651E+00	2.06264E+00
23	1.62083E-01	1.22129E+00	1.55795E+00	9.67983E-01	1.46188E+00	2.81388E+00	2.77800E+00	2.06292E+00
24	1.62118E-01	1.22229E+00	1.55951E+00	9.68881E-01	1.46334E+00	2.81674E+00	2.77981E+00	2.06319E+00

0 int.	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.58454E+00	1.44189E+00	1.29985E+00	7.95191E-01	6.73673E-01	5.99085E-01	3.73113E-01	2.08434E-01
2	1.58446E+00	1.44179E+00	1.29968E+00	7.92559E-01	6.73465E-01	5.98803E-01	3.73083E-01	2.08416E-01
3	1.58465E+00	1.44201E+00	1.30015E+00	7.93504E-01	6.73904E-01	5.99453E-01	3.73158E-01	2.08453E-01
4	1.58670E+00	1.44327E+00	1.30282E+00	7.95568E-01	6.76417E-01	6.03118E-01	3.73574E-01	2.08661E-01
5	1.58834E+00	1.44636E+00	1.30595E+00	8.04134E-01	6.82618E-01	6.12205E-01	3.74578E-01	2.09167E-01
6	1.59128E+00	1.44973E+00	1.31658E+00	8.12464E-01	6.89433E-01	6.22251E-01	3.75660E-01	2.09718E-01
7	1.59350E+00	1.45220E+00	1.32188E+00	8.18639E-01	6.94474E-01	6.29737E-01	3.76439E-01	2.10120E-01
8	1.59561E+00	1.45444E+00	1.32670E+00	8.24308E-01	6.99094E-01	6.36633E-01	3.77134E-01	2.10484E-01
9	1.59673E+00	1.45560E+00	1.32920E+00	8.27254E-01	7.01495E-01	6.40219E-01	3.77490E-01	2.10672E-01
10	1.59693E+00	1.45579E+00	1.32960E+00	8.27728E-01	7.01889E-01	6.40796E-01	3.77550E-01	2.10704E-01
11	1.59722E+00	1.45606E+00	1.33017E+00	8.28405E-01	7.02452E-01	6.41621E-01	3.77636E-01	2.10751E-01
12	1.59741E+00	1.45624E+00	1.33054E+00	8.28844E-01	7.02817E-01	6.42155E-01	3.77692E-01	2.10781E-01
13	1.59779E+00	1.45659E+00	1.33130E+00	8.29739E-01	7.03562E-01	6.43245E-01	3.77806E-01	2.10842E-01
14	1.59883E+00	1.45774E+00	1.33372E+00	8.32537E-01	7.05894E-01	6.46658E-01	3.78173E-01	2.11034E-01
15	1.59999E+00	1.45936E+00	1.33713E+00	8.36398E-01	7.09112E-01	6.51361E-01	3.78693E-01	2.11300E-01

16	1.60055E+00	1.46044E+00	1.33958E+00	8.38889E-01	7.11186E-01	6.54389E-01	3.79057E-01	2.11472E-01
17	1.60085E+00	1.46125E+00	1.34106E+00	8.40719E-01	7.12677E-01	6.56995E-01	3.79226E-01	2.11579E-01
18	1.60130E+00	1.46234E+00	1.34334E+00	8.43220E-01	7.14698E-01	6.59601E-01	3.79438E-01	2.11711E-01
19	1.60187E+00	1.46359E+00	1.34596E+00	8.46099E-01	7.17027E-01	6.63068E-01	3.79688E-01	2.11868E-01
20	1.60266E+00	1.46517E+00	1.34927E+00	8.49789E-01	7.19998E-01	6.67485E-01	3.79990E-01	2.12062E-01
21	1.60324E+00	1.46630E+00	1.35164E+00	8.52384E-01	7.22084E-01	6.70617E-01	3.80144E-01	2.12176E-01
22	1.60331E+00	1.46641E+00	1.35187E+00	8.52613E-01	7.22221E-01	6.70862E-01	3.80060E-01	2.12148E-01
23	1.60315E+00	1.46613E+00	1.35127E+00	8.51933E-01	7.21629E-01	6.70019E-01	3.79917E-01	2.12080E-01
24	1.60295E+00	1.46578E+00	1.35053E+00	8.51094E-01	7.20913E-01	6.68989E-01	3.79772E-01	2.12008E-01

0 int.	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.05268E-02	7.49131E-02	1.42844E-01	4.65014E-01	1.38200E-01	2.70211E-01	8.38324E-01	5.89345E-01
2	9.05094E-02	7.48905E-02	1.42816E-01	4.64916E-01	1.38139E-01	2.70062E-01	8.37865E-01	5.88943E-01
3	9.05404E-02	7.49525E-02	1.42866E-01	4.65095E-01	1.38264E-01	2.70428E-01	8.38908E-01	5.90084E-01
4	9.07239E-02	7.51788E-02	1.43168E-01	4.66152E-01	1.38983E-01	2.72472E-01	8.44796E-01	5.96305E-01
5	9.11771E-02	7.57895E-02	1.43908E-01	4.68756E-01	1.40768E-01	2.77553E-01	8.59895E-01	6.11777E-01
6	9.16742E-02	7.64622E-02	1.44715E-01	4.71604E-01	1.42738E-01	2.83190E-01	8.75511E-01	6.28988E-01
7	9.20415E-02	7.69620E-02	1.45307E-01	4.73699E-01	1.44203E-01	2.87409E-01	8.87496E-01	6.41911E-01
8	9.23782E-02	7.74224E-02	1.45846E-01	4.75614E-01	1.45553E-01	2.91311E-01	8.98527E-01	6.53909E-01
9	9.25535E-02	7.76624E-02	1.46126E-01	4.76609E-01	1.46255E-01	2.93342E-01	9.04257E-01	6.60159E-01
10	9.25832E-02	7.77023E-02	1.46173E-01	4.76775E-01	1.46368E-01	2.93660E-01	9.05154E-01	6.61095E-01
11	9.26256E-02	7.77592E-02	1.46240E-01	4.77013E-01	1.46528E-01	2.94114E-01	9.06432E-01	6.62428E-01
12	9.26530E-02	7.77960E-02	1.46284E-01	4.77167E-01	1.46632E-01	2.94408E-01	9.07256E-01	6.63287E-01
13	9.27091E-02	7.78712E-02	1.46373E-01	4.77482E-01	1.46845E-01	2.95008E-01	9.08942E-01	6.65042E-01
14	9.28934E-02	7.81064E-02	1.46653E-01	4.78464E-01	1.47514E-01	2.96876E-01	9.14195E-01	6.70452E-01
15	9.31249E-02	7.84295E-02	1.47087E-01	4.79809E-01	1.48440E-01	2.99426E-01	9.21338E-01	6.77688E-01
16	9.32790E-02	7.86367E-02	1.47285E-01	4.80667E-01	1.49087E-01	3.01047E-01	9.25852E-01	6.82169E-01
17	9.33886E-02	7.87900E-02	1.47461E-01	4.81258E-01	1.49502E-01	3.02316E-01	9.29604E-01	6.86272E-01
18	9.35372E-02	7.90012E-02	1.47701E-01	4.82151E-01	1.50157E-01	3.04134E-01	9.35210E-01	6.92730E-01
19	9.37094E-02	7.92450E-02	1.47975E-01	4.83151E-01	1.50915E-01	3.06256E-01	9.41902E-01	7.00510E-01
20	9.39283E-02	7.95560E-02	1.48333E-01	4.84435E-01	1.51890E-01	3.09008E-01	9.50809E-01	7.10988E-01
21	9.40794E-02	7.97778E-02	1.48581E-01	4.85339E-01	1.52595E-01	3.11027E-01	9.57573E-01	7.19156E-01
22	9.40854E-02	7.97972E-02	1.48593E-01	4.85402E-01	1.52682E-01	3.11273E-01	9.58625E-01	7.20707E-01
23	9.40389E-02	7.97402E-02	1.48519E-01	4.85148E-01	1.52519E-01	3.10816E-01	9.57321E-01	7.19412E-01
24	9.39841E-02	7.96700E-02	1.48432E-01	4.84842E-01	1.52311E-01	3.10233E-01	9.55576E-01	7.17566E-01

0 int.	grp. 25	grp. 26	grp. 27
1	2.40405E-01	1.43572E-01	1.82493E-02
2	2.40239E-01	1.43274E-01	1.82530E-02
3	2.40861E-01	1.43880E-01	1.84376E-02
4	2.44117E-01	1.46888E-01	1.92662E-02
5	2.52227E-01	1.54414E-01	2.13758E-02
6	2.61299E-01	1.62936E-01	2.38511E-02
7	2.68161E-01	1.69485E-01	2.58664E-02
8	2.74583E-01	1.75708E-01	2.78689E-02
9	2.77989E-01	1.78980E-01	2.89320E-02
10	2.78423E-01	1.79417E-01	2.90634E-02
11	2.79113E-01	1.80089E-01	2.92262E-02
12	2.79557E-01	1.80439E-01	2.93375E-02
13	2.80460E-01	1.81253E-01	2.95635E-02
14	2.83203E-01	1.83702E-01	3.02517E-02
15	2.86775E-01	1.86840E-01	3.10579E-02
16	2.88913E-01	1.88679E-01	3.15188E-02
17	2.91054E-01	1.90865E-01	3.22314E-02
18	2.94591E-01	1.94675E-01	3.35314E-02
19	2.98895E-01	1.99800E-01	3.50636E-02
20	3.04765E-01	2.05594E-01	3.70654E-02
21	3.09447E-01	2.10726E-01	3.87006E-02
22	3.10461E-01	2.12085E-01	3.91892E-02
23	3.09846E-01	2.11579E-01	3.91320E-02
24	3.08903E-01	2.10742E-01	3.89481E-02

- elapsed time .02 min.

1fine group summary for zone 1 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.15908E-02	.00000E+00	1.21481E-02	1.00810E-02	3.09144E-03	1.06192E-02	9.98828E-01
2	.00000E+00	1.89806E-01	2.22135E-03	1.64506E-01	6.53231E-02	1.34789E-02	1.13236E-01	1.00004E+00
3	.00000E+00	2.15143E-01	2.57561E-02	1.60145E-01	8.06667E-02	1.55694E-02	1.44661E-01	1.00001E+00
4	.00000E+00	1.24340E-01	3.85958E-02	1.04853E-01	6.77161E-02	7.45523E-03	8.77619E-02	1.00001E+00
5	.00000E+00	1.65620E-01	6.74914E-02	2.58969E-01	9.47629E-02	4.48859E-03	1.33862E-01	9.99991E-01
6	.00000E+00	1.79580E-01	1.34183E-01	6.53717E-01	5.44423E-02	7.15425E-03	2.52157E-01	1.00008E+00
7	.00000E+00	8.90859E-02	9.82803E-02	7.45598E-01	3.63447E-02	7.81134E-03	1.43213E-01	1.00001E+00
8	.00000E+00	1.37510E-02	4.25657E-02	6.31132E-01	2.14716E-02	1.42741E-02	2.05686E-02	1.00004E+00
9	.00000E+00	9.98654E-04	2.16931E-02	5.34415E-01	2.06194E-02	2.35072E-02	-2.14347E-02	9.99991E-01
10	.00000E+00	7.41661E-05	2.05412E-02	4.57425E-01	1.05386E-02	3.65472E-02	-2.64710E-02	1.00001E+00
11	.00000E+00	5.83497E-06	1.06395E-02	4.17259E-01	8.09771E-03	5.88987E-02	-5.63515E-02	1.00001E+00
12	.00000E+00	4.09897E-07	8.09775E-03	2.36125E-01	9.33482E-03	6.36837E-02	-6.49171E-02	9.99956E-01
13	.00000E+00	6.50880E-08	9.33483E-03	1.74619E-01	6.16570E-03	5.70097E-02	-5.38409E-02	1.00001E+00
14	.00000E+00	1.28987E-08	6.16570E-03	1.51883E-01	7.54330E-03	7.76143E-02	-7.89921E-02	1.00000E+00
15	.00000E+00	1.45770E-09	7.63279E-03	8.56730E-02	8.97342E-03	6.76259E-03	-8.10665E-03	1.00019E+00
16	.00000E+00	4.28030E-10	9.15594E-03	4.36836E-02	9.79747E-03	3.75713E-03	-4.40072E-03	1.00015E+00
17	.00000E+00	1.37847E-10	8.04885E-03	1.55153E-02	7.96427E-03	4.15374E-03	-4.07002E-03	1.00007E+00
18	.00000E+00	9.86942E-11	7.52836E-03	1.23595E-02	7.32564E-03	5.68945E-03	-5.48621E-03	1.00008E+00
19	.00000E+00	1.39533E-10	9.29629E-03	2.71943E-02	1.03349E-02	5.78997E-03	-6.52989E-03	1.00005E+00
20	.00000E+00	2.26894E-10	1.18167E-02	1.11290E-01	1.04966E-02	2.43915E-02	-2.30741E-02	1.00008E+00
21	.00000E+00	3.32100E-11	1.03831E-02	2.65557E-02	1.02679E-02	1.60485E-02	-1.59358E-02	1.00009E+00
22	.00000E+00	3.85312E-11	1.45623E-02	5.95232E-02	1.33542E-02	4.58394E-02	-4.46335E-02	1.00004E+00
23	.00000E+00	3.68400E-11	1.90099E-02	2.03773E-01	2.23190E-02	1.26400E-01	-1.29720E-01	1.00007E+00
24	.00000E+00	1.00274E-11	2.66695E-02	1.36172E-01	2.62370E-02	1.37548E-01	-1.37123E-01	1.00005E+00
25	.00000E+00	2.93536E-12	2.23268E-02	5.08687E-02	1.66509E-02	7.66285E-02	-7.09556E-02	1.00008E+00
26	.00000E+00	2.05829E-12	1.08445E-02	3.48524E-02	7.38309E-03	6.92194E-02	-6.57597E-02	1.00002E+00
27	.00000E+00	4.90502E-13	2.30870E-03	5.10900E-03	1.23604E-03	1.91515E-02	-1.80791E-02	1.00001E+00
28	.00000E+00	1.00000E+00	6.45248E-01	5.51537E+00	6.45248E-01	9.31963E-01	7.01984E-02	1.00002E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	r2n rate	fiss rate	flux*dx**2	total flux
1	1.64872E-01	1.06192E-02	1.69616E-01	.00000E+00	2.17299E-03	2.53617E-03	.00000E+00	1.15495E-01
2	1.25535E+00	1.13236E-01	1.30607E+00	.00000E+00	1.77724E-05	1.17400E-02	.00000E+00	8.85265E-01
3	1.60534E+00	1.44661E-01	1.66886E+00	.00000E+00	.00000E+00	1.45464E-02	.00000E+00	1.13131E+00
4	9.99774E-01	8.77619E-02	1.03787E+00	.00000E+00	.00000E+00	6.30571E-03	.00000E+00	7.03842E-01
5	1.51350E+00	1.33862E-01	1.57324E+00	.00000E+00	.00000E+00	1.87378E-03	.00000E+00	1.06612E+00
6	2.91497E+00	2.52157E-01	3.02982E+00	.00000E+00	.00000E+00	1.71695E-03	.00000E+00	2.05246E+00
7	2.83630E+00	1.43213E-01	2.90439E+00	.00000E+00	.00000E+00	1.77358E-03	.00000E+00	1.97960E+00
8	2.06708E+00	2.05686E-02	2.07885E+00	.00000E+00	.00000E+00	1.87585E-03	.00000E+00	1.42777E+00
9	1.59668E+00	-2.14347E-02	1.58463E+00	.00000E+00	.00000E+00	2.58686E-03	.00000E+00	1.09438E+00
10	1.45555E+00	-2.64710E-02	1.44202E+00	.00000E+00	.00000E+00	5.50833E-03	.00000E+00	9.96724E-01
11	1.32909E+00	-5.63515E-02	1.30015E+00	.00000E+00	.00000E+00	1.13391E-02	.00000E+00	9.03560E-01
12	8.27128E-01	-6.49171E-02	7.93485E-01	.00000E+00	.00000E+00	1.44411E-02	.00000E+00	5.56077E-01
13	7.01391E-01	-5.38409E-02	6.73925E-01	.00000E+00	.00000E+00	1.36448E-02	.00000E+00	4.71964E-01
14	6.40067E-01	-7.89921E-02	5.99437E-01	.00000E+00	.00000E+00	9.68757E-03	.00000E+00	4.24473E-01
15	3.77478E-01	-8.10665E-03	3.73156E-01	.00000E+00	.00000E+00	2.44874E-03	.00000E+00	2.58185E-01
16	2.10664E-01	-4.40072E-03	2.08456E-01	.00000E+00	.00000E+00	1.63364E-03	.00000E+00	1.44160E-01
17	9.25454E-02	-4.07002E-03	9.05465E-02	.00000E+00	.00000E+00	2.42217E-03	.00000E+00	6.29174E-02
18	7.76514E-02	-5.48621E-03	7.49389E-02	.00000E+00	.00000E+00	3.14991E-03	.00000E+00	5.23972E-02
19	1.46114E-01	-6.52989E-03	1.42876E-01	.00000E+00	.00000E+00	3.90643E-03	.00000E+00	9.93090E-02
20	4.78673E-01	-2.30741E-02	4.65135E-01	.00000E+00	.00000E+00	1.72471E-02	.00000E+00	3.23551E-01
21	1.46231E-01	-1.59358E-02	1.38279E-01	.00000E+00	.00000E+00	1.11861E-02	.00000E+00	9.74988E-02
22	2.95258E-01	-4.46335E-02	2.70401E-01	.00000E+00	.00000E+00	3.11145E-02	.00000E+00	1.92774E-01
23	9.04014E-01	-1.29720E-01	8.38888E-01	.00000E+00	.00000E+00	8.70885E-02	.00000E+00	5.96454E-01
24	6.59905E-01	-1.37123E-01	5.89883E-01	.00000E+00	.00000E+00	9.44123E-02	.00000E+00	4.26370E-01
25	2.77809E-01	-7.09556E-02	2.40658E-01	.00000E+00	.00000E+00	5.47217E-02	.00000E+00	1.78407E-01
26	1.78862E-01	-6.57597E-02	1.43568E-01	.00000E+00	.00000E+00	5.03591E-02	.00000E+00	1.08950E-01
27	2.88973E-02	-1.80791E-02	1.82834E-02	.00000E+00	.00000E+00	1.40471E-02	.00000E+00	1.55307E-02
28	2.37771E+01	7.01982E-02	2.37569E+01	.00000E+00	2.19078E-03	4.75264E-01	.00000E+00	1.63635E+01

1fine group summary for zone 2 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
2	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.49012E-08	1.00000E+00
3	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
4	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	2.98023E-08	1.00000E+00
5	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.49012E-08	1.00000E+00
6	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.08616E-07	1.00000E+00
7	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.49012E-08	1.00000E+00
8	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.45286E-07	1.00001E+00
9	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.79397E-08	1.00000E+00
10	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.98023E-08	1.00000E+00
11	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.23517E-08	1.00000E+00
12	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
13	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	5.58794E-08	9.99999E-01
14	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.23517E-08	1.00000E+00
15	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.49012E-08	1.00000E+00
16	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	2.32831E-09	9.99999E-01
17	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-4.65661E-10	1.00000E+00
18	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.86265E-09	1.00000E+00
19	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	6.98493E-09	9.99999E-01
20	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.11759E-08	1.00000E+00
21	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-1.86265E-09	1.00000E+00
22	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.86265E-08	1.00000E+00
23	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	2.98023E-08	1.00000E+00
24	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.49012E-08	1.00000E+00
25	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-7.45058E-09	1.00000E+00
26	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.00000E+00
27	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	1.86265E-09	1.00000E+00
28	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	-2.88710E-07	9.99998E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*df**2	total flux
1	1.64468E-01	1.06192E-02	1.64872E-01	1.06192E-02	.00000E+00	.00000E+00	.00000E+00	5.22576E-03
2	1.25135E+00	1.13236E-01	1.25535E+00	1.13236E-01	.00000E+00	.00000E+00	.00000E+00	3.97743E-02
3	1.60154E+00	1.44661E-01	1.60534E+00	1.44661E-01	.00000E+00	.00000E+00	.00000E+00	5.08981E-02
4	9.97103E-01	8.77619E-02	9.99774E-01	8.77619E-02	.00000E+00	.00000E+00	.00000E+00	3.16946E-02
5	1.50966E+00	1.33862E-01	1.51350E+00	1.33862E-01	.00000E+00	.00000E+00	.00000E+00	4.79687E-02
6	2.90810E+00	2.52157E-01	2.91497E+00	2.52157E-01	.00000E+00	.00000E+00	.00000E+00	9.23946E-02
7	2.83252E+00	1.43213E-01	2.83630E+00	1.43213E-01	.00000E+00	.00000E+00	.00000E+00	8.99488E-02
8	2.06632E+00	2.05684E-02	2.06708E+00	2.05686E-02	.00000E+00	.00000E+00	.00000E+00	6.55870E-02
9	1.59745E+00	-2.14347E-02	1.59668E+00	-2.14347E-02	.00000E+00	.00000E+00	.00000E+00	5.08834E-02
10	1.45628E+00	-2.64710E-02	1.45555E+00	-2.64710E-02	.00000E+00	.00000E+00	.00000E+00	4.62042E-02
11	1.33063E+00	-5.63516E-02	1.32909E+00	-5.63515E-02	.00000E+00	.00000E+00	.00000E+00	4.22042E-02
12	8.28954E-01	-6.49171E-02	8.27128E-01	-6.49171E-02	.00000E+00	.00000E+00	.00000E+00	2.62789E-02
13	7.02909E-01	-5.38409E-02	7.01391E-01	-5.38409E-02	.00000E+00	.00000E+00	.00000E+00	2.22835E-02
14	6.42288E-01	-7.89922E-02	6.40067E-01	-7.89921E-02	.00000E+00	.00000E+00	.00000E+00	2.03488E-02
15	3.77708E-01	-8.10666E-03	3.77476E-01	-8.10666E-03	.00000E+00	.00000E+00	.00000E+00	1.19830E-02
16	2.10788E-01	-4.40071E-03	2.10664E-01	-4.40072E-03	.00000E+00	.00000E+00	.00000E+00	6.68746E-03
17	9.26597E-02	-4.07002E-03	9.25454E-02	-4.07002E-03	.00000E+00	.00000E+00	.00000E+00	2.93882E-03
18	7.78049E-02	-5.48621E-03	7.76516E-02	-5.48621E-03	.00000E+00	.00000E+00	.00000E+00	2.46680E-03
19	1.46295E-01	-6.52939E-03	1.46114E-01	-6.52939E-03	.00000E+00	.00000E+00	.00000E+00	4.63990E-03
20	4.77214E-01	-2.30741E-02	4.76573E-01	-2.30741E-02	.00000E+00	.00000E+00	.00000E+00	1.51343E-02
21	1.46665E-01	-1.59858E-02	1.46251E-01	-1.59858E-02	.00000E+00	.00000E+00	.00000E+00	4.64755E-03
22	2.94481E-01	-4.46335E-02	2.95258E-01	-4.46335E-02	.00000E+00	.00000E+00	.00000E+00	9.32655E-03
23	9.07457E-01	-1.29720E-01	9.04014E-01	-1.29720E-01	.00000E+00	.00000E+00	.00000E+00	2.87454E-02
24	6.63497E-01	-1.37123E-01	6.59905E-01	-1.37123E-01	.00000E+00	.00000E+00	.00000E+00	2.10010E-02
25	2.79666E-01	-7.09556E-02	2.77809E-01	-7.09556E-02	.00000E+00	.00000E+00	.00000E+00	8.84671E-03
26	1.80538E-01	-6.57597E-02	1.78862E-01	-6.57597E-02	.00000E+00	.00000E+00	.00000E+00	5.70866E-03
27	2.98651E-02	-1.80791E-02	2.88995E-02	-1.80791E-02	.00000E+00	.00000E+00	.00000E+00	9.24742E-04
28	2.37727E+01	7.01985E-02	2.37771E+01	7.01982E-02	.00000E+00	.00000E+00	.00000E+00	7.54501E-01

1fine group summary for zone 3 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance

1	.00000E+00	.00000E+00	.00000E+00	3.62496E-03	2.71736E-03	1.39254E-05	-2.63436E-03	1.00001E+00
2	.00000E+00	.00000E+00	4.74582E-04	2.54979E-02	1.82960E-02	5.08557E-05	-1.78724E-02	1.00000E+00
3	.00000E+00	.00000E+00	2.58577E-03	4.97845E-02	1.57413E-02	1.36164E-04	-1.32907E-02	9.99998E-01
4	.00000E+00	.00000E+00	5.06014E-03	4.19433E-02	5.43075E-03	1.02966E-04	-4.73177E-04	9.99996E-01
5	.00000E+00	.00000E+00	1.09180E-02	8.14928E-02	5.15380E-03	1.51820E-04	5.61206E-03	1.00000E+00
6	.00000E+00	.00000E+00	1.82989E-02	2.34914E-01	3.20958E-03	3.19886E-04	1.47696E-02	9.99999E-01
7	.00000E+00	.00000E+00	1.22080E-02	2.35097E-01	1.18172E-03	3.44620E-04	1.06818E-02	9.99999E-01
8	.00000E+00	.00000E+00	2.15095E-03	1.58434E-01	7.62887E-03	2.94644E-04	-5.77305E-03	1.00002E+00
9	.00000E+00	.00000E+00	7.66188E-03	1.05053E-01	8.75736E-04	1.10776E-03	5.67863E-03	9.99989E-01
10	.00000E+00	.00000E+00	8.76903E-04	8.53690E-02	8.47009E-04	8.33680E-04	-8.03752E-04	9.99999E-01
11	.00000E+00	.00000E+00	8.47070E-04	7.67891E-02	8.67220E-04	1.33241E-03	-1.35254E-03	1.00000E+00
12	.00000E+00	.00000E+00	8.67226E-04	4.66546E-02	8.67993E-04	4.15380E-05	-4.23938E-05	1.00000E+00
13	.00000E+00	.00000E+00	8.67995E-04	3.95734E-02	8.07270E-04	6.00838E-05	6.29574E-07	1.00000E+00
14	.00000E+00	.00000E+00	8.07271E-04	3.63942E-02	6.85853E-04	9.69574E-05	2.44528E-05	1.00000E+00
15	.00000E+00	.00000E+00	7.30555E-04	2.07804E-02	8.50473E-04	8.34515E-05	-2.03013E-04	9.99961E-01
16	.00000E+00	.00000E+00	9.55570E-04	1.11020E-02	9.61779E-04	5.23149E-05	-5.82626E-05	9.99952E-01
17	.00000E+00	.00000E+00	1.07193E-03	4.26381E-03	1.04955E-03	2.57586E-05	-3.23359E-06	9.99972E-01
18	.00000E+00	.00000E+00	1.10994E-03	3.38014E-03	1.09143E-03	2.31470E-05	-4.51598E-06	9.99982E-01
19	.00000E+00	.00000E+00	1.10250E-03	7.31065E-03	1.07862E-03	4.73630E-05	-2.32426E-05	9.99969E-01
20	.00000E+00	.00000E+00	1.31433E-03	2.62568E-02	1.11627E-03	1.95222E-04	3.60049E-06	9.99969E-01
21	.00000E+00	.00000E+00	1.48515E-03	6.83639E-03	1.68010E-03	7.51837E-05	-2.20064E-04	9.99998E-01
22	.00000E+00	.00000E+00	2.06471E-03	1.50265E-02	2.00823E-03	1.75085E-04	-1.18259E-04	9.99998E-01
23	.00000E+00	.00000E+00	2.80913E-03	4.88464E-02	3.58614E-03	7.39733E-04	-1.51678E-03	1.00000E+00
24	.00000E+00	.00000E+00	4.36243E-03	3.38682E-02	4.64790E-03	7.88947E-04	-1.07452E-03	1.00000E+00
25	.00000E+00	.00000E+00	4.17635E-03	1.29484E-02	3.33275E-03	4.40410E-04	4.03121E-04	1.00000E+00
26	.00000E+00	.00000E+00	1.73460E-03	9.34854E-03	1.23543E-03	4.08214E-04	9.09269E-05	1.00000E+00
27	.00000E+00	.00000E+00	3.58235E-04	1.74948E-03	9.01397E-07	1.27959E-04	2.29368E-04	1.00000E+00
28	.00000E+00	.00000E+00	8.69000E-02	1.42233E+00	8.69001E-02	8.06988E-03	-7.97013E-03	9.99987E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*db**2	total flux
1	1.62914E-01	7.98487E-03	1.64468E-01	1.06192E-02	9.70886E-05	.00000E+00	.00000E+00	3.54432E-02
2	1.23411E+00	9.53635E-02	1.25139E+00	1.13236E-01	.00000E+00	.00000E+00	.00000E+00	2.69072E-01
3	1.57756E+00	1.31370E-01	1.60054E+00	1.44661E-01	.00000E+00	.00000E+00	.00000E+00	3.44143E-01
4	9.82490E-01	8.72887E-02	9.97103E-01	8.77619E-02	.00000E+00	.00000E+00	.00000E+00	2.14434E-01
5	1.48654E+00	1.39474E-01	1.50966E+00	1.33862E-01	.00000E+00	.00000E+00	.00000E+00	3.24614E-01
6	2.86231E+00	2.66927E-01	2.90810E+00	2.52157E-01	.00000E+00	.00000E+00	.00000E+00	6.25230E-01
7	2.80614E+00	1.53895E-01	2.83252E+00	1.43213E-01	.00000E+00	.00000E+00	.00000E+00	6.10998E-01
8	2.06323E+00	1.47954E-02	2.06632E+00	2.05684E-02	.00000E+00	.00000E+00	.00000E+00	4.47411E-01
9	1.60065E+00	-1.57561E-02	1.59745E+00	-2.14347E-02	.00000E+00	.00000E+00	.00000E+00	3.46624E-01
10	1.46073E+00	-2.72748E-02	1.45628E+00	-2.64710E-02	.00000E+00	.00000E+00	.00000E+00	3.16110E-01
11	1.33997E+00	-5.77041E-02	1.33063E+00	-5.65516E-02	.00000E+00	.00000E+00	.00000E+00	2.89433E-01
12	8.39532E-01	-6.49595E-02	8.28954E-01	-6.49171E-02	.00000E+00	.00000E+00	.00000E+00	1.80863E-01
13	7.11721E-01	-5.38402E-02	7.02509E-01	-5.38409E-02	.00000E+00	.00000E+00	.00000E+00	1.53344E-01
14	6.55170E-01	-7.89677E-02	6.42288E-01	-7.89922E-02	.00000E+00	.00000E+00	.00000E+00	1.40672E-01
15	3.79130E-01	-8.30968E-03	3.77708E-01	-8.10666E-03	.00000E+00	.00000E+00	.00000E+00	8.20179E-02
16	2.11517E-01	-4.45898E-03	2.10788E-01	-4.40071E-03	.00000E+00	.00000E+00	.00000E+00	4.57660E-02
17	9.33183E-02	-4.07325E-03	9.26897E-02	-4.07002E-03	.00000E+00	.00000E+00	.00000E+00	2.01571E-02
18	7.86898E-02	-5.49073E-03	7.78049E-02	-5.48621E-03	.00000E+00	.00000E+00	.00000E+00	1.69636E-02
19	1.47348E-01	-6.55263E-03	1.46295E-01	-6.52958E-03	.00000E+00	.00000E+00	.00000E+00	3.18261E-02
20	4.80895E-01	-2.30705E-02	4.77214E-01	-2.30741E-02	.00000E+00	.00000E+00	.00000E+00	1.03945E-01
21	1.49198E-01	-1.61558E-02	1.46665E-01	-1.59858E-02	.00000E+00	.00000E+00	.00000E+00	3.20736E-02
22	3.01460E-01	-4.47518E-02	2.94481E-01	-4.46336E-02	.00000E+00	.00000E+00	.00000E+00	6.46242E-02
23	9.26991E-01	-1.31237E-01	9.07457E-01	-1.29720E-01	.00000E+00	.00000E+00	.00000E+00	1.98922E-01
24	6.83279E-01	-1.38197E-01	6.65497E-01	-1.37123E-01	.00000E+00	.00000E+00	.00000E+00	1.46108E-01
25	2.89428E-01	-7.05525E-02	2.79666E-01	-7.09556E-02	.00000E+00	.00000E+00	.00000E+00	6.17675E-02
26	1.89113E-01	-6.56687E-02	1.80538E-01	-6.57597E-02	.00000E+00	.00000E+00	.00000E+00	4.01536E-02
27	3.16252E-02	-1.78497E-02	2.95651E-02	-1.80791E-02	.00000E+00	.00000E+00	.00000E+00	6.64039E-03
28	2.37450E+01	6.22278E-02	2.37727E+01	7.01985E-02	9.70886E-05	.00000E+00	.00000E+00	5.14925E+00

1fine group summary for zone 4 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	5.72781E-03	7.58123E-03	4.04045E-04	-7.98488E-03	9.99951E-01

2	.00000E+00	.00000E+00	4.34996E-03	7.50659E-02	9.86603E-02	1.05707E-03	-9.53634E-02	9.99960E-01
3	.00000E+00	.00000E+00	4.67764E-02	6.84700E-02	1.78146E-01	5.38166E-06	-1.31370E-01	9.99977E-01
4	.00000E+00	.00000E+00	6.96142E-02	4.56654E-02	1.56902E-01	3.21769E-06	-8.72888E-02	9.99988E-01
5	.00000E+00	.00000E+00	1.29023E-01	1.48202E-01	2.68498E-01	3.76761E-06	-1.39474E-01	9.99991E-01
6	.00000E+00	.00000E+00	2.73845E-01	4.54992E-01	5.40761E-01	1.14694E-05	-2.66927E-01	9.99998E-01
7	.00000E+00	.00000E+00	5.51870E-01	7.94828E-01	7.05749E-01	2.53405E-05	-1.53895E-01	9.99987E-01
8	.00000E+00	.00000E+00	7.35003E-01	9.99998E-01	7.49818E-01	4.69885E-05	-1.47955E-02	9.99912E-01
9	.00000E+00	.00000E+00	7.40128E-01	9.14701E-01	7.24358E-01	9.57646E-05	1.57562E-02	9.99889E-01
10	.00000E+00	.00000E+00	7.21161E-01	8.63250E-01	6.95750E-01	2.10951E-04	2.72748E-02	9.99896E-01
11	.00000E+00	.00000E+00	6.98861E-01	8.02573E-01	6.40743E-01	4.55760E-04	5.77041E-02	9.99941E-01
12	.00000E+00	.00000E+00	5.57986E-01	4.18480E-01	4.92393E-01	5.95448E-04	6.49595E-02	9.99979E-01
13	.00000E+00	.00000E+00	4.88335E-01	3.38116E-01	4.33612E-01	8.98113E-04	5.38402E-02	9.99965E-01
14	.00000E+00	.00000E+00	4.69922E-01	3.26044E-01	3.89484E-01	1.47558E-03	7.89677E-02	9.99988E-01
15	.00000E+00	.00000E+00	2.53052E-01	1.29946E-01	2.43446E-01	1.29478E-03	8.31182E-03	9.99994E-01
16	.00000E+00	.00000E+00	1.68051E-01	5.52184E-02	1.62679E-01	8.93839E-04	4.46052E-03	9.99989E-01
17	.00000E+00	.00000E+00	8.70363E-02	1.58602E-02	8.25198E-02	4.43013E-04	4.07423E-03	9.99991E-01
18	.00000E+00	.00000E+00	7.74393E-02	1.30975E-02	7.15674E-02	4.00733E-04	5.49168E-03	9.99995E-01
19	.00000E+00	.00000E+00	1.30693E-01	3.71582E-02	1.23325E-01	8.14469E-04	6.55422E-03	9.99995E-01
20	.00000E+00	.00000E+00	3.21996E-01	2.61426E-01	2.95577E-01	3.34455E-03	2.30752E-02	9.99995E-01
21	.00000E+00	.00000E+00	1.55439E-01	5.30859E-02	1.37971E-01	1.31411E-03	1.61487E-02	1.00003E+00
22	.00000E+00	.00000E+00	3.00652E-01	1.62439E-01	2.52791E-01	3.08767E-03	4.47558E-02	9.99992E-01
23	.00000E+00	.00000E+00	7.35845E-01	9.00933E-01	5.91619E-01	1.29886E-02	1.31236E-01	1.00000E+00
24	.00000E+00	.00000E+00	7.57036E-01	7.83301E-01	6.04657E-01	1.42006E-02	1.38195E-01	1.00001E+00
25	.00000E+00	.00000E+00	4.85811E-01	3.17303E-01	4.08211E-01	8.04798E-03	7.05515E-02	1.00000E+00
26	.00000E+00	.00000E+00	3.83619E-01	3.35838E-01	3.10191E-01	7.75853E-03	6.56678E-02	1.00000E+00
27	.00000E+00	.00000E+00	1.27163E-01	7.00078E-02	1.06650E-01	2.66383E-03	1.78468E-02	9.99999E-01
28	.00000E+00	.00000E+00	9.47164E+00	9.39168E+00	9.47164E+00	6.25415E-02	-6.22249E-02	9.99967E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	rxn rate	fiss rate	flux*db**2	total flux
1	1.62161E-01	-9.49344E-09	1.62914E-01	7.98487E-03	4.19263E-10	.00000E+00	.00000E+00	1.88594E-01
2	1.22281E+00	1.00706E-07	1.23411E+00	9.53635E-02	.00000E+00	.00000E+00	.00000E+00	1.40005E+00
3	1.56001E+00	-9.93787E-09	1.57756E+00	1.31370E-01	.00000E+00	.00000E+00	.00000E+00	1.78668E+00
4	9.69351E-01	-4.15396E-08	9.82490E-01	8.72887E-02	.00000E+00	.00000E+00	.00000E+00	1.11059E+00
5	1.46411E+00	-7.27154E-08	1.48654E+00	1.39474E-01	.00000E+00	.00000E+00	.00000E+00	1.67782E+00
6	2.81824E+00	-5.61789E-09	2.86231E+00	2.66927E-01	.00000E+00	.00000E+00	.00000E+00	3.22968E+00
7	2.78079E+00	-1.58678E-07	2.80614E+00	1.53895E-01	.00000E+00	.00000E+00	.00000E+00	3.18459E+00
8	2.06332E+00	-1.54147E-07	2.06323E+00	1.47954E-02	.00000E+00	.00000E+00	.00000E+00	2.36081E+00
9	1.60284E+00	9.33789E-08	1.60065E+00	-1.57561E-02	.00000E+00	.00000E+00	.00000E+00	1.83437E+00
10	1.46659E+00	3.18761E-08	1.46073E+00	-2.72748E-02	.00000E+00	.00000E+00	.00000E+00	1.67705E+00
11	1.35014E+00	1.97993E-08	1.33997E+00	-5.77041E-02	.00000E+00	.00000E+00	.00000E+00	1.54447E+00
12	8.50654E-01	-1.33726E-10	8.39552E-01	-6.49595E-02	.00000E+00	.00000E+00	.00000E+00	9.72774E-01
13	7.20541E-01	-1.23753E-08	7.11721E-01	-5.38402E-02	.00000E+00	.00000E+00	.00000E+00	8.24166E-01
14	6.68451E-01	3.14674E-08	6.55170E-01	-7.89677E-02	.00000E+00	.00000E+00	.00000E+00	7.64154E-01
15	3.79703E-01	2.14114E-06	3.79130E-01	-8.30988E-03	.00000E+00	.00000E+00	.00000E+00	4.34834E-01
16	2.11973E-01	1.64051E-06	2.11517E-01	-4.45898E-03	.00000E+00	.00000E+00	.00000E+00	2.42686E-01
17	9.39556E-02	9.74090E-07	9.33183E-02	-4.07525E-03	.00000E+00	.00000E+00	.00000E+00	1.07508E-01
18	7.96330E-02	9.57096E-07	7.85898E-02	-5.49073E-03	.00000E+00	.00000E+00	.00000E+00	9.10705E-02
19	1.48388E-01	1.59252E-06	1.47348E-01	-6.55263E-03	.00000E+00	.00000E+00	.00000E+00	1.69782E-01
20	4.84690E-01	4.64083E-06	4.80893E-01	-2.30705E-02	.00000E+00	.00000E+00	.00000E+00	5.54503E-01
21	1.52209E-01	-7.15259E-06	1.49198E-01	-1.61558E-02	.00000E+00	.00000E+00	.00000E+00	1.73914E-01
22	3.09925E-01	3.96618E-06	3.01460E-01	-4.47518E-02	.00000E+00	.00000E+00	.00000E+00	3.53887E-01
23	9.54642E-01	-1.09747E-06	9.26991E-01	-1.31237E-01	.00000E+00	.00000E+00	.00000E+00	1.08924E+00
24	7.16662E-01	-2.49207E-06	6.83279E-01	-1.38197E-01	.00000E+00	.00000E+00	.00000E+00	8.15240E-01
25	3.08383E-01	-1.02446E-06	2.89428E-01	-7.05525E-02	.00000E+00	.00000E+00	.00000E+00	3.49800E-01
26	2.10268E-01	-8.84297E-07	1.89113E-01	-6.56687E-02	.00000E+00	.00000E+00	.00000E+00	2.36952E-01
27	3.88360E-02	1.29718E-07	3.16252E-02	-1.78497E-02	.00000E+00	.00000E+00	.00000E+00	4.28482E-02
28	2.37882E+01	3.21612E-06	2.37450E+01	6.22278E-02	4.19263E-10	.00000E+00	.00000E+00	2.72146E+01

1fine group summary for system

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.15908E-02	.00000E+00	2.15009E-02	2.05796E-02	3.50941E-03	-9.49344E-09	9.98823E-01
2	.00000E+00	1.89806E-01	7.04589E-03	2.65070E-01	1.82279E-01	1.45866E-02	1.00706E-07	1.00000E+00

3	.00000E+00	2.15143E-01	7.51173E-02	2.78400E-01	2.74554E-01	1.57110E-02	-9.95787E-09	9.99986E-01
4	.00000E+00	1.24340E-01	1.13270E-01	1.92461E-01	2.30049E-01	7.56141E-03	-4.15396E-08	1.00000E+00
5	.00000E+00	1.65620E-01	2.07433E-01	4.88664E-01	3.68413E-01	4.64417E-03	-7.27154E-08	9.99989E-01
6	.00000E+00	1.79580E-01	4.26327E-01	1.34362E+00	5.98413E-01	7.48561E-03	-5.61769E-09	1.00001E+00
7	.00000E+00	8.90899E-02	6.62359E-01	1.77552E+00	7.43275E-01	8.18130E-03	-1.58678E-07	9.99990E-01
8	.00000E+00	1.37510E-02	7.79720E-01	1.78956E+00	7.78918E-01	1.46157E-02	-1.54147E-07	9.99921E-01
9	.00000E+00	9.98454E-04	7.69483E-01	1.55417E+00	7.45854E-01	2.67108E-02	9.33769E-08	9.99895E-01
10	.00000E+00	7.41661E-05	7.42679E-01	1.40604E+00	7.05236E-01	3.75918E-02	3.18761E-08	9.99900E-01
11	.00000E+00	5.83497E-06	7.10348E-01	1.29662E+00	6.49708E-01	6.06868E-02	1.97993E-08	9.99942E-01
12	.00000E+00	4.09897E-07	5.66901E-01	7.01260E-01	5.02598E-01	6.43205E-02	-1.33726E-10	9.99974E-01
13	.00000E+00	6.50880E-08	4.98538E-01	5.52309E-01	4.40585E-01	5.79679E-02	-1.25753E-08	9.99971E-01
14	.00000E+00	1.28987E-08	4.76895E-01	5.14321E-01	3.97713E-01	7.91868E-02	3.14674E-08	9.99989E-01
15	.00000E+00	1.45770E-09	2.61415E-01	2.36402E-01	2.53270E-01	8.14122E-03	2.14114E-06	1.00000E+00
16	.00000E+00	4.28030E-10	1.78143E-01	1.10004E-01	1.73438E-01	4.70329E-03	1.64051E-06	9.99999E-01
17	.00000E+00	1.37847E-10	9.61571E-02	3.56398E-02	9.15337E-02	4.62251E-03	9.74090E-07	1.00000E+00
18	.00000E+00	9.86942E-11	8.60776E-02	2.88371E-02	7.99845E-02	6.11237E-03	9.57096E-07	9.99997E-01
19	.00000E+00	1.39533E-10	1.41091E-01	7.16631E-02	1.34438E-01	6.65180E-03	1.59252E-06	9.99997E-01
20	.00000E+00	2.26894E-10	3.35127E-01	3.98972E-01	3.07190E-01	2.75813E-02	4.64083E-06	1.00000E+00
21	.00000E+00	3.32100E-11	1.67307E-01	8.64159E-02	1.49869E-01	1.74378E-02	-7.15299E-06	1.00005E+00
22	.00000E+00	3.85312E-11	3.17259E-01	2.36989E-01	2.68153E-01	4.91022E-02	3.96618E-06	9.99998E-01
23	.00000E+00	3.68400E-11	7.57664E-01	1.15355E+00	6.17524E-01	1.40128E-01	-1.09747E-06	1.00002E+00
24	.00000E+00	1.00274E-11	7.88068E-01	9.53341E-01	6.35522E-01	1.52537E-01	-2.49207E-06	1.00002E+00
25	.00000E+00	2.93536E-12	5.13315E-01	3.81120E-01	4.28195E-01	8.51169E-02	-1.02446E-06	1.00001E+00
26	.00000E+00	2.05829E-12	3.96198E-01	3.80039E-01	3.18810E-01	7.73861E-02	-8.84297E-07	1.00001E+00
27	.00000E+00	4.90502E-13	1.29830E-01	7.68663E-02	1.07887E-01	2.19433E-02	1.29718E-07	1.00000E+00
28	.00000E+00	1.00000E+00	1.02038E+01	1.63294E+01	1.02088E+01	1.00257E+00	3.20340E-06	9.99974E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dx**2	total flux
1	1.62161E-01	-9.49844E-09	1.69616E-01	.00000E+00	2.27008E-03	2.53617E-03	.00000E+00	3.41756E-01
2	1.22281E+00	1.00706E-07	1.30607E+00	.00000E+00	1.77724E-05	1.17400E-02	.00000E+00	2.59416E+00
3	1.56001E+00	-9.95787E-09	1.66886E+00	.00000E+00	.00000E+00	1.45464E-02	.00000E+00	3.31300E+00
4	9.69351E-01	-4.15396E-08	1.05787E+00	.00000E+00	.00000E+00	6.30671E-03	.00000E+00	2.06056E+00
5	1.46411E+00	-7.27154E-08	1.57324E+00	.00000E+00	.00000E+00	1.87378E-03	.00000E+00	3.11652E+00
6	2.81824E+00	-5.61769E-09	3.02552E+00	.00000E+00	.00000E+00	1.71699E-03	.00000E+00	5.99977E+00
7	2.78075E+00	-1.58678E-07	2.90439E+00	.00000E+00	.00000E+00	1.77358E-03	.00000E+00	5.86513E+00
8	2.05332E+00	-1.54147E-07	2.07885E+00	.00000E+00	.00000E+00	1.87589E-03	.00000E+00	4.30158E+00
9	1.60284E+00	9.33769E-08	1.58463E+00	.00000E+00	.00000E+00	2.58686E-03	.00000E+00	3.32605E+00
10	1.46559E+00	3.18761E-08	1.44202E+00	.00000E+00	.00000E+00	5.50833E-03	.00000E+00	3.03607E+00
11	1.35014E+00	1.97993E-08	1.30015E+00	.00000E+00	.00000E+00	1.13391E-02	.00000E+00	2.77967E+00
12	8.50654E-01	-1.33726E-10	7.98485E-01	.00000E+00	.00000E+00	1.44411E-02	.00000E+00	1.73599E+00
13	7.20541E-01	-1.25753E-08	6.73925E-01	.00000E+00	.00000E+00	1.36448E-02	.00000E+00	1.47178E+00
14	6.68651E-01	3.14674E-08	5.99437E-01	.00000E+00	.00000E+00	9.68757E-03	.00000E+00	1.34968E+00
15	3.79703E-01	2.14114E-06	3.73156E-01	.00000E+00	.00000E+00	2.44874E-03	.00000E+00	7.87020E-01
16	2.11973E-01	1.64051E-06	2.08456E-01	.00000E+00	.00000E+00	1.63364E-03	.00000E+00	4.39800E-01
17	9.39556E-02	9.74090E-07	9.05465E-02	.00000E+00	.00000E+00	2.42217E-03	.00000E+00	1.98522E-01
18	7.96330E-02	9.57096E-07	7.49389E-02	.00000E+00	.00000E+00	3.14991E-03	.00000E+00	1.62878E-01
19	1.48386E-01	1.59252E-06	1.42876E-01	.00000E+00	.00000E+00	3.90643E-03	.00000E+00	3.05558E-01
20	4.84690E-01	4.64083E-06	4.65135E-01	.00000E+00	.00000E+00	1.72471E-02	.00000E+00	9.97053E-01
21	1.52209E-01	-7.15299E-06	1.38279E-01	.00000E+00	.00000E+00	1.11861E-02	.00000E+00	3.08133E-01
22	3.09925E-01	3.96618E-06	2.70401E-01	.00000E+00	.00000E+00	3.11145E-02	.00000E+00	6.20613E-01
23	9.54642E-01	-1.09747E-06	8.38888E-01	.00000E+00	.00000E+00	8.70385E-02	.00000E+00	1.91336E+00
24	7.16562E-01	-2.49207E-06	5.89883E-01	.00000E+00	.00000E+00	9.44129E-02	.00000E+00	1.40871E+00
25	3.08383E-01	-1.02446E-06	2.40658E-01	.00000E+00	.00000E+00	5.47217E-02	.00000E+00	5.96821E-01
26	2.10268E-01	-8.84297E-07	1.43568E-01	.00000E+00	.00000E+00	5.03591E-02	.00000E+00	3.91359E-01
27	3.88360E-02	1.29718E-07	1.82834E-02	.00000E+00	.00000E+00	1.40471E-02	.00000E+00	6.59440E-02
28	2.37882E+01	3.21612E-06	2.37569E+01	.00000E+00	2.28785E-03	4.73264E-01	.00000E+00	4.94819E+01

- elapsed time .02 min.

0direct access unit 9 requires 516 blocks of length 1456 for cross section weighting.

1 transport cross section weighting function

0zone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	2.28201E-03	2.45111E-02	3.14747E-02	1.91341E-02	2.98150E-02	5.59903E-02	3.19028E-02	4.59996E-03

2	3.56978E-03	3.80654E-02	4.86293E-02	2.95021E-02	4.49991E-02	8.47853E-02	4.81425E-02	6.91430E-03
3	2.90064E-03	3.24762E-02	4.29348E-02	2.71977E-02	4.24442E-02	8.05892E-02	4.61187E-02	5.51826E-03
4	1.00127E-03	1.19508E-02	1.64580E-02	1.09506E-02	1.74601E-02	3.34190E-02	1.98421E-02	1.97977E-03
5	1.66181E-03	1.86404E-02	2.46721E-02	1.56208E-02	2.44024E-02	4.65789E-02	2.67237E-02	3.29008E-03

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	4.79708E-03	5.93129E-03	1.25953E-02	1.44534E-02	1.19970E-02	1.75072E-02	1.83347E-03	9.86573E-04
2	7.20549E-03	8.89850E-03	1.89432E-02	2.18226E-02	1.80992E-02	2.65540E-02	2.72512E-03	1.47934E-03
3	5.80105E-03	8.34660E-03	1.77139E-02	2.01774E-02	1.67294E-02	2.45408E-02	2.54984E-03	1.37622E-03
4	1.95844E-03	3.39517E-03	7.19347E-03	8.10473E-03	6.75643E-03	9.87134E-03	1.10883E-03	5.81428E-04
5	3.36643E-03	4.83346E-03	1.02540E-02	1.16707E-02	9.70110E-03	1.41787E-02	1.52319E-03	8.11876E-04

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.06648E-04	1.21812E-03	1.46287E-03	5.15797E-03	3.53078E-03	9.85200E-03	2.87242E-02	3.01170E-02
2	1.36818E-03	1.84425E-03	2.19492E-03	7.75647E-03	5.35673E-03	1.50040E-02	4.36069E-02	4.60956E-02
3	1.26507E-03	1.70526E-03	2.05242E-03	7.16904E-03	4.98443E-03	1.38862E-02	4.05360E-02	4.27688E-02
4	5.12890E-04	6.84691E-04	8.26263E-04	2.90886E-03	2.01327E-03	5.59257E-03	1.66466E-02	1.74718E-02
5	7.34488E-04	9.85068E-04	1.18528E-03	4.16750E-03	2.87553E-03	8.00844E-03	2.35398E-02	2.47246E-02

Ozone	grp. 25	grp. 26	grp. 27	grp. 28
1	1.54907E-02	1.41313E-02	3.69046E-03	3.83691E-01
2	2.38528E-02	2.21059E-02	6.07750E-03	5.85578E-01
3	2.19868E-02	2.04189E-02	5.58307E-03	5.39751E-01
4	8.89766E-03	8.13641E-03	2.04488E-03	2.17222E-01
5	1.26692E-02	1.16111E-02	3.01905E-03	3.11448E-01

1 80 d, sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp

0cell averaged fluxes

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.67760E-01	1.28589E+00	1.64329E+00	1.02237E+00	1.54850E+00	2.98131E+00	2.87547E+00	2.07391E+00
2	1.64667E-01	1.25332E+00	1.60285E+00	9.98405E-01	1.51153E+00	2.91143E+00	2.83435E+00	2.06669E+00
3	1.63541E-01	1.24154E+00	1.58793E+00	9.89434E-01	1.49782E+00	2.88491E+00	2.81984E+00	2.06443E+00
4	1.62157E-01	1.22524E+00	1.56105E+00	9.70842E-01	1.46593E+00	2.82182E+00	2.78242E+00	2.06268E+00
5	1.64192E-01	1.24633E+00	1.59169E+00	9.85966E-01	1.49729E+00	2.88251E+00	2.81782E+00	2.06664E+00

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.58964E+00	1.44780E+00	1.31247E+00	8.07731E-01	6.85553E-01	6.16570E-01	3.75028E-01	2.09401E-01
2	1.59707E+00	1.45593E+00	1.32988E+00	8.28065E-01	7.02170E-01	6.41207E-01	3.77593E-01	2.10727E-01
3	1.59958E+00	1.45868E+00	1.33549E+00	8.34530E-01	7.07555E-01	6.49085E-01	3.78444E-01	2.11172E-01
4	1.60271E+00	1.46525E+00	1.34942E+00	8.49926E-01	7.20086E-01	6.67653E-01	3.79920E-01	2.12039E-01
5	1.59796E+00	1.45864E+00	1.33545E+00	8.34033E-01	7.07086E-01	6.48420E-01	3.78113E-01	2.11056E-01

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.13908E-02	7.60806E-02	1.44252E-01	4.69975E-01	1.41622E-01	2.80015E-01	8.66382E-01	6.19525E-01
2	9.28043E-02	7.77306E-02	1.46207E-01	4.76894E-01	1.46448E-01	2.93886E-01	9.05789E-01	6.61758E-01
3	9.30083E-02	7.82729E-02	1.46851E-01	4.79156E-01	1.47992E-01	2.98187E-01	9.17860E-01	6.74141E-01
4	9.39516E-02	7.95696E-02	1.48341E-01	4.84477E-01	1.51951E-01	3.09196E-01	9.51684E-01	7.12287E-01
5	9.29749E-02	7.82526E-02	1.46801E-01	4.79011E-01	1.48088E-01	2.98165E-01	9.19849E-01	6.76797E-01

Ozone	grp. 25	grp. 26	grp. 27
1	2.56240E-01	1.58255E-01	2.25591E-02
2	2.78766E-01	1.79726E-01	2.91393E-02
3	2.85005E-01	1.85275E-01	3.06398E-02
4	3.05625E-01	2.06679E-01	3.74371E-02
5	2.85734E-01	1.88023E-01	3.16819E-02

0flux disadvantage factors (zone average/cell average-flux)

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.02173E+00	1.03175E+00	1.03242E+00	1.03273E+00	1.03427E+00	1.03428E+00	1.02046E+00	1.00852E+00
2	1.00289E+00	1.00561E+00	1.00704E+00	1.00853E+00	1.00951E+00	1.01003E+00	1.00587E+00	1.00008E+00
3	9.96053E-01	9.96160E-01	9.97640E-01	9.99463E-01	1.00036E+00	1.00084E+00	1.00050E+00	9.98931E-01
4	9.87602E-01	9.81478E-01	9.80751E-01	9.80178E-01	9.79057E-01	9.78946E-01	9.87437E-01	9.98084E-01
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	9.94795E-01	9.92567E-01	9.82790E-01	9.68463E-01	9.69547E-01	9.50880E-01	9.91842E-01	9.92158E-01
2	9.99446E-01	9.98141E-01	9.95830E-01	9.92844E-01	9.92047E-01	9.88875E-01	9.98625E-01	9.98444E-01

3	1.00089E+00	9.99962E-01	1.00003E+00	1.00060E+00	1.00064E+00	1.00103E+00	1.00087E+00	1.00055E+00
4	1.00298E+00	1.00453E+00	1.01046E+00	1.01906E+00	1.01858E+00	1.02966E+00	1.00478E+00	1.00466E+00
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.82963E-01	9.72245E-01	9.82634E-01	9.81136E-01	9.56658E-01	9.39129E-01	9.42489E-01	9.15083E-01
2	9.96014E-01	9.93330E-01	9.99952E-01	9.95581E-01	9.89253E-01	9.86650E-01	9.85358E-01	9.77779E-01
3	1.00056E+00	1.00026E+00	1.00034E+00	1.00080E+00	9.99689E-01	1.00007E+00	9.98490E-01	9.96076E-01
4	1.01029E+00	1.01683E+00	1.01049E+00	1.01141E+00	1.02643E+00	1.03700E+00	1.03528E+00	1.05244E+00
5	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00	1.00000E+00

Ozone	grp. 25	grp. 26	grp. 27
1	8.93651E-01	8.41680E-01	7.12051E-01
2	9.72210E-01	9.55872E-01	9.19745E-01
3	9.99969E-01	9.85385E-01	9.67109E-01
4	1.06588E+00	1.09922E+00	1.18166E+00
5	1.00000E+00	1.00000E+00	1.00000E+00

Ocell averaged currents

Ozone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	2.28201E-03	2.45111E-02	3.14747E-02	1.91341E-02	2.93150E-02	5.59903E-02	3.19026E-02	4.59996E-03
2	3.56978E-03	3.80654E-02	4.86293E-02	2.95021E-02	4.49991E-02	8.47863E-02	4.81425E-02	6.91430E-03
3	2.90064E-03	3.24762E-02	4.20348E-02	2.71977E-02	4.24442E-02	8.05892E-02	4.61187E-02	5.51826E-03
4	1.00127E-03	1.19508E-02	1.64580E-02	1.09306E-02	1.74601E-02	3.34190E-02	1.98421E-02	1.97977E-03
5	1.66181E-03	1.86404E-02	2.46721E-02	1.56208E-02	2.44024E-02	4.65789E-02	2.67237E-02	3.29008E-03

Ozone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	4.79708E-03	5.93129E-03	1.29933E-02	1.44534E-02	1.19970E-02	1.75072E-02	1.83347E-03	9.86573E-04
2	7.20549E-03	8.89860E-03	1.89432E-02	2.18226E-02	1.80992E-02	2.66540E-02	2.72512E-03	1.47934E-03
3	5.80105E-03	8.34660E-03	1.77139E-02	2.01774E-02	1.67294E-02	2.45408E-02	2.54984E-03	1.37622E-03
4	1.95844E-03	3.39517E-03	7.19347E-03	8.10473E-03	6.75643E-03	9.87134E-03	1.10883E-03	5.81428E-04
5	3.36643E-03	4.83346E-03	1.02540E-02	1.16707E-02	9.70110E-03	1.41789E-02	1.52319E-03	8.11876E-04

Ozone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	9.06648E-04	1.21812E-03	1.46287E-03	5.15797E-03	3.53078E-03	9.85200E-03	2.87242E-02	3.01170E-02
2	1.36818E-03	1.84425E-03	2.19492E-03	7.75647E-03	5.35673E-03	1.50040E-02	4.36069E-02	4.60956E-02
3	1.26507E-03	1.70528E-03	2.03242E-03	7.16904E-03	4.98443E-03	1.38862E-02	4.05360E-02	4.27688E-02
4	5.12890E-04	6.84691E-04	8.26263E-04	2.90886E-03	2.01327E-03	5.59257E-03	1.66466E-02	1.74718E-02
5	7.34486E-04	9.85068E-04	1.18328E-03	4.16750E-03	2.87553E-03	8.00844E-03	2.35398E-02	2.47246E-02

Ozone	grp. 25	grp. 26	grp. 27
1	1.54907E-02	1.41313E-02	3.69046E-03
2	2.38526E-02	2.21085E-02	6.07750E-03
3	2.19868E-02	2.04189E-02	5.58307E-03
4	8.89766E-03	8.13641E-03	2.04488E-03
5	1.26692E-02	1.16111E-02	3.01905E-03

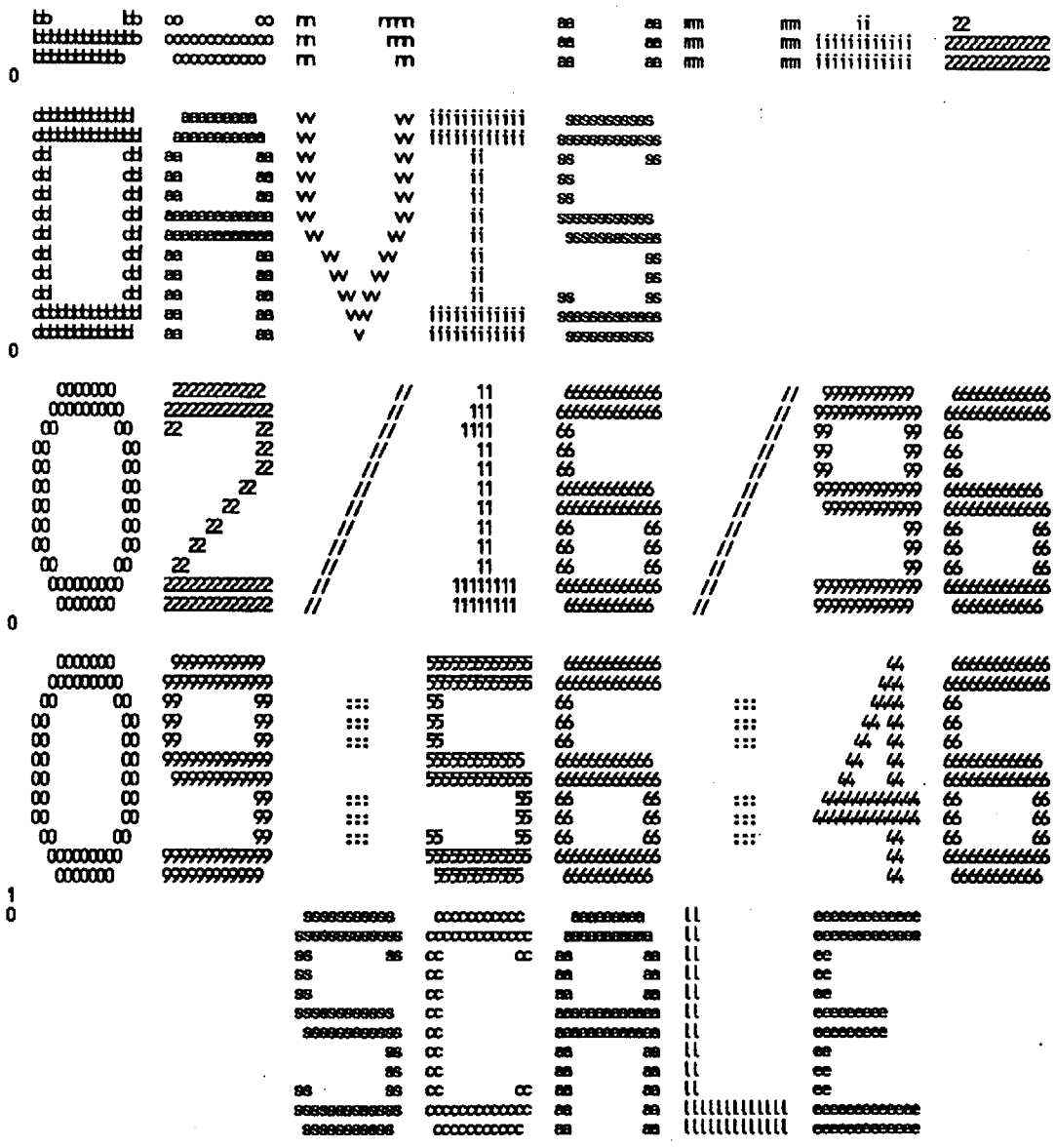
Ozone	volume	vol. fraction
1	6.88443E-01	3.30753E-01
2	3.17352E-02	1.52468E-02
3	2.16724E-01	1.04122E-01
4	1.14454E+00	5.49878E-01
5	2.08144E+00	1.00000E+00

- elapsed time .03 min.

Orequested parm=halt8,skipcellwt,skipshipdata

pass= 1, exec halts after pass 8

```
1 tttttttttttt    oooooooooooo  m        m                 aaaaaaaa   mm        mm  iiiiiiiiiiii   zzzzzzzzzz
  tttttttttttt    oooooooooooo  mm       m                aaaaaaaaaa  mmm      mmm  iiiiiiiiiiii   zzzzzzzzzzzz
  tt      tt      oo        oo  mmm      m               aa      aa  mmmm    mmmm      ii               zz      zz
  tt      tt      oo        oo  m m      m               aa      aa  mm mm  mm mm      ii                     zz
  tt      tt      oo        oo  m  m     m               aa      aa  mm  mmm  mm       ii                    zz
  tttttttttttt    oo        oo  m   m    m  -------------aaaaaaaaaaaa  mm   mm  mm       ii                  zz
  tttttttttttt    oo        oo  m    m   m  -------------aaaaaaaaaaaa  mm    m  mm       ii                zz
  tt      tt      oo        oo  m     m  m               aa      aa  mm       mm       ii              zz
  tt      tt      oo        oo  m      m m               aa      aa  mm       mm       ii            zz
```



```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   scale  version:   4.2         *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program:  c0c008                             *****
*****                                                       *****
*****     creation date:  04/27/95                          *****
*****                                                       *****
*****          library:  /neutronics/scale/exe              *****
*****                                                       *****
*****                                                       *****
*****  this is not a  scale  configuration controlled code  *****
*****                                                       *****
*****          jobname:  davis                              *****
*****                                                       *****
*****  date of execution:  02/16/96                         *****
*****                                                       *****
*****  time of execution:  09:56:46                         *****
*****                                                       *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****************************************************************
```

```
1
0      -1q array has     1 entries.
0       0q array has     4 entries.
0       1q array has     6 entries.
0       2q array has     2 entries.
1logical assignments
0master library   12
 working library  17
 scratch file     18
 new library       1
0p r o b l e m   d e s c r i p t i o n
0igr--geometry (0/1/2/3--inf med/slab/cyl/sphere              2
0izm--number of zones or material regions                     4
0ms--mixing table length                                     70
0ibl--shielded cross section edit option (0/1--no/yes)        0
0ibr--bondarenko factor edit option (0/1--no/yes)             0
0issopt--dancoff factor option                                0
0convergence criterion    1.00000E-03
0geometry correction factor for wigner rational approximation  1.350E+00
0       3q array has    70 entries.
0       4q array has    70 entries.
0       5q array has    70 entries.
0       6q array has     4 entries.
0       7q array has     4 entries.
0       8q array has     4 entries.
0       9q array has     4 entries.
```

```
0      10q array has     70 entries.
0      11q array has      4 entries.
0m i x i n g   t a b l e
0entry  mixture  isotope  number density  new identifier
   1       3       8016    2.09710E-02          201
   2       3       1001    4.19420E-02          202
   3       3       5010    3.81515E-06          203
   4       3       5011    1.54884E-05          204
   5       2      40302    4.25156E-02          205
   6       1      92235    2.17519E-04       200006
   7       1      92234    1.80884E-06       200007
   8       1      92236    3.09919E-06       200008
   9       1      92238    7.29235E-03       200009
  10       1       8016    1.50611E-02       200010
  11       1       8016    1.15315E-02       200011
  12       1      36083    5.19887E-08       200012
  13       1      36085    2.52399E-08       200013
  14       1      38090    5.64542E-07       200014
  15       1      39089    1.85221E-07       200015
  16       1      42095    8.27836E-08       200016
  17       1      40093    4.11148E-07       200017
  18       1      40094    6.33205E-07       200018
  19       1      40095    4.27867E-07       200019
  20       1      41094    1.77349E-13       200020
  21       1      43099    5.87758E-07       200021
  22       1      45103    1.52118E-07       200022
  23       1      45105    3.63974E-09       200023
  24       1      44101    5.18370E-07       200024
  25       1      44106    5.96664E-08       200025
  26       1      46105    1.21221E-07       200026
  27       1      46108    1.56859E-08       200027
  28       1      47109    9.63590E-09       200028
  29       1      51124    3.00808E-12       200029
  30       1      54131    2.47825E-07       200030
  31       1      54132    4.19533E-07       200031
  32       1      54135    2.09120E-09       200032
  33       1      54136    9.93252E-07       200033
  34       1      55134    2.70779E-09       200034
  35       1      55135    2.99702E-07       200035
  36       1      55137    6.30110E-07       200036
  37       1      56136    7.27113E-10       200037
  38       1      57139    6.33240E-07       200038
  39       1      59141    3.00200E-07       200039
  40       1      59143    1.34650E-07       200040
  41       1      58144    4.90451E-07       200041
  42       1      60143    4.35283E-07       200042
  43       1      60145    3.87075E-07       200043
  44       1      61147    1.73729E-07       200044
  45       1      61148    4.19133E-10       200045
  46       1      60147    4.46317E-08       200046
  47       1      62147    4.30449E-09       200047
  48       1      62149    2.10275E-08       200048
  49       1      62150    8.60817E-08       200049
  50       1      62151    3.43758E-08       200050
  51       1      62152    3.85958E-08       200051
  52       1      64155    3.40414E-11       200052
  53       1      63153    1.83469E-08       200053
  54       1      63154    5.35540E-10       200054
  55       1      63155    3.62762E-09       200055
  56       1      40302    4.42681E-03       200056
```

```
  57     1        1001    2.30630E-02          200057
  58     1        5010    2.09787E-06          200058
  59     1        5011    8.51673E-06          200059
  60     1       55133    6.04856E-07          200060
  61     1       95237    4.79701E-08          200061
  62     1       94238    5.71923E-10          200062
  63     1       94239    5.27664E-06          200063
  64     1       94240    1.45266E-07          200064
  65     1       94241    1.08078E-08          200065
  66     1       94242    9.49211E-11          200066
  67     1       95241    2.80569E-11          200067
  68     1       95243    5.82811E-13          200068
  69     1       96244    3.88991E-15          200069
  70     1         999    3.30753E-21          200070
Ogeometry and material description
Ozone  mixture  outer dimension  temperature     extra xs   type (0/1--fuel/mod)
   1      3        6.32460E-01   6.07600E+02   7.90564E-01          0
   2      2        6.73100E-01   6.50000E+02   1.29082E+01          0
   3      3        8.14000E-01   6.07600E+02   3.54862E+00          0
   4      1        2.96100E+00   9.75000E+02   2.32883E-01          0
     8067 locations of   200000 available are required to make a new master containing the self-shielded values
Ono nuclides in your problem have bondarenko factor data**bonami will copy from logical 12 to logical  1
Ocopy      999  1/v cross sectio from log 12 to log  1    bondarenko trigger 0
Ocopy     1001  hydrogen        from log 12 to log 18    bondarenko trigger 0
Ocopy     1001  hydrogen        from log 18 to log  1    bondarenko trigger 0
Ocopy     1001  hydrogen        from log 18 to log  1    bondarenko trigger 0
Ocopy     5010  b-10 1273 218rgp from log 12 to log 18    bondarenko trigger 0
Ocopy     5010  b-10 1273 218rgp from log 18 to log  1    bondarenko trigger 0
Ocopy     5010  b-10 1273 218rgp from log 18 to log  1    bondarenko trigger 0
Ocopy     5011  boron-11        from log 12 to log 18    bondarenko trigger 0
Ocopy     5011  boron-11        from log 18 to log  1    bondarenko trigger 0
Ocopy     5011  boron-11        from log 18 to log  1    bondarenko trigger 0
Ocopy     8016  oxygen-16       from log 12 to log 18    bondarenko trigger 0
Ocopy     8016  oxygen-16       from log 18 to log  1    bondarenko trigger 0
Ocopy     8016  oxygen-16       from log 18 to log  1    bondarenko trigger 0
Ocopy     8016  oxygen-16       from log 18 to log  1    bondarenko trigger 0
Ocopy    36083  kr-83           from log 12 to log  1    bondarenko trigger 0
Ocopy    36085  kr-85           from log 12 to log  1    bondarenko trigger 0
Ocopy    38090  sr-90           from log 12 to log  1    bondarenko trigger 0
Ocopy    39089   y-89           from log 12 to log  1    bondarenko trigger 0
Ocopy    40093  zr-93           from log 12 to log  1    bondarenko trigger 0
Ocopy    40094  zr-94           from log 12 to log  1    bondarenko trigger 0
Ocopy    40095  zr-95           from log 12 to log  1    bondarenko trigger 0
Ocopy    40302  zircalloy       from log 12 to log 18    bondarenko trigger 0
Ocopy    40302  zircalloy       from log 18 to log  1    bondarenko trigger 0
Ocopy    40302  zircalloy       from log 18 to log  1    bondarenko trigger 0
Ocopy    41094  nb-94           from log 12 to log  1    bondarenko trigger 0
Ocopy    42095  mo-95           from log 12 to log  1    bondarenko trigger 0
Ocopy    43099  tc-99           from log 12 to log  1    bondarenko trigger 0
Ocopy    44101  ru-101          from log 12 to log  1    bondarenko trigger 0
Ocopy    44106  ru-106          from log 12 to log  1    bondarenko trigger 0
Ocopy    45103  rh-103          from log 12 to log  1    bondarenko trigger 0
Ocopy    45105  rh-105          from log 12 to log  1    bondarenko trigger 0
Ocopy    46105  pd-105          from log 12 to log  1    bondarenko trigger 0
Ocopy    46108  pd-108          from log 12 to log  1    bondarenko trigger 0
Ocopy    47109  silver-109      from log 12 to log  1    bondarenko trigger 0
Ocopy    51124  sb-124          from log 12 to log  1    bondarenko trigger 0
Ocopy    54131  xe-131          from log 12 to log  1    bondarenko trigger 0
Ocopy    54132  xe-132          from log 12 to log  1    bondarenko trigger 0
Ocopy    54135  xenon-135       from log 12 to log  1    bondarenko trigger 0
```

```
0copy   54136  xe-136          from log 12 to log  1   bondarenko trigger 0
0copy   55133  cesium-133      from log 12 to log  1   bondarenko trigger 0
0copy   55134  cs-134          from log 12 to log  1   bondarenko trigger 0
0copy   55135  cs-135          from log 12 to log  1   bondarenko trigger 0
0copy   55137  cs-137          from log 12 to log  1   bondarenko trigger 0
0copy   56136  ba-136          from log 12 to log  1   bondarenko trigger 0
0copy   57139  la-139          from log 12 to log  1   bondarenko trigger 0
0copy   58144  ce-144          from log 12 to log  1   bondarenko trigger 0
0copy   59141  pr-141          from log 12 to log  1   bondarenko trigger 0
0copy   59143  pr-143          from log 12 to log  1   bondarenko trigger 0
0copy   60143  nd-143          from log 12 to log  1   bondarenko trigger 0
0copy   60145  nd-145          from log 12 to log  1   bondarenko trigger 0
0copy   60147  nd-147          from log 12 to log  1   bondarenko trigger 0
0copy   61147  pm-147          from log 12 to log  1   bondarenko trigger 0
0copy   61148  pm-148          from log 12 to log  1   bondarenko trigger 0
0copy   62147  sm-147          from log 12 to log  1   bondarenko trigger 0
0copy   62149  sm-149          from log 12 to log  1   bondarenko trigger 0
0copy   62150  sm-150          from log 12 to log  1   bondarenko trigger 0
0copy   62151  sm-151          from log 12 to log  1   bondarenko trigger 0
0copy   62152  sm-152          from log 12 to log  1   bondarenko trigger 0
0copy   63153  eu-153          from log 12 to log  1   bondarenko trigger 0
0copy   63154  eu-154          from log 12 to log  1   bondarenko trigger 0
0copy   63155  eu-155          from log 12 to log  1   bondarenko trigger 0
0copy   64155  gd-155          from log 12 to log  1   bondarenko trigger 0
0copy   92234  u-234 1043 sigo= from log 12 to log  1   bondarenko trigger 0
0copy   92235  uranium-235     from log 12 to log  1   bondarenko trigger 0
0copy   92236  u-236 1163 sigo= from log 12 to log  1   bondarenko trigger 0
0copy   92238  uranium-238     from log 12 to log  1   bondarenko trigger 0
0copy   93237  neptunium-237   from log 12 to log  1   bondarenko trigger 0
0copy   94238  pu-238 1050 sigo from log 12 to log  1   bondarenko trigger 0
0copy   94239  plutonium-239   from log 12 to log  1   bondarenko trigger 0
0copy   94240  plutonium-240   from log 12 to log  1   bondarenko trigger 0
0copy   94241  plutonium-241   from log 12 to log  1   bondarenko trigger 0
0copy   94242  plutonium-242   from log 12 to log  1   bondarenko trigger 0
0copy   95241  am-241 1056 sigo from log 12 to log  1   bondarenko trigger 0
0copy   95243  am-243 1057 218  from log 12 to log  1   bondarenko trigger 0
0copy   96244  curium-244      from log 12 to log  1   bondarenko trigger 0
1     scale 4.2 - 27 group neutron burnup library
        based on endf-b version 4 data with endf-b version 5 fission products
           compiled for nrc      1/27/89
              last updated       9/16/93
                l.m.petrie  -   ornl
        tape id                          4321        number of nuclides          70
        number of neutron groups           27        number of gamma groups       0
        first thermal group                15        logical unit                 1
                                  table of contents
      1/v cross sections normalized to 1.0 at 0.0253 ev                    id  200070
       hydrogen      endf/b-iv mat 1269/thrmf002   updated 10/13/89        id     202
       hydrogen      endf/b-iv mat 1269/thrmf002   updated 10/13/89        id  200057
      b-10 1273 218ngp 042375 p-3 293k                                     id     203
      b-10 1273 218ngp 042375 p-3 293k                                     id  200058
       boron-11      endf/b-iv mat 1160            updated 10/13/89        id     204
       boron-11      endf/b-iv mat 1160            updated 10/13/89        id  200059
       oxygen-16     endf/b-iv mat 1276            updated 10/13/89        id     201
       oxygen-16     endf/b-iv mat 1276            updated 10/13/89        id  200010
       oxygen-16     endf/b-iv mat 1276            updated 10/13/89        id  200011
       kr-83         mt=102,103,103,105,106,107    updated 10/13/89        id  200012
       kr-85           mt=  102                                           id  200013
       sr-90         mt=102                        updated 10/13/89        id  200014
        y-89         mt=102                        updated 10/13/89        id  200015
```

```
zr-93          mt=  102                                                id   200017
zr-94          mt=102                          updated 10/13/89        id   200018
zr-95          mt=102                          updated 10/13/89        id   200019
zircalloy      endf/b-iv mat 1284              updated 10/13/89        id      205
zircalloy      endf/b-iv mat 1284              updated 10/13/89        id   200056
nb-94          mt=102                          updated 10/13/89        id   200020
mo-95          mt=102                          updated 10/13/89        id   200016
tc-99          mt=102                          updated 10/13/89        id   200021
ru-101         mt=102                          updated 10/13/89        id   200024
ru-106         mt=102                          updated 10/13/89        id   200025
rh-103         mt=102                          updated 10/13/89        id   200022
rh-105         mt=  102                                                id   200023
pd-105         mt=102                          updated 10/13/89        id   200026
pd-108         mt=102                          updated 10/13/89        id   200027
silver-109     endf/b-iv mat 1139              updated 10/13/89        id   200028
sb-124         mt=102                          updated 10/13/89        id   200029
xe-131         mt=102,103,104,105,106          updated 10/13/89        id   200030
xe-132         mt=102,103,104,105,106          updated 10/13/89        id   200031
xenon-135      endf/b-iv mat 1294              updated 10/13/89        id   200032
xe-136         mt=  102, 103, 104, 105, 107                            id   200033
cesium-133     endf/b-iv mat 1141              updated 10/13/89        id   200060
cs-134         mt=102                          updated 10/13/89        id   200034
cs-135         mt=  102                                                id   200035
cs-137         mt=102                          updated 10/13/89        id   200036
ba-136         mt=102                          updated 10/13/89        id   200037
la-139         mt=102                          updated 10/13/89        id   200038
ce-144         mt=  102                                                id   200041
pr-141         mt=102,103,104,105,106,107      updated 10/13/89        id   200039
pr-143         mt=102                          updated 10/13/89        id   200040
nd-143         mt=102                          updated 10/13/89        id   200042
nd-145         mt=102                          updated 10/13/89        id   200043
nd-147         mt=102                          updated 10/13/89        id   200046
pm-147         mt=102                          updated 10/13/89        id   200044
pm-148         mt=  102                                                id   200045
sm-147         endf/b-v fission product        updated 10/13/89        id   200047
sm-149         mt=102,103,107                  updated 10/13/89        id   200048
sm-150         mt=102                          updated 10/13/89        id   200049
sm-151         mt=102,103,104,105,106,107      updated 10/13/89        id   200050
sm-152         mt=102,103,104,105,106,107      updated 10/13/89        id   200051
eu-153         mt=102,103,104,105,106,107      updated 10/13/89        id   200053
eu-154         mt=102,103,104,105,106,107      updated 10/13/89        id   200054
eu-155         mt=102,103,104,105,106,107      updated 10/13/89        id   200055
gd-155         mt=102                          updated 10/13/89        id   200052
u-234 1043 sigp=5+4 nsxlacs p-3 293k f-1/e-m(1.+5)                     id   200007
uranium-235    endf/b-iv mat 1261              updated 10/13/89        id   200006
u-236 1163 sigp=5+4 nsxlacs p-3 293k f-1/e-m(1.+5)                     id   200008
uranium-238    endf/b-iv mat 1262              updated 10/13/89        id   200009
neptunium-237  endf/b-iv mat 1263              updated 10/13/89        id   200061
pu-238 1050 sigp=5+4 nsxlacs p-3 293k f-1/e-m(1.+5)                    id   200062
plutonium-239  endf/b-iv mat 1264              updated 10/13/89        id   200063
plutonium-240  endf/b-iv mat 1265              updated 10/13/89        id   200064
plutonium-241  endf/b-iv mat 1266              updated 10/13/89        id   200065
plutonium-242  endf/b-iv mat 1161              updated 10/13/89        id   200066
am-241 1056 sigp=5+4 nsxlacs 218ngp p-3 293k                           id   200067
am-243 1057 218 gp wt f-1/e-m 090576 p3 293k                           id   200068
curium-244     endf/b-iv mat 1162              updated 10/13/89        id   200069
0   tape copy used     0 i/o's, and took     .00 seconds
1          m       m  iiiiiiiiiiii   tttttttttttt     aaaaaaaa    ww      ww  ll
           mm      m  iiiiiiiiiiii   tttttttttttt     aaaaaaaaaa  ww      ww  ll
           mmm     m      ii            tt        aa        aa  ww      ww  ll
```

```
m m     m     ii        tt      aa      aa  ww        ww  ll
m  m    m     ii        tt      aa      aa  ww        ww  ll
m   m   m     ii        tt      aaaaaaaaaaa ww    w   ww  ll
m    m  m     ii        tt      aaaaaaaaaaa ww   www  ww  ll
m     m m     ii        tt      aa      aa  ww  ww ww  ww  ll
m      mm     ii        tt      aa      aa  ww ww   ww ww  ll
m      mm     ii        tt      aa      aa  wwww     wwww  ll
m       m iiiiiiiiiii   tt      aa      aa  www       www  llllllllllll
m       m iiiiiiiiiii   tt      aa      aa  ww        ww   llllllllllll
0

dddddddddd    aaaaaaaa   w       w iiiiiiiiiii   ssssssssss
dddddddddddd  aaaaaaaaaa w       w iiiiiiiiiii   ssssssssssss
dd      dd    aa      aa w       w    ii        ss      ss
dd      dd    aa      aa w       w    ii        ss
dd      dd    aa      aa w       w    ii        ss
dd      dd    aaaaaaaaaaaa w     w    ii        ssssssssssss
dd      dd    aaaaaaaaaaaa  w   w     ii         ssssssssssss
dd      dd    aa      aa     w w      ii                 ss
dd      dd    aa      aa     w w      ii                 ss
dd      dd    aa      aa      w       ii        ss      ss
dddddddddddd  aa      aa      w       iiiiiiiiiii ssssssssssss
dddddddddddd  aa      aa      v       iiiiiiiiiii  ssssssssss
0

  000000    zzzzzzzzzz          //    11      666666666          //  999999999   666666666
 00000000   zzzzzzzzzzz         //    111     6666666666         //  9999999999  6666666666
 00    00   zz      zz          //   1111     66                 //  99      99  66
00      00        zz            //    11      66                 //  99      99  66
00      00        zz            //    11      66                 //  99      99  66
00      00      zz              //    11      666666666          //  999999999   666666666
00      00    zz                //    11      6666666666         //   99999999   6666666666
00      00  zz                  //    11      66      66         //         99  66      66
00      00 zz                   //    11      66      66         //         99  66      66
 00    00  zz                   //    11      66      66         //         99  66      66
  00000000 zzzzzzzzzzz          //   11111111 6666666666         //  999999999   6666666666
   000000  zzzzzzzzzzz          //   11111111  666666666         //  99999999    666666666
0

  000000    99999999            55555555    666666666              44  777777777
 00000000   99999999            55555555    6666666666             444  777777777
 00    00   99      99     :::  55          66                 :::  4444 77     77
00      00 99      99     :::  55          66                 :::  44 44       77
00      00 99      99     :::  55          66                 :::  44  44      77
00      00 99999999        55555555    666666666              44  44       77
00      00  99999999       55555555    6666666666             44   44      77
00      00         99  :::         55  66      66         :::  44444444444  77
00      00         99  :::         55  66      66         :::  44444444444  77
 00    00          99  :::  55      55  66      66             44       77
  00000000  99999999     55555555    6666666666             44       77
   000000   99999999      55555555    666666666              44       77
1
0
                     99999999    cccccccccc   aaaaaaaa   ll      eeeeeeeeeeee
                    99999999    cccccccccccc  aaaaaaaaaa ll      eeeeeeeeeeee
                    99      99  cc      cc   aa      aa ll      ee
                    99          cc           aa      aa ll      ee
                    99          cc           aa      aa ll      ee
                    99999999    cc           aaaaaaaaaa ll      eeeeeeee
                     99999999   cc           aaaaaaaaaa ll      eeeeeeee
                           99   cc           aa      aa ll      ee
```

```
                ss  cc          aa      aa  ll          ee
        ss      ss  cc      cc  aa      aa  ll          ee
        ssssssssssss  cccccccccccc  aa      aa  llllllllllll  eeeeeeeeeeee
         ssssssssss    cccccccccc   aa      aa  llllllllllll  eeeeeeeeeeee
```

```
*****************************************************************
*****************************************************************
*****************************************************************
*****                                                       *****
*****          program verification information              *****
*****                                                       *****
*****          code system:   .scale  version:   4.2        *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****                                                       *****
*****                                                       *****
*****          program:  c0c002                             *****
*****                                                       *****
*****     creation date:  04/27/95                          *****
*****                                                       *****
*****          library:  /neutronics/scale/exe              *****
*****                                                       *****
*****                                                       *****
*****  this is not a  scale  configuration controlled code  *****
*****                                                       *****
*****          jobname:  davis                              *****
*****                                                       *****
*****  date of execution:  02/16/96                         *****
*****                                                       *****
*****  time of execution:  09:56:47                         *****
*****                                                       *****
*****                                                       *****
*****************************************************************
*****************************************************************
*****************************************************************
```

```
1
0       -1q array has      1 entries.
0        0q array has      4 entries.
0        1q array has     12 entries.
0select  5 nuclides from the master  library on logical  1
        65 nuclides from the working library on logical  3
         0 nuclides from the working library on logical  0
           to create the new working library on logical  4

         1 resonance calculations have been requested
         0 output option for ampx formatted cross section data
0the storage allocated for this case is 200000 words
0        2q array has     70 entries.
0        3q array has     15 entries.
0        4q array has      5 entries.
0 general information concerning cross section library
    tape identification number              4349
    number of nuclides on tape                65
    number of neutron energy groups           27
    first thermal neutron energy group        15
```

```
   number of gamma energy groups              0
0  direct access unit number  9 requires  72 blocks of length  1484 words
- xsdrn tape   4321
                        scale 4.2 - 27 group neutron burnup library
                          based on endf-b version 4 data with endf-b version 5 fission products
                            compiled for nrc      1/27/89
                              last updated       9/16/93
                                l.m.petrie   -   ornl
-  work tape   4349

 xsdrn weighted tape--parent case entitled--   80 d, sas2h: babcock wilcox 15x15,
  3.00wt%, 20gwd/mtu burn high temp


0 nuclides from xsdrn tape
    1    hydrogen        endf/b-iv mat 1269/thrm1002    updated 10/13/89          202
    2   b-10 1273 218ngp 042375 p-3 293k                                            203
    3    boron-11        endf/b-iv mat 1160             updated 10/13/89          204
    4    oxygen-16       endf/b-iv mat 1276             updated 10/13/89          201
    5    zircalloy       endf/b-iv mat 1284             updated 10/13/89          205
0 nuclides from  work tape
    6   1/v cross sections normalized to 1.0 at 0.0253 ev                          999
    7    hydrogen        endf/b-iv mat 1269/thrm1002    updated 10/13/89         1001
    8   b-10 1273 218ngp 042375 p-3 293k                                           5010
    9    boron-11        endf/b-iv mat 1160             updated 10/13/89         5011
   10    oxygen-16       endf/b-iv mat 1276             updated 10/13/89         8016
   11    oxygen-16       endf/b-iv mat 1276             updated 10/13/89            6
   12    kr-83           mt=102,103,103,105,106,107     updated 10/13/89        36083
   13    kr-85              mt=  102                                            36085
   14    sr-90           mt=102                         updated 10/13/89        38090
   15     y-89           mt=102                         updated 10/13/89        39089
   16    zr-93              mt=  102                                            40093
   17    zr-94           mt=102                         updated 10/13/89        40094
   18    zr-95           mt=102                         updated 10/13/89        40095
   19    zircalloy       endf/b-iv mat 1284             updated 10/13/89        40802
   20    nb-94           mt=102                         updated 10/13/89        41094
   21    mo-95           mt=102                         updated 10/13/89        42095
   22    tc-99           mt=102                         updated 10/13/89        43099
   23    ru-101          mt=102                         updated 10/13/89        44101
   24    ru-106          mt=102                         updated 10/13/89        44106
   25    rh-103          mt=102                         updated 10/13/89        45103
   26    rh-105             mt=  102                                            45105
   27    pd-105          mt=102                         updated 10/13/89        46105
   28    pd-108          mt=102                         updated 10/13/89        46108
   29    silver-109      endf/b-iv mat 1139             updated 10/13/89        47109
   30    sb-124          mt=102                         updated 10/13/89        51124
   31    xe-131          mt=102,103,104,105,106         updated 10/13/89        54131
   32    xe-132          mt=102,103,104,105,106         updated 10/13/89        54132
   33    xenon-135       endf/b-iv mat 1294             updated 10/13/89        54135
   34    xe-136             mt=  102, 103, 104, 105, 107                        54136
   35    cesium-133      endf/b-iv mat 1141             updated 10/13/89        55133
   36    cs-134          mt=102                         updated 10/13/89        55134
   37    cs-135             mt=  102                                            55135
   38    cs-137          mt=102                         updated 10/13/89        55137
   39    ba-136          mt=102                         updated 10/13/89        56136
   40    la-139          mt=102                         updated 10/13/89        57139
   41    ce-144             mt=  102                                            58144
   42    pr-141          mt=102,103,104,105,106,107     updated 10/13/89        59141
   43    pr-143          mt=102                         updated 10/13/89        59143
```

```
   44    nd-143        mt=102                          updated 10/13/89          60143
   45    nd-145        mt=102                          updated 10/13/89          60145
   46    nd-147        mt=102                          updated 10/13/89          60147
   47    pm-147        mt=102                          updated 10/13/89          61147
   48    pm-148          mt=  102                                                61148
   49    sm-147        endf/b-v fission product        updated 10/13/89          62147
   50    sm-149        mt=102,103,107                  updated 10/13/89          62149
   51    sm-150        mt=102                          updated 10/13/89          62150
   52    sm-151        mt=102,103,104,105,106,107      updated 10/13/89          62151
   53    sm-152        mt=102,103,104,105,106,107      updated 10/13/89          62152
   54    eu-153        mt=102,103,104,105,106,107      updated 10/13/89          63153
   55    eu-154        mt=102,103,104,105,106,107      updated 10/13/89          63154
   56    eu-155        mt=102,103,104,105,106,107      updated 10/13/89          63155
   57    gd-155        mt=102                          updated 10/13/89          64155
   58   u-234 1043 sigo=5+4 new-lacs p-3 293k f-1/e-m(1.+5)                      92234
   59    uranium-235   endf/b-iv mat 1261              updated 10/13/89          92235
   60   u-236 1163 sigo=5+4 new-lacs p-3 293k f-1/e-m(1.+5)                      92236
   61    uranium-238   endf/b-iv mat 1262              updated 10/13/89          92238
   62    neptunium-237 endf/b-iv mat 1263              updated 10/13/89          93237
   63   pu-238 1050 sigo=5+4 new-lacs p-3 293k f-1/e-m(1.+5)                      94238
   64    plutonium-239 endf/b-iv mat 1264              updated 10/13/89          94239
   65    plutonium-240 endf/b-iv mat 1265              updated 10/13/89          94240
   66    plutonium-241 endf/b-iv mat 1266              updated 10/13/89          94241
   67    plutonium-242 endf/b-iv mat 1161              updated 10/13/89          94242
   68   am-241 1056 sigo=5+4 new-lacs 218ngp p-3 293k                            95241
   69   am-243 1057 218 gp wt f-1/e-m 090376 p3 293k                             95243
   70    curium-244    endf/b-iv mat 1162              updated 10/13/89          96244
0 hydrogen       endf/b-iv mat 1269/thrm1002    updated 10/13/89          202    temperature=  607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0b-10 1273 218ngp 042375 p-3 293k                                          203    temperature=  607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 boron-11       endf/b-iv mat 1160             updated 10/13/89          204    temperature=  607.60
                                thermal scattering matrix number   2 at a temperature of   550.00 was selected.
0 oxygen-16      endf/b-iv mat 1276             updated 10/13/89          201    temperature=  607.60
0 zircalloy      endf/b-iv mat 1284             updated 10/13/89          205    temperature=  650.00
0resonance data for this nuclide
0mass number (a)          =   90.436          temperature(kelvin)      =  650.000
0potential scatter sigma  =    6.395          lumped nuclear density   = 4.2515602E-02
0spin factor (g)          =    1.079          lump dimension (a-bar)   = 6.7309999E-01
0inner radius             = 6.3246000E-01     dancoff correction (c)   = 1.6805907E-01
0the absorber will be treated by the nordheim integral method.
0this resonance material will be treated as a 2-dimensional object.
0volume fraction of lump in cell used to account for spatial self-shielding=1.00000
0group      res abs        res fiss       res scat
  8      -1.156752E-03    .000000E+00   -7.806033E-01
  9      -4.625978E-02    .000000E+00   -2.073270E+00
 10      -5.962230E-02    .000000E+00   -1.351984E+00
 11      -1.761672E-01    .000000E+00   -7.350731E-01
0excess resonance integrals
0                resolved
0absorption      2.92402E-01
 fission          .00000E+00
-  elapsed time   .00 min.
-  elapsed time   .02 min.
1     this xsdm working tape was created 02/16/96 at 09:56:47
      the title of the parent case is as follows
      xsdm weighted tape--parent case entitled--   80 d, sas2h: babcock wilcox 15x15,
       3.00wt%, 20gwd/mtu burn high temp

         tape id                    8670          number of nuclides                70
```

```
 number of neutron groups          27        number of gamma groups          0
 first thermal group               15        logical unit                    4
                          table of contents
 hydrogen      endf/b-iv mat 1269/thrm1002   updated 10/13/89          id   202
b-10 1273 218ngp 042375 p-3 293k                                        id   203
 boron-11      endf/b-iv mat 1160            updated 10/13/89          id   204
 oxygen-16     endf/b-iv mat 1276            updated 10/13/89          id   201
 zircalloy     endf/b-iv mat 1284            updated 10/13/89          id   205
1/v cross sections normalized to 1.0 at 0.0253 ev                       id   999
 hydrogen      endf/b-iv mat 1269/thrm1002   updated 10/13/89          id  1001
b-10 1273 218ngp 042375 p-3 293k                                        id  5010
 boron-11      endf/b-iv mat 1160            updated 10/13/89          id  5011
 oxygen-16     endf/b-iv mat 1276            updated 10/13/89          id  8016
 oxygen-16     endf/b-iv mat 1276            updated 10/13/89          id     6
 kr-83         mt=102,103,103,105,106,107    updated 10/13/89          id 36083
 kr-85           mt=  102                                              id 36085
 sr-90         mt=102                        updated 10/13/89          id 38090
  y-89         mt=102                        updated 10/13/89          id 39089
 zr-93           mt=  102                                              id 40093
 zr-94         mt=102                        updated 10/13/89          id 40094
 zr-95         mt=102                        updated 10/13/89          id 40095
 zircalloy     endf/b-iv mat 1284            updated 10/13/89          id 40302
 nb-94         mt=102                        updated 10/13/89          id 41094
 mo-95         mt=102                        updated 10/13/89          id 42095
 tc-99         mt=102                        updated 10/13/89          id 43099
 ru-101        mt=102                        updated 10/13/89          id 44101
 ru-106        mt=102                        updated 10/13/89          id 44106
 rh-103        mt=102                        updated 10/13/89          id 45103
 rh-105          mt=  102                                              id 45105
 pd-105        mt=102                        updated 10/13/89          id 46105
 pd-108        mt=102                        updated 10/13/89          id 46108
 silver-109    endf/b-iv mat 1139            updated 10/13/89          id 47109
 sb-124        mt=102                        updated 10/13/89          id 51124
 xe-131        mt=102,103,104,105,106        updated 10/13/89          id 54131
 xe-132        mt=102,103,104,105,106        updated 10/13/89          id 54132
 xenon-135     endf/b-iv mat 1294            updated 10/13/89          id 54135
 xe-136          mt=  102, 103, 104, 105, 107                          id 54136
 cesium-133    endf/b-iv mat 1141            updated 10/13/89          id 55133
 cs-134        mt=102                        updated 10/13/89          id 55134
 cs-135          mt=  102                                              id 55135
 cs-137        mt=102                        updated 10/13/89          id 55137
 ba-136        mt=102                        updated 10/13/89          id 56136
 la-139        mt=102                        updated 10/13/89          id 57139
 ce-144          mt=  102                                              id 58144
 pr-141        mt=102,103,104,105,106,107    updated 10/13/89          id 59141
 pr-143        mt=102                        updated 10/13/89          id 59143
 nd-143        mt=102                        updated 10/13/89          id 60143
 nd-145        mt=102                        updated 10/13/89          id 60145
 nd-147        mt=102                        updated 10/13/89          id 60147
 pm-147        mt=102                        updated 10/13/89          id 61147
 pm-148          mt=  102                                              id 61148
 sm-147        endf/b-v fission product      updated 10/13/89          id 62147
 sm-149        mt=102,103,107                updated 10/13/89          id 62149
 sm-150        mt=102                        updated 10/13/89          id 62150
 sm-151        mt=102,103,104,105,106,107    updated 10/13/89          id 62151
 sm-152        mt=102,103,104,105,106,107    updated 10/13/89          id 62152
 eu-153        mt=102,103,104,105,106,107    updated 10/13/89          id 63153
 eu-154        mt=102,103,104,105,106,107    updated 10/13/89          id 63154
 eu-155        mt=102,103,104,105,106,107    updated 10/13/89          id 63155
 gd-155        mt=102                        updated 10/13/89          id 64155
```

```
      u-234 1043 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                    id    92234
       uranium-235    endf/b-iv mat 1261          updated 10/13/89            id    92235
      u-236 1163 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                    id    92236
       uranium-238    endf/b-iv mat 1262          updated 10/13/89            id    92238
       neptunium-237  endf/b-iv mat 1263          updated 10/13/89            id    93237
      pu-238 1050 sigo=5+4 newklacs p-3 293k f-1/e-m(1.+5)                   id    94238
       plutonium-239  endf/b-iv mat 1264          updated 10/13/89            id    94239
       plutonium-240  endf/b-iv mat 1265          updated 10/13/89            id    94240
       plutonium-241  endf/b-iv mat 1266          updated 10/13/89            id    94241
       plutonium-242  endf/b-iv mat 1161          updated 10/13/89            id    94242
      am-241 1056 sigo=5+4 newklacs 218ngp p-3 293k                          id    95241
      am-243 1057 218 gp wt f-1/e-m 090576 p3 293k                           id    95243
       curium-244     endf/b-iv mat 1162          updated 10/13/89            id    96244
0       tape copy used      0 i/o's, and took     .00 seconds
1 xx        xx  ssssssssss  dddddddddd  rrrrrrrrrr  mm       mm pppppppppp  mm       mm
  xx        xx  ssssssssssss dddddddddd rrrrrrrrrr mm       mm pppppppppp mmm       mmm
   xx      xx   ss        ss dd       dd rr       rr mmm     mm pp       pp mmmm     mmmm
    xx    xx    ss           dd       dd rr       rr mm m    mm pp       pp mm mm   mm mm
     xx xx      ss           dd       dd rr       rr mm  mm  mm pp       pp mm  mm mm  mm
      xxx       ssssssssssss dd       dd rrrrrrrrrr mm   mm mm pppppppppp mm   mmm  mm
      xxx        ssssssssssss dd       dd rrrrrrrrrr mm    m mm pppppppppp mm    m   mm
     xx xx              ss  dd       dd rr     rr  mm     mm mm pp         mm        mm
    xx   xx             ss  dd       dd rr      rr mm      mm pp         mm        mm
   xx     xx   ss        ss dd       dd rr       rr mm      mm pp         mm        mm
  xx       xx  ssssssssssss dddddddddd rr        rr mm      mm pp         mm        mm
 xx         xx  ssssssssss  dddddddddd  rr        rr mm      mm pp         mm        mm
0

  dddddddddd     aaaaaaaa    w       w iiiiiiiiiii   ssssssssss
  dddddddddd    aaaaaaaaaa   w       w iiiiiiiiiii  ssssssssssss
  dd       dd   aa      aa   w       w     ii       ss        ss
  dd       dd   aa      aa   w       w     ii       ss
  dd       dd   aa      aa   w       w     ii       ss
  dd       dd   aaaaaaaaaaaa w       w     ii       ssssssssssss
  dd       dd   aaaaaaaaaaaa  w     w      ii        ssssssssssss
  dd       dd   aa      aa     w   w       ii                ss
  dd       dd   aa      aa      w w        ii                ss
  dd       dd   aa      aa      w w        ii       ss       ss
  dddddddddd    aa      aa       w       iiiiiiiiiii  ssssssssssss
  dddddddddd    aa      aa       v       iiiiiiiiiii   ssssssssss
0

    000000     zzzzzzzzzz          //     11     66666666666         //  99999999999  66666666666
   00000000   zzzzzzzzzzzz         //    111     66666666666         //  99999999999  66666666666
  00      00  zz        zz         //   1111     66                  //  99       99  66
 00        00          zz          //     11     66                  //  99       99  66
 00        00          zz          //     11     66                  //  99       99  66
 00        00        zz            //     11     66666666666         //  99999999999  66666666666
 00        00      zz              //     11     66666666666         //   99999999999 66666666666
 00        00    zz                //     11     66      66          //           99  66      66
 00        00  zz                  //     11     66      66          //           99  66      66
  00      00  zz                   //     11     66      66          //           99  66      66
   00000000   zzzzzzzzzzzz         //  11111111  66666666666         //  99999999999  66666666666
    000000    zzzzzzzzzzzz         //  11111111   66666666666        //  99999999999   66666666666
0

    000000     99999999999         55555555555  66666666666                 44    88888888888
   00000000   99999999999          55555555555  66666666666                444   8888888888888
  00      00  99       99     :::  55           66                 :::    444   88       88
 00        00 99       99     :::  55           66                 :::   44 44   88       88
```

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00      00  99      99      :::     55          66              :::       44  44   88      88
00      00  99999999999             5555555555  66666666666               44  44   88888888888
00      00   99999999999            555555555555 666666666666             44  44   88888888888
00      00          99      :::             55  66      66      :::     44444444444  88      88
00      00          99      :::             55  66      66      :::     44444444444  88      88
 00    00           99      :::     55      55  66      66      :::           44   88      88
  000000000   99999999999             555555555555 666666666666                44   88888888888
   0000000    99999999999              5555555555  6666666666                 44    88888888888
1
0                          99999999999   cccccccccc    aaaaaaaa   ll          eeeeeeeeeeee
                          99999999999999 cccccccccccc  aaaaaaaaaa  ll          eeeeeeeeeeee
                          99      99    cc      cc    aa      aa  ll          ee
                          99            cc            aa      aa  ll          ee
                          99            cc            aa      aa  ll          ee
                          99999999999   cc            aaaaaaaaaaaa ll         eeeeeeeee
                           99999999999  cc            aaaaaaaaaaaa ll         eeeeeeeee
                                   99   cc            aa      aa  ll          ee
                                   99   cc            aa      aa  ll          ee
                          99       99   cc      cc    aa      aa  ll          ee
                          99999999999999 cccccccccccc aa      aa  llllllllllll eeeeeeeeeeee
                           99999999999   cccccccccc   aa      aa  llllllllllll eeeeeeeeeeee
```

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*****************************************************************
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*****                                                       *****
*****                                                       *****
*****                                                       *****
```

```
0      0q array has     11 entries.
0      1q array has     15 entries.
0      2q array has     10 entries.
0      3q array has     12 entries.
0      4q array has      9 entries.
0      5q array has     12 entries.
0direct access unit   9 requires    12 blocks of length  704 for cross section mixing.
1                        80 d, second part of sas2h pass to make library
0general problem description data block
0                                 general problem data

 ige  1/2/3 = plane/cylinder/sphere      2        isn  quadrature order                    8
 izm  number of zones                    4        isct order of scattering                 3
 im   number of special intervals       28        ievt 0/1/2/3/4/5/6=q/k/alpha/c/z/r/h     1
 ibl  0/1/2/3 = vacuum/refl/per/white    1        iim  inner iteration maximum            20
 ibr  right boundary condition           3        iom  outer iteration maximum            25
 mix  number of mixtures                 3        iclc -1/0/n--flat res/sn/cpt             0
 ms   mixing table length               70        ith  0/1 = forward/adjoint               0
 ign  number of energy groups           27        iflu not used(always wgtd)               0
 nrg  number of neutron groups          27        iprt -2/-1/0/n=mixture xsec print       -2
 ngg  number of gamma groups             0        idl  0/1/2/3=no/prt nd/pch n/both       14
 iftg number of first thermal group     15        ipbt -1/0/1=none/fine/all bal. prt       0
0                                 special options

 ifg  0/1 = none/weighting calculation   1        ipn  0/1/2 diff. coef. param             0
 iqm  volumetric sources (0/n=no/yes)    0        idfm 0/1 = none/density factors 39*      0
 ipm  boundary sources (0/n=no/yes)      0        iaz  0/n = none/n activities by zone     0
 ifn  0/1/2 = input 33*/34*/use last    14        iai  0/1=none/activities by interval     0
 itmx maximum time (minutes)            10        ifct 0/1=no/yes upscatter scaling        0
 idt1 0/1/2/3=no/xsect/srce/flux--out    0        ipvt 0/1/2=no/k/alpha parametric srch    0
 isx  broad group fluxes                 0        isen outer iteration acceleration        0
 ibln activity data unit                 0        rbnd band rebaln parameter               0
 jbkl 0/1/2 buckling geometry            0
0                                 weighting data (ifg=1)

 icon -1/0/1=cell/zone/region weight    -1        ihtf total xsect pan in brd gp tables    3
 ignf number of broad groups             3        ndsf pan g-g or file number              4
 itp  0/10/20/30/40 0/c/e/ac/a           0        nusf table length or max order           6
 ipp  -2/-1/0/n=wgtad xsect print       -2        mxcm extra 1-d x-sect positions          0
 iap  -1/n anisn xsect print            -1
0                                 floating point parameters

 eps  overall convergence        1.00000E-04      dy   cyl/pla ht for buckling    .00000E+00
 ptc  point convergence          1.00000E-04      dz   plane depth for buckling  2.00000E+02
 xnf  normalization factor       1.00000E+00      vsc  void streaming correction  .00000E+00
 ev   eigenvalue guess            .00000E+00      pv   ipvt=1/2--k/alpha          1.00000E+00
 evm  eigenvalue modifier         .00000E+00      eql  ev change eps for search  1.00000E-03
 bf   buckling factor=1.420892   1.42089E+00      xrpm new param mod for search  7.50000E-01
      this case will require      2611 locations for mixing
      this case has been allocated 200000 locations
1                        80 d, second part of sas2h pass to make library
0      13q array has    70 entries.
0      14q array has    70 entries.
0      15q array has    70 entries.
0                                 data block 2 (mixing table, etc.)
0     nuclides        cccc                          mixing table                          extra
       on tape      identification            mixture  component     atom density       xsect id's
     1    202                                    3       201        2.09710E-02
     2    203                                    3       202        4.19420E-02
     3    204                                    3       203        3.81515E-06
```

INFORMATION ONLY

4	201	3	204	1.54884E-05
5	205	2	205	4.25156E-02
6	999	1	92235	2.17519E-04
7	1001	1	92234	1.80384E-06
8	5010	1	92236	3.09919E-06
9	5011	1	92238	7.29235E-03
10	8016	1	8016	1.50611E-02
11	6	1	6	1.15315E-02
12	36083	1	36083	5.19887E-08
13	36085	1	36085	2.52399E-08
14	38090	1	38090	5.64542E-07
15	39089	1	39089	1.85221E-07
16	40093	1	42095	8.27836E-08
17	40094	1	40093	4.11148E-07
18	40095	1	40094	6.33205E-07
19	40802	1	40095	4.27857E-07
20	41094	1	41094	1.77349E-13
21	42095	1	43099	5.87758E-07
22	43099	1	45103	1.52118E-07
23	44101	1	45105	3.63974E-09
24	44106	1	44101	5.18370E-07
25	45103	1	44106	5.96664E-08
26	45105	1	46105	1.21221E-07
27	46105	1	46108	1.56859E-08
28	46108	1	47109	9.63590E-09
29	47109	1	51124	3.00808E-12
30	51124	1	54131	2.47829E-07
31	54131	1	54132	4.19533E-07
32	54132	1	54135	2.09120E-09
33	54135	1	54136	9.95252E-07
34	54136	1	55134	2.70779E-09
35	55133	1	55135	2.99702E-07
36	55134	1	55137	6.30110E-07
37	55135	1	56136	7.27113E-10
38	55137	1	57139	6.33240E-07
39	56136	1	59141	3.00200E-07
40	57139	1	59143	1.34650E-07
41	58144	1	58144	4.90451E-07
42	59141	1	60143	4.35283E-07
43	59143	1	60145	3.87075E-07
44	60143	1	61147	1.75725E-07
45	60145	1	61148	4.19133E-10
46	60147	1	60147	4.46317E-08
47	61147	1	62147	4.30449E-09
48	61148	1	62149	2.10275E-08
49	62147	1	62150	8.60817E-08
50	62149	1	62151	3.43758E-08
51	62150	1	62152	3.85958E-08
52	62151	1	64155	3.40414E-11
53	62152	1	63153	1.83469E-08
54	63153	1	63154	5.35540E-10
55	63154	1	63155	3.62762E-09
56	63155	1	40802	4.42681E-03
57	64155	1	1001	2.30630E-02
58	92234	1	5010	2.09787E-06
59	92235	1	5011	8.51673E-06
60	92236	1	55133	6.04856E-07
61	92238	1	95237	4.79701E-08
62	95237	1	94238	5.71923E-10
63	94238	1	94239	5.27664E-06

INFORMATION ONLY

64	94239	1	94240	1.45266E-07
65	94240	1	94241	1.08078E-08
66	94241	1	94242	9.49211E-11
67	94242	1	95241	2.80565E-11
68	95241	1	95243	5.82811E-13
69	95243	1	96244	3.88991E-15
70	96244	1	999	3.30753E-21

- elapsed time .00 min.
0 24259 locations will be used
0 36q array has 29 entries.
0 36q array has 28 entries.
0 39q array has 4 entries.
0 40q array has 4 entries.
0 47q array has 27 entries.
0 51q array has 27 entries.
1 80 d, second part of sas2h pass to make library

0 neutron group parameters

gp	energy boundaries	lethargy boundaries	weighted velocities	broad gp numbers	calc type	group band	right albedo	left albedo
1	2.00000E+07	-6.93147E-01	4.60581E+09	1	0	1	1.00000E+00	
2	6.43400E+06	4.40989E-01	2.88737E+09	1	0	2	1.00000E+00	
3	3.00000E+06	1.20397E+00	2.12201E+09	1	0	3	1.00000E+00	
4	1.85000E+06	1.68740E+00	1.75673E+09	1	0	4	1.00000E+00	
5	1.40000E+06	1.96611E+00	1.46535E+09	1	0	5	1.00000E+00	
6	9.00000E+05	2.40795E+00	1.06620E+09	2	0	6	1.00000E+00	
7	4.00000E+05	3.21888E+00	6.07557E+08	2	0	7	1.00000E+00	
8	1.00000E+05	4.60517E+00	2.72415E+08	2	0	8	1.00000E+00	
9	1.70000E+04	6.37713E+00	1.13526E+08	2	0	9	1.00000E+00	
10	3.00000E+03	8.11173E+00	4.82126E+07	2	0	10	1.00000E+00	
11	5.50000E+02	9.80818E+00	2.05946E+07	2	0	11	1.00000E+00	
12	1.00000E+02	1.15129E+01	1.01036E+07	2	0	12	1.00000E+00	
13	3.00000E+01	1.27169E+01	5.69995E+06	2	0	13	1.00000E+00	
14	1.00000E+01	1.38155E+01	3.20957E+06	2	0	14	1.00000E+00	
15	3.04999E+00	1.50030E+01	2.10601E+06	2	0	15	1.00000E+00	
16	1.77000E+00	1.55471E+01	1.70522E+06	2	0	16	1.00000E+00	
17	1.29999E+00	1.58657E+01	1.52545E+06	2	0	17	1.00000E+00	
18	1.12999E+00	1.59959E+01	1.42867E+06	2	0	18	1.00000E+00	
19	1.00000E+00	1.61181E+01	1.31002E+06	2	0	19	1.00000E+00	
20	8.00000E-01	1.63412E+01	9.05898E+05	2	0	20	1.00000E+00	
21	4.00000E-01	1.70344E+01	8.17974E+05	3	0	21	1.00000E+00	
22	3.25000E-01	1.72420E+01	6.90070E+05	3	0	22	1.00000E+00	
23	2.25000E-01	1.76098E+01	4.86953E+05	3	0	23	1.00000E+00	
24	9.99999E-02	1.84207E+01	3.57766E+05	3	0	24	1.00000E+00	
25	5.00000E-02	1.91138E+01	2.71895E+05	3	0	25	1.00000E+00	
26	3.00000E-02	1.96247E+01	1.87283E+05	3	0	26	1.00000E+00	
27	1.00000E-02	2.07253E+01	8.88201E+04	3	0	27	1.00000E+00	
28	1.00000E-05	2.76510E+01						

1 80 d, second part of sas2h pass to make library

0

	mixture by zone	order p(l) by zone	activity table matl no.	activity table reaction	quadrature constants weights	quadrature constants directions	quadrature constants refl direc	quadrature constants wt x cos
1	3	3			0	-2.79004E-01	3	0
2	2	3			5.06143E-02	-1.97286E-01	3	-9.98548E-03
3	3	3			5.06143E-02	1.97286E-01	2	9.98548E-03
4	1	3			0	-6.04195E-01	8	0
5					5.59953E-02	-5.58410E-01	8	-3.10450E-02
6					5.59953E-02	-2.31301E-01	7	-1.28598E-02
7					5.59953E-02	2.31301E-01	6	1.28598E-02
8					5.59953E-02	5.58410E-01	5	3.10450E-02
9					0	-8.50774E-01	15	0
10					5.22884E-02	-8.21784E-01	15	-4.29665E-02

11					5.22844E-02	-6.01588E-01	14	-3.14537E-02
12					5.22844E-02	-2.20196E-01	13	-1.15128E-02
13					5.22844E-02	2.20196E-01	12	1.15128E-02
14					5.22844E-02	6.01588E-01	11	3.14537E-02
15					5.22844E-02	8.21784E-01	10	4.29666E-02
16					0	-9.89052E-01	24	0
17					4.53355E-02	-9.64143E-01	24	-4.37099E-02
18					4.53355E-02	-8.17361E-01	23	-3.70555E-02
19					4.53355E-02	-5.46143E-01	22	-2.47597E-02
20					4.53355E-02	-1.91780E-01	21	-8.69444E-03
21					4.53355E-02	1.91780E-01	20	8.69444E-03
22					4.53355E-02	5.46143E-01	19	2.47597E-02
23					4.53355E-02	8.17361E-01	18	3.70555E-02
24					4.53355E-02	9.64143E-01	17	4.37099E-02

0constants for p(3) scattering

0angl	set 1	set 2	set 3	set 4	set 5
1	-2.79004E-01	8.83235E-01	6.74143E-02	-6.16919E-01	-1.71701E-02
2	-1.97286E-01	8.83235E-01	.00000E+00	-4.36228E-01	1.21411E-02
3	1.97286E-01	8.83235E-01	.00000E+00	4.36228E-01	-1.21411E-02
4	-6.04419E-01	4.52016E-01	3.16379E-01	-8.04435E-01	-1.74564E-01
5	-5.58410E-01	4.52016E-01	2.23714E-01	-7.43201E-01	-6.68028E-02
6	-2.31301E-01	4.52016E-01	-2.23713E-01	-3.07844E-01	1.61276E-01
7	2.31301E-01	4.52016E-01	-2.23713E-01	3.07844E-01	-1.61276E-01
8	5.58410E-01	4.52016E-01	2.23713E-01	7.43201E-01	6.68028E-02
9	-8.50774E-01	-8.57235E-02	6.26843E-01	-1.98456E-01	-4.86835E-01
10	-8.21784E-01	-8.57235E-02	5.42862E-01	-1.91694E-01	-3.44245E-01
11	-6.01588E-01	-8.57235E-02	.00000E+00	-1.40330E-01	3.44244E-01
12	-2.20196E-01	-8.57235E-02	-5.42862E-01	-5.13643E-02	3.44245E-01
13	2.20196E-01	-8.57235E-02	-5.42862E-01	5.13643E-02	-3.44245E-01
14	6.01588E-01	-8.57235E-02	.00000E+00	1.40330E-01	-3.44245E-01
15	8.21784E-01	-8.57235E-02	5.42862E-01	1.91694E-01	3.44245E-01
16	-9.89052E-01	-4.49528E-01	8.36885E-01	5.00703E-01	-7.51005E-01
17	-9.64143E-01	-4.49528E-01	7.73181E-01	4.91083E-01	-6.26438E-01
18	-8.17361E-01	-4.49528E-01	3.20262E-01	4.16320E-01	1.46514E-01
19	-5.46143E-01	-4.49528E-01	-3.20262E-01	2.78178E-01	7.36575E-01
20	-1.91780E-01	-4.49528E-01	-7.73181E-01	9.76824E-02	4.17236E-01
21	1.91780E-01	-4.49528E-01	-7.73181E-01	-9.76824E-02	-4.17236E-01
22	5.46143E-01	-4.49528E-01	-3.20262E-01	-2.78178E-01	-7.36575E-01
23	8.17361E-01	-4.49528E-01	3.20262E-01	-4.16320E-01	-1.46514E-01
24	9.64143E-01	-4.49528E-01	7.73181E-01	-4.91083E-01	6.26438E-01

1 int	radii	mid pts	zone no.	areas	volumes	dens fact	radius mod	spec(int)
1	0	1.97844E-02	1	0	4.90881E-03		0	
2	3.95287E-02	5.92931E-02	1	2.48366E-01	1.47264E-02		0	
3	7.90575E-02	1.18586E-01	1	4.96733E-01	5.89057E-02		0	
4	1.58115E-01	1.97844E-01	1	9.93466E-01	9.81762E-02		0	
5	2.37172E-01	2.76701E-01	1	1.49020E+00	1.37447E-01			
6	3.16230E-01	3.55759E-01	1	1.98693E+00	1.76717E-01			
7	3.95288E-01	4.34816E-01	1	2.48366E+00	2.15988E-01			
8	4.74345E-01	5.13874E-01	1	2.98040E+00	2.55258E-01			
9	5.53403E-01	5.73167E-01	1	3.47713E+00	1.42355E-01			
10	5.92931E-01	6.12698E-01	1	3.72550E+00	1.52173E-01			
11	6.32460E-01	6.42620E-01	2	3.97386E+00	8.20460E-02			
12	6.52780E-01	6.62940E-01	2	4.10154E+00	8.46405E-02			
13	6.73100E-01	6.96683E-01	3	4.22921E+00	2.06562E-01			
14	7.20067E-01	7.43550E-01	3	4.52431E+00	2.19422E-01			
15	7.67033E-01	7.90517E-01	3	4.81941E+00	2.33282E-01			
16	8.14000E-01	8.62795E-01	4	5.11451E+00	5.29051E-01			
17	9.11591E-01	9.60386E-01	4	5.72769E+00	5.88691E-01			
18	1.00918E+00	1.10677E+00	4	6.34088E+00	1.35731E+00			
19	1.20436E+00	1.30195E+00	4	7.56724E+00	1.59667E+00			

20	1.39955E+00	1.49714E+00	4	8.79560E+00	1.83603E+00
21	1.59473E+00	1.69232E+00	4	1.00200E+01	2.07540E+00
22	1.78991E+00	1.88750E+00	4	1.12463E+01	2.31478E+00
23	1.98509E+00	2.08268E+00	4	1.24727E+01	2.55412E+00
24	2.18027E+00	2.27786E+00	4	1.36991E+01	2.79349E+00
25	2.37545E+00	2.47305E+00	4	1.49254E+01	3.03285E+00
26	2.57064E+00	2.66823E+00	4	1.61518E+01	3.27221E+00
27	2.76582E+00	2.81461E+00	4	1.73781E+01	1.72587E+00
28	2.86341E+00	2.91220E+00	4	1.79913E+01	1.78571E+00
29	2.96100E+00			1.86045E+01	

- elapsed time .00 min.

1 outer iter	inner iters	1 - balance	eigenvalue	1 - source ratio	1 - scatter ratio	1 - upscat ratio	search parameter	time (min)
1	214	-7.06698E-06	1.15443E+00	-1.71280E-01	1.00000E+00	-4.60574E-02	.00000E+00	.0000
2	311	-1.00740E-08	1.17067E+00	-7.90221E-04	-2.27080E-02	-3.84405E-03	.00000E+00	.0167
3	385	-5.23615E-08	1.17198E+00	-4.52431E-05	-1.70393E-03	-6.85077E-04	.00000E+00	.0167
4	439	2.42399E-07	1.17221E+00	-3.01259E-06	-3.08065E-04	-1.27030E-04	.00000E+00	.0167
5	480	3.75332E-06	1.17220E+00	2.97588E-07	-5.87089E-05	-2.53117E-05	.00000E+00	.0167

grp	to grp	inner iters	mfd int.	max. flux difference	msf int.	max. scale factor	coarse mesh
1	1	1	17	4.33775E-06	28	1.00000E+00	1
2	2	1	17	5.27413E-06	28	1.00000E+00	1
3	3	1	17	4.89446E-06	28	1.00000E+00	1
4	4	1	17	4.78465E-06	28	1.00000E+00	1
5	5	1	17	4.99087E-06	28	1.00000E+00	1
6	6	1	17	3.40175E-06	28	1.00000E+00	1
7	7	1	24	1.68467E-06	28	1.00000E+00	2
8	8	1	3	3.67338E-07	20	1.00000E+00	2
9	9	1	27	7.98624E-06	28	9.99992E-01	3
10	10	1	26	1.20169E-06	28	1.00000E+00	3
11	11	1	26	2.62173E-06	28	1.00000E+00	3
12	12	1	26	1.32747E-06	28	9.99999E-01	3
13	13	1	26	1.73455E-06	28	1.00000E+00	3
14	14	1	25	5.12378E-07	28	1.00000E+00	3
15	15	1	2	2.87106E-05	28	9.99968E-01	2
16	16	1	2	3.53864E-05	28	9.99970E-01	2
17	17	1	2	4.43141E-05	28	9.99972E-01	2
18	18	1	26	7.66225E-05	18	9.99988E-01	3
19	19	1	2	4.23971E-05	28	9.99916E-01	3
20	20	1	2	3.49095E-05	28	9.99951E-01	3
21	21	1	25	5.28731E-05	28	9.99933E-01	3
22	22	1	24	2.65468E-05	28	9.99967E-01	3
23	23	1	1	3.77642E-05	28	9.99964E-01	4
24	24	1	1	4.99425E-05	9	1.00008E+00	4
25	25	1	1	5.76682E-05	8	1.00008E+00	5
26	26	1	1	4.33597E-05	6	1.00008E+00	6
27	27	1	1	4.07989E-05	5	1.00002E+00	8

6	507	-4.34097E-06	1.17232E+00	2.72614E-07	-1.20606E-05	-5.81653E-06	.00000E+00	.0167

final monitor
lambda 1.17226E+00 production/absorption 1.18767E+00 angular flux on 16

- elapsed time .02 min.

1 80 d, second part of ses2h pass to make library

0 int.	zone number	radius	int. midpoint	area	volume	prod density
1	1	.00000E+00	1.97164E-02	.00000E+00	4.90881E-03	.00000E+00
2	1	3.95287E-02	5.92951E-02	2.48366E-01	1.47264E-02	.00000E+00
3	1	7.90575E-02	1.18589E-01	4.96733E-01	5.89057E-02	.00000E+00
4	1	1.58115E-01	1.97164E-01	9.93466E-01	9.81762E-02	.00000E+00
5	1	2.37172E-01	2.76701E-01	1.49020E+00	1.37447E-01	.00000E+00
6	1	3.16230E-01	3.55759E-01	1.98693E+00	1.76717E-01	.00000E+00
7	1	3.95288E-01	4.34816E-01	2.48366E+00	2.15988E-01	.00000E+00

8	1	4.74345E-01	5.13874E-01	2.98040E+00	2.55258E-01	.00000E+00
9	1	5.53408E-01	5.73167E-01	3.47713E+00	1.42355E-01	.00000E+00
10	1	5.92931E-01	6.12698E-01	3.72550E+00	1.52173E-01	.00000E+00
11	2	6.32460E-01	6.42620E-01	3.97386E+00	8.20460E-02	.00000E+00
12	2	6.52780E-01	6.62940E-01	4.10154E+00	8.46405E-02	.00000E+00
13	3	6.73100E-01	6.96583E-01	4.22921E+00	2.05562E-01	.00000E+00
14	3	7.20067E-01	7.43550E-01	4.52431E+00	2.19422E-01	.00000E+00
15	3	7.67033E-01	7.90517E-01	4.81941E+00	2.33282E-01	.00000E+00
16	4	8.14000E-01	8.62795E-01	5.11451E+00	5.29051E-01	2.66055E-02
17	4	9.11591E-01	9.60386E-01	5.72769E+00	5.88891E-01	2.88895E-02
18	4	1.00918E+00	1.10677E+00	6.34088E+00	1.35731E+00	6.55135E-02
19	4	1.20436E+00	1.30195E+00	7.56724E+00	1.59667E+00	7.55684E-02
20	4	1.39955E+00	1.49714E+00	8.79360E+00	1.83603E+00	8.57156E-02
21	4	1.59473E+00	1.69232E+00	1.00200E+01	2.07540E+00	9.59183E-02
22	4	1.78991E+00	1.88750E+00	1.12463E+01	2.31478E+00	1.06180E-01
23	4	1.98509E+00	2.08268E+00	1.24727E+01	2.55412E+00	1.16508E-01
24	4	2.18027E+00	2.27786E+00	1.36991E+01	2.79346E+00	1.26917E-01
25	4	2.37545E+00	2.47305E+00	1.49254E+01	3.03285E+00	1.37423E-01
26	4	2.57064E+00	2.66823E+00	1.61518E+01	3.27221E+00	1.48057E-01
27	4	2.76582E+00	2.81461E+00	1.73781E+01	1.72587E+00	7.80634E-02
28	4	2.86341E+00	2.91220E+00	1.79913E+01	1.78571E+00	8.08029E-02
29		2.96100E+00		1.86045E+01		

1 80 d, second part of ses2h pass to make library

0 total flux

0 int.	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.20007E-02	8.81879E-02	1.11134E-01	6.85422E-02	1.02386E-01	1.92570E-01	1.92963E-01	1.46870E-01
2	1.19959E-02	8.81379E-02	1.11069E-01	6.85039E-02	1.02333E-01	1.92483E-01	1.92922E-01	1.46865E-01
3	1.19965E-02	8.81504E-02	1.11091E-01	6.85218E-02	1.02367E-01	1.92553E-01	1.92975E-01	1.46876E-01
4	1.20027E-02	8.82287E-02	1.11202E-01	6.86000E-02	1.02497E-01	1.92797E-01	1.93132E-01	1.46905E-01
5	1.20140E-02	8.83668E-02	1.11396E-01	6.87329E-02	1.02714E-01	1.93197E-01	1.93382E-01	1.46948E-01
6	1.20295E-02	8.85562E-02	1.11663E-01	6.89161E-02	1.03012E-01	1.93748E-01	1.93722E-01	1.47005E-01
7	1.20491E-02	8.87990E-02	1.12007E-01	6.91539E-02	1.03401E-01	1.94468E-01	1.94166E-01	1.47075E-01
8	1.20727E-02	8.91029E-02	1.12444E-01	6.94610E-02	1.03908E-01	1.95407E-01	1.94746E-01	1.47158E-01
9	1.20925E-02	8.93690E-02	1.12835E-01	6.97426E-02	1.04377E-01	1.96278E-01	1.95284E-01	1.47227E-01
10	1.21061E-02	8.95781E-02	1.13161E-01	6.99904E-02	1.04798E-01	1.97067E-01	1.95773E-01	1.47275E-01
11	1.21174E-02	8.97514E-02	1.13435E-01	7.01985E-02	1.05152E-01	1.97744E-01	1.96193E-01	1.47319E-01
12	1.21297E-02	8.98803E-02	1.13607E-01	7.03067E-02	1.05322E-01	1.98083E-01	1.96397E-01	1.47363E-01
13	1.21556E-02	9.01151E-02	1.13875E-01	7.04445E-02	1.05514E-01	1.98425E-01	1.96590E-01	1.47432E-01
14	1.21957E-02	9.04891E-02	1.14325E-01	7.06998E-02	1.05890E-01	1.99089E-01	1.96973E-01	1.47523E-01
15	1.22384E-02	9.09702E-02	1.14945E-01	7.10861E-02	1.06485E-01	2.00167E-01	1.97605E-01	1.47624E-01
16	1.23080E-02	9.17412E-02	1.15953E-01	7.17309E-02	1.07508E-01	2.02017E-01	1.98704E-01	1.47793E-01
17	1.23768E-02	9.25100E-02	1.16963E-01	7.23797E-02	1.08543E-01	2.03921E-01	1.99855E-01	1.47989E-01
18	1.24318E-02	9.31359E-02	1.17794E-01	7.29176E-02	1.09415E-01	2.05568E-01	2.00880E-01	1.48194E-01
19	1.24800E-02	9.36939E-02	1.18543E-01	7.34055E-02	1.10214E-01	2.07109E-01	2.01856E-01	1.48405E-01
20	1.25085E-02	9.40514E-02	1.19003E-01	7.37079E-02	1.10716E-01	2.08102E-01	2.02501E-01	1.48562E-01
21	1.25265E-02	9.42497E-02	1.19300E-01	7.39077E-02	1.11050E-01	2.08782E-01	2.02952E-01	1.48679E-01
22	1.25381E-02	9.43932E-02	1.19508E-01	7.40417E-02	1.11277E-01	2.09253E-01	2.03270E-01	1.48766E-01
23	1.25455E-02	9.44863E-02	1.19640E-01	7.41302E-02	1.11428E-01	2.09575E-01	2.03491E-01	1.48829E-01
24	1.25499E-02	9.45423E-02	1.19721E-01	7.41846E-02	1.11522E-01	2.09780E-01	2.03634E-01	1.48871E-01
25	1.25518E-02	9.45684E-02	1.19761E-01	7.42109E-02	1.11568E-01	2.09886E-01	2.03709E-01	1.48893E-01
26	1.25515E-02	9.45660E-02	1.19759E-01	7.42101E-02	1.11568E-01	2.09894E-01	2.03716E-01	1.48895E-01
27	1.25499E-02	9.45463E-02	1.19733E-01	7.41926E-02	1.11540E-01	2.09839E-01	2.03678E-01	1.48880E-01
28	1.25475E-02	9.45169E-02	1.19693E-01	7.41657E-02	1.11494E-01	2.09747E-01	2.03615E-01	1.48859E-01

0 int.	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.15786E-01	1.06908E-01	1.00573E-01	6.52162E-02	5.58645E-02	5.37128E-02	2.92968E-02	1.63189E-02
2	1.15787E-01	1.06909E-01	1.00577E-01	6.52211E-02	5.58693E-02	5.37195E-02	2.92986E-02	1.63198E-02
3	1.15785E-01	1.06900E-01	1.00556E-01	6.51973E-02	5.58475E-02	5.36886E-02	2.92928E-02	1.63148E-02
4	1.15780E-01	1.06878E-01	1.00506E-01	6.51399E-02	5.57953E-02	5.36142E-02	2.92777E-02	1.63095E-02
5	1.15773E-01	1.06844E-01	1.00425E-01	6.50524E-02	5.57160E-02	5.35012E-02	2.92552E-02	1.62987E-02
6	1.15762E-01	1.06797E-01	1.00324E-01	6.49335E-02	5.56088E-02	5.33480E-02	2.92255E-02	1.62844E-02

7	1.15749E-01	1.06736E-01	1.00187E-01	6.47777E-02	5.54691E-02	5.31477E-02	2.91880E-02	1.62662E-02
8	1.15734E-01	1.06653E-01	1.00004E-01	6.45724E-02	5.52852E-02	5.28845E-02	2.91407E-02	1.62431E-02
9	1.15723E-01	1.06576E-01	9.98331E-02	6.43809E-02	5.51164E-02	5.26394E-02	2.90983E-02	1.62220E-02
10	1.15722E-01	1.06503E-01	9.96748E-02	6.42066E-02	5.49629E-02	5.24168E-02	2.90612E-02	1.62033E-02
11	1.15726E-01	1.06446E-01	9.95495E-02	6.40698E-02	5.48409E-02	5.22410E-02	2.90286E-02	1.61874E-02
12	1.15721E-01	1.06426E-01	9.95026E-02	6.40162E-02	5.47906E-02	5.21705E-02	2.90107E-02	1.61794E-02
13	1.15678E-01	1.06398E-01	9.94386E-02	6.39343E-02	5.47185E-02	5.20657E-02	2.89958E-02	1.61719E-02
14	1.15604E-01	1.06332E-01	9.92926E-02	6.37569E-02	5.45679E-02	5.18421E-02	2.89710E-02	1.61581E-02
15	1.15526E-01	1.06223E-01	9.90538E-02	6.34778E-02	5.43319E-02	5.14910E-02	2.89336E-02	1.61368E-02
16	1.15417E-01	1.06043E-01	9.86582E-02	6.30183E-02	5.39425E-02	5.09106E-02	2.88651E-02	1.60995E-02
17	1.15320E-01	1.05865E-01	9.82629E-02	6.25589E-02	5.35479E-02	5.03276E-02	2.87834E-02	1.60576E-02
18	1.15249E-01	1.05715E-01	9.79247E-02	6.21664E-02	5.32016E-02	4.98267E-02	2.86955E-02	1.60147E-02
19	1.15194E-01	1.05576E-01	9.76092E-02	6.18006E-02	5.28732E-02	4.93581E-02	2.86025E-02	1.59702E-02
20	1.15167E-01	1.05488E-01	9.74052E-02	6.15643E-02	5.26560E-02	4.90535E-02	2.85325E-02	1.59357E-02
21	1.15154E-01	1.05428E-01	9.72653E-02	6.13999E-02	5.25029E-02	4.88407E-02	2.84791E-02	1.59121E-02
22	1.15147E-01	1.05386E-01	9.71623E-02	6.12829E-02	5.23920E-02	4.86886E-02	2.84385E-02	1.58935E-02
23	1.15143E-01	1.05356E-01	9.70705E-02	6.11997E-02	5.23128E-02	4.85803E-02	2.84035E-02	1.58791E-02
24	1.15141E-01	1.05336E-01	9.70414E-02	6.11431E-02	5.22588E-02	4.85065E-02	2.83780E-02	1.58696E-02
25	1.15139E-01	1.05323E-01	9.70124E-02	6.11098E-02	5.22269E-02	4.84630E-02	2.83765E-02	1.58643E-02
26	1.15136E-01	1.05319E-01	9.70030E-02	6.10986E-02	5.22178E-02	4.84500E-02	2.83748E-02	1.58635E-02
27	1.15134E-01	1.05321E-01	9.70089E-02	6.11054E-02	5.22257E-02	4.84600E-02	2.83799E-02	1.58660E-02
28	1.15132E-01	1.05327E-01	9.70124E-02	6.11239E-02	5.22449E-02	4.84854E-02	2.83892E-02	1.58704E-02

0 int.	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	7.31416E-03	6.28415E-03	1.15895E-02	3.81663E-02	1.26128E-02	2.73563E-02	9.12864E-02	7.43944E-02
2	7.31463E-03	6.28463E-03	1.15906E-02	3.81683E-02	1.26136E-02	2.73575E-02	9.12810E-02	7.43780E-02
3	7.31273E-03	6.28239E-03	1.15875E-02	3.81570E-02	1.26089E-02	2.73325E-02	9.11607E-02	7.42348E-02
4	7.30814E-03	6.27699E-03	1.15800E-02	3.81304E-02	1.25884E-02	2.72752E-02	9.08965E-02	7.39269E-02
5	7.30120E-03	6.26879E-03	1.15687E-02	3.80904E-02	1.25619E-02	2.71896E-02	9.05045E-02	7.34707E-02
6	7.29188E-03	6.25768E-03	1.15536E-02	3.80366E-02	1.25261E-02	2.70745E-02	8.99823E-02	7.28634E-02
7	7.27981E-03	6.24316E-03	1.15339E-02	3.79670E-02	1.24794E-02	2.69256E-02	8.93168E-02	7.20875E-02
8	7.26409E-03	6.22408E-03	1.15085E-02	3.78766E-02	1.24181E-02	2.67329E-02	8.84762E-02	7.11118E-02
9	7.24956E-03	6.20628E-03	1.14849E-02	3.77951E-02	1.23611E-02	2.65557E-02	8.77205E-02	7.02386E-02
10	7.23640E-03	6.19002E-03	1.14637E-02	3.77178E-02	1.23089E-02	2.63970E-02	8.70637E-02	6.94840E-02
11	7.22574E-03	6.17713E-03	1.14466E-02	3.76581E-02	1.22688E-02	2.62773E-02	8.65867E-02	6.89588E-02
12	7.22114E-03	6.17202E-03	1.14393E-02	3.76339E-02	1.22549E-02	2.62367E-02	8.64410E-02	6.88264E-02
13	7.21535E-03	6.16471E-03	1.14299E-02	3.76004E-02	1.22331E-02	2.61653E-02	8.61574E-02	6.84957E-02
14	7.20335E-03	6.14886E-03	1.14104E-02	3.75294E-02	1.21830E-02	2.60156E-02	8.55260E-02	6.77308E-02
15	7.18440E-03	6.12363E-03	1.13799E-02	3.74187E-02	1.21029E-02	2.57598E-02	8.46024E-02	6.66314E-02
16	7.15294E-03	6.08227E-03	1.13295E-02	3.72579E-02	1.19738E-02	2.53680E-02	8.31925E-02	6.49957E-02
17	7.12061E-03	6.04095E-03	1.12778E-02	3.70535E-02	1.18464E-02	2.49785E-02	8.17641E-02	6.33730E-02
18	7.09124E-03	6.00519E-03	1.12299E-02	3.68859E-02	1.17362E-02	2.46359E-02	8.03982E-02	6.18414E-02
19	7.06259E-03	5.97137E-03	1.11831E-02	3.67222E-02	1.16321E-02	2.43078E-02	7.90225E-02	6.03115E-02
20	7.04285E-03	5.94904E-03	1.11509E-02	3.66098E-02	1.15652E-02	2.40869E-02	7.80410E-02	5.92308E-02
21	7.02854E-03	5.93321E-03	1.11275E-02	3.65279E-02	1.15141E-02	2.39274E-02	7.73044E-02	5.84282E-02
22	7.01799E-03	5.92177E-03	1.11102E-02	3.64674E-02	1.14784E-02	2.38099E-02	7.67450E-02	5.78252E-02
23	7.01035E-03	5.91357E-03	1.10976E-02	3.64233E-02	1.14524E-02	2.37237E-02	7.63259E-02	5.73753E-02
24	7.00515E-03	5.90799E-03	1.10891E-02	3.63929E-02	1.14344E-02	2.36625E-02	7.60230E-02	5.70601E-02
25	7.00220E-03	5.90474E-03	1.10842E-02	3.63750E-02	1.14230E-02	2.36238E-02	7.58253E-02	5.68316E-02
26	7.00159E-03	5.90388E-03	1.10831E-02	3.63692E-02	1.14189E-02	2.36073E-02	7.57263E-02	5.67154E-02
27	7.00267E-03	5.90487E-03	1.10842E-02	3.63738E-02	1.14203E-02	2.36089E-02	7.57175E-02	5.66895E-02
28	7.00481E-03	5.90691E-03	1.10876E-02	3.63846E-02	1.14254E-02	2.36232E-02	7.57680E-02	5.67266E-02

0 int.	grp. 25	grp. 26	grp. 27
1	3.35491E-02	2.41530E-02	4.58300E-03
2	3.35367E-02	2.41390E-02	4.57960E-03
3	3.34582E-02	2.40695E-02	4.56537E-03
4	3.32911E-02	2.39225E-02	4.53517E-03
5	3.30335E-02	2.37031E-02	4.48942E-03
6	3.27127E-02	2.34075E-02	4.42663E-03
7	3.22914E-02	2.30277E-02	4.34421E-03
8	3.17630E-02	2.25476E-02	4.23750E-03

9	3.12927E-02	2.21189E-02	4.14064E-03
10	3.08925E-02	2.17501E-02	4.05697E-03
11	3.05246E-02	2.15126E-02	4.00616E-03
12	3.05676E-02	2.14770E-02	4.00288E-03
13	3.03768E-02	2.12995E-02	3.95515E-03
14	2.99373E-02	2.08753E-02	3.83581E-03
15	2.95249E-02	2.02711E-02	3.66548E-03
16	2.84310E-02	1.94025E-02	3.40967E-03
17	2.75585E-02	1.85863E-02	3.19073E-03
18	2.67431E-02	1.78654E-02	3.02957E-03
19	2.59347E-02	1.71748E-02	2.88633E-03
20	2.53719E-02	1.67161E-02	2.80122E-03
21	2.49590E-02	1.63925E-02	2.74490E-03
22	2.46528E-02	1.61607E-02	2.70646E-03
23	2.44265E-02	1.59987E-02	2.67950E-03
24	2.42641E-02	1.58762E-02	2.66089E-03
25	2.41547E-02	1.57977E-02	2.64852E-03
26	2.40957E-02	1.57524E-02	2.64158E-03
27	2.40756E-02	1.57364E-02	2.63892E-03
28	2.40875E-02	1.57398E-02	2.63880E-03

- elapsed time .02 min.

1fine group summary for zone 1 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	4.67418E-04	6.18667E-04	5.15140E-05	-6.70150E-04	9.99954E-01
2	.00000E+00	.00000E+00	3.54979E-04	5.98570E-03	7.85842E-03	1.71078E-04	-7.68424E-03	9.99965E-01
3	.00000E+00	.00000E+00	3.73267E-03	5.39824E-03	1.40451E-02	9.16518E-05	-1.04038E-02	9.99975E-01
4	.00000E+00	.00000E+00	5.50156E-03	3.57677E-03	1.22894E-02	4.17406E-05	-6.82947E-03	9.99990E-01
5	.00000E+00	.00000E+00	1.01507E-02	1.14905E-02	2.08174E-02	4.95177E-05	-1.07161E-02	9.99995E-01
6	.00000E+00	.00000E+00	2.13613E-02	3.44665E-02	4.09637E-02	8.42157E-05	-1.96866E-02	1.00000E+00
7	.00000E+00	.00000E+00	4.21313E-02	6.09411E-02	5.41112E-02	6.11923E-05	-1.20405E-02	9.99989E-01
8	.00000E+00	.00000E+00	5.63106E-02	7.82920E-02	5.87049E-02	3.63776E-05	-2.42543E-03	9.99912E-01
9	.00000E+00	.00000E+00	5.77144E-02	7.25311E-02	5.74379E-02	2.98332E-05	2.83608E-04	9.99889E-01
10	.00000E+00	.00000E+00	5.70217E-02	6.90297E-02	5.54756E-02	3.59889E-05	1.51609E-03	9.99895E-01
11	.00000E+00	.00000E+00	5.57675E-02	6.53938E-02	5.22079E-02	5.49886E-05	3.50808E-03	9.99935E-01
12	.00000E+00	.00000E+00	4.52797E-02	3.49928E-02	4.11731E-02	6.02716E-05	4.04730E-03	9.99978E-01
13	.00000E+00	.00000E+00	4.04651E-02	2.85751E-02	3.66456E-02	8.46484E-05	3.71604E-03	9.99968E-01
14	.00000E+00	.00000E+00	3.94298E-02	2.84635E-02	3.40018E-02	1.37365E-04	5.29107E-03	9.99988E-01
15	.00000E+00	.00000E+00	2.17987E-02	1.09582E-02	2.05290E-02	1.13699E-04	1.15599E-03	9.99999E-01
16	.00000E+00	.00000E+00	1.43326E-02	4.64962E-03	1.36982E-02	7.75404E-05	5.56898E-04	9.99998E-01
17	.00000E+00	.00000E+00	7.39742E-03	1.34883E-03	7.01844E-03	3.86148E-05	3.40339E-04	1.00000E+00
18	.00000E+00	.00000E+00	6.58663E-03	1.12750E-03	6.16090E-03	3.52800E-05	3.90472E-04	9.99998E-01
19	.00000E+00	.00000E+00	1.11382E-02	3.17060E-03	1.05229E-02	7.10121E-05	5.44186E-04	1.00001E+00
20	.00000E+00	.00000E+00	2.75750E-02	2.24821E-02	2.54191E-02	2.98214E-04	1.86249E-03	1.00001E+00
21	.00000E+00	.00000E+00	1.36785E-02	4.77690E-03	1.26269E-02	1.19797E-04	1.13166E-03	1.00001E+00
22	.00000E+00	.00000E+00	2.77871E-02	1.55070E-02	2.41322E-02	2.97848E-04	3.35632E-03	1.00003E+00
23	.00000E+00	.00000E+00	7.46213E-02	9.26697E-02	6.08537E-02	1.34524E-03	1.26178E-02	1.00006E+00
24	.00000E+00	.00000E+00	8.09249E-02	8.68198E-02	6.70169E-02	1.57951E-03	1.25340E-02	1.00005E+00
25	.00000E+00	.00000E+00	5.39521E-02	3.66998E-02	4.72144E-02	9.32754E-04	5.80328E-03	1.00003E+00
26	.00000E+00	.00000E+00	4.30680E-02	4.09199E-02	3.77950E-02	9.46340E-04	4.31571E-03	1.00002E+00
27	.00000E+00	.00000E+00	1.45827E-02	8.87213E-03	1.35158E-02	3.37707E-04	7.29229E-04	1.00000E+00
28	.00000E+00	.00000E+00	8.32664E-01	8.25607E-01	8.32664E-01	7.17835E-03	-7.16596E-03	9.99985E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	r2n rate	fiss rate	flux*df**2	total flux
1	1.21126E-02	-6.70150E-04	1.20047E-02	.00000E+00	3.42140E-11	.00000E+00	1.85418E-05	1.51455E-02
2	8.96886E-02	-7.68424E-03	8.82302E-02	.00000E+00	.00000E+00	.00000E+00	8.67742E-05	1.11658E-01
3	1.13340E-01	-1.04038E-02	1.11189E-01	.00000E+00	.00000E+00	.00000E+00	9.12278E-05	1.40863E-01
4	7.01303E-02	-6.82947E-03	6.85763E-02	.00000E+00	.00000E+00	.00000E+00	4.14886E-05	8.69880E-02
5	1.05039E-01	-1.07161E-02	1.09436E-01	.00000E+00	.00000E+00	.00000E+00	4.92256E-05	1.30087E-01
6	1.97518E-01	-1.96866E-02	1.92654E-01	.00000E+00	.00000E+00	.00000E+00	8.33469E-05	2.44654E-01
7	1.96054E-01	-1.20405E-02	1.93005E-01	.00000E+00	.00000E+00	.00000E+00	5.92494E-05	2.44169E-01
8	1.47259E-01	-2.42543E-03	1.46877E-01	.00000E+00	.00000E+00	.00000E+00	3.27003E-05	1.84833E-01

9	1.15724E-01	2.83608E-04	1.15786E-01	.00000E+00	.00000E+00	.00000E+00	2.16496E-05	1.45456E-01
10	1.06461E-01	1.51609E-03	1.06904E-01	.00000E+00	.00000E+00	.00000E+00	1.91219E-05	1.34104E-01
11	9.95853E-02	3.50803E-03	1.00565E-01	.00000E+00	.00000E+00	.00000E+00	1.78532E-05	1.25844E-01
12	6.41067E-02	4.04730E-03	6.52073E-02	.00000E+00	.00000E+00	.00000E+00	1.04812E-05	8.13417E-02
13	5.48750E-02	3.71606E-03	5.58561E-02	.00000E+00	.00000E+00	.00000E+00	8.74662E-06	6.96523E-02
14	5.22893E-02	5.29107E-03	5.37011E-02	.00000E+00	.00000E+00	.00000E+00	8.54748E-06	6.67104E-02
15	2.90408E-02	1.15599E-03	2.92941E-02	.00000E+00	.00000E+00	.00000E+00	4.51451E-06	3.66681E-02
16	1.61929E-02	5.56898E-04	1.63177E-02	.00000E+00	.00000E+00	.00000E+00	2.27539E-06	2.04352E-02
17	7.22892E-03	3.40839E-04	7.31343E-03	.00000E+00	.00000E+00	.00000E+00	9.35884E-07	9.14376E-03
18	6.18067E-03	3.90472E-04	6.28328E-03	.00000E+00	.00000E+00	.00000E+00	7.82806E-07	7.83982E-03
19	1.14517E-02	5.44186E-04	1.15888E-02	.00000E+00	.00000E+00	.00000E+00	1.51584E-06	1.44870E-02
20	3.76758E-02	1.86249E-03	3.81635E-02	.00000E+00	.00000E+00	.00000E+00	5.58922E-06	4.76861E-02
21	1.22791E-02	1.13166E-03	1.26109E-02	.00000E+00	.00000E+00	.00000E+00	1.43628E-06	1.56642E-02
22	2.63063E-02	3.35652E-03	2.73504E-02	.00000E+00	.00000E+00	.00000E+00	3.08835E-06	3.37833E-02
23	8.66904E-02	1.24178E-02	9.12651E-02	.00000E+00	.00000E+00	.00000E+00	9.24094E-06	1.12039E-01
24	6.90572E-02	1.23240E-02	7.43776E-02	.00000E+00	.00000E+00	.00000E+00	5.53871E-06	9.03598E-02
25	3.06675E-02	5.80528E-03	3.35434E-02	.00000E+00	.00000E+00	.00000E+00	1.91586E-06	4.04585E-02
26	2.15422E-02	4.31571E-03	2.41510E-02	.00000E+00	.00000E+00	.00000E+00	1.00795E-06	2.88225E-02
27	4.00971E-03	7.29229E-04	4.58320E-03	.00000E+00	.00000E+00	.00000E+00	1.18640E-07	5.43018E-03
28	1.78254E+00	-7.16597E-03	1.78983E+00	.00000E+00	3.42140E-11	.00000E+00	5.85915E-04	2.24432E+00

1fine group summary for zone 2 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	2.06683E-04	1.54985E-04	2.32426E-06	-1.51733E-04	1.00001E+00
2	.00000E+00	.00000E+00	2.70590E-05	1.41871E-03	1.01799E-03	1.36646E-05	-1.00462E-03	1.00000E+00
3	.00000E+00	.00000E+00	1.44709E-04	2.73739E-03	8.65533E-04	2.03111E-05	-7.40822E-04	9.99997E-01
4	.00000E+00	.00000E+00	2.80440E-04	2.29053E-03	2.98675E-04	1.30164E-05	-2.91359E-05	9.99998E-01
5	.00000E+00	.00000E+00	6.04168E-04	4.40881E-03	2.78508E-04	1.68152E-05	3.08803E-04	1.00000E+00
6	.00000E+00	.00000E+00	1.00673E-03	1.23951E-02	1.69352E-04	2.70462E-05	8.10288E-04	1.00000E+00
7	.00000E+00	.00000E+00	6.64585E-04	1.25898E-02	6.32829E-05	2.68055E-05	5.71487E-04	1.00000E+00
8	.00000E+00	.00000E+00	1.16608E-04	9.20138E-03	4.43061E-04	2.20963E-05	-3.48580E-04	1.00001E+00
9	.00000E+00	.00000E+00	4.44876E-04	6.35212E-03	5.29519E-05	7.66192E-05	3.15312E-04	9.99990E-01
10	.00000E+00	.00000E+00	5.30161E-05	4.97750E-03	4.98855E-05	5.92153E-05	-5.55869E-05	1.00000E+00
11	.00000E+00	.00000E+00	4.93888E-05	4.44113E-03	5.01560E-05	8.97438E-05	-9.05024E-05	9.99998E-01
12	.00000E+00	.00000E+00	5.01563E-05	2.75369E-03	5.12315E-05	5.66744E-06	-6.73952E-06	1.00000E+00
13	.00000E+00	.00000E+00	5.12516E-05	2.35799E-03	4.81010E-05	6.31812E-06	-3.18396E-06	9.99999E-01
14	.00000E+00	.00000E+00	4.81010E-05	2.25132E-03	4.24263E-05	8.59768E-06	-2.92386E-06	1.00000E+00
15	.00000E+00	.00000E+00	4.50612E-05	1.22556E-03	5.01583E-05	6.34690E-06	-1.14108E-05	9.99972E-01
16	.00000E+00	.00000E+00	5.64361E-05	6.54372E-04	5.66892E-05	3.87836E-06	-4.11121E-06	9.99967E-01
17	.00000E+00	.00000E+00	6.34504E-05	2.54690E-04	6.26925E-05	1.89523E-06	-1.12472E-06	9.99974E-01
18	.00000E+00	.00000E+00	6.63330E-05	2.05079E-04	6.62190E-05	1.70738E-06	-1.58354E-06	9.99978E-01
19	.00000E+00	.00000E+00	6.68473E-05	4.38134E-04	6.46427E-05	3.39981E-06	-1.17876E-06	9.99973E-01
20	.00000E+00	.00000E+00	8.03046E-05	1.58663E-03	6.74533E-05	1.36408E-05	-7.37724E-07	9.99973E-01
21	.00000E+00	.00000E+00	9.36267E-05	4.34878E-04	1.05877E-04	5.39066E-06	-1.56213E-05	9.99984E-01
22	.00000E+00	.00000E+00	1.38921E-04	1.01766E-03	1.36006E-04	1.31399E-05	-1.02203E-05	9.99999E-01
23	.00000E+00	.00000E+00	2.04742E-04	3.54102E-03	2.59970E-04	5.78359E-05	-1.13147E-04	1.00001E+00
24	.00000E+00	.00000E+00	3.32536E-04	2.66196E-03	3.85313E-04	6.53416E-05	-9.82163E-05	1.00001E+00
25	.00000E+00	.00000E+00	3.37536E-04	1.06910E-03	2.75171E-04	3.78339E-05	2.44845E-05	1.00001E+00
26	.00000E+00	.00000E+00	1.43187E-04	8.34158E-04	1.10236E-04	3.74471E-05	-4.51738E-06	1.00000E+00
27	.00000E+00	.00000E+00	3.19642E-05	1.75859E-04	9.06089E-08	1.30472E-05	1.88212E-05	1.00001E+00
28	.00000E+00	.00000E+00	5.20201E-03	8.24763E-02	5.20201E-03	6.48854E-04	-6.43502E-04	1.00002E+00

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dr**2	total flux
1	1.21372E-02	-8.21883E-04	1.21126E-02	-6.70150E-04	5.53566E-06	.00000E+00	1.53028E-06	2.02085E-03
2	8.99465E-02	-8.68885E-03	8.96886E-02	-7.68424E-03	.00000E+00	.00000E+00	1.08461E-05	1.49713E-02
3	1.13684E-01	-1.11446E-02	1.13340E-01	-1.04038E-02	.00000E+00	.00000E+00	1.25442E-05	1.89226E-02
4	7.03469E-02	-6.85880E-03	7.01303E-02	-6.82947E-03	.00000E+00	.00000E+00	7.39337E-06	1.17108E-02
5	1.05379E-01	-1.04073E-02	1.05089E-01	-1.07161E-02	.00000E+00	.00000E+00	8.61102E-06	1.75419E-02
6	1.98195E-01	-1.88763E-02	1.97518E-01	-1.96866E-02	.00000E+00	.00000E+00	1.01678E-05	3.29900E-02
7	1.96462E-01	-1.14660E-02	1.96054E-01	-1.20405E-02	.00000E+00	.00000E+00	8.35054E-06	3.27199E-02
8	1.47387E-01	-2.77401E-03	1.47259E-01	-2.42543E-03	.00000E+00	.00000E+00	5.27090E-06	2.45599E-02
9	1.15714E-01	5.98921E-04	1.15724E-01	2.83608E-04	.00000E+00	.00000E+00	4.57858E-06	1.92896E-02

10	1.06420E-01	1.46050E-03	1.06461E-01	1.51609E-03	.00000E+00	.00000E+00	4.90000E-06	1.77414E-02
11	9.94894E-02	3.41753E-03	9.95833E-02	3.50805E-03	.00000E+00	.00000E+00	4.74984E-06	1.65896E-02
12	6.39995E-02	4.04056E-03	6.41067E-02	4.04730E-03	.00000E+00	.00000E+00	3.20675E-06	1.06750E-02
13	5.47744E-02	3.71288E-03	5.48750E-02	3.71605E-03	.00000E+00	.00000E+00	2.73804E-06	9.13697E-03
14	5.21479E-02	5.28815E-03	5.22893E-02	5.29107E-03	.00000E+00	.00000E+00	2.60121E-06	8.70188E-03
15	2.90048E-02	1.14458E-03	2.90406E-02	1.15599E-03	.00000E+00	.00000E+00	1.42518E-06	4.83717E-03
16	1.61768E-02	5.52787E-04	1.61929E-02	5.56898E-04	.00000E+00	.00000E+00	7.94814E-07	2.69754E-03
17	7.21972E-03	3.39215E-04	7.22892E-03	3.40839E-04	.00000E+00	.00000E+00	3.54593E-07	1.20404E-03
18	6.17045E-03	3.88889E-04	6.18067E-03	3.90472E-04	.00000E+00	.00000E+00	3.03010E-07	1.02921E-03
19	1.14371E-02	5.43008E-04	1.14517E-02	5.44186E-04	.00000E+00	.00000E+00	5.61300E-07	1.90737E-03
20	3.76275E-02	1.86175E-03	3.76758E-02	1.86249E-03	.00000E+00	.00000E+00	1.84404E-06	6.27505E-03
21	1.22513E-02	1.11604E-03	1.22791E-02	1.13166E-03	.00000E+00	.00000E+00	5.99633E-07	2.04386E-03
22	2.62251E-02	3.34610E-03	2.63063E-02	3.35632E-03	.00000E+00	.00000E+00	1.28256E-06	4.37663E-03
23	8.63991E-02	1.23045E-02	8.66904E-02	1.24176E-02	.00000E+00	.00000E+00	4.21031E-06	1.44205E-02
24	6.87923E-02	1.22258E-02	6.90572E-02	1.23240E-02	.00000E+00	.00000E+00	3.33258E-06	1.14833E-02
25	3.05535E-02	5.82776E-03	3.06675E-02	5.80528E-03	.00000E+00	.00000E+00	1.47116E-06	5.09988E-03
26	2.14711E-02	4.31119E-03	2.15422E-02	4.31571E-03	.00000E+00	.00000E+00	1.02266E-06	3.58285E-03
27	4.00315E-03	7.48050E-04	4.00971E-03	7.29229E-04	.00000E+00	.00000E+00	1.84689E-07	6.67496E-04
28	1.78341E+00	-7.80948E-03	1.78254E+00	-7.16597E-03	5.53566E-06	.00000E+00	1.04873E-04	2.97196E-01

1fine group summary for zone 3 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	.00000E+00	.00000E+00	2.47800E-04	3.27983E-04	2.73059E-05	-3.55276E-04	9.99985E-01
2	.00000E+00	.00000E+00	1.88190E-04	3.19562E-03	4.20005E-03	9.13191E-05	-4.10303E-03	9.99988E-01
3	.00000E+00	.00000E+00	1.99211E-03	2.88600E-03	7.50880E-03	4.89588E-05	-5.56652E-03	9.99991E-01
4	.00000E+00	.00000E+00	2.94020E-03	1.91515E-03	6.58025E-03	2.23496E-05	-3.66253E-03	9.99995E-01
5	.00000E+00	.00000E+00	5.43012E-03	6.16265E-03	1.11645E-02	2.65566E-05	-5.76089E-03	9.99996E-01
6	.00000E+00	.00000E+00	1.14440E-02	1.84788E-02	2.19622E-02	4.51512E-05	-1.05634E-02	1.00000E+00
7	.00000E+00	.00000E+00	2.25827E-02	3.23786E-02	2.87498E-02	3.25120E-05	-6.19931E-03	9.99992E-01
8	.00000E+00	.00000E+00	2.99704E-02	4.11368E-02	3.08444E-02	1.91133E-05	-8.90349E-04	9.99919E-01
9	.00000E+00	.00000E+00	3.04027E-02	3.79442E-02	3.00483E-02	1.52984E-05	3.42473E-04	9.99892E-01
10	.00000E+00	.00000E+00	2.98641E-02	3.60235E-02	2.89502E-02	1.87810E-05	8.98221E-04	9.99900E-01
11	.00000E+00	.00000E+00	2.91219E-02	3.39510E-02	2.71052E-02	2.85488E-05	1.98999E-03	9.99945E-01
12	.00000E+00	.00000E+00	2.35342E-02	1.80424E-02	2.12291E-02	3.10764E-05	2.27449E-03	9.99982E-01
13	.00000E+00	.00000E+00	2.09068E-02	1.47265E-02	1.88657E-02	4.36246E-05	1.97811E-03	9.99974E-01
14	.00000E+00	.00000E+00	2.03424E-02	1.45453E-02	1.75754E-02	7.01955E-05	2.89710E-03	9.99990E-01
15	.00000E+00	.00000E+00	1.11751E-02	5.69812E-03	1.06749E-02	5.91223E-05	4.41088E-04	1.00000E+00
16	.00000E+00	.00000E+00	7.39560E-03	2.41959E-03	7.12855E-03	4.03509E-05	2.26916E-04	9.99998E-01
17	.00000E+00	.00000E+00	3.82636E-03	6.99233E-04	3.68808E-03	2.00164E-05	1.68248E-04	1.00000E+00
18	.00000E+00	.00000E+00	3.40758E-03	5.81734E-04	3.17871E-03	1.83027E-05	2.10571E-04	9.99998E-01
19	.00000E+00	.00000E+00	5.75868E-03	1.64318E-03	5.45357E-03	3.68025E-05	2.68262E-04	1.00001E+00
20	.00000E+00	.00000E+00	1.42494E-02	1.16418E-02	1.31626E-02	1.51834E-04	9.34785E-04	1.00001E+00
21	.00000E+00	.00000E+00	7.04013E-03	2.44308E-03	6.35558E-03	6.12665E-05	6.25242E-04	1.00000E+00
22	.00000E+00	.00000E+00	1.41662E-02	7.84643E-03	1.22107E-02	1.50709E-04	1.80448E-03	1.00001E+00
23	.00000E+00	.00000E+00	3.72310E-02	4.64951E-02	3.05321E-02	6.74944E-04	6.02222E-03	1.00004E+00
24	.00000E+00	.00000E+00	3.99739E-02	4.27425E-02	3.29851E-02	7.77611E-04	6.20128E-03	1.00004E+00
25	.00000E+00	.00000E+00	2.64138E-02	1.78287E-02	2.29366E-02	4.53130E-04	3.02337E-03	1.00002E+00
26	.00000E+00	.00000E+00	2.09760E-02	1.94328E-02	1.79488E-02	4.49415E-04	2.57752E-03	1.00001E+00
27	.00000E+00	.00000E+00	7.06032E-03	4.10187E-03	6.24878E-03	1.56133E-04	6.55396E-04	1.00000E+00
28	.00000E+00	.00000E+00	4.27394E-01	4.25207E-01	4.27394E-01	3.57088E-03	-3.56223E-03	9.99981E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	r2n rate	fiss rate	flux*db**2	total flux
1	1.22635E-02	-1.17716E-03	1.21372E-02	-8.21883E-04	1.81384E-11	.00000E+00	9.82987E-06	8.02929E-03
2	9.12460E-02	-1.27919E-02	8.99465E-02	-8.68885E-03	.00000E+00	.00000E+00	4.63188E-05	5.96012E-02
3	1.15305E-01	-1.67102E-02	1.13684E-01	-1.11446E-02	.00000E+00	.00000E+00	4.87719E-05	7.53082E-02
4	7.13148E-02	-1.05209E-02	7.03469E-02	-6.85860E-03	.00000E+00	.00000E+00	2.22147E-05	4.65769E-02
5	1.06847E-01	-1.61682E-02	1.05379E-01	-1.04073E-02	.00000E+00	.00000E+00	2.63995E-05	6.97662E-02
6	2.00812E-01	-2.94397E-02	1.98195E-01	-1.88763E-02	.00000E+00	.00000E+00	4.46854E-05	1.31168E-01
7	1.97984E-01	-1.78653E-02	1.95462E-01	-1.14660E-02	.00000E+00	.00000E+00	3.14798E-05	1.29729E-01
8	1.47678E-01	-3.66436E-03	1.47387E-01	-2.77401E-03	.00000E+00	.00000E+00	1.71812E-05	9.71141E-02
9	1.15482E-01	9.41358E-04	1.15714E-01	5.98921E-04	.00000E+00	.00000E+00	1.13259E-05	7.60946E-02
10	1.06157E-01	2.35872E-03	1.06420E-01	1.46050E-03	.00000E+00	.00000E+00	9.97886E-06	6.99826E-02

11	9.89099E-02	5.40752E-03	9.94894E-02	3.41753E-03	.00000E+00	.00000E+00	9.26896E-06	6.53352E-02
12	6.33108E-02	6.31505E-03	6.39995E-02	4.04056E-03	.00000E+00	.00000E+00	5.40416E-06	4.19403E-02
13	5.41914E-02	5.69099E-03	5.47744E-02	3.71288E-03	.00000E+00	.00000E+00	4.50767E-06	3.58962E-02
14	5.12812E-02	8.18524E-03	5.21479E-02	5.28815E-03	.00000E+00	.00000E+00	4.36788E-06	3.40899E-02
15	2.89128E-02	1.58566E-03	2.90048E-02	1.14458E-03	.00000E+00	.00000E+00	2.34749E-06	1.90670E-02
16	1.61246E-02	7.79704E-04	1.61768E-02	5.52787E-04	.00000E+00	.00000E+00	1.18408E-06	1.06342E-02
17	7.17317E-03	5.07462E-04	7.21972E-03	3.39215E-04	.00000E+00	.00000E+00	4.85125E-07	4.73976E-03
18	6.10852E-03	5.99560E-04	6.17045E-03	3.88889E-04	.00000E+00	.00000E+00	4.03886E-07	4.04496E-03
19	1.13620E-02	8.11270E-04	1.14371E-02	5.43008E-04	.00000E+00	.00000E+00	7.85590E-07	7.50798E-03
20	3.73541E-02	2.79854E-03	3.76275E-02	1.86175E-03	.00000E+00	.00000E+00	2.89424E-06	2.46931E-02
21	1.20552E-02	1.73928E-03	1.22513E-02	1.11604E-03	.00000E+00	.00000E+00	7.34564E-07	8.01127E-03
22	2.56141E-02	5.15059E-03	2.62251E-02	3.34610E-03	.00000E+00	.00000E+00	1.56268E-06	1.70941E-02
23	8.40664E-02	1.83267E-02	8.63991E-02	1.23045E-02	.00000E+00	.00000E+00	4.63645E-06	5.62131E-02
24	6.59934E-02	1.84271E-02	6.87923E-02	1.22258E-02	.00000E+00	.00000E+00	2.72678E-06	4.44851E-02
25	2.89698E-02	8.85113E-03	3.05335E-02	5.82776E-03	.00000E+00	.00000E+00	9.30720E-07	1.98546E-02
26	1.99179E-02	6.88871E-03	2.14711E-02	4.31119E-03	.00000E+00	.00000E+00	4.78674E-07	1.36878E-02
27	3.55929E-03	1.40345E-03	4.00319E-03	7.48050E-04	.00000E+00	.00000E+00	5.48513E-08	2.51055E-03
28	1.77999E+00	-1.13717E-02	1.78341E+00	-7.80948E-03	1.81384E-11	.00000E+00	3.10960E-04	1.17258E+00

1fine group summary for zone 4 by group including sum for all groups in line 28

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.16008E-02	.00000E+00	2.00624E-02	1.90161E-02	3.55152E-03	1.17714E-03	9.98896E-01
2	.00000E+00	1.89845E-01	6.57451E-03	2.45171E-01	1.68596E-01	1.50450E-02	1.27917E-02	1.00002E+00
3	.00000E+00	2.15153E-01	6.95018E-02	2.55257E-01	2.51731E-01	1.62167E-02	1.67100E-02	9.99989E-01
4	.00000E+00	1.24336E-01	1.04064E-01	1.75766E-01	2.10093E-01	7.78570E-03	1.05208E-02	1.00000E+00
5	.00000E+00	1.65607E-01	1.90083E-01	4.43392E-01	3.34282E-01	5.24419E-03	1.61679E-02	9.99990E-01
6	.00000E+00	1.79557E-01	3.88650E-01	1.19090E+00	5.30394E-01	8.34588E-03	2.94394E-02	1.00001E+00
7	.00000E+00	8.90750E-02	5.92130E-01	1.56491E+00	6.55110E-01	8.43674E-03	1.76660E-02	9.99989E-01
8	.00000E+00	1.37484E-02	6.89104E-01	1.57535E+00	6.85681E-01	1.35633E-02	3.66444E-03	9.99919E-01
9	.00000E+00	9.98261E-04	6.77797E-01	1.37018E+00	6.57554E-01	2.22558E-02	-9.46345E-04	9.99900E-01
10	.00000E+00	7.41517E-05	6.54661E-01	1.24308E+00	6.23498E-01	3.36628E-02	-2.35799E-03	9.99897E-01
11	.00000E+00	5.83383E-06	6.27678E-01	1.15489E+00	5.78688E-01	5.44398E-02	-5.40594E-03	9.99939E-01
12	.00000E+00	4.09818E-07	5.04172E-01	6.31195E-01	4.52379E-01	5.81215E-02	-6.31550E-03	9.99975E-01
13	.00000E+00	6.50753E-08	4.47028E-01	5.01330E-01	3.99918E-01	5.28143E-02	-5.69044E-03	9.99970E-01
14	.00000E+00	1.28962E-08	4.31015E-01	4.73474E-01	3.66127E-01	7.30776E-02	-8.18508E-03	9.99988E-01
15	.00000E+00	1.45741E-09	2.39208E-01	2.17654E-01	2.33184E-01	7.60760E-03	-1.58942E-03	1.00002E+00
16	.00000E+00	4.27947E-10	1.63478E-01	1.01394E-01	1.59863E-01	4.39423E-03	-7.82303E-04	1.00002E+00
17	.00000E+00	1.37820E-10	8.83870E-02	3.29888E-02	8.45978E-02	4.29620E-03	-5.08981E-04	1.00002E+00
18	.00000E+00	9.86750E-11	7.92269E-02	2.67303E-02	7.41409E-02	5.68515E-03	-5.98836E-04	9.99996E-01
19	.00000E+00	1.39506E-10	1.29972E-01	6.64083E-02	1.24581E-01	6.20269E-03	-8.15618E-04	1.00004E+00
20	.00000E+00	2.26850E-10	3.09741E-01	3.71921E-01	2.86362E-01	2.61725E-02	-2.80546E-03	1.00004E+00
21	.00000E+00	3.32035E-11	1.57289E-01	8.21225E-02	1.42423E-01	1.66057E-02	-1.74392E-03	1.00008E+00
22	.00000E+00	3.85257E-11	3.05675E-01	2.32134E-01	2.62859E-01	4.81644E-02	-5.15478E-03	1.00002E+00
23	.00000E+00	3.68329E-11	7.57959E-01	1.18160E+00	6.32537E-01	1.43741E-01	-1.85410E-02	1.00003E+00
24	.00000E+00	1.00254E-11	8.08964E-01	1.00097E+00	6.67141E-01	1.60245E-01	-1.84294E-02	1.00001E+00
25	.00000E+00	2.93479E-12	5.34122E-01	4.03112E-01	4.52903E-01	9.00686E-02	-8.85264E-03	1.00001E+00
26	.00000E+00	2.05789E-12	4.13185E-01	4.02923E-01	3.38007E-01	8.20655E-02	-6.88947E-03	1.00001E+00
27	.00000E+00	4.90406E-13	1.35879E-01	8.12775E-02	1.14078E-01	2.32046E-02	-1.40358E-03	1.00000E+00
28	.00000E+00	1.00000E+00	9.50655E+00	1.50459E+01	9.50554E+00	9.91034E-01	1.13207E-02	9.99979E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	r0n rate	fiss rate	flux*dv**2	total flux
1	1.25460E-02	-1.82671E-03	1.22635E-02	-1.17716E-03	2.11820E-03	2.36649E-03	2.76897E-04	3.18892E-01
2	9.44986E-02	-2.12016E-07	9.12460E-02	-1.27919E-02	1.64382E-05	1.08586E-02	1.55345E-03	2.39941E+00
3	1.19668E-01	-2.14495E-07	1.15305E-01	-1.67102E-02	.00000E+00	1.33372E-02	1.81172E-03	3.03761E+00
4	7.41490E-02	-1.59579E-07	7.13148E-02	-1.05209E-02	.00000E+00	5.75964E-03	8.80201E-04	1.88181E+00
5	1.11466E-01	-2.99055E-07	1.06847E-01	-1.61682E-02	.00000E+00	1.70018E-03	1.08027E-03	2.82779E+00
6	2.09690E-01	-3.15309E-07	2.00812E-01	-2.94397E-02	.00000E+00	1.52183E-03	1.73113E-03	5.31780E+00
7	2.03574E-01	7.19751E-07	1.97984E-01	-1.76653E-02	.00000E+00	1.56320E-03	1.22589E-03	5.16943E+00
8	1.48844E-01	8.91858E-08	1.47678E-01	-3.66436E-03	.00000E+00	1.65134E-03	6.97159E-04	3.78668E+00
9	1.15132E-01	-4.95225E-06	1.15482E-01	9.41398E-04	.00000E+00	2.28061E-03	4.70483E-04	2.93229E+00
10	1.05331E-01	7.30195E-07	1.06157E-01	2.35872E-03	.00000E+00	4.86990E-03	4.27886E-04	2.68418E+00
11	9.70350E-02	1.57992E-06	9.89099E-02	5.40752E-03	.00000E+00	1.00996E-02	3.86187E-04	2.47582E+00

12	6.11364E-02	-4.48833E-07	6.33108E-02	6.31505E-03	.00000E+00	1.29982E-02	2.27518E-04	1.56254E+00
13	5.22575E-02	5.56128E-07	5.41914E-02	5.69099E-03	.00000E+00	1.23853E-02	1.96952E-04	1.33591E+00
14	4.85024E-02	1.64006E-07	5.12812E-02	8.18524E-03	.00000E+00	8.91818E-03	1.79823E-04	1.24246E+00
15	2.83957E-02	-3.75582E-06	2.89128E-02	1.58566E-03	.00000E+00	2.25454E-03	1.12083E-04	7.21604E-01
16	1.58735E-02	-2.59897E-06	1.61246E-02	7.79704E-04	.00000E+00	1.50578E-03	5.90541E-05	4.04918E-01
17	7.00632E-03	-1.51869E-06	7.17317E-03	5.07462E-04	.00000E+00	2.23863E-03	2.39567E-05	1.78868E-01
18	5.90814E-03	7.23973E-07	6.10852E-03	5.99560E-04	.00000E+00	2.91977E-03	1.95466E-05	1.50978E-01
19	1.10906E-02	-4.34831E-06	1.13620E-02	8.11270E-04	.00000E+00	3.61999E-03	3.86401E-05	2.83152E-01
20	3.63989E-02	-8.92089E-06	3.73541E-02	2.79654E-03	.00000E+00	1.60777E-02	1.35090E-04	9.29430E-01
21	1.14295E-02	-4.63980E-06	1.20552E-02	1.73928E-03	.00000E+00	1.06308E-02	3.41899E-05	2.92824E-01
22	2.36338E-02	-4.17178E-06	2.56141E-02	5.15059E-03	.00000E+00	3.04770E-02	6.83018E-05	6.07898E-01
23	7.58090E-02	-1.42541E-05	8.40664E-02	1.83267E-02	.00000E+00	8.91544E-02	2.06240E-04	1.95988E+00
24	5.67570E-02	-2.29052E-06	6.59984E-02	1.84271E-02	.00000E+00	9.91094E-02	1.19408E-04	1.47880E+00
25	2.40987E-02	-1.50983E-06	2.89699E-02	8.85113E-03	.00000E+00	5.78799E-02	4.03110E-05	6.31259E-01
26	1.57444E-02	-7.66454E-07	1.99179E-02	6.88871E-03	.00000E+00	5.33914E-02	1.96715E-05	4.14925E-01
27	2.63900E-03	-1.38607E-07	3.55925E-03	1.40345E-03	.00000E+00	1.48532E-02	2.00523E-06	6.97283E-02
28	1.76861E+00	-5.10214E-05	1.77999E+00	-1.13717E-02	2.13464E-03	4.74422E-01	1.19738E-02	4.50999E+01

1fine group summary for system

0 grp.	fix source	fiss source	in scatter	slf scatter	out scatter	absorption	leakage	balance
1	.00000E+00	2.16003E-02	.00000E+00	2.09843E-02	2.01177E-02	3.63266E-03	-1.82671E-03	9.98894E-01
2	.00000E+00	1.89845E-01	7.14474E-03	2.55772E-01	1.81682E-01	1.53211E-02	-2.12016E-07	1.00001E+00
3	.00000E+00	2.15153E-01	7.53713E-02	2.66279E-01	2.74150E-01	1.63774E-02	-2.14495E-07	9.99988E-01
4	.00000E+00	1.24336E-01	1.12788E-01	1.83549E-01	2.29259E-01	7.86281E-03	-1.59579E-07	1.00000E+00
5	.00000E+00	1.65607E-01	2.06268E-01	4.65449E-01	3.66542E-01	5.33708E-03	-2.99055E-07	9.99990E-01
6	.00000E+00	1.79557E-01	4.22463E-01	1.25624E+00	5.98489E-01	8.52229E-03	-3.15309E-07	1.00001E+00
7	.00000E+00	8.90750E-02	6.57509E-01	1.67082E+00	7.38034E-01	8.55725E-03	7.19751E-07	9.99989E-01
8	.00000E+00	1.37484E-02	7.75501E-01	1.70898E+00	7.75673E-01	1.36409E-02	8.91858E-08	9.99918E-01
9	.00000E+00	9.98261E-04	7.66389E-01	1.48700E+00	7.45073E-01	2.23769E-02	-4.95225E-06	9.99897E-01
10	.00000E+00	7.41517E-05	7.41600E-01	1.35311E+00	7.07973E-01	3.37767E-02	7.30195E-07	9.99897E-01
11	.00000E+00	5.83383E-06	7.12614E-01	1.25867E+00	6.58052E-01	5.46125E-02	1.57992E-06	9.99939E-01
12	.00000E+00	4.09818E-07	5.73036E-01	6.86982E-01	5.14832E-01	5.82185E-02	-4.48833E-07	9.99975E-01
13	.00000E+00	6.50753E-08	5.08432E-01	5.46990E-01	4.55498E-01	5.29488E-02	5.56128E-07	9.99969E-01
14	.00000E+00	1.28962E-08	4.90835E-01	5.18734E-01	4.17547E-01	7.32937E-02	1.64006E-07	9.99988E-01
15	.00000E+00	1.45741E-09	2.72226E-01	2.35536E-01	2.64439E-01	7.78677E-03	-3.75582E-06	1.00002E+00
16	.00000E+00	4.27947E-10	1.85263E-01	1.09118E-01	1.80747E-01	4.51600E-03	-2.59897E-06	1.00002E+00
17	.00000E+00	1.37820E-10	9.96743E-02	3.52416E-02	9.53170E-02	4.35672E-03	-1.51869E-06	1.00002E+00
18	.00000E+00	9.86750E-11	8.92874E-02	2.86446E-02	8.35467E-02	5.74034E-03	7.23973E-07	9.99996E-01
19	.00000E+00	1.39505E-10	1.46934E-01	7.16602E-02	1.40622E-01	6.31390E-03	-4.34831E-06	1.00003E+00
20	.00000E+00	2.28850E-10	3.51664E-01	4.07631E-01	3.25011E-01	2.66312E-02	-8.92089E-06	1.00004E+00
21	.00000E+00	3.32035E-11	1.78102E-01	8.97774E-02	1.61310E-01	1.67921E-02	-4.63980E-06	1.00003E+00
22	.00000E+00	3.85257E-11	3.47768E-01	2.56505E-01	2.99138E-01	4.86261E-02	-4.17178E-06	1.00002E+00
23	.00000E+00	3.68329E-11	8.70014E-01	1.32630E+00	7.26183E-01	1.45819E-01	-1.42541E-05	1.00003E+00
24	.00000E+00	1.00254E-11	9.30196E-01	1.13300E+00	7.67516E-01	1.62668E-01	-2.29052E-06	1.00002E+00
25	.00000E+00	2.93479E-12	6.14825E-01	4.58709E-01	5.23329E-01	9.14923E-02	-1.50983E-06	1.00001E+00
26	.00000E+00	2.05789E-12	4.77362E-01	4.64110E-01	3.98861E-01	8.34987E-02	-7.66454E-07	1.00001E+00
27	.00000E+00	4.90406E-13	1.57554E-01	9.44273E-02	1.33843E-01	2.37115E-02	-1.38607E-07	1.00000E+00
28	.00000E+00	1.00000E+00	1.07708E+01	1.63832E+01	1.07708E+01	1.00843E+00	-5.09708E-05	9.99980E-01

0 grp.	rt bdy flux	rt leakage	lft bdy flux	lft leakage	n2n rate	fiss rate	flux*dr**2	total flux
1	1.25460E-02	-1.82671E-03	1.20047E-02	.00000E+00	2.12374E-03	2.36649E-03	3.05799E-04	3.44088E-01
2	9.44989E-02	-2.12016E-07	8.82302E-02	.00000E+00	1.64382E-05	1.08686E-02	1.69738E-03	2.58564E+00
3	1.19668E-01	-2.14495E-07	1.11189E-01	.00000E+00	.00000E+00	1.33372E-02	1.96428E-03	3.27270E+00
4	7.41490E-02	-1.59579E-07	6.85763E-02	.00000E+00	.00000E+00	5.75964E-03	9.51298E-04	2.02709E+00
5	1.11466E-01	-2.99055E-07	1.08435E-01	.00000E+00	.00000E+00	1.70018E-03	1.11451E-03	3.04519E+00
6	2.09690E-01	-3.15309E-07	1.98654E-01	.00000E+00	.00000E+00	1.52183E-03	1.86953E-03	5.72661E+00
7	2.08574E-01	7.19751E-07	1.98005E-01	.00000E+00	.00000E+00	1.56520E-03	1.32497E-03	5.57605E+00
8	1.48846E-01	8.91858E-08	1.46877E-01	.00000E+00	.00000E+00	1.65134E-03	7.52311E-04	4.05318E+00
9	1.15132E-01	-4.95225E-06	1.15788E-01	.00000E+00	.00000E+00	2.28061E-03	5.08037E-04	3.17313E+00
10	1.05331E-01	7.30195E-07	1.09904E-01	.00000E+00	.00000E+00	4.86990E-03	4.61887E-04	2.90601E+00
11	9.70360E-02	1.57992E-06	1.00569E-01	.00000E+00	.00000E+00	1.00996E-02	4.18059E-04	2.68359E+00
12	6.11364E-02	-4.48833E-07	6.52073E-02	.00000E+00	.00000E+00	1.29982E-02	2.46609E-04	1.69650E+00

13	5.22575E-02	5.56128E-07	5.58561E-02	.00000E+00	.00000E+00	1.23853E-02	2.12925E-04	1.45060E+00
14	4.85024E-02	1.64006E-07	5.37011E-02	.00000E+00	.00000E+00	8.91818E-03	1.95339E-04	1.35196E+00
15	2.83957E-02	-3.75582E-06	2.92941E-02	.00000E+00	.00000E+00	2.25454E-03	1.20320E-04	7.85176E-01
16	1.58735E-02	-2.59897E-06	1.63177E-02	.00000E+00	.00000E+00	1.50578E-03	6.33084E-05	4.38685E-01
17	7.00632E-03	-1.51869E-06	7.31343E-03	.00000E+00	.00000E+00	2.23863E-03	2.57323E-05	1.93945E-01
18	5.90814E-03	7.23973E-07	6.28328E-03	.00000E+00	.00000E+00	2.91977E-03	2.08363E-05	1.63892E-01
19	1.10909E-02	-4.34831E-06	1.15888E-02	.00000E+00	.00000E+00	3.61999E-03	4.15029E-05	3.07055E-01
20	3.63939E-02	-8.92089E-06	3.81635E-02	.00000E+00	.00000E+00	1.60777E-02	1.45418E-04	1.00808E+00
21	1.14295E-02	-4.63980E-06	1.26109E-02	.00000E+00	.00000E+00	1.05308E-02	3.69596E-05	3.18544E-01
22	2.36338E-02	-4.17178E-06	2.73504E-02	.00000E+00	.00000E+00	3.04770E-02	7.42352E-05	6.63152E-01
23	7.58090E-02	-1.42541E-05	9.12651E-02	.00000E+00	.00000E+00	8.91544E-02	2.24328E-04	2.14255E+00
24	5.67570E-02	-2.29032E-06	7.43778E-02	.00000E+00	.00000E+00	9.91094E-02	1.31005E-04	1.62513E+00
25	2.40987E-02	-1.50983E-06	3.35434E-02	.00000E+00	.00000E+00	5.78792E-02	4.46288E-05	6.96472E-01
26	1.57444E-02	-7.66454E-07	2.41510E-02	.00000E+00	.00000E+00	5.33914E-02	2.21808E-05	4.61018E-01
27	2.63900E-03	-1.38607E-07	4.58320E-03	.00000E+00	.00000E+00	1.48532E-02	2.36341E-06	7.83366E-02
28	1.76861E+00	-5.10214E-05	1.78983E+00	.00000E+00	2.14017E-03	4.74422E-01	1.29765E-02	4.88144E+01

- elapsed time .02 min.
0direct access unit 9 requires 556 blocks of length 216 for cross section weighting.
1 transport cross section weighting function

0zone	grp. 1	grp. 2	grp. 3	grp. 4	grp. 5	grp. 6	grp. 7	grp. 8
1	1.07422E-03	4.92818E-03	5.24255E-03	2.49975E-03	3.18142E-03	5.53234E-03	3.72288E-03	1.74266E-03
2	6.54432E-04	4.85769E-03	5.73826E-03	3.43066E-03	4.29923E-03	6.17028E-03	4.34420E-03	2.14741E-03
3	1.10130E-03	5.34262E-03	5.82505E-03	2.90781E-03	3.85805E-03	6.79941E-03	4.39160E-03	1.82522E-03
4	7.56919E-04	4.19640E-03	4.89163E-03	2.38012E-03	2.82742E-03	4.80501E-03	3.32850E-03	1.79604E-03
5	7.79006E-04	4.26124E-03	4.95507E-03	2.40452E-03	2.87734E-03	4.89412E-03	3.37804E-03	1.79638E-03

0zone	grp. 9	grp. 10	grp. 11	grp. 12	grp. 13	grp. 14	grp. 15	grp. 16
1	1.11199E-03	1.01507E-03	1.09743E-03	8.72673E-04	7.78309E-04	9.94814E-04	3.12890E-04	1.54070E-04
2	1.78929E-03	1.95243E-03	2.04407E-03	1.59844E-03	1.40528E-03	1.64490E-03	6.25391E-04	3.39817E-04
3	1.12150E-03	1.05819E-03	1.30452E-03	1.21935E-03	1.09228E-03	1.49279E-03	3.71988E-04	1.83579E-04
4	1.19360E-03	1.09882E-03	1.08054E-03	6.77736E-04	6.01721E-04	6.37346E-04	3.11332E-04	1.61644E-04
5	1.19178E-03	1.09457E-03	1.04627E-03	7.05146E-04	6.26364E-04	6.80196E-04	3.14753E-04	1.62901E-04

0zone	grp. 17	grp. 18	grp. 19	grp. 20	grp. 21	grp. 22	grp. 23	grp. 24
1	7.62481E-05	7.76098E-05	1.22573E-04	4.32713E-04	2.03616E-04	5.85562E-04	2.17475E-03	2.10195E-03
2	1.61881E-04	1.52163E-04	2.56965E-04	8.53914E-04	3.61149E-04	9.59598E-04	3.43723E-03	3.26641E-03
3	1.01804E-04	1.12108E-04	1.63311E-04	5.70749E-04	3.11329E-04	9.14972E-04	3.29418E-03	3.27295E-03
4	6.92960E-05	6.03873E-05	1.11611E-04	3.87665E-04	1.27641E-04	3.18483E-04	1.14133E-03	9.51111E-04
5	7.09504E-05	6.29644E-05	1.14227E-04	3.96917E-04	1.36911E-04	3.48803E-04	1.25382E-03	1.07312E-03

0zone	grp. 25	grp. 26	grp. 27	grp. 28
1	9.76151E-04	6.98886E-04	1.05706E-04	4.18172E-02
2	1.53098E-03	1.12572E-03	1.94077E-04	5.53519E-02
3	1.56317E-03	1.18646E-03	2.22660E-04	5.16169E-02
4	4.02748E-04	2.45817E-04	3.04580E-05	3.45363E-02
5	4.63469E-04	2.94298E-04	3.95202E-05	3.54027E-02

1broad group parameters

grp	upper energy	mid energy	velocity	fiss spec
1	2.0000E+07	2.6301E+06	1.9627E+09	7.1654E-01
2	9.0000E+05	1.5044E+05	9.5300E+06	2.8346E-01
3	4.0000E-01	1.2789E-01	3.6950E+05	1.2407E-10
4	1.0000E-05			

1 80 d, second part of ses2h pass to make library
0cell averaged fluxes

0zone	grp. 1	grp. 2	grp. 3
1	3.85739E-01	1.14035E+00	2.59852E-01
2	3.90955E-01	1.14199E+00	2.50017E-01
3	3.95886E-01	1.14245E+00	2.45580E-01
4	4.11019E-01	1.14597E+00	2.14250E-01
5	4.09335E-01	1.14560E+00	2.17294E-01

0flux disadvantage factors (zone average/cell average-flux)

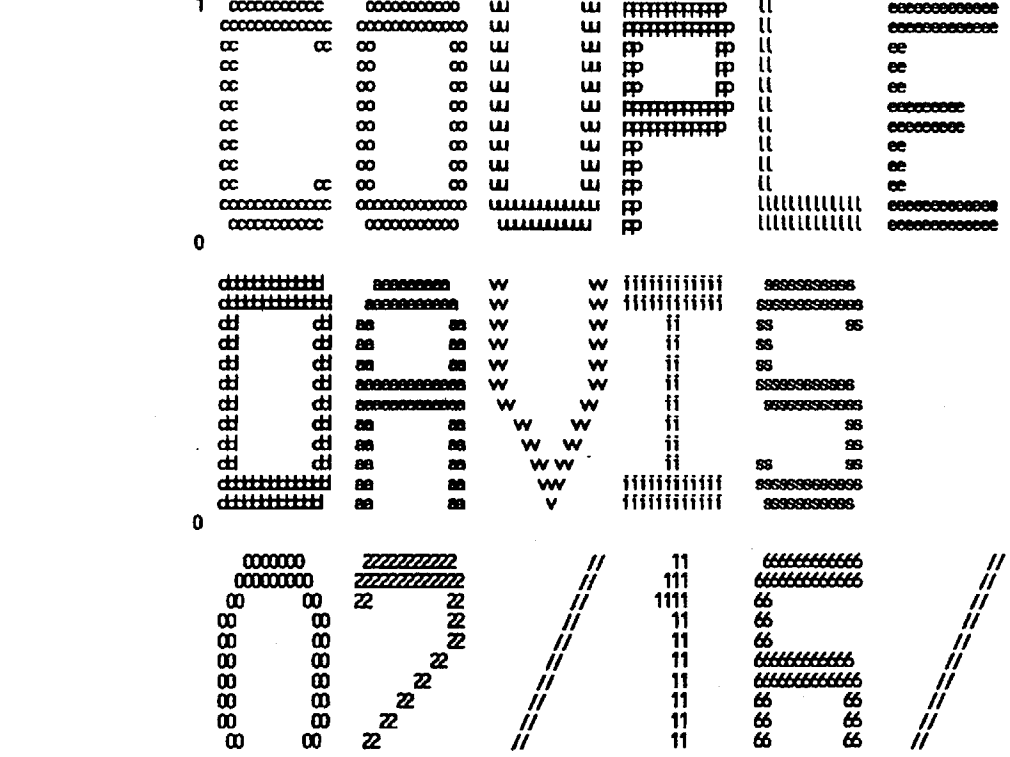
Ozone	grp. 1	grp. 2	grp. 3
1	9.42357E-01	9.95413E-01	1.19589E+00
2	9.55098E-01	9.96848E-01	1.15058E+00
3	9.62260E-01	9.97251E-01	1.13016E+00
4	1.00411E+00	1.00032E+00	9.85981E-01
5	1.00000E+00	1.00000E+00	1.00000E+00

Ocell averaged currents

Ozone	grp. 1	grp. 2	grp. 3
1	1.69253E-02	1.80443E-02	6.84760E-03
2	1.89903E-02	2.54864E-02	1.08752E-02
3	1.90448E-02	2.18064E-02	1.07857E-02
4	1.50625E-02	1.62663E-02	3.21759E-03
5	1.52572E-02	1.65356E-02	3.60993E-03

Ozone	volume	vol. fraction
1	1.25665E+00	4.56236E-02
2	1.66687E-01	6.05165E-03
3	6.58265E-01	2.38987E-02
4	2.54624E+01	9.24428E-01
5	2.75440E+01	1.00000E+00

- elapsed time .03 min.



```
    00000000    ZZZZZZZZZZZZ  //          11111111   6666666666666   //        99999999999999  6666666666666
     0000000    ZZZZZZZZZZZZ  //          11111111    666666666666   //         9999999999999   666666666666
0

     0000000     99999999999              55555555555   666666666666              555555555555      11
    00000000    999999999999              55555555555  6666666666666              555555555555     111
   00      00   99        99      :::    55           66              :::       55              1111
  00        00  99        99      :::    55           66              :::       55                11
  00        00  99        99      :::    55           66              :::       55                11
  00        00  999999999999             555555555555  666666666666              555555555555      11
  00        00   99999999999             555555555555  666666666666              555555555555      11
  00        00           99      :::              55  66        66    :::                  55      11
  00        00           99      :::              55  66        66    :::                  55      11
   00      00            99      :::    55        55  66        66    :::       55         55      11
    00000000    999999999999             555555555555  666666666666              555555555555  11111111
     0000000    99999999999               555555555   666666666666               555555555   11111111
1
0                          ssssssssss    cccccccccc    aaaaaaaa    ll            eeeeeeeeeeee
                          ssssssssssss  cccccccccccc  aaaaaaaaaa  ll            eeeeeeeeeeee
                          ss        ss  cc        cc  aa      aa  ll            ee
                          ss            cc            aa      aa  ll            ee
                          ss            cc            aa      aa  ll            ee
                          ssssssssssss  cc            aaaaaaaaaaaa  ll          eeeeeeee
                           ssssssssssss cc            aaaaaaaaaaaa  ll          eeeeeeee
                                     ss cc            aa      aa  ll            ee
                                     ss cc            aa      aa  ll            ee
                          ss        ss  cc        cc  aa      aa  ll            ee
                          ssssssssssss  cccccccccccc  aa      aa  llllllllllll  eeeeeeeeeeee
                           ssssssssssss  cccccccccc   aa      aa  llllllllllll  eeeeeeeeeeee
```

program verification information

code system: scale version: 4.2

program: c0c005

creation date: 04/27/95

library: /neutronics/scale/exe

this is not a scale configuration controlled code

jobname: davis

date of execution: 02/16/96

time of execution: 09:56:51

```
                    *****                                                    *****
                    *****                                                    *****
                    ************************************************************
                    ************************************************************
                    ************************************************************
1
0       -1q array has     1 entries.
0        0q array has     1 entries.
0        0q array has     1 entries.
0        1q array has     1 entries.
0        1q array has     1 entries.
0        1q array has     1 entries.
0        1q array has     1 entries.
0        1q array has     1 entries.
0        2q array has     1 entries.
0         * core allocated to array-data (by -1$$ or default) was   200000 words. *
1          * broad 3-group flux weighting factors *
0
0                 therm =    .5092
0                 res   =    .3604
0                 fast  =   2.7315
0 user requested (see jadl) that only the nuclide transitions presently included in
0 origen library be updated.
1cross sections, available from ampx (normalized to thermal flux), barns

                    10010 to  10020  2.71089E-01
                    10010 tot-cap    2.71089E-01
                    50100 to  40100  1.94358E-02
                    50100 to  10010  1.94358E-02
                    50100 to  40090  2.86217E-03
                    50100 to  10020  2.86217E-03
                    50100 to  30070  3.11798E+03
                    50100 to  20040  3.11813E+03
                    50100 to  10030  7.24701E-02
                    50100 tot-cap    3.11808E+03
                    50110 to  50100  8.12321E-06
                    50110 to  50120  4.12119E-03
                    50110 to  40110  1.03660E-06
                    50110 to  10010  1.03660E-06
                    50110 to  40090  9.25064E-06
                    50110 to  10030  9.25064E-06
                    50110 to  30080  1.20762E-04
                    50110 to  20040  1.20762E-04
                    50110 tot-cap    4.26037E-03
                    80160 to  80170  1.44801E-04
                    80160 to  70160  7.10768E-05
                    80160 to  10010  7.10768E-05
                    80160 to  70150  1.34050E-05
                    80160 to  10020  1.34050E-05
                    80160 to  60130  2.04523E-02
                    80160 to  20040  2.04523E-02
                    80160 to  80161  3.11718E-03
                    80160 tot-cap    2.06816E-02
                   360830 to 360820  1.61398E-02
                   360830 to 360810  1.70396E-09
                   360830 to 360840  1.45243E+02
                   360830 to 350830  6.75101E-04
                   360830 to  10010  6.75101E-04
                   360830 to 350820  5.33053E-06
                   360830 to  10020  5.33053E-06
```

```
360830 to 350810  1.86312E-06
360830 to  10030  1.86312E-06
360830 to 340810  3.01531E-08
360830 to  20030  3.01531E-08
360830 to 340800  3.54617E-05
360830 to  20040  3.54617E-05
360830 tot-cap    1.45260E+02
360850 to 360860  1.30308E+00
360850 tot-cap    1.30308E+00
380900 to 380910  6.02302E-01
380900 tot-cap    6.02302E-01
390890 to 390900  9.32409E-01
390890 tot-cap    9.32409E-01
400930 to 400940  1.11829E+01
400930 tot-cap    1.11829E+01
400940 to 400950  1.57479E-01
400940 tot-cap    1.57479E-01
400950 to 400960  1.86408E+00
400950 tot-cap    1.86408E+00
410940 to 410950  3.29842E+01
410940 tot-cap    3.29842E+01
420950 to 420960  3.36617E+01
420950 tot-cap    3.36617E+01
430990 to 430980  4.89705E-03
430990 to 431000  7.76754E+01
430990 tot-cap    7.76803E+01
441010 to 441020  2.35436E+01
441010 tot-cap    2.35436E+01
441060 to 441070  7.21853E-01
441060 tot-cap    7.21853E-01
451030 to 451020  1.77353E-03
451030 to 451040  3.30609E+02
451030 tot-cap    3.30610E+02
451050 to 451060  7.72918E+03
451050 tot-cap    7.72918E+03
461050 to 461060  2.90735E+01
461050 tot-cap    2.90735E+01
461080 to 461090  5.74038E+01
461080 tot-cap    5.74038E+01
471090 to 471080  4.12423E-03
471090 to 471100  3.19744E+02
471090 to 461090  2.36886E-04
471090 to  10010  2.36886E-04
471090 to 451060  1.93998E-04
471090 to  20040  1.93998E-04
471090 to 471091  5.19478E-01
471090 tot-cap    3.19748E+02
511240 to 511250  1.04754E+01
511240 tot-cap    1.04754E+01
541310 to 541300  5.00077E-02
541310 to 541290  1.04667E-05
541310 to 541320  2.32236E+02
541310 to 531310  3.07430E-05
541310 to  10010  3.07430E-05
541310 to 531300  4.19366E-07
541310 to  10020  4.19366E-07
541310 to 531290  4.30016E-07
541310 to  10030  4.30016E-07
541310 to 521280  1.42920E-05
541310 to  20040  1.42920E-05
```

541310	tot-cap	2.32286E+02
541320	to 541310	8.07852E-03
541320	to 541300	1.71339E-05
541320	to 541330	8.02739E-01
541320	to 531320	6.21127E-06
541320	to 10010	6.21127E-06
541320	to 531310	2.60372E-07
541320	to 10020	2.60372E-07
541320	to 531300	3.50591E-08
541320	to 10030	3.50591E-08
541320	to 521290	7.59245E-07
541320	to 20040	7.59245E-07
541320	tot-cap	8.10842E-01
541350	to 541360	1.43961E+06
541350	tot-cap	1.43961E+06
541360	to 541350	1.38188E-02
541360	to 541340	4.22060E-05
541360	to 541370	1.16414E-01
541360	to 531360	2.55237E-07
541360	to 10010	2.55237E-07
541360	to 531350	9.50002E-08
541360	to 10020	9.50002E-08
541360	to 531340	2.14623E-08
541360	to 10030	2.14623E-08
541360	to 521330	2.14051E-07
541360	to 20040	2.14051E-07
541360	tot-cap	1.30276E-01
551330	to 551320	6.47110E-03
551330	to 551340	8.91954E+01
551330	to 541330	7.16967E-04
551330	to 10010	7.16967E-04
551330	to 531300	1.10582E-05
551330	to 20040	1.10582E-05
551330	tot-cap	8.92026E+01
551340	to 551350	1.19033E+02
551340	tot-cap	1.19033E+02
551350	to 551360	1.83684E+01
551350	tot-cap	1.83684E+01
551370	to 551380	1.98276E-01
551370	tot-cap	1.98276E-01
561360	to 561370	7.75574E-01
561360	tot-cap	7.75574E-01
571390	to 571400	7.38489E+00
571390	tot-cap	7.38489E+00
581440	to 581450	1.10831E+00
581440	tot-cap	1.10831E+00
591410	to 591400	4.63708E-03
591410	to 591390	1.33233E-06
591410	to 571370	2.00747E-06
591410	to 20040	4.15264E-05
591410	to 581400	1.41654E-05
591410	to 10010	4.06384E-05
591410	to 591420	1.08333E+01
591410	to 581410	3.82873E-05
591410	to 10020	1.18143E-05
591410	to 581390	1.23899E-06
591410	to 10030	1.23899E-06
591410	to 571390	1.19656E-08
591410	to 20030	1.19656E-08
591410	to 571380	3.95169E-05

591410	tot-cap	1.08381E+01
591430	to 591440	8.87636E+01
591430	tot-cap	8.87636E+01
601430	to 601420	7.10500E-02
601430	to 601410	7.24124E-06
601430	to 581390	1.61835E-05
601430	to 20040	4.51721E-04
601430	to 591420	3.03118E-06
601430	to 10010	3.14386E-05
601430	to 601440	1.93022E+02
601430	to 591430	3.02966E-05
601430	to 10020	1.88919E-06
601430	to 591410	2.72231E-06
601430	to 10030	2.72231E-06
601430	to 581410	1.30796E-08
601430	to 20030	1.30796E-08
601430	to 581400	4.35537E-04
601430	tot-cap	1.93094E+02
601450	to 601440	9.12502E-02
601450	to 601430	9.24545E-05
601450	to 581410	6.64715E-06
601450	to 20040	1.67466E-04
601450	to 591440	1.73670E-06
601450	to 10010	1.13346E-05
601450	to 601460	6.93315E+01
601450	to 591450	1.06419E-05
601450	to 10020	1.04397E-06
601450	to 591430	1.64584E-06
601450	to 10030	1.64584E-06
601450	to 581430	3.35098E-09
601450	to 20030	3.35098E-09
601450	to 581420	1.60817E-04
601450	tot-cap	6.94231E+01
601470	to 601480	1.60240E+02
601470	tot-cap	1.60240E+02
611470	to 611460	2.49119E-02
611470	to 611450	7.77289E-05
611470	to 591430	6.95141E-06
611470	to 20040	6.48066E-05
611470	to 601460	9.54605E-06
611470	to 10010	2.18569E-05
611470	to 611480	5.15641E+02
611470	to 601470	1.94799E-05
611470	to 10020	7.16905E-06
611470	to 601450	2.70677E-06
611470	to 10030	2.70677E-06
611470	to 591450	4.06970E-09
611470	to 20030	4.06970E-09
611470	to 591440	5.78651E-05
611470	tot-cap	5.15667E+02
611480	to 611490	1.11167E+04
611480	tot-cap	1.11167E+04
621470	to 621460	6.49974E-02
621470	to 621450	5.85168E-05
621470	to 601430	5.18407E-05
621470	to 20040	1.01687E-05
621470	to 611460	1.17939E-04
621470	to 10010	1.70051E-04
621470	to 621480	1.97780E+02
621470	to 611470	1.50150E-04

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621470 to  10020  9.80571E-05
621470 to 611450  1.05291E-04
621470 to  10030  1.05291E-04
621470 to 601450  4.84463E-05
621470 to  20030  4.84463E-05
621470 to 601440  9.65032E-04
621470 to 621471  1.36089E+00
621470 tot-cap    1.97863E+02
621490 to 621480  3.67532E-02
621490 to 621470  2.91681E-05
621490 to 621500  4.45711E+04
621490 to 611490  3.82096E-04
621490 to  10010  3.82096E-04
621490 to 601460  3.82096E-04
621490 to  20040  3.82096E-04
621490 tot-cap    4.45711E+04
621500 to 621510  1.20427E+02
621500 tot-cap    1.20427E+02
621510 to 621500  1.23390E-01
621510 to 621490  1.09757E-04
621510 to 601470  1.24667E-05
621510 to  20040  9.77816E-05
621510 to 611500  1.50290E-06
621510 to  10010  1.17581E-05
621510 to 621520  4.75884E+03
621510 to 611510  1.08999E-05
621510 to  10020  5.84483E-07
621510 to 611490  1.06263E-06
621510 to  10030  1.06263E-06
621510 to 601490  1.09471E-09
621510 to  20030  1.09471E-09
621510 to 601480  8.53249E-05
621510 tot-cap    4.75896E+03
621520 to 621510  1.46977E-02
621520 to 621500  9.93126E-05
621520 to 601480  2.22102E-06
621520 to  20040  9.22918E-06
621520 to 611510  6.36616E-07
621520 to  10010  1.87864E-06
621520 to 621530  6.53500E+02
621520 to 611520  1.66881E-06
621520 to  10020  4.26786E-07
621520 to 611500  1.10998E-07
621520 to  10030  1.10998E-07
621520 to 601500  3.36886E-10
621520 to  20030  3.36886E-10
621520 to 601490  7.00816E-06
621520 tot-cap    6.53515E+02
631530 to 631520  1.42749E-02
631530 to 631510  2.13169E-05
631530 to 611490  3.60826E-05
631530 to  20040  5.10810E-04
631530 to 621520  5.98256E-06
631530 to  10010  5.10999E-05
631530 to 631540  5.45292E+02
631530 to 621530  4.90348E-05
631530 to  10020  3.93741E-06
631530 to 621510  8.81432E-07
631530 to  10030  8.81432E-07
631530 to 611510  2.01461E-08
```

631530	to 20030	2.01461E-08
631530	to 611500	4.74728E-04
631530	tot-cap	5.45307E+02
631540	to 631530	2.28202E-02
631540	to 631520	8.19747E-06
631540	to 611500	7.97057E-11
631540	to 20040	6.07772E-04
631540	to 621530	1.79461E-06
631540	to 10010	9.75262E-04
631540	to 631550	9.96274E+02
631540	to 621540	9.75261E-04
631540	to 10020	1.79362E-06
631540	to 621520	3.03935E-06
631540	to 10030	3.03935E-06
631540	to 611520	1.28796E-08
631540	to 20030	1.28796E-08
631540	to 611510	6.07772E-04
631540	tot-cap	9.96299E+02
631550	to 631540	1.87362E-02
631550	to 631530	5.24656E-05
631550	to 611510	1.41368E-06
631550	to 20040	6.95794E-06
631550	to 621540	2.86085E-06
631550	to 10010	6.02559E-06
631550	to 631560	2.48080E+03
631550	to 621550	4.63459E-06
631550	to 10020	1.46885E-06
631550	to 621530	4.86241E-07
631550	to 10030	4.86241E-07
631550	to 611530	1.10209E-10
631550	to 20030	1.10209E-10
631550	to 611520	5.54427E-06
631550	tot-cap	2.48082E+03
641550	to 641560	1.64517E+04
641550	tot-cap	1.64517E+04
922340	to 922330	4.90863E-03
922340	fission	3.60699E+00
922340	nu-sigf	9.47289E+00
922340	to 922320	7.11723E-05
922340	to 922350	1.61906E+02
922340	to 922341	2.44147E+00
922340	tot-cap	1.65518E+02
922350	to 922340	2.25517E-02
922350	fission	3.47364E+02
922350	nu-sigf	8.41025E+02
922350	to 922330	2.14395E-05
922350	to 922360	7.94250E+01
922350	to 922351	6.94449E-02
922350	tot-cap	4.26811E+02
922360	to 922350	2.50056E-02
922360	fission	1.53934E+00
922360	nu-sigf	4.22025E+00
922360	to 922340	3.33242E-04
922360	to 922370	6.81206E+01
922360	to 922361	2.67105E+00
922360	tot-cap	6.98853E+01
922380	to 922370	4.99532E-02
922380	fission	7.69022E-01
922380	nu-sigf	2.16235E+00
922380	to 922360	3.22753E-04

```
922380 to 922390  7.22104E+00
922380 tot-cap    8.04034E+00
952370 to 952360  1.13851E-02
952370 fission    4.18314E+00
952370 nu-sigf    1.25870E+01
952370 to 952350  4.35558E-05
952370 to 952380  2.67252E+02
952370 to 952371  6.26053E-01
952370 tot-cap    2.71446E+02
942380 to 942370  1.83000E-03
942380 fission    1.92885E+01
942380 nu-sigf    5.45744E+01
942380 to 942360  1.08416E-05
942380 to 942390  2.54526E+02
942380 to 942381  2.43431E+00
942380 tot-cap    2.73816E+02
942390 to 942380  9.72024E-03
942390 fission    8.63828E+02
942390 nu-sigf    2.48333E+03
942390 to 942370  1.64884E-05
942390 to 942360  1.63452E-03
942390 to 942400  4.90626E+02
942390 tot-cap    1.35446E+03
942400 to 942390  4.55751E-03
942400 fission    4.91362E+00
942400 nu-sigf    1.53359E+01
942400 to 942380  4.44741E-05
942400 to 942410  2.01524E+03
942400 tot-cap    2.02016E+03
942410 to 942400  5.82221E-02
942410 fission    8.88807E+02
942410 nu-sigf    2.60762E+03
942410 to 942390  9.51621E-05
942410 to 942420  2.95569E+02
942410 tot-cap    1.18443E+03
942420 to 942410  1.85790E-02
942420 fission    3.62068E+00
942420 nu-sigf    1.13321E+01
942420 to 942400  2.25864E-04
942420 to 942430  2.79175E+02
942420 tot-cap    2.82814E+02
952410 fission    1.12519E+01
952410 nu-sigf    3.61820E+01
952410 to 952420  9.97806E+02
952410 tot-cap    1.00906E+03
952430 fission    2.79863E+00
952430 nu-sigf    9.38139E+00
952430 to 952440  3.63841E+02
952430 tot-cap    3.66634E+02
962440 to 962430  4.46494E-03
962440 fission    1.27444E+01
962440 nu-sigf    4.26595E+01
962440 to 962420  4.45261E-05
962440 to 962450  1.19183E+02
962440 to 962441  3.10608E+00
962440 tot-cap    1.31952E+02
0the reaction  50100 to  30070 was not used, because  50100 is not in library., (in subr pool)
                                 in the search of library number 3
0the reaction  50100 to  40090 was not used, because  50100 is not in library., (in subr pool)
                                 in the search of library number 3
```

```
0the reaction  50110 to  40090 was not used, because  50110 is not in library., (in subr pool)
                                  in the search of library number 3
0the reaction  50100 to  40100 was not used, because  50100 is not in library., (in subr pool)
                                  in the search of library number 3
0the reaction  80160 to  80161 was not used, because  80161 is not in library., (in subr pool)
0the reaction 621470 to 621471 was not used, because 621471 is not in library., (in subr pool)
0the fission product transitions for  922340 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  922340 to 922341 was not used, because  922341 is not in library., (in subr pool)
0the reaction  922350 to 922351 was not used, because  922351 is not in library., (in subr pool)
0the fission product transitions for  922360 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  922360 to 922361 was not used, because  922361 is not in library., (in subr pool)
0the fission product transitions for  952370 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  952370 to 952371 was not used, because  952371 is not in library., (in subr pool)
0the fission product transitions for  942380 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  942380 to 942381 was not used, because  942381 is not in library., (in subr pool)
0the fission product transitions for  942400 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  942420 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  952410 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  952430 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the fission product transitions for  962440 were not used.  library fissile nuclides are
   922330  922350  942410  922380  942390
0use substitute nuclide in block 8 data.  or, update with new fission yield data.
0the reaction  962440 to 962441 was not used, because  962441 is not in library., (in subr pool)
1
0                        case completed.  date,   2/16/1996
0 * normal termination *
1  oooooooooo   rrrrrrrrrrr   iiiiiiiiiiii   gggggggggg   eeeeeeeeeeee  m        m  sssssssssss
   oooooooooooo rrrrrrrrrrrr  iiiiiiiiiiii  gggggggggggg  eeeeeeeeeeee  mm       m  ssssssssssssss
   oo        oo rr        rr      ii       gg        gg  ee            mmm      m  ss         ss
   oo        oo rr        rr      ii       gg            ee            m m      m  ss
   oo        oo rr        rr      ii       gg            ee            m  m     m  ss
   oo        oo rrrrrrrrrrrr      ii       gg   gggggg   eeeeeeee      m   m    m  sssssssssss
   oo        oo rrrrrrrrrrrr      ii       gg   gggggg   eeeeeeee      m    m   m  ssssssssssss
   oo        oo rr      rr        ii       gg        gg  ee            m     m m  ss         ss
   oo        oo rr       rr       ii       gg        gg  ee            m      mm  ss         ss
   oo        oo rr        rr      ii       gg        gg  ee            m       m  ss         ss
   oooooooooooo rr         rr iiiiiiiiiiii  gggggggggggg  eeeeeeeeeeee  m        m  ssssssssssss
    oooooooooo  rr         rr iiiiiiiiiiii   gggggggggg   eeeeeeeeeeee  m        m  sssssssssss
0

   dddddddddddd     aaaaaaaa    w        w iiiiiiiiiiii   sssssssssss
   dddddddddddd   aaaaaaaaaa    w        w iiiiiiiiiiii  ssssssssssss
   dd        dd aa        aa    w        w      ii       ss         ss
   dd        dd aa        aa    w        w      ii       ss
```

```
  dd      dd  aa      aa  w      w    ii      ss
  dd      dd  aaaaaaaaaaa  w      w    ii      sssssssssss
  dd      dd  aaaaaaaaaaa   w    w     ii       sssssssssss
  dd      dd  aa      aa    w  w       ii              ss
  dd      dd  aa      aa     w w       ii              ss
  dd      dd  aa      aa      w w      ii      ss      ss
  ddddddddddd aa      aa       ww    iiiiiiiiiii  sssssssssssss
  ddddddddddd aa      aa        v    iiiiiiiiiii   sssssssssss
0

   000000     22222222222          //     11     666666666666          //  999999999   666666666666
  00000000    22222222222         //     111     666666666666         //  999999999999 666666666666
 00      00   22      22          //    1111     66                  //  99      99  66
00        00          22         //      11     66                 //   99      99  66
00        00          22        //       11     66                //    99      99  66
00        00        22         //        11     666666666666     //     999999999999 666666666666
00        00      22          //         11     666666666666    //      999999999999 666666666666
00        00    22           //          11     66      66     //                99  66      66
00        00  22            //           11     66      66    //                 99  66      66
 00      00  22            //            11     66      66   //                  99  66      66
  00000000   22222222222  //            11111111 666666666666  //          999999999999 666666666666
   000000    22222222222 //             11111111  666666666   //           999999999    666666666
0

   000000     999999999                 555555555555 666666666666                555555555555  22222222222
  00000000    999999999999              555555555555 666666666666                555555555555 22222222222222
 00      00   99      99      :::       55           66                  :::    55           22      22
00        00  99      99      :::       55           66                  :::    55                   22
00        00  99      99      :::       55           66                  :::    55                   22
00        00  999999999999              555555555555 666666666666                555555555555       22
00        00   999999999                555555555555 666666666666                555555555555     22
00        00          99      :::               55 66      66      :::                55     22
00        00          99      :::               55 66      66      :::                55   22
 00      00           99      :::       55      55 66      66      :::       55       55 22
  00000000   999999999999                555555555555 666666666666                555555555555 22222222222222
   000000    999999999999                 555555555555  666666666                 555555555555 22222222222222
1
0                          99999999999   cccccccccccc    aaaaaaaa   ll          eeeeeeeeeeee
                          99999999999999 cccccccccccccc  aaaaaaaaaa ll          eeeeeeeeeeee
                          99      99    cc      cc     aa      aa ll          ee
                          99            cc             aa      aa ll          ee
                          99            cc             aa      aa ll          ee
                          999999999999  cc             aaaaaaaaaaaa ll        eeeeeeeeee
                           999999999999 cc             aaaaaaaaaaaa ll        eeeeeeeeee
                                    99  cc             aa      aa ll          ee
                                    99  cc             aa      aa ll          ee
                          99        99  cc      cc     aa      aa ll          ee
                          999999999999  cccccccccccccc aa      aa llllllllllll eeeeeeeeeeee
                           99999999999   cccccccccccc  aa      aa llllllllllll eeeeeeeeeeee
```

****
****
****
***** program verification information *****
*****
*****

```
*****                 code system:    scale  version:    4.2                *****
*****                                                                        *****
*****************************************************************************
*****************************************************************************
*****                                                                        *****
*****                                                                        *****
*****                program:  c0c004                                        *****
*****                                                                        *****
*****           creation date:  04/27/95                                     *****
*****                                                                        *****
*****                library:  /neutronics/scale/exe                         *****
*****                                                                        *****
*****                                                                        *****
*****      this is not a   scale  configuration controlled code              *****
*****                                                                        *****
*****                jobname:  davis                                         *****
*****                                                                        *****
*****      date of execution:  02/16/96                                      *****
*****                                                                        *****
*****      time of execution:  09:56:52                                      *****
*****                                                                        *****
*****                                                                        *****
*****************************************************************************
*****************************************************************************
*****************************************************************************
1
0      -1q array has      1 entries.
0       0q array has      1 entries.
0       0q array has      1 entries.
0       0q array has      1 entries.
0       0q array has      1 entries.
0        dbl. prec. machine word applied has, at least, a 16 significant figure accuracy.
0            short-lived split test fraction, qm =    9.1188E-04
0            half-norm of matrix used, am =    7.0000E+00
0            4-place-accuracy-retention ratio, ratio4 =    6.4516E-13
0       1q array has     20 entries.
0       3q array has      1 entries.
0       3q array has      1 entries.
0       3q array has      1 entries.
0       3q array has      1 entries.
0       4q array has      1 entries.
0      54q array has     12 entries.
1library information...

         cross-section data taken from position number  1 of library on unit 33.

         pass   1
         pass   0
         *scale-system control module sas2 library*
         used a time-dependent neutron spectrum, for each of the above passes
           pass 0 applies start-up fuel densities
           pass n applies mid time densities of nth library interval
         first library updated was...
         pass   1
         pass   0
         *scale-system control module sas2 library*
         used a time-dependent neutron spectrum, for each of the above passes
           pass 0 applies start-up fuel densities
           pass n applies mid time densities of nth library interval
         first library updated was...
```

```
*****************************************************************
*                                                               *
*          prelim lwr origen-s binary working library--id = 1143 *
*       made from modified card-image origen-s libraries of scale 4.2 *
*     data from the light element, actinide, and fission product libraries *
*       decay data, including gamma and total energy, are from endf/b-vi *
*                                                               *
*     neutron flux spectrum factors and cross sections were produced from *
*     the 'presas2' case updating all nuclides on the scale 'burnup' library *
*                                                               *
*                fission product yields are from endf/b-v       *
*                                                               *
*          photon libraries use an 18-energy-group structure    *
*         the photon data are from the master photon data base, *
*          produced to include bremsstrahlung from uo2 matrix   *
*                                                               *
*     see information above this box (if present) for later updates *
*                                                               *
*****************************************************************
*                                                               *
*****************************************************************
0
0          .other identification and sizes of library.
0          data set name:  ft33f001
0        2/16/1996    date library was produced
0            1697     total number of nuclides in library
              689     number of light-element nuclides
              129     number of actinide nuclides
              879     number of fission product nuclides
0            7985     number of nonzero off-diagonal matrix elements
0
1
  sas2h: babcock wilcox 15x15, 3.00w%, 20gwd/mtu burn high temp                actinides        page   1
    power= 8.466E-05mw, burnup=2.0318E-02mwd, flux= 1.69E+13n/cm**2-sec
0                                  nuclide concentrations, gram atoms
                                   basis = converted to atoms/(barn-cm)
```

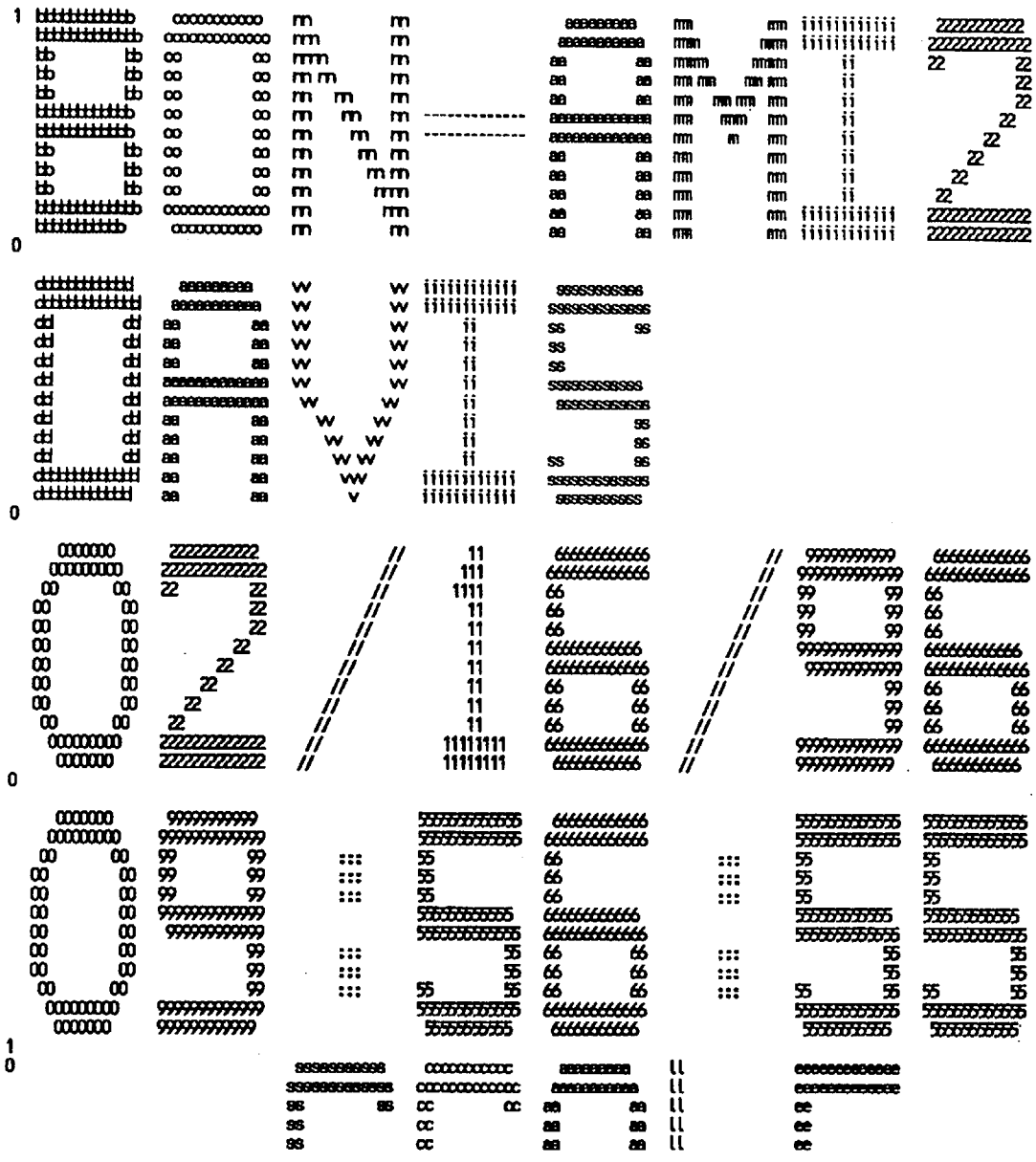
	charge	40.0 d	80.0 d	120.0 d	160.0 d	160.0 d	200.0 d	240.0 d
u230	.00E+00	3.84E-23	1.13E-22	2.02E-22	3.02E-22	3.02E-22	4.15E-22	5.44E-22
u231	.00E+00	1.72E-21	3.70E-21	5.85E-21	8.19E-21	8.18E-21	1.07E-20	1.35E-20
u232	.00E+00	2.37E-14	4.88E-14	7.61E-14	1.07E-13	1.07E-13	1.42E-13	1.82E-13
u233	.00E+00	2.43E-12	4.77E-12	6.94E-12	9.03E-12	9.03E-12	1.10E-11	1.29E-11
u234	5.56E-06	5.50E-06	5.45E-06	5.40E-06	5.35E-06	5.35E-06	5.30E-06	5.25E-06
u235	6.92E-04	6.77E-04	6.58E-04	6.42E-04	6.26E-04	6.26E-04	6.11E-04	5.98E-04
u236	3.17E-06	6.35E-06	9.43E-06	1.24E-05	1.53E-05	1.53E-05	1.80E-05	2.07E-05
u237	.00E+00	2.10E-08	2.42E-08	2.69E-08	2.96E-08	2.96E-08	3.22E-08	3.47E-08
u238	2.21E-02	2.21E-02	2.20E-02	2.20E-02	2.20E-02	2.20E-02	2.20E-02	2.20E-02
u239	.00E+00	5.53E-09	5.49E-09	5.46E-09	5.43E-09	4.13E-09	5.41E-09	5.39E-09
u240	.00E+00	.00E+00	.00E+00	.00E+00	2.05E-40	2.05E-40	2.46E-39	1.71E-38
u241	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
np235	.00E+00	6.46E-17	3.27E-16	8.08E-16	1.51E-15	1.51E-15	2.45E-15	3.62E-15
np236m	.00E+00	1.06E-15	2.58E-15	4.25E-15	6.07E-15	6.04E-15	8.03E-15	1.01E-14
np236	.00E+00	4.47E-15	2.32E-14	5.84E-14	1.12E-13	1.12E-13	1.85E-13	2.79E-13
np237	.00E+00	6.29E-08	1.54E-07	2.56E-07	3.67E-07	3.67E-07	4.87E-07	6.16E-07
np238	.00E+00	7.56E-11	1.84E-10	3.04E-10	4.34E-10	4.33E-10	5.73E-10	7.23E-10
np239	.00E+00	7.99E-07	7.95E-07	7.88E-07	7.84E-07	7.84E-07	7.81E-07	7.78E-07
np240m	.00E+00	.00E+00	.00E+00	.00E+00	1.75E-42	1.75E-42	2.10E-41	1.46E-40
np240	.00E+00	1.32E-11	1.30E-11	1.28E-11	1.27E-11	1.15E-11	1.26E-11	1.25E-11
np241	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00
pu236	.00E+00	5.86E-15	3.05E-14	7.67E-14	1.46E-13	1.46E-13	2.39E-13	3.58E-13
pu237	.00E+00	3.37E-15	1.15E-14	2.18E-14	3.28E-14	3.28E-14	4.39E-14	5.48E-14
pu238	.00E+00	3.73E-10	1.99E-09	5.06E-09	9.70E-09	9.70E-09	1.60E-08	2.41E-08

```
    pu239    .00E+00 8.27E-06 1.66E-05 2.42E-05 3.13E-05 3.13E-05 3.77E-05 4.37E-05
    pu240    .00E+00 1.24E-07 4.70E-07 9.91E-07 1.65E-06 1.65E-06 2.41E-06 3.25E-06
    pu241    .00E+00 5.08E-09 3.72E-08 1.14E-07 2.56E-07 2.56E-07 4.66E-07 7.51E-07
    pu242    .00E+00 2.30E-11 3.32E-10 1.56E-09 4.63E-09 4.63E-09 1.06E-08 2.07E-08
    pu243    .00E+00 2.82E-15 4.05E-14 1.90E-13 5.59E-13 5.47E-13 1.28E-12 2.48E-12
    pu244    .00E+00 3.86E-36 6.63E-33 5.11E-31 1.12E-29 1.12E-29 1.22E-28 8.52E-28
    pu245    .00E+00  .00E+00 5.04E-39 3.83E-37 8.34E-36 8.26E-36 9.05E-35 6.32E-34
    pu246    .00E+00 2.80E-45 7.04E-42 7.01E-40 1.79E-38 1.79E-38 2.17E-37 1.65E-36
    am239    .00E+00 9.95E-23 1.42E-21 6.64E-21 1.95E-20 1.93E-20 4.41E-20 8.52E-20
    am240    .00E+00 4.28E-20 6.10E-19 2.85E-18 8.36E-18 8.34E-18 1.90E-17 3.67E-17
    am241    .00E+00 6.90E-12 9.93E-11 4.66E-10 1.37E-09 1.37E-09 3.13E-09 6.05E-09
    am242m   .00E+00 1.30E-14 3.53E-13 2.39E-12 9.02E-12 9.02E-12 2.48E-11 5.57E-11
    am242    .00E+00 8.19E-15 1.17E-13 5.47E-13 1.60E-12 1.59E-12 3.64E-12 7.02E-12
    am243    .00E+00 7.80E-14 2.21E-12 1.57E-11 6.20E-11 6.20E-11 1.78E-10 4.19E-10
    am244m   .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00  .00E+00
    am244    .00E+00 2.54E-17 7.17E-16 5.04E-15 1.99E-14 1.97E-14 5.69E-14 1.33E-13
    am245    .00E+00 2.69E-40 4.52E-37 3.42E-35 7.35E-34 7.35E-34 7.88E-33 5.43E-32
    am246    .00E+00  .00E+00  .00E+00  .00E+00 4.28E-41 4.29E-41 5.44E-40 4.11E-39
    cm241    .00E+00 3.93E-26 3.85E-24 5.47E-23 3.43E-22 3.43E-22 1.39E-21 4.24E-21
    cm242    .00E+00 5.54E-14 1.53E-12 1.08E-11 4.07E-11 4.07E-11 1.14E-10 2.59E-10
    cm243    .00E+00 3.65E-17 1.95E-15 2.05E-14 1.05E-13 1.05E-13 3.65E-13 9.97E-13
    cm244    .00E+00 2.84E-16 1.59E-14 1.69E-13 8.95E-13 8.95E-13 3.23E-12 9.14E-12
    cm245    .00E+00 2.91E-19 3.21E-17 5.03E-16 3.51E-15 3.51E-15 1.56E-14 5.28E-14
    cm246    .00E+00 5.29E-22 1.14E-19 2.71E-18 2.51E-17 2.51E-17 1.40E-16 5.67E-16
    cm247    .00E+00 1.58E-25 6.84E-23 2.37E-21 2.91E-20 2.91E-20 2.02E-19 9.79E-19
    cm248    .00E+00 2.02E-28 1.74E-25 8.94E-24 1.46E-22 1.46E-22 1.27E-21 7.39E-21
1
    sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp                    actinides        page   2
      power= 8.466E-05mw, burnup=2.0318E-02mwd, flux= 1.69E+13n/cm**2-sec
0                                   nuclide concentrations, gram atoms
                                    basis = converted to atoms/(barn-cm)
            charge   40.0 d   80.0 d  120.0 d  160.0 d  160.0 d  200.0 d  240.0 d
    cm249   .00E+00 1.21E-33 1.03E-30 5.29E-29 8.61E-28 7.79E-28 7.45E-27 4.32E-26
    cm250   .00E+00 9.51E-39 1.61E-35 1.23E-33 2.66E-32 2.66E-32 2.87E-31 2.00E-30
    cm251   .00E+00  .00E+00  .00E+00 3.06E-41 6.60E-40 4.51E-40 7.12E-39 4.95E-38
  totals   2.28E-02 2.28E-02 2.27E-02 2.27E-02 2.27E-02 2.27E-02 2.27E-02 2.27E-02
0   flux            1.71E+13 1.70E+13 1.69E+13 1.68E+13  .00E+00 1.67E+13 1.67E+13
0 .results on logical unit no. 71, position  1, for time step  7, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0 .results on logical unit no. 71, position  2, for time step  5, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0 .results on logical unit no. 71, position  3, for time step  4, subcase 1. (run position 1, case position 1)
  title: sas2h: babcock wilcox 15x15, 3.00wt%, 20gwd/mtu burn high temp
0    .terminated logical unit no. 71 with zero flag record.
1 * normal termination of execution *
0                                   table of contents for material tables
0                                     case or subcase printed      page

                                          1                1
0nset        33
        33        4        1       27        6        0        0        0        0        0
         0        0        0        0        0        2       -1     1698      690      130
       880     7935        0        5       99        2       16       96       18       18
        18        0       71
0     56q array has     2 entries.
0     56q array has     1 entries.
0     56q array has     1 entries.
0     56q array has     1 entries.
0     56q array has     1 entries.
0     56q array has     1 entries.
```

```
0       56q array has      1 entries.
0       57q array has      3 entries.
0        1q array has     20 entries.
0        1q array has     10 entries.
     l90   97376
     l116  60826
     l32   33663 nudata (library) storage size
     l44   33734
     l103  75953
0       58q array has      4 entries.
0       60q array has      7 entries.
0       58q array has      7 entries.
0       66q array has      1 entries.
0       73q array has      4 entries.
0       74q array has      4 entries.
0       75q array has      4 entries.
     l140  66991
    used   101044 in size   200000
0jqpt          12
           0          0          0          0          0          0          0          0          0          0
           0          0
0therm          4
  5.091676E-01 3.604486E-01 2.731459E+00 1.000000E-31
0nxn            5
        7935         20          6         18       1697
0mm            19
           7          7          0          0          1          1          0          0          0          0
          21        100          4          4          3         74          4          1          0
0tconst         5
  8.640000E+04  .000000E+00  .000000E+00  .000000E+00 1.000000E-08
0mzero          4
           0        689        129        879
0pow            3
   .000000E+00  .000000E+00  .000000E+00
0 lirp          9
           6          0         51         26          2       3000       1000       1697         94
 n-gamma, fission and total mev/fission =          4.4180E+00   1.9429E+02   1.9871E+02
 start of interval flux =        1.71666E+13
 n-gamma, fission and total mev/fission =          4.8296E+00   1.9446E+02   1.9929E+02
 start of interval flux =        1.70387E+13
 n-gamma, fission and total mev/fission =          4.9847E+00   1.9462E+02   1.9955E+02
 start of interval flux =        1.69221E+13
 n-gamma, fission and total mev/fission =          5.0218E+00   1.9477E+02   1.9980E+02
 start of interval flux =        1.68318E+13
 start of interval flux =         .00000E+00
 n-gamma, fission and total mev/fission =          5.1263E+00   1.9491E+02   2.0004E+02
 start of interval flux =        1.67626E+13
 n-gamma, fission and total mev/fission =          5.2266E+00   1.9505E+02   2.0027E+02
 start of interval flux =        1.67123E+13
0 case or subcase    1  sas2h: babcock wilcox 15x15, 3.00w%, 20gwd/mtu burn high temp
0       56q array has     20 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has     20 entries.
0       56q array has      1 entries.
0       56q array has      1 entries.
0       56q array has     20 entries.
0       56q array has     20 entries.
0requested parm=halt8,skipcellwt,skipshipdata
  pass= 2, exec halts after pass   8
```

INFORMATION ONLY



```
SSSSSSSSSSS   CC          AAAAAAAAAAAA  LL          EEEEEEEEE
 SSSSSSSSSSS  CC          AAAAAAAAAAAA  LL          EEEEEEEEE
        SS    CC          AA        AA  LL          EE
        SS    CC          AA        AA  LL          EE
SS      SS    CC      CC  AA        AA  LL          EE
SSSSSSSSSSSS  CCCCCCCCCCCC  AA        AA  LLLLLLLLLLLL  EEEEEEEEEEEE
 SSSSSSSSSSS   CCCCCCCCCC   AA        AA  LLLLLLLLLLLL  EEEEEEEEEEEE
```

program verification information

code system: scale version: 4.2

program: c0c008

creation date: 04/27/95

library: /nautronics/scale/exe

this is not a scale configuration controlled code

jobname: davis

date of execution: 02/16/96

time of execution: 09:56:55

```
1
0      -1q array has     1 entries.
0       0q array has     4 entries.
0       1q array has     6 entries.
0       2q array has     2 entries.
1logical assignments
0master library   12
 working library   0
 scratch file     18
 new library       1
0p r o b l e m   d e s c r i p t i o n
0igr--geometry (0/1/2/3--inf med/slab/cyl/sphere          2
0izm--number of zones or material regions                 4
0ms--mixing table length                                 66
0ibl--shielded cross section edit option (0/1--no/yes)    0
0ibr--bondarenko factor edit option (0/1--no/yes)         0
0issopt--dancoff factor option                            0
```