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Title: Thermal Analysis of RH Shielded Canisters in RH-TRU 72-B Cask

Summary:

The purpose of this calculation is to document the thermal performance of the NS15 and NS30 shielded RH waste canisters in the RH-TRU 72-B packaging. The calculation demonstrates compliance with the applicable regulatory requirements as specified in 10 CFR 71 for Normal Conditions of Transport (NCT) and Hypothetical Accident Conditions (HAC).

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1.0 Introduction

The Remote-Handled Transuranic Waste Shipping Cask (Model No. RH-TRU 72-B) is designed for the safe transport of remote-handled transuranic (RH-TRU) wastes from various sites around the United States. The purpose of this calculation is to document the thermal performance of the alternative NS15 and NS30 shielded RH waste canisters under NCT and HAC conditions when transported within the RH-TRU 72-B packaging. The NS15 and NS30 neutron shield inserts are supplemental internal additions to the RH-TRU waste canister assembly (removable lid design) and provide dose rate attenuation for neutron-emitting RH waste.

This calculation documents the thermal safety basis for adding the NS15 and NS30 neutron shield inserts to the RH-TRU Waste Canister Assembly as an alternative payload configuration for the RH-TRU 72-B packaging. The analysis confirms that the package design complies with all thermal acceptance criteria specified in 10 CFR 71[1].

1.1 Objective

The objectives of this calculation are:

- develop a thermal model of the waste canister assembly with the NS15 and NS30 neutron shield inserts within the existing and approved thermal model of the RH-TRU 72-B packaging,
- determine the combined thermal performance of the shielded canisters and the RH-TRU 72-B packaging under NCT and HAC conditions of transportation and for a variation in the decay heat distribution within the containers, and
- ensure that the RH-TRU 72-B packaging temperatures remain bounded by the previous safety evaluations for NCT and HAC conditions.

1.2 Purpose

The purpose of this calculation is to demonstrate compliance with the applicable regulatory requirements for the NS15 and NS30 shielded canisters as an alternative payload configuration for the RH-TRU 72-B packaging. The applicable regulatory requirements are specified in 10 CFR 71 [1] for Normal Conditions of Transport (NCT) and for Hypothetical Accident Conditions (HAC). Further guidance for the calculation is taken from NUREG-1609 [3] and Regulatory Guide 7.8 [4].

1.3 Scope

The scope of this calculation is limited to the transportation of the NS15 and NS30 shielded canisters, as defined by drawing X-106-503-SNP [5], within the RH-TRU 72-B packaging with a payload decay heat of fifty (50) watts or less.

2.0 Description of Thermal Design

The Remote-Handled Transuranic Waste Shipping Cask (Model No. RH-TRU 72-B) is an existing Type B packaging designed for the safe transport of remote-handled transuranic (RH-TRU) wastes from various sites around the United States. This section presents a description of the RH-TRU 72-B packaging and the payload canisters, their design features, the payload configurations, and the thermal load conditions evaluated.

2.1 Geometry

Design drawings of the RH-TRU 72-B packaging and the standard waste canisters are presented in the RH-TRU 72-B SAR [2]. Design information for the NS15 and NS30 neutron shield inserts is provided by design drawing X-106-503-SNP [5].

2.2 Principal Design Features

2.2.1 RH-TRU 72-B Packaging

The RH-TRU 72-B packaging is composed of an inner vessel which optionally provides an inner containment boundary, an outer cask which provides an outer containment boundary and acts as an environmental barrier, and energy absorbing impact limiters at each end of the outer cask. Polyurethane foam filled energy absorbers (impact limiters) are attached to each end of the outer cask to provide impact and thermal protection under normal and accident conditions of transport. The empty cask weighs approximately 37,000 lbs. Figure 2-1 illustrates an overview of the RH-TRU 72-B package.

The RH-TRU 72-B Cask is designed with a totally passive thermal system. The principal design features of this system consists of an external thermal fire shield surrounding a 4.375-in. cask wall and polyurethane foam impact limiters protecting the ends of the cask body. The fire shield consists of a 10 gauge stainless steel sheet (0.135-in. thick) offset from the outer cask body by a 12 gauge stainless steel wire wrap (0.105-in. diameter) on a 3-in. pitch. The cylindrical outer cask consists of a 1.50-in. thick, 41.13-in. O.D. stainless steel outer shell, a 1.875-in. thick lead shield, and a 1-in. thick, 32.375-in. I.D. stainless steel inner shell. The outer cask bottom end plate is 5-in. thick stainless steel, while the outer cask lid is 6-in. thick stainless steel. The 32-in. O.D. inner vessel of the cask is constructed of 0.375-in. thick stainless steel with a 1.50-in. thick stainless steel bottom end plate and a 6.50-in. thick stainless steel lid. Butyl rubber containment O-ring seals are used on the inner and outer containment boundaries. Impact protection is provided by polyurethane foam impact limiters covering each end of the outer cask. The polyurethane impact limiters also provide thermal protection during the hypothetical accident condition (HAC) fire.

2.2.2 Waste Canisters

The payload of the RH-TRU 72-B cask will consist of one RH waste canister, either a standard or shielded configuration. This calculation addresses only the NS15 and NS30 shielded waste canister configurations. All RH-TRU waste will be loaded directly into the payload canister or into inner containers which are then overpacked within the payload canister. The standard payload canister uses a 26-in. outside diameter 1/4-in. thin-wall cylinder fabricated of carbon or stainless steel as the outer shell. Including a lift pintle at the top of the payload canister, the overall length is 120½ inches. The payload canister is basically a one- or two-piece construction unit (fixed or removable lid versions, respectively, either of which may be configured with a through-pintle fill port and plug) capable of transporting RH-TRU waste.

This calculation addresses the addition of the NS15 and NS30 neutron shield inserts for the RH waste canister as an authorized payload configuration for shipment in the RH-TRU 72-B packaging. The NS15 and NS30 neutron shielded canisters contain supplemental internal neutron shielding components added to the RH-TRU waste canister assembly (removable lid design) and provide dose rate attenuation for neutron-emitting RH

waste. The nominal dimensions for the NS30 and NS15 neutron shielded canisters are provided in drawing X-106-503-SNP [5].

The neutron shielding for the NS15 and NS30 neutron shield inserts is fabricated from pipe-grade extra-high molecular weight (EHMW), high density polyethylene (HDPE) plastic with a cell classification of 345444C or greater per ASTM D3350 [17]. The NS15 shield insert body pipe has a nominal wall thickness of 3.387-in. (3.288-in. minimum) and the NS30 shield insert body pipe has a nominal wall thickness of 1.454-in. (1.412-in. minimum). Both the NS15 and NS30 shield insert body pipes have a 24-in. outside diameter and the shield insert end caps have a nominal wall thickness of 5-in. Figure 2-2 illustrates an overview of the NS15 shielded waste canister. The overview of the NS30 shielded canister is similar except for the wall thickness of the shield insert.

2.3 Methodology

The methodology used to conduct the analysis was as follows:

1. The existing thermal models of the RH-TRU 72-B packaging for the transport of paper and metallic wastes under normal conditions of transport (NCT) and hypothetical accident conditions (HAC) were extracted from Reference [2] safety analysis report. Since these thermal models were developed under an earlier version of SINDA/FLUINT, the models were re-run and the results compared to the original results to ensure that the current version of the code produces similar results.
2. A 'solids' based thermal model of the 72-B canisters with the NS15 and NS30 neutron shield inserts was developed using the Thermal Desktop® computer program. The thermal model simulates the entire canister and included representation of the paper and metallic waste configurations, as appropriate, plus the waste containers that hold the waste.
3. A 'cask and impact limiter only' thermal model for NCT and HAC were created from the existing non-graphical, text based thermal models obtained from the Reference [2] safety analysis report by deleting the thermal definitions for the canister and payload contained within each thermal model.
4. A representation of the interior surfaces for the inner vessel (IV) of the 72-B cask was added to the 'solids' modeling of the NS15 and NS30 shielded canisters. This thermal representation of the IV surfaces is used to generate the radiation and conductance tie-ins between the shielded canisters and the cask and impact limiter portions of the RH-TRU 72-B packaging.
5. The combined thermal models of the shielded canisters and the 72-B packaging are then exercised using the SINDA/FLUINT computer program to predict the thermal performance of the shielded canisters within the 72-B packaging.

2.4 Design Basis Thermal Load Conditions

The shielded waste canister and RH-TRU 72-B package combinations are evaluated in accordance with 10 CFR 71 [1] and Regulatory Guide 7.8 [4] for the applicable NCT thermal loads. The load conditions are defined as follows:

- *NCT Hot*: An ambient temperature of 100 °F is used to evaluate the maximum temperatures within the cask with maximum decay heat and 10 CFR §71.71(c)(1) prescribed insolation.

- *NCT Hot, No Solar*: Same as NCT Hot, but without insolation. This case serves as the basis for evaluation of the maximum temperature at the accessible surfaces of the package in accordance with 10 CFR §71.43(g). 10 CFR §71.43(g) stipulates that for exclusive use packages, the maximum accessible surface temperature must be less than 185 °F for this condition.
- *HAC Hot:* Thermal conditions prior to the event are conservatively taken from the *NCT Hot* condition, followed by a thirty-minute transient with an ambient t*emperatur*e of 1,475 °F with maximum decay heat, and then back to a steady-state am*bient t*emperature of 100 °F with maximum decay heat and insolation per 10CFR71.71(c)(1). This load case evaluates the peak temperature achieved for the various cask components under the HAC fire event and the associated thermal stresses.

Cold environment conditions are not addressed by this evaluation since the minimum temperatures expected within the packaging and payload are bounded by -20 °F and -40 °F uniform temperature conditions established in the RH-TRU 72-B SAR [2].

2.5 Design Basis Thermal Loads

2.5.1 Insolation Loads

Maximum steady-state package temperatures with insolation are determined by using the insolation values delineated in 10 CFR §71.71(c)(1), averaged over 12 hours. This action conservatively bounds the transient thermal response that the payload and internal package components have to a diurnal (i.e., cyclic) solar load. The relatively large thermal mass and the polyurethane foam impact limiters will effectively isolate (i.e., decouples) the thermal response of the internal components from the cyclic variation in insolation heating applied to the outside of the package. To account for self-shading provided by the package surfaces in the horizontal orientation, the projected area of the package curved surfaces is used instead of their full area when calculating the total insolation incident on the package. A solar absorptivity of 0.52 is assumed for the stainless steel surfaces under NCT conditions. The solar absorptivity is increased to 0.8 after the HAC fire event to account for potential soot accumulation on the package surfaces.

2.5.2 Payload Decay Heat

The package payload is assumed to consist of a paper based waste stream with an assumed maximum decay heat loading of 50 watts. The decay heat is assumed to be equally distributed within the waste volume on a volumetric basis. Approximately the same total volume of waste can be accommodated by either canister design/payload definition. The thermal properties of the paper based waste stream are the same as presented in the RH-TRU 72-B SAR [2].

Table 2-1 - Insolation Data per 10CFR71.71(c)(1)

Form and Location of Surface	Total Insolation for a 12-hour Period (g-cal/cm^2)(1)
Flat surfaces transported horizontally; base surface	None
Flat surfaces transported horizontally; all other surfaces	800
Flat surfaces not transported horizontally	200
Curved surfaces	400

Notes:

(1) The 12-hour period covers the daylight hours. Insolation for the remaining 12 hours (nights) is zero. The 12-hour insolation values are converted to equivalent 12-hour averaged values for evaluation of package temperatures.

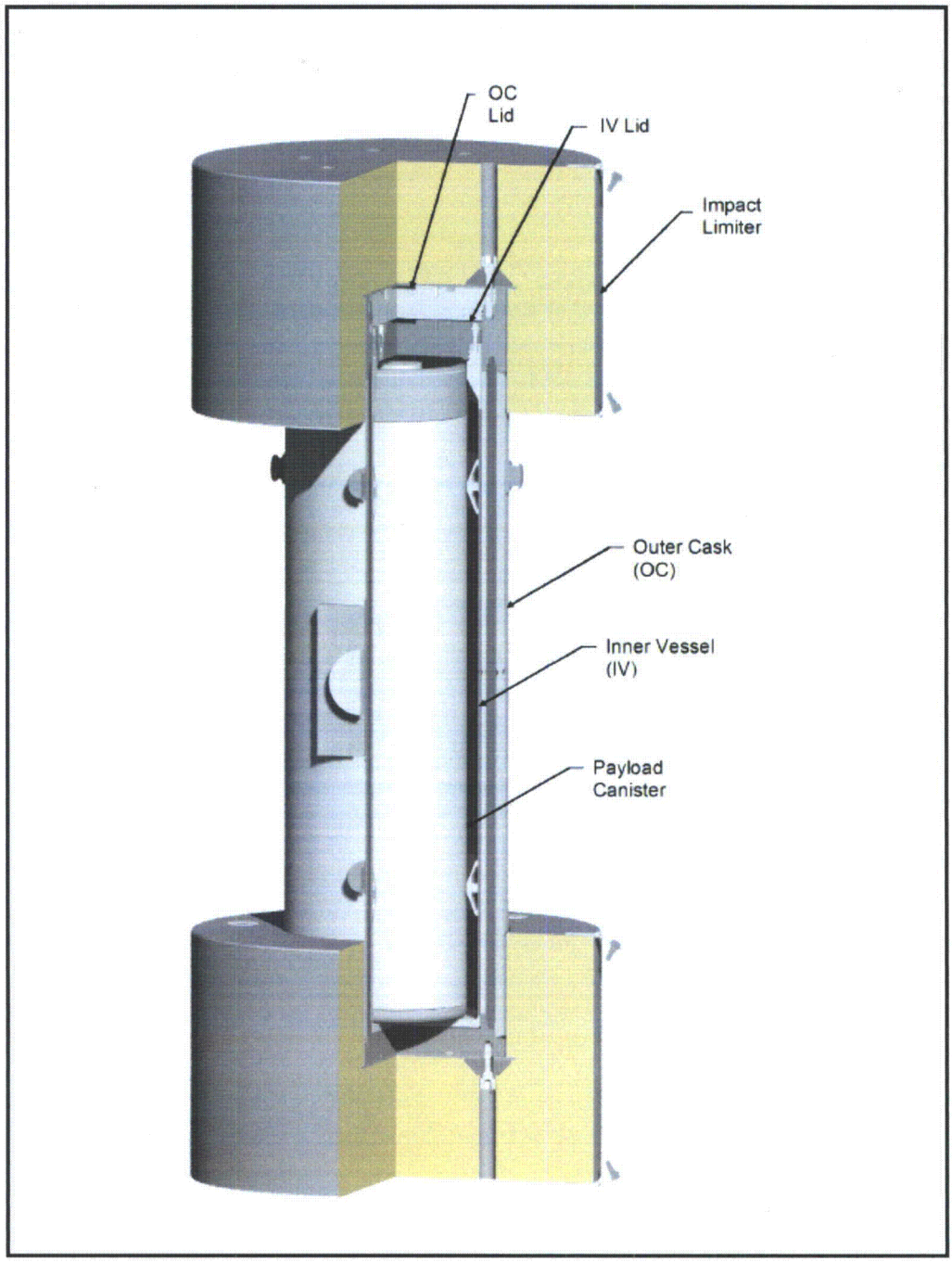

Figure 2-1 - Overview of RH-TRU 72-B Package

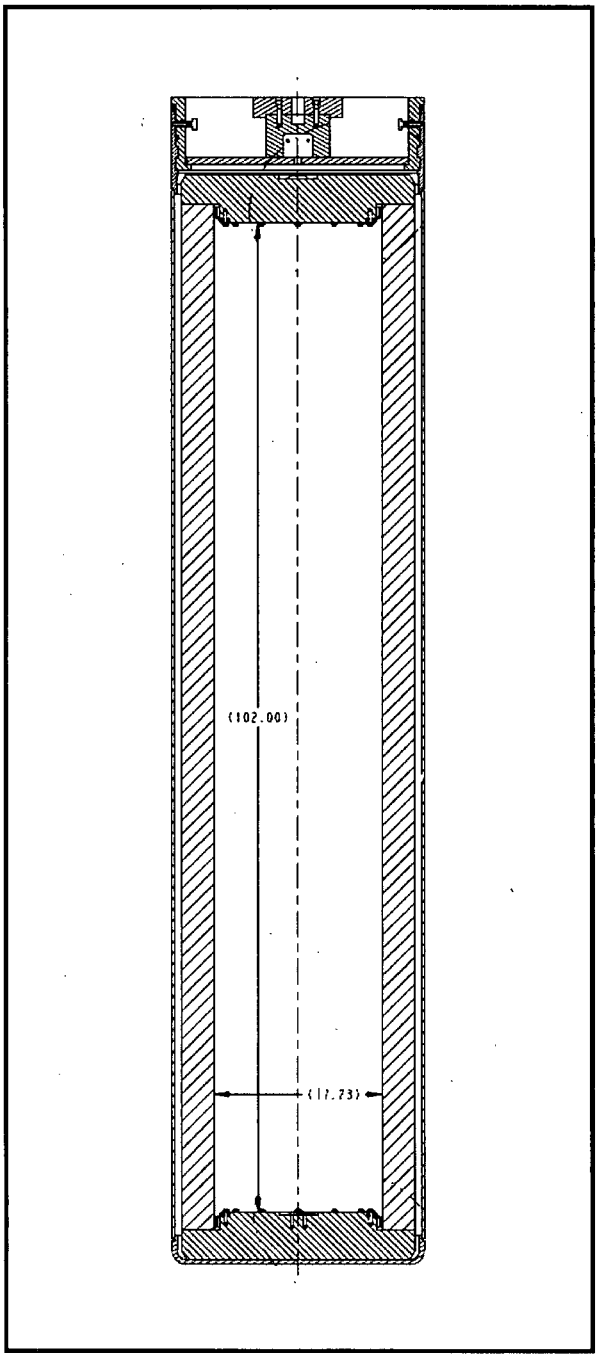

Figure 2-2 - Overview of NS15 Shielded Waste Canister

3.0 Material Specifications

This section presents the thermal properties used in the thermal model of the NS15 and NS30 shielded waste canisters within the RH-TRU 72-B packaging. The RH-TRU 72-B package is fabricated primarily of Type 304 stainless steel, lead, and polyurethane foam. The void spaces within the package are assumed to be filled with air at one atmosphere. Air also fills the gap between the outer cask (OC) outer shell and the thermal shield. The various waste containers to be transported will be constructed of carbon or stainless steel.

The shielded canister shell may be fabricated from carbon or stainless steel. For the purposes of this analysis the shell material is assumed to be ASTM A516 carbon steel since both the higher thermal conductivity and emissivity of carbon steel will bound the canister temperatures achieved under HAC conditions with stainless steel. The shield inserts are fabricated of high density polyethylene (HDPE) material. The void spaces within the waste canisters are assumed to be filled with air at one atmosphere.

3.1 Summary of Thermal Properties

The thermal properties for the RH-TRU 72-B packaging components are documented in the RH-TRU 72-B SAR [2].

The thermal properties of A516 carbon steel assumed for the fabrication of the waste canisters presented in Table 3-1 are taken from Table TCD, material group B, of the ASME Boiler and Pressure Vessel Code [7]. The density of A516 carbon steel is taken from an on-line database [8].

The thermal properties of the HDPE shielding material used for the NS15 and NS30 shield inserts is based on DriscoPlex® pipe material [6] (see product data sheet in Appendix 7.6). The thermal properties of the material presented in Table 3-2 are taken from [9], while its density is obtained from the product datasheet. A single, non-temperature dependent point is used since over the typical working temperature range the thermal conductivity is essentially constant with temperature [9].

The thermal properties for air presented in Table 3-3 are derived from curve fits provided in [10]. Because the thermal conductivity of air varies significantly with temperature, the computer model calculates the thermal conductivity across the various air spaces as a function of the mean film temperature.

The payload within the shielded canisters is conservatively assumed to be paper and to exhibit the thermal conductivity of air in order to bound the potential temperature rise and temperature limit within the payload. This modeling assumption is consistent with the treatment established in the RH-TRU 72-B SAR [2] for paper based payloads.

3.2 Emissivity, Absorption, & Transmittance Data

Table 3-4 presents the surface emissivity assumed for the various surfaces in the shielded canister thermal model. The optical properties are based on the information contained in [11]. The emissivity and solar absorptivity for the RH-TRU 72-B packaging materials are documented in the safety analysis report [2].

3.3 Technical Specification of Components

The materials used in the RH-TRU 72-B package that are considered to be temperature sensitive are the butyl used for the O-ring seals and the polyurethane foam used in the impact limiters.

The RH-TRU 72-B SAR [2] presents the basis for the temperature limitations of the butyl rubber O-ring seals and the polyurethane foam. Per the RH-TRU 72-B SAR, the butyl rubber O-ring seals have an allowable temperature range of -40 °F to 225 °F and a short duration (8 hours) upper temperature limit of 360 °F. The allowable temperature range for the polyurethane foam during impact loadings is -20 °F to 300 °F. Temperature excursions between -40 °F and 300 °F will not permanently degrade the properties of the foam. No temperature limit exists for the polyurethane foam under the hypothetical accident condition (HAC) since the failure of the foam via thermal decomposition provides a principle thermal protection mechanism under elevated temperature conditions. Foam performance under hypothetical accident condition (HAC) transient conditions is discussed in Section 3.5 of the RH-TRU 72-B SAR [2].

Other package materials are stainless steel and lead. The melting points for these materials are 2,600 °F and 620 °F, respectively. The carbon steel, which may be used in the waste containers and the payload canister, has a melting temperature of approximately 2,750 °F. In compliance with the ASME B&PV Code [18], the allowable temperature for stainless steel under NCT conditions is limited to 800 °F if the component serves a structural purpose (e.g., the IV shell, the OC inner and outer shell, lid, and trunnions). While a higher, short-term temperature is permissible under HAC conditions, the NCT limit of 800 °F is conservatively applied for the HAC condition as well.

The design temperature limit for the HDPE used for the shielded inserts is assumed to be the vicat softening temperature. Per data sheet in Appendix 7.6, the vicat softening temperature for the pipe-grade HDPE considered for this evaluation is 256 °F.

No specific temperature limit exists for the waste payload. Instead, the temperature limit for the waste material is discussed in Appendix 4.6 of the RH-TRU Payload Appendices [2].

Table 3-1 - Thermal Properties of ASTM A516 Carbon Steel

Temperature (°F)	Density (lb_m/in^3)	Thermal Conductivity (Btu/hr-ft-°F)	Specific Heat (Btu/lb_m-°F)
70	0.284	23.6	0.106
100		23.9	0.110
150		24.2	0.114
200		24.4	0.118
250		24.4	0.121
300		24.4	0.123
400		24.2	0.128

Table 3-2 - Thermal Properties of HDPE

Temperature (°F)	Density (lb_m/in^3)	Thermal Conductivity (Btu/hr-ft-°F)	Specific Heat (Btu/lb_m-°F)
-	0.035	0.25	0.46

Table 3-3 - Thermal Properties of Air

Temperature (°F)	Density lb_m/in^3)	Specific Heat (Btu/lb_m-°F)	Dynamic Viscosity (lb_m /ft-hr)	Thermal Conductivity (Btu/hr-ft-°F)	Prandtl No.	Coef. Of Thermal Exp. (°R^{-1})
-40	Use Ideal Gas Law w/ Molecular wt = 28.966 g/mole	0.240	0.03673	0.0121	Compute as $Pr = c_p\mu / k$	Compute as $\beta = 1/(°F+459.67)$
0		0.240	0.03953	0.0131		
50		0.240	0.04288	0.0143		
100		0.241	0.04607	0.0155		
200		0.242	0.05207	0.0178		
300		0.243	0.05764	0.0199		
400		0.245	0.06286	0.0220		

Table 3-4 - Surface Emissivity

Material	Assumed Conditions	Assumed Emissivity (ε)
Canister Shell (Carbon Steel)	Painted	0.8
HDPE Surfaces	Black	0.85
Inner Waste Containers Shell (Carbon Steel)	Oxidized or painted	0.8

4.0 Thermal Evaluation under Normal Conditions of Transport

This section presents the thermal analysis methodology and the evaluation of the thermal performance for the NS15 and NS30 shielded canisters and the RH-TRU 72-B packaging combination under NCT conditions to demonstrate compliance with the requirements of 10 CFR §71.43(g) and §71.71. The thermal evaluations are performed using conservative analytical techniques to assure that all materials are maintained within their applicable minimum and maximum allowable temperature during all modes of operation.

4.1 Thermal Model for NCT

The analytical thermal model of the shielded canisters within the RH-TRU 72-B packaging are developed for use with the Thermal Desktop® [12] and SINDA/FLUINT [13] computer programs. These programs work together to provide the functions needed to build, exercise, and post-process a thermal model. The SINDA/FLUINT and Thermal Desktop® computer programs have been validated for safety basis calculations for nuclear related projects [14].

The analytical thermal model of the RH-TRU 72-B packaging developed for the RH-TRU 72-B SAR [2] is re-used for the purposes of this calculation. The thermal model is set up as an axisymmetric, lumped-parameter, finite-difference 360° model. Complete details of the cask and impact limiter modeling are provided in the RH-TRU 72-B SAR. A summary description is also provided in Appendix 7.4.1. The NCT thermal evaluations assumed that the package is in its normal horizontal orientation for transportation.

The thermal modeling of the NS15 and NS30 shielded canister payloads are developed using the Thermal Desktop® computer program based on drawing X-106-503-SNP [5]. With the exception of the payload definition and the thickness of the high density polyethylene (HDPE) used for shielding, identical modeling approaches are used for the thermal models for the two canister designs. Approximately 1,270 thermal nodes are used to define and simulate the NS15 canister design and its enclosed payload, while approximately 1,385 thermal nodes are used for the NS30 canister design.

Waste will not be directly loaded into the NS15 shielded canister. Instead, the wasted is assumed to be contained within three (3) approximately 15-gallon waste containers which are then overpacked by the NS15 canister. Three alternative arrangements of the containers within the NS15 canister were examined to determine the sensitivity of the results to the use and placement of dunnage. While the results indicate a general insensitivity to container placement within the canister, the stacking of the three waste containers against the base of the canister was shown to yield a slightly higher (i.e., ≈2°F) payload temperature than the other placement assumptions.

The heat transfer between the various components within the shielded canisters is via radiation and conduction. All void spaces within the canister and cask cavity are assumed to be filled with air at atmospheric pressure.

A similar modeling approach is used for the payload definition for the NS30 canister, except that the waste is assumed to be contained within six (6) approximately 8-gallon containers that, in turn, are housed within three (3) approximately 30-gallon waste containers.

A paper based waste stream is assumed for the payload with a maximum decay heat loading of 50 watts for either canister configuration. The decay heat is assumed to be equally distributed within the waste volume on a volumetric basis. This is the same modeling approach used in the RH-TRU 72-B SAR [2].

Details of the thermal modeling used for the NS15 and NS30 shielded canister configurations are provided in Appendix 7.4.2.

4.2 Heat and Cold

4.2.1 Maximum Temperatures for NCT Conditions

Two ambient conditions are evaluated for NCT conditions: NCT Hot (i.e., 100 °F with regulatory solar averaged over 12 hours) and NCT Hot, No Solar (i.e., 100 °F with no insolation loading). See Section 2.4 for a description of each ambient condition. Table 4-1 presents the resulting package temperatures for the transportation of the NS15 shielded canister, while Table 4-2 presents the same type of results for the NS30 shielded canister. The maximum temperatures seen for the NS15 and NS30 neutron shield inserts are 141 °F and 137 °F, respectively. The temperature levels achieved under NCT conditions demonstrate that all component temperatures for the NS15 and NS30 canister configurations are within their respective limits.

Figure 4-1 illustrates the temperature distribution within the NS15 shielded canister and payload under the NCT Hot condition. The temperature distribution on the left side of the figure includes the waste drums and waste payload, while the illustration on the right side of the figure presents the temperature distribution within the canister shell and the NS15 shield insert only. Figure 4-2 illustrates similar temperature distributions for the NS30 shielded canister.

Since no specific dunnage is defined for the NS15 and NS30 shielded canisters, the sensitivity of the results to the placement of the waste containers within the shielded canisters was evaluated. The evaluation was conducted for the NS15 canister by considering two alternative placements besides the stacking of the three waste containers against the base of the canister. These alternative placements were 1) the stacking of the three waste containers against the lid of the canister (i.e., the 'top position'), and 2) the centering of the three waste containers within the canister (i.e.,, the 'middle position'). The evaluation showed that the temperature results are essentially insensitive to the stacking arrangement with the middle positioning yielding the lowest peak payload temperature and the bottom positioning the highest. However, the difference in the peak payload temperature between these two positions is only 2°F (see Figure 4-1 and Figure 4-3).

To assess the effect of eccentric placement within the horizontal cask, another sensitivity evaluation was conducted using the 'bottom position' waste container arrangement as described above. The changes to the thermal modeling for the eccentric placement consisted of reducing the mean gap between the lower half of the horizontally oriented drums, HDPE poly insert, and canister and their adjacent component to approximately one half of the gap assumed for the concentric placement of the components. The corresponding mean gap between the upper half of these same components was increased by approximately 50% over that assumed for the concentric placement of the components. The thermal conductance due to the line contact between the components is conservatively ignored. All other aspects of the thermal model remained the same as discussed above. The net thermal impact was a very slight (i.e., $\leq$ 0.2°F) decrease in the peak payload and HDPE temperatures. The results demonstrate that, given the low decay heat considered for the shielded canisters, the

reduction in thermal resistance over the bottom half of the payload and HDPE insert offset the increased thermal resistance over the upper half.

It should be noted that the cask design includes a support structure to limit the eccentric offset of the canister when the cask is in the horizontal position such that a minimum radial gap of 2.375-inches would exist. This gap is only 0.25-inch smaller than that existing for the concentric placement of a canister with the nominal diameter.

4.2.2 Minimum Temperatures for NCT Conditions

Cold environment conditions are not addressed by this evaluation since, given sufficient time, the minimum temperatures expected within the packaging and payload are bounded by -20 °F and -40 °F uniform temperature conditions established in the RH-TRU 72-B SAR [2]. These minimum temperature levels are within the allowable temperature limits for all components of the NS15 and NS30 shielded canisters.

4.3 Maximum Normal Operating Pressure

The RH-TRU 72-B package has a design pressure of 150 psig. The major factors affecting the pressure within the sealed IV are:

- Radiolytic gas generation (or consumption),
- Temperature-related pressure change,
- Barometric pressure change,
- Chemical reactions,
- Biological gas generation, and/or
- Thermal decomposition.

The determination of the maximum normal operating pressure (MNOP) is not within the scope of this calculation.

4.4 Evaluation of Package Performance for Normal Conditions of Transport

The combined thermal performance of the NS15 and NS30 shielded RH waste canisters in the RH-TRU 72-B packaging has been evaluated for the applicable NCT conditions of transportation and for a maximum decay heat loading of 50 W within the canisters. The evaluations found that the resulting component temperatures remained within their specified allowable limits for all cases. Further, the computed temperatures for the RH-TRU 72-B packaging components were essentially the same as those predicted in the RH-TRU 72-B SAR [2] for similar ambient conditions. Thus the NS15 and NS30 shielded RH waste canisters will not impact the safety basis of the RH-TRU 72-B packaging.

Table 4-1 - Maximum NCT Temperatures for NS15 Shielded Canister

Location / Component	Temperature (°F) [1]		
	NCT With Insolation	NCT Without Insolation	Allowable Temperature
Waste Centerline	247	225	N/A[2]
NS15 Shield Insert	141	119	256
Canister Shell	133	111	2,600
IV Shell	128	105	800
IV Void Space Bulk Avg	127	104	N/A
OC Inner Shell	126	103	800
OC Lead Shield	126	103	620
OC Outer Shell	126	103	800
OC Thermal Shield	125	103	185
OC Upper Ring Forging	125	102	800
IV O-Ring Seal	125	103	225
OC O-Ring Seal	125	102	225
IV Lid	125	103	800
OC Lid	125	103	800
Impact Limiter Foam	132	104	300
Impact Limiter Shell	133	105	185

Table Note: 1) Temperatures assume a total payload decay heat loading of 50 W.

2) The temperature limit for the waste material is discussed in Appendix 4.6 of the RH-TRU Payload Appendices [2].

Table 4-2 - Maximum NCT Temperatures for NS30 Shielded Canister

Location / Component	Temperature (°F) [1]		
	NCT With Insolation	NCT Without Insolation	Allowable Temperature
Waste Centerline	234	214	N/A[2]
NS30 Shield Insert	137	115	256
Canister Shell	132	110	2,600
IV Shell	128	105	800
IV Void Space Bulk Avg	127	104	N/A
OC Inner Shell	126	103	800
OC Lead Shield	126	103	620
OC Outer Shell	126	103	800
OC Thermal Shield	125	103	185
OC Upper Ring Forging	125	103	800
IV O-Ring Seal	126	103	225
OC O-Ring Seal	125	103	225
IV Lid	126	103	800
OC Lid	125	103	800
Impact Limiter Foam	132	104	300
Impact Limiter Shell	133	105	185

Table Note: 1) Temperatures assume a total payload decay heat loading of 50 W.

2) The temperature limit for the waste material is discussed in Appendix 4.6 of the RH-TRU Payload Appendices [2].

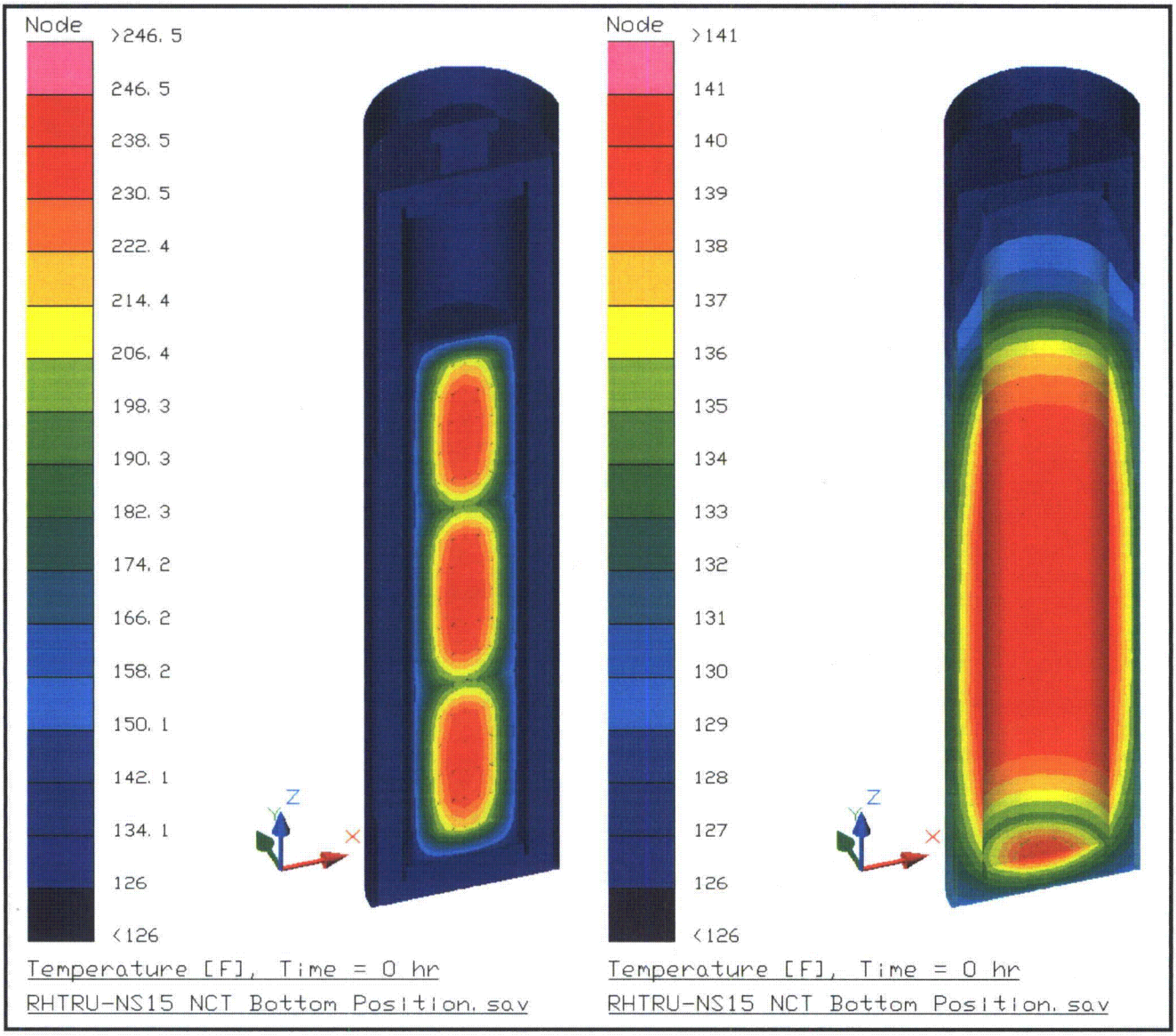

Figure 4-1 - NCT Temperature Distribution within NS15 Shielded Canister

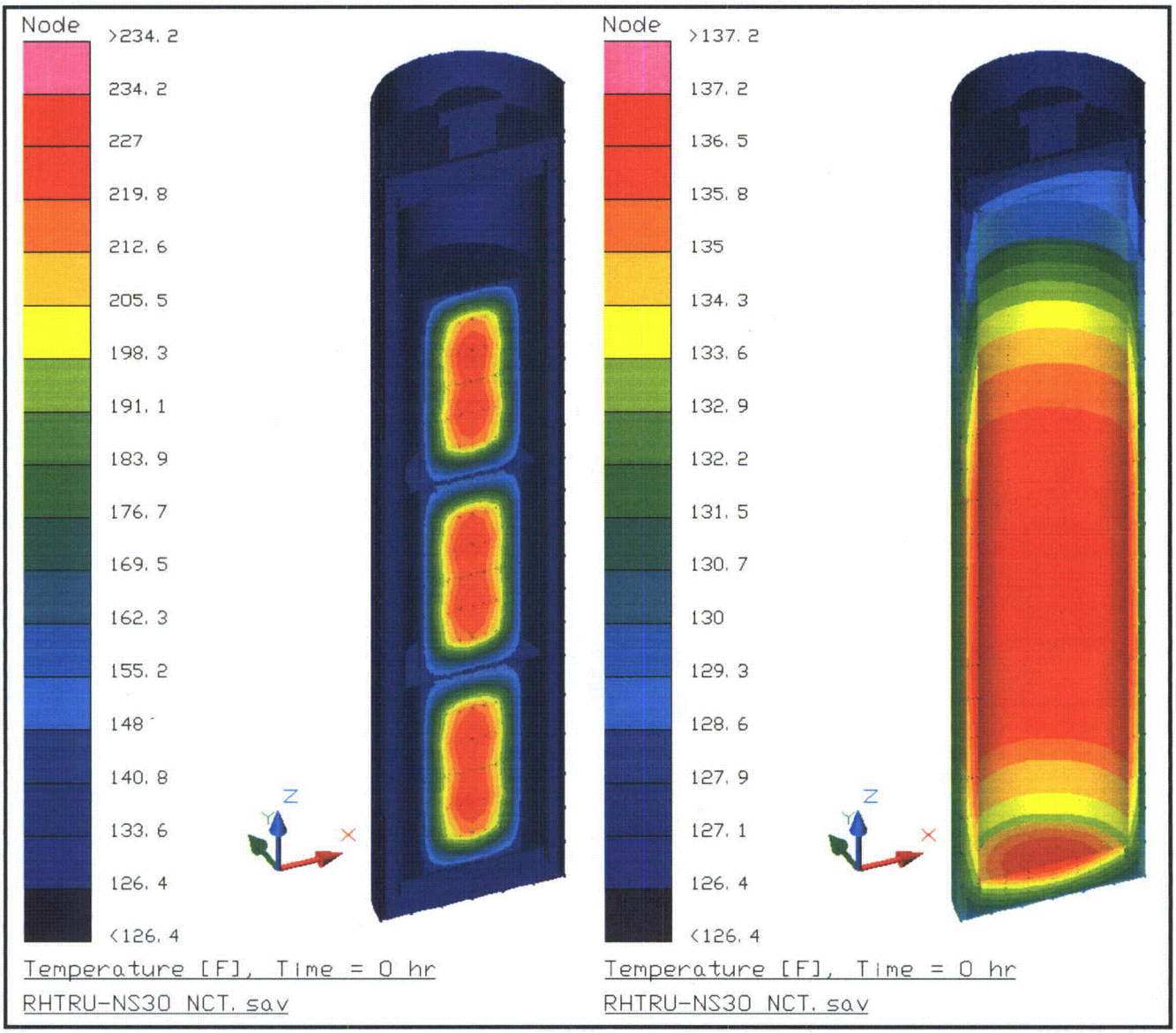

Figure 4-2 - NCT Temperature Distribution within NS30 Shielded Canister

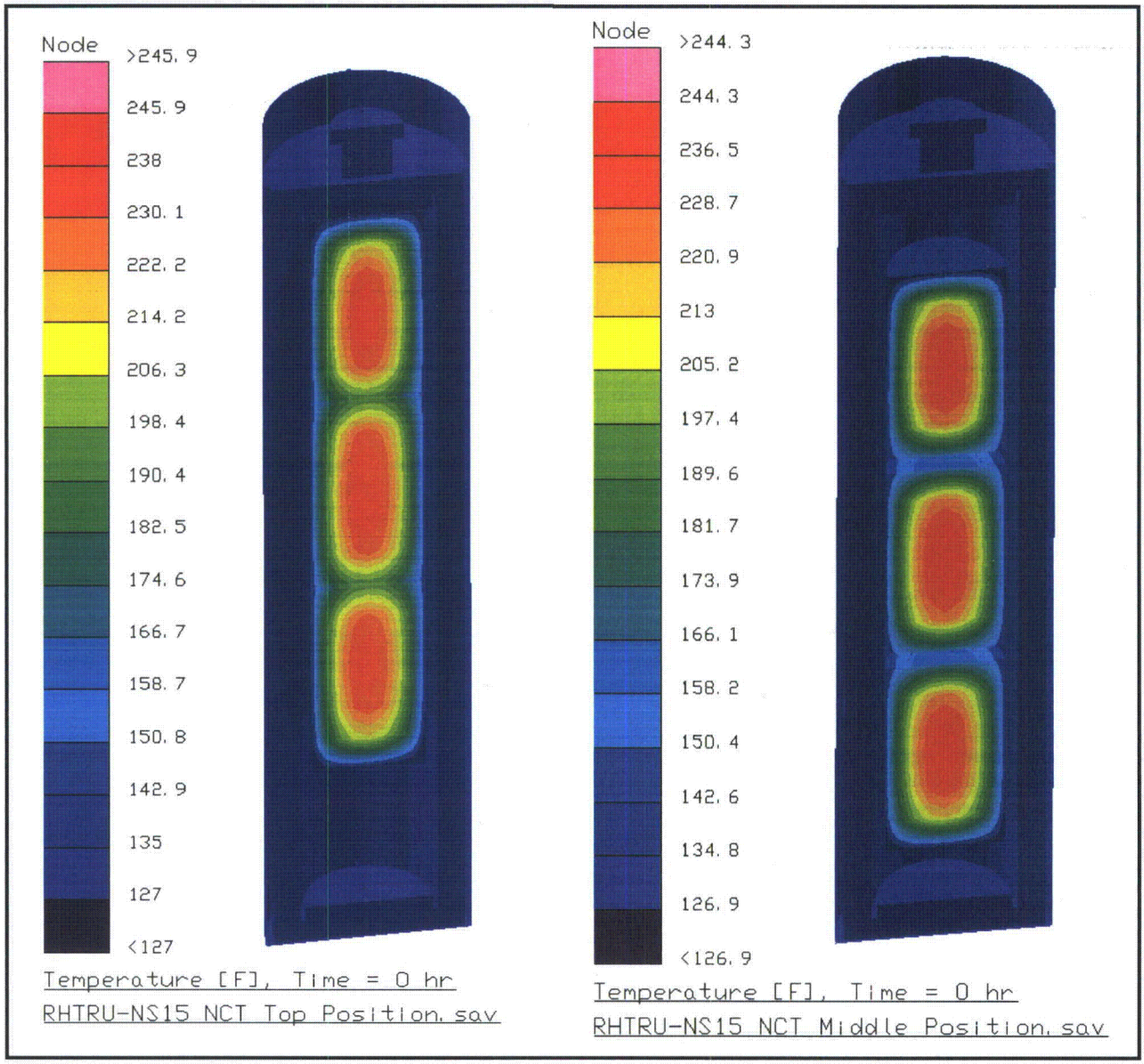

Figure 4-3 - NCT Temperature Distribution for Alternative Waste Positioning within NS15 Shielded Canister

5.0 Thermal Evaluation under Hypothetical Accident Conditions

This section presents the thermal analysis methodology and the evaluation of the thermal performance for the NS15 and NS30 shielded canisters and the RH-TRU 72-B packaging combination under the hypothetical accident condition (HAC) specified in 10 CFR §71.73(c)(4).

5.1 Initial Conditions

The initial conditions assumed for the package prior to the HAC event are described in the RH-TRU 72-B SAR [2]. A summary of the modifications made to the NCT thermal model of the packaging to simulate the assumed package conditions prior to and during the HAC event are as follows:

- The simulated worst-case damage arising from the postulated HAC free and puncture drops were made to the impact limiters. This included reducing the foam thickness to bound the amount of foam lost due to thermal decomposition during the fire event,
- No significant thermal damage is predicted for the RH-TRU 72-B cask body as a result of the free drop events,
- Included credit for the thermal conductance through the wire wrap supporting the thermal shield to maximize the heat flow into the package. This conductance was conservatively ignored for NCT,
- Increased the emissivity of all external surfaces to 0.8 and the solar absorptivity to account for possible oxidation and/or soot accumulation on the surfaces,
- Assumed an initial temperature distribution within the package equivalent to the steady-state conditions with a 100 °F ambient and no insolation.

The RH-TRU 72-B SAR [2] describes the initial conditions and the expected level of damage sustained by the RH-TRU 72-B package from the 10 CFR 71.73 prescribed free and puncture drops. The total gross weight of the loaded NS15 or NS30 shielded canisters is 3,100 lb, or a factor of approximately 2.6 less than the 8,000 lb gross weight for the removable or fixed lid standard payload canisters. As such, the expected level of package damage would be less with an NS15 or NS30 shielded canister payload. Free drop testing of an NS30 shielded canister, which structurally bounds the NS15 shielded canister, in a RH-TRU 72-B surrogate test fixture demonstrated that no significant damage is sustained by the shield insert as a result of the free drop [16]. Therefore, the analytical models of the shielded canisters for NCT condition described in Appendix 7.4.2 are also valid for the HAC evaluation.

5.2 Fire Test Conditions

The fire test conditions analyzed to address the 10 CFR §71.73(c) requirements are as follows:

- The initial ambient conditions are assumed to be 100 °F ambient with no insolation,
- At time = 0, a fully engulfing fire environment consisting of a 1,475 °F ambient with an effective emissivity of 0.9 is used to simulate the average flame temperature of the hydrocarbon fuel/air fire event.

- The convection heat transfer coefficients between the package and the ambient during the 30-minute fire event are based on an average gas velocity of 9 m/sec. Following the 30-minute fire event the convection coefficients are based on still air,
- The ambient condition of 100 °F with insolation is assumed following the 30-minute fire event. A solar absorptivity of 0.8 is assumed for the exterior surfaces to account for potential soot accumulation on the package surfaces.

The transient analysis is continued for 11.5 hours after the end of the 30-minute fire to capture the peak package temperatures. The peak O-ring seal temperatures were determined by extending the transient time period to 24 hours.

5.3 Maximum Temperatures and Pressure

Table 5-1 and Table 5-2 present the predicted maximum temperatures for NS15 and NS30 shielded canister configurations, respectively, under HAC conditions. The results show that all component temperatures remain with allowable limits. The peak temperature of the HDPE shield inserts is seen to remain below the design limit of 256 °F for both configurations. Further, the fact that the canister shell also remains below this temperature level demonstrates that the HDPE temperature limit would not have been exceeded even if direct contact existed between the components. The logic behind this conclusion is as follows: The alternative arrangement of assuming a tight contact between the bases of the insert and canister shell will yield lower transient peak temperatures under HAC conditions for the base of the canister shell since the thermal mass of the HDPE insert would be closely coupled to the canister base and thus help absorb the transient heat flux during the fire event yielding a lower peak canister base temperature than would be achieved with no contact. Therefore, the peak canister temperature achieved under HAC conditions without contact with the HDPE insert will bound that achieved with contact and will also bound the peak HDPE insert temperature achieved with and without contact.

Figure 5-1 illustrates the temperature response of the RH-TRU 72-B packaging with the NS15 canister payload. A similar response is seen with the NS30 canister. The illustrated temperature response is essentially the same as presented in the RH-TRU 72-B SAR [2]. Figure 5-2 and Figure 5-3 illustrate the temperature response of the NS15 and NS30 canister payloads, respectively.

5.4 Maximum Thermal Stresses

The temperature levels and transient response seen for the NS15 and NS30 canisters under HAC conditions are similar to that seen for the base payload for the RH-TRU 72-B packaging. As such, the thermal stresses presented in the RH-TRU 72-B SAR [2] are also applicable to the NS15 and NS30 canisters.

5.5 Evaluation of Package Performance for Hypothetical Accident Conditions of Transport

The combined thermal performance of the NS15 and NS30 shielded RH waste canisters in the RH-TRU 72-B packaging has been evaluated for the applicable HAC conditions of transportation and for a maximum decay heat loading of 50 W within the canisters. The evaluations found that the resulting component temperatures remained within their specified allowable limits for all cases. Further, the computed temperatures for the RH-TRU 72-B packaging components were essentially the same as those predicted in the RH-TRU 72-B SAR [2] for accident conditions. Thus the NS15 and NS30 shielded RH waste canisters will not impact the safety basis of the RH-TRU 72-B packaging.

Table 5-1 - HAC Temperatures for NS15 Shielded Canister

Location / Component	Temperature (°F) [1]			
	End of Fire	Peak	Post-fire Steady-State	Allowable Temperature
Waste Centerline	225	244	244	N/A[2]
NS15 Shield Insert	119	189	138	256
Canister Shell	113	229	130	2,600
IV Shell	151	323	125	800
IV Void Space Bulk Avg	284	406	124	N/A
OC Inner Shell	416	488	123	800
OC Lead Shield	527	544	123	620
OC Outer Shell	605	606	123	800
OC Thermal Shield	1,231	1,231	123	2,600
OC Upper Ring Forging	105	159	123	800
IV O-Ring Seal	103	142	123	360/225[3]
OC O-Ring Seal	107	145	123	360/225[3]
IV Lid	105	159	123	800
OC Lid	106	150	123	800
Impact Limiter Foam	N/A	N/A	N/A	N/A
Impact Limiter Shell	1,427	1,427	131	2,600

Table Note: 1) Temperatures assume a total payload decay heat loading of 50 W.

2) The temperature limit for the waste material is discussed in Appendix 4.6 of the RH-TRU Payload Appendices [2].

3) 360°F is the transient limit during the HAC transient and 225°F is a steady-state limit for post-fire conditions

Table 5-2 - HAC Temperatures for NS30 Shielded Canister

Location / Component	Temperature (°F) [1]			
	End of Fire	Peak	Post-fire Steady-State	Allowable Temperature
Waste Centerline	214	232	232	N/A
NS30 Shield Insert	115	206	135	256
Canister Shell	113	232	129	2,600
IV Shell	151	323	125	800
IV Void Space Bulk Avg	284	406	124	N/A
OC Inner Shell	416	488	123	800
OC Lead Shield	527	544	123	620
OC Outer Shell	605	606	123	800
OC Thermal Shield	1,231	1,231	123	2,600
OC Upper Ring Forging	105	160	123	800
IV O-Ring Seal	107	149	123	360/225[3]
OC O-Ring Seal	104	149	123	360/225[3]
IV Lid	109	160	123	800
OC Lid	107	151	123	800
Impact Limiter Foam	N/A	N/A	N/A	N/A
Impact Limiter Shell	1,427	1,427	131	2,600

Table Note: 1) Temperatures assume a total payload decay heat loading of 50 W.

2) The temperature limit for the waste material is discussed in Appendix 4.6 of the RH-TRU Payload Appendices [2].

3) 360°F is the transient limit during the HAC transient and 225°F is a steady-state limit for post-fire conditions

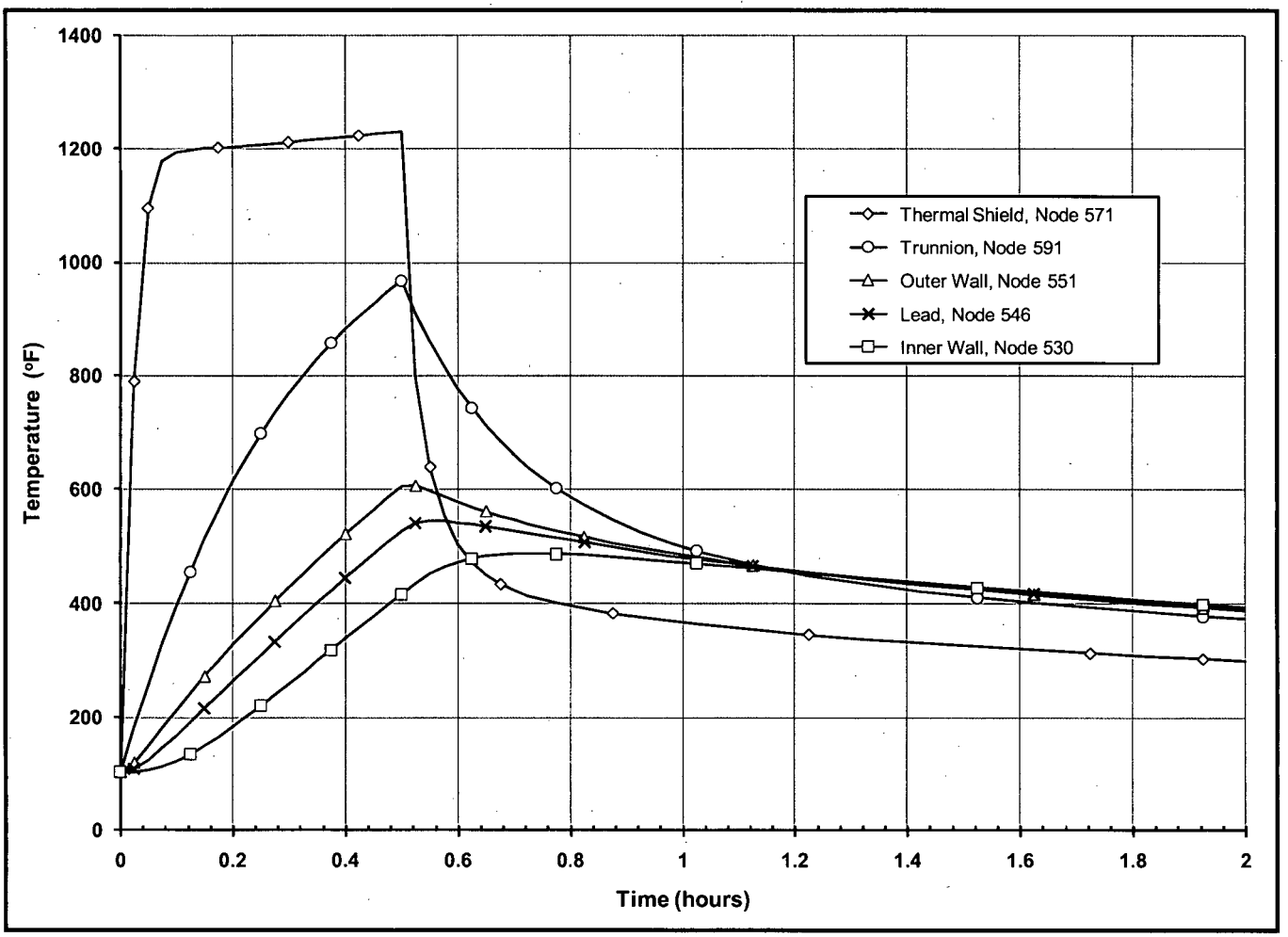

Figure 5-1 - HAC Temperature Response for RH-TRU 72-B Package with NS15 Shielded Canister Payload

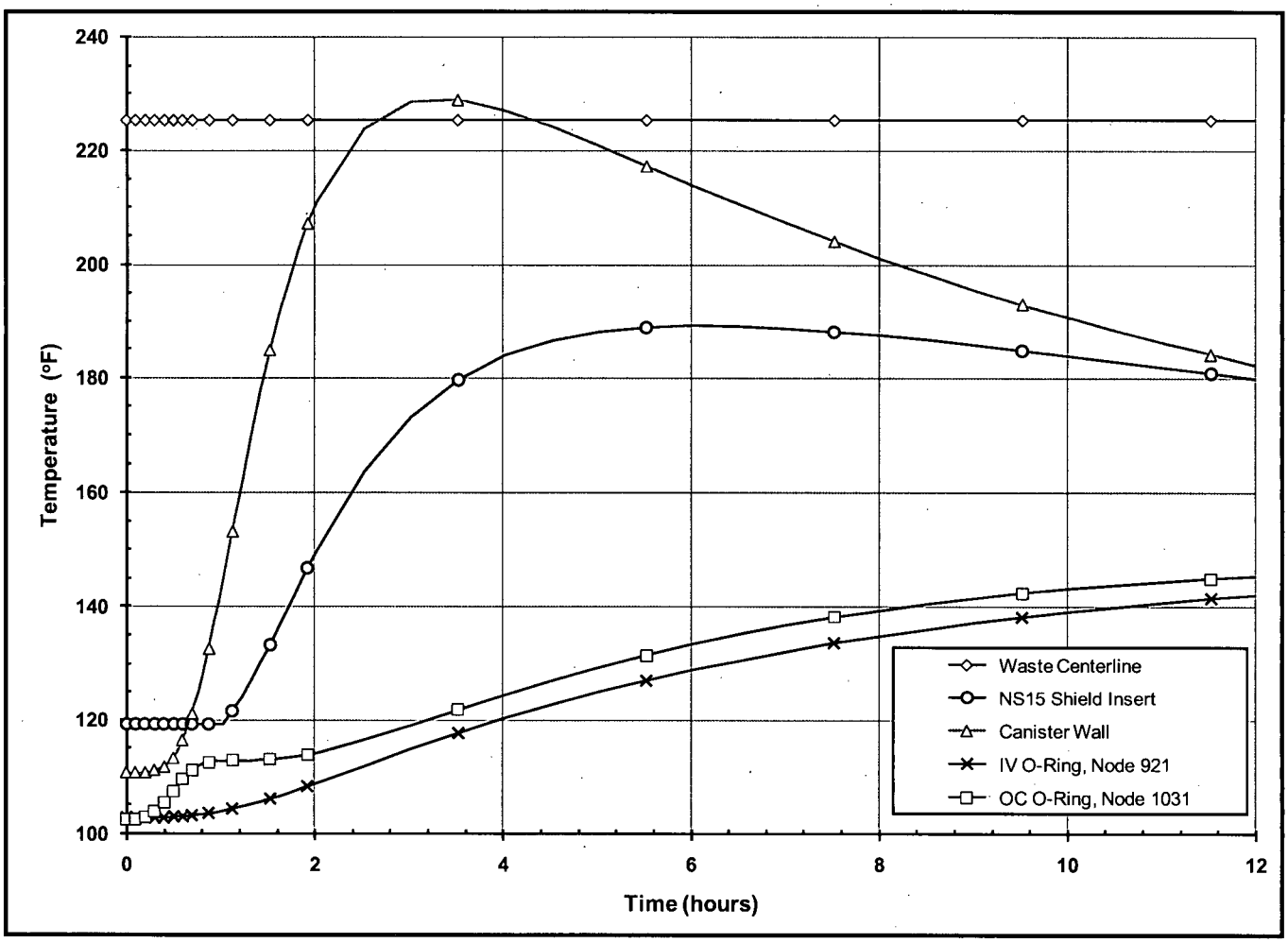

Figure 5-2 - HAC Temperature Response for NS15 Shielded Canister Payload

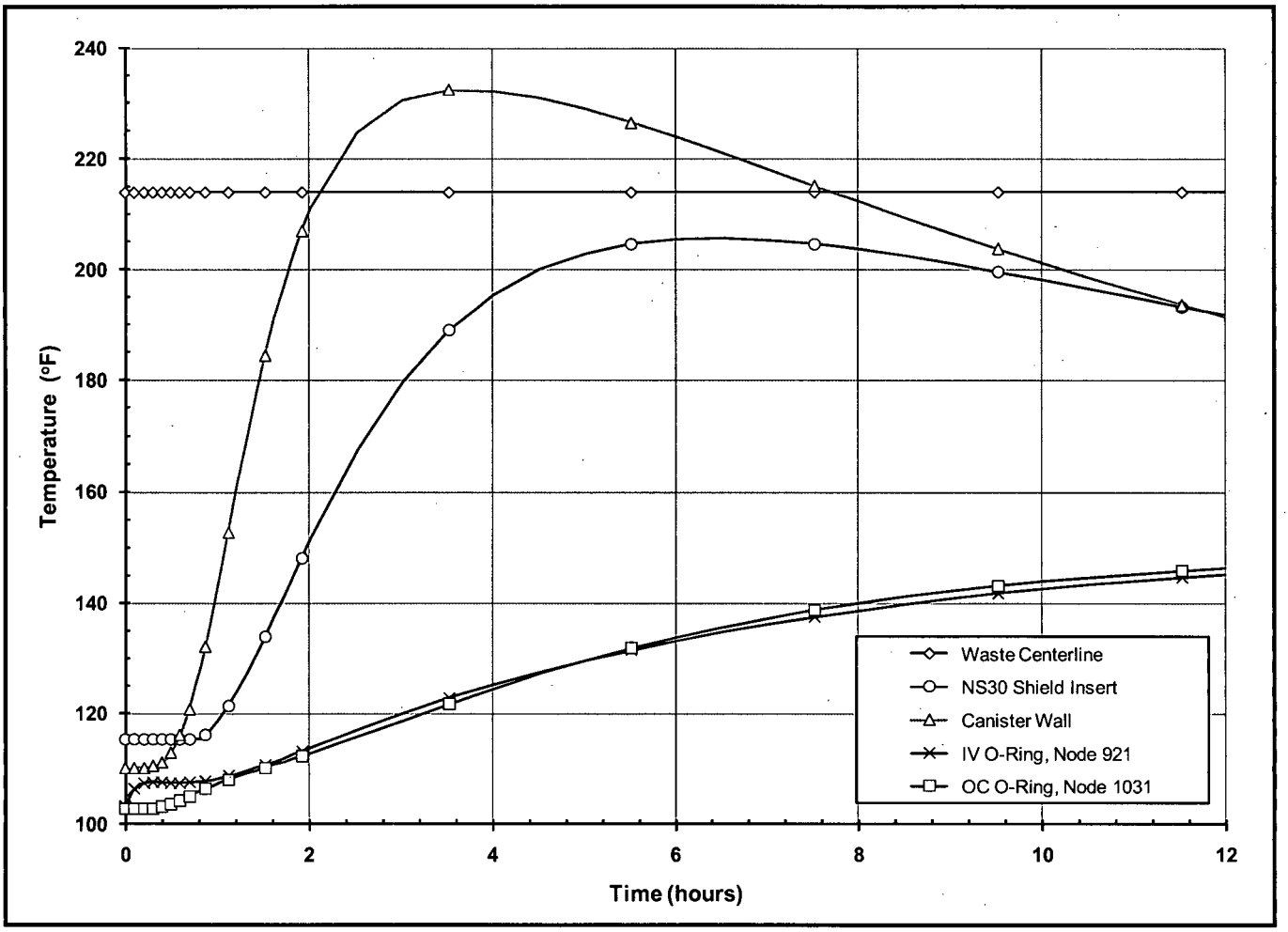

Figure 5-3 - HAC Temperature Response for NS30 Shielded Canister Payload

6.0 Conclusion

The thermal evaluations presented in this calculation demonstrate that both the NS15 and NS30 shielded RH waste canisters with a maximum payload decay heat loading of 50 watts comply with all the thermal acceptance criteria specified in 10 CFR 71[1]. The evaluations were conducted using conservative assumptions and methods. The evaluations included sensitivity analyses for assumed placement of the waste payload within the canister and for centered or eccentric location of the cylindrical shells within one another. The thermal response seen for the RH-TRU 72-B packaging components are seen as being essentially the same as those predicted in the RH-TRU 72-B SAR [2] under both NCT and HAC conditions. As such, the addition of the NS15 and NS30 shielded RH waste canisters as alternative payloads will not impact the safety basis of the RH-TRU 72-B packaging.

7.0 Appendices

7.1 References

1. Title 10, Code of Federal Regulations, Part 71 (10 CFR 71), *Packaging and Transportation of Radioactive Materials*, United States Nuclear Regulatory Commission (USNRC), 01-01-02 Edition.
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17. ASTM D 3350, *Standard Specification for Polyethylene Plastics Pipe and Fittings Materials*, ASTM International, West Conshohocken, PA, 2003, DOI: 10.1520/C0033-03, www.astm.org.
18. American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NB, Class 1 Components, & Subsection NG, Core Support Structures.

7.2 Sample Input File

The input files are too large for inclusion directly into this calculation. Instead, the input and output files are provided on a CDROM.

7.3 Computer Run Record

AREVA	COMPUTER RUN RECORD		
Computer Run Identification	**Verification of Existing RH-TRU 72-B Thermal Models**		
Software Verification	Verified under AFS-EN-PRC-013, Rev. 01		
Analysis Software	Thermal Desktop™ & SINDA/FLUINT™, Version 5.1		
Hardware Description	Pentium M, Windows XP operating system for computer DLT6000		
Disk Storage Description	All files stored on CD-ROM in folder named: **RH-TRU 72-B Verification**		
Disk File Storage	File Description	File Name	Creator
	ASCII Input	RH-TRU_50Watt_NCT.inp RH-TRU_50Watt_HAC.inp RH-TRU_300Watt_NCT.inp RH-TRU_300Watt_HAC.inp frcvv-sqft.f	G Banken
	Binary Database	-none-	G Banken
	ASCII Output	RH-TRU_NCT_50W.out RH-TRU_50W_HAC.out RH-TRU_NCT_300W.out RH-TRU_300Watt_HAC.out	G Banken
	Binary Output	-none-	G Banken
	Spreadsheets	none	
Printed Attachments	Description		

COMPUTER RUN RECORD

Computer Run Identification	**NS15 Shielded Canister**		
Software Verification	Verified under AFS-EN-PRC-013, Rev. 01		
Analysis Software	Thermal Desktop™ & SINDA/FLUINT™, Version 5.1		
Hardware Description	Pentium M, Windows XP operating system for computer DLT6000		
Disk Storage Description	All files stored on CD-ROM in folder named: **NS15 Safety Evaluation**		
Disk File Storage	File Description	File Name	Creator
	ASCII **Input**	RHTRU-NS15_NCT_Bottom_Position.inp/cc RHTRU-NS15_NCT_Middle_Position.inp/cc RHTRU-NS15_NCT_Top_Position.inp/cc RHTRU-NS15_NCT_Eccentric.inp/cc RHTRU-NS15_NCT_NoSolar.inp RHTRU-NS15_HAC.inp RHTRU-NS15_HAC_PostSS.inp RHTRU-NS15_NCT_Bottom_Position.rad RHTRU-NS15_NCT_Middle_Position.rad RHTRU-NS15_NCT_Top_Position.rad RH-TRU Optical Properties.rco RH-TRU Material Properties.tdp RH-TRU_Cask_NCT.dat / RH-TRU_Cask_HAC.dat frcvv-sqft.f	G Banken
	Binary Database	RHTRU-NS15_NCT_Bottom_Position.dwg RHTRU-NS15_NCT_Middle_Position.dwg RHTRU-NS15_NCT_Top_Position.dwg RHTRU-NS15_NCT_Eccentric.dwg	G Banken
	ASCII Output	RHTRU-NS15_NCT_Bottom_Position.out/usr1 RHTRU-NS15_NCT_Middle_Position.out/usr1 RHTRU-NS15_NCT_Top_Position.out/usr1 RHTRU-NS15_NCT_Eccentric.out/usr1 RHTRU-NS15_NCT_NoSolar.out/usr1 RHTRU-NS15_HAC.out/usr1 RHTRU-NS15_HAC_PostSS.out/usr1	G Banken
	Binary Output	RHTRU-NS15_NCT_Bottom_Position.sav RHTRU-NS15_NCT_Middle_Position.sav RHTRU-NS15_NCT_Top_Position.sav RHTRU-NS15_NCT_Eccentric.sav RHTRU-NS15_NCT_NoSolar.sav RHTRU-NS15_HAC.sav RHTRU-NS15_HAC_PostSS.sav	G Banken
	Spreadsheets	RHTRU-72B Shielded Canister Results.xls	

AREVA	COMPUTER RUN RECORD		
Computer Run Identification	**NS30 Shielded Canister**		
Software Verification	Verified under AFS-EN-PRC-013, Rev. 01		
Analysis Software	Thermal Desktop™ & SINDA/FLUINT™, Version 5.1		
Hardware Description	Pentium M, Windows XP operating system for computer DLT6000		
Disk Storage Description	All files stored on CD-ROM in folder named: **NS30 Safety Evaluation**		
Disk File Storage	File Description	File Name	Creator
	ASCII **Input**	RHTRU-NS30_NCT.inp RHTRU-NS30_NCT_NoSolar.inp RHTRU-NS30_HAC.inp RHTRU-NS30_HAC_PostSS.inp RHTRU-NS30.cc RHTRU-NS30.rad RH-TRU Optical Properties.rco RH-TRU Material Properties.tdp RH-TRU_Cask_NCT.dat RH-TRU_Cask_HAC.dat frcvv-sqft.f	G Banken
	Binary Database	RH-TRU NS30 Canister.dwg	G Banken
	ASCII Output	RHTRU-NS30_NCT.out/usr1 RHTRU-NS30_NCT_NoSolar.out/usr1 RHTRU-NS30_HAC.out/usr1 RHTRU-NS30_HAC_PostSS.out/usr1	G Banken
	Binary Output	RHTRU-NS30_NCT.sav RHTRU-NS30_NCT_NoSolar.sav RHTRU-NS30_HAC.sav RHTRU-NS30_HAC_PostSS.sav	G Banken
	Spreadsheets	RHTRU-72B Shielded Canister Results.xls	

7.4 Thermal Model Details

This section presents details of the thermal modeling used to simulate the NS15 and NS30 shielded canisters within the RH-TRU 72-B packaging. The analytical thermal model of the shielded canisters within the RH-TRU 72-B packaging is developed for use with the Thermal Desktop® [12] and SINDA/FLUINT [13] computer programs. These programs work together to provide the functions needed to build, exercise, and post-process a thermal model. The Thermal Desktop® computer program provides graphical input and output display functions, as well as computing the thermal mass, conduction, and radiation exchange conductors for the defined geometry and thermal/optical properties. Thermal Desktop® is designed to run as an application module within the AutoCAD™ design software. As such, all of the CAD tools available for generating geometry within AutoCAD™ can be used for generating a thermal model. In addition, the use of the AutoCAD™ layers tool presents a convenient means of segregating the thermal model into its various elements.

The SINDA/FLUINT computer program is a general purpose code that handles problems defined in finite difference (i.e., lumped parameter) and/or finite element terms and can be used to compute the steady-state and transient behavior of the modeled system. Although the code can be used to solve any physical problem governed by diffusion-type equations, specialized functions used to address the physics of heat transfer and fluid flow make the code primarily a thermal code. The SINDA '85 computer program used to produce the thermal results presented in the RH-TRU 72-B [2] safety analysis report is an early predecessor to Version 5.1 of the SINDA/FLUINT software used for this evaluation.

Together, the Thermal Desktop® and SINDA/FLUINT codes provide the capability to simulate steady-state and transient temperatures using temperature dependent material properties and heat transfer via conduction, convection, and radiation. While complex algorithms may also be programmed into the solution process to, for example, compute heat transfer coefficients as a function of the local conditions, this capability of the code has not been utilized for this evaluation.

The SINDA/FLUINT and Thermal Desktop® computer programs have been validated for safety basis calculations for nuclear related projects [14].

7.4.1 Thermal Model for RH-TRU 72-B Packaging

The analytical thermal model of the RH-TRU 72-B packaging developed for the RH-TRU 72-B SAR [2] is re-used for the purposes of this calculation. The thermal model for NCT provides an axisymmetric, 360° representation of the RH-TRU 72-B cask body and impact limiters, as illustrated in Figure 7-1 to Figure 7-4. The modeling is defined via non-graphical, textual modeling language that defines a lumped-parameter, finite-difference representation of the package. Similar modeling is used for HAC conditions, except for the simulation of the non- axisymmetric effect of the trunnions and the side drop and puncture pin damage. To address these HAC related aspects of the thermal modeling, the thermal modeling for the lead shield, outer vessel, thermal shield, and the impact limiters are extended to three dimensions. Figure 7-5 illustrates the revised thermal modeling for the impact limiters to capture the pre-fire drop damage. Full details of the modeling and the assumptions used in its development are provided in the RH-TRU 72-B SAR. The following bullet items identify the basis of this thermal modeling:

- The thermal analyses are based on coding for the SINDA '85/FLUINT finite difference code

- All internal voids are assumed to be filled with air at one (1) atmosphere
- Solar heat input is based on projected surface area of the package and a solar absorptivity of $\alpha = 0.52$ for NCT and $\alpha = 0.8$ for HAC
- Convective heat transfer from the exterior of the package is based on natural convection for NCT and post-fire HAC conditions and on forced convection during the 30-minute HAC fire. These convection coefficients are determined from the local Nusselt number based on local air temperature (average of the local external surface temperature and the ambient temperature) and the surface area. The Nusselt number is calculated as a function of the Grashof and Prandtl numbers
- External radiation from packaging and impact limiter surfaces is calculated assuming a surface emissivity of $\varepsilon = 0.3$ for NCT and $\varepsilon = 0.8$ for HAC

7.4.2 Thermal Model for NS15 and NS30 Shielded Canisters

The thermal modeling of the NS15 and NS30 shielded canisters and waste payload are developed using the Thermal Desktop® computer program [12] based on the geometry provided by drawing X-106-503-SNP [5]. With the exception of the payload definition and the thickness of the high density polyethylene (HDPE) used for shielding, identical modeling approaches are used for the thermal models for the NS15 and NS30 canister designs. Approximately 1,270 thermal nodes are used to define the NS15 canister design and its enclosed payload, while approximately 1,385 thermal nodes are used for the NS30 canister design. The interface of the graphics based modeling of the NS15 and NS30 shielded canisters with the textual based thermal modeling of the RH-TRU 72-B cask body is provided via a series of shell surfaces illustrated in Figure 7-6 whose location and surface area match precisely the nodal distribution in the text based modeling of the RH-TRU 72-B cask body.

The shell for both shielded payload canister configurations is identical to the unshielded configuration with a 26-in. outside diameter and a ¼-in. thick wall fabricated of painted ASTM A516 carbon steel. Including the lifting pintle at the top of the payload canister, the overall length of the modeled canister is 120½ inches. Given the combination of the relative thinness of the shell, the conductivity of carbon steel, and the relatively low heat flux associated with a 50 W decay heat payload, the shell of the canister is modeled with a single thermal node in the radial direction. Axial thermal resolution is provided with thermal nodes spaced approximately every 5 inches along the shell's length. The lid and base of the canister shell as modeled with one node for the ¼-in. thickness and 5 nodes in the radial direction. The lifting pintle is modeled with solid elements using 30 thermal nodes. The heat transfer between the waste canister shell and the RH-TRU 72-B cask body is modeled as conduction and radiation across the nominal 2.625-in. gap in the same fashion as the thermal modeling defined in the RH-TRU 72-B SAR [2]. The radial gap between the canister and the RH-TRU 72-B inner vessel is mechanically maintained within ½-in. of nominal spacing by the use of spacer rings and support rails. Figure 7-7 illustrates the thermal interface between the waste canister and the inner surfaces of the cask cavity. Heat transfer between the base and lid ends of the canister and the cask inner surfaces is modeled as conduction and radiation across 0.125-in. and 0.5-in. gaps, respectively. The relatively void space associated with the region around the lifting pintle on the canister effectively isolates the top of the canister from the underside of the cask lid.

The HDPE neutron shielding material for the NS15 canister is modeled with a nominal thickness of 3.387-in. and an outer diameter of 24 inches. The top and bottom end caps have a 5-in. thickness. The neutron shielding material for the NS30 canister is modeled with a nominal thickness of 1.454-in. The outer diameter and the

thickness of the top and bottom end caps are the same as that for the NS15 shield insert. Figure 7-8 illustrates the thermal model of the NS15 shield insert in the waste canister. Except for sidewall thickness, the thermal modeling for the NS30 shield insert is similar.

Five thermal nodes are used to model the HDPE wall thickness of the NS15 shield insert and three nodes are used for the NS30 shield insert. The 5-in. node spacing in the axial direction matches that used for the canister shell. The top and bottom end caps are simulated with 9 thermal nodes in the radial direction and 6 nodes across the thickness. Radial heat transfer between the HDPE insert and the canister shell wall is simulated as conduction and radiation across the nominal 0.75-in. gap between the components. The use of a uniform radial gap is appropriate for NCT and HAC evaluations even though the RH-TRU 72-B package is transported horizontally since the increase in the radial gap on one side of the HDPE insert will be offset by a corresponding smaller gap on the opposing side. In addition, ignoring the narrow line contact that will exist for the horizontal package orientation will yield conservative temperature estimates for NCT conditions, while the bounding temperature achieved under HAC conditions can be conservatively estimated by assuming the inner surface reaches a temperature equivalent to that achieved by the outer surface.

Axial heat transfer between the HDPE insert and the base and lid ends of the canister is modeled as conduction and radiation across 0.125-in. and 0.375-in. gaps, respectively. The HDPE insert is conservatively assumed to have shifted forwarded slightly under horizontal transportation from its vertical loading position. This modeling arrangement yields conservative temperatures since the alternative arrangement of assuming a tight contact between the bases of the insert and canister shell will yield lower temperatures under the steady-state NCT conditions for the insert and payload because the thermal resistance would be lower. The alternative arrangement of assuming a tight contact between the bases of the insert and canister shell will also yield lower transient peak temperatures under HAC conditions for the base of the canister shell since the thermal mass of the HDPE insert would be closely coupled to the canister base and thus help absorb the transient heat flux during the fire event. Therefore, the peak canister temperature achieved under HAC conditions without contact with the HDPE insert will bound that achieved with contact and will also bound the peak HDPE insert temperature achieved with and without contact.

The payload for the NS15 canister is assumed to be contained within three (3) approximately 16-gallon containers. Each waste container and its contents are represented by 119 thermal nodes. The containers are assumed to be full of waste whose volumetric heat generation is evenly distributed and whose effective thermal conductivity is equal to that of air. The shell of the containers is simulated as 0.04-in. thick carbon steel.

Three alternative placements of the waste containers within the canister are considered: first, the containers are assumed to be stacked on the bottom of the canister cavity, the second configuration assumes the use of approximately 19.9-in. of dunnage at the bottom of the canister to elevate the top of the uppermost container to near the top of the canister cavity, and the third placement configuration assumes approximately 7.5-in. of dunnage at both the top and bottom of the canister to center the waste containers within the canister. The second placement configuration further assumes the use of slip sheets or some other separator between the containers, while the first and third container arrangement assumes the containers are in close, near physical contact with one another. The dunnage required for these various placement configurations are not specifically modeled, but are assumed to have the thermal conductance of an equivalent airspace. Even containers in near physical contact with one another are assumed to have an approximate airspace of 0.375-in. between their end face surfaces because the

rolled rims and dished ends prevent tighter contact. Figure 7-9 illustrates the bottom and top positioning configurations of the waste containers, while Figure 7-10 illustrates the center positioning scheme.

To assess the effect of eccentric placement within the horizontal cask, a sensitivity evaluation was conducted for the bottom positioning configuration for the waste containers described above. The changes to the thermal modeling for the eccentric placement consisted of reducing the mean gap between the lower half of the horizontally oriented drums, poly insert, and canister and their adjacent component to one half of the gap assumed for the concentric placement of the components. The corresponding mean gap between the upper half of these same components was increased by 50% over that assumed for the concentric placement of the components. The thermal conductance due to the line contact between the components is conservatively ignored. All other aspects of the thermal model remained the same as discussed above.

The modeling approach used for the payload definition for the NS30 canister is similar to that for the N15 canister, except that the waste is assumed to be contained within six (6) approximately 8-gallon containers that, in turn, are housed within three (3) approximately 30-gallon drums. Figure 7-11 illustrates the assumed payload configuration for the NS30 shielded canister configuration. As with the payload definition for the NS15 canister, each waste container is assumed to be full of waste whose volumetric heat generation is evenly distributed and whose effective thermal conductivity is equal to that of air. The shell of the containers is simulated as 0.04-in. thick carbon steel. The shell and the contents are represented by 68 thermal nodes for each container.

The waste containers are assumed to be centered radially within the 30-gallon drums, to be in near contact with one another and the bottom of the drum, and within 0.75-in. of the drum lid. The near contact condition is simulated as a 0.125-in. gap to account for the axial offset provided by the rolled rims on the containers. The drums are assumed to be centered within the HDPE neutron shielding and in near physical contact with one another. Again, the near physical contact is simulated via 0.375-in. airspace because the rolled rims and dished ends prevent tighter contact. The 30-gallon drums are simulated as carbon steel shell elements with a thickness of 0.045-in.

7.5 Verification of Existing RH-TRU 72-B Thermal Models

The modeling approach of using a mixture of lumped-parameter and 'solids' modeling, together with the use of Version 5.1 of the SINDA/FLUINT computer program, was validated as producing similar results for both NCT and HAC codes when running the thermal models developed for the SINDA '85 code. This validation is documented in a scoping evaluation conducted on the NS15 and NS30 shielded insert concepts [15]. Table 7-1 summarizes the comparative results obtained between the original SINDA '85 modeling and that obtained using the modeling approach utilized in this evaluation. As seen, the results are very similar, thus verifying the modeling approach.

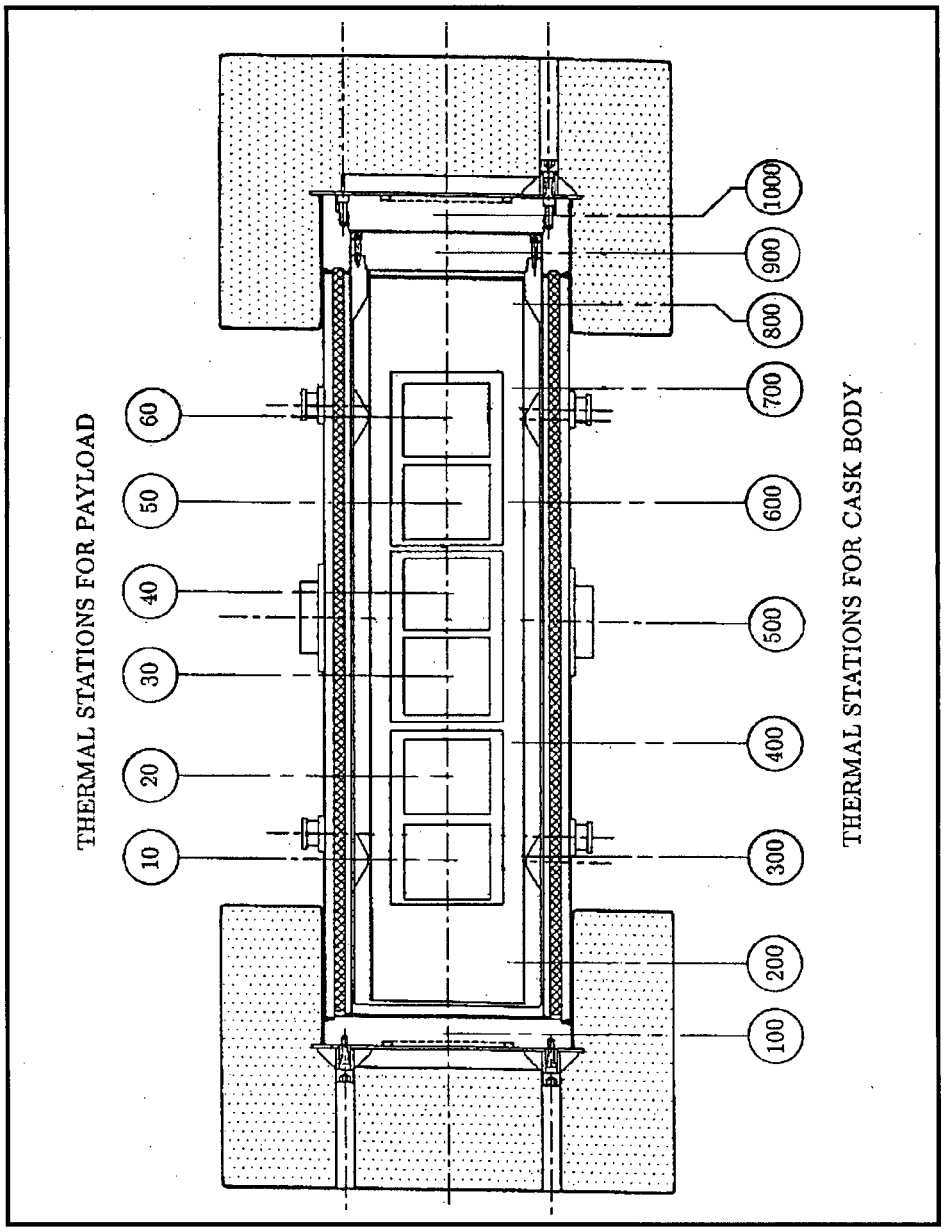

Figure 7-1 - Thermal Model Layout for RH-TRU 72-B Packaging

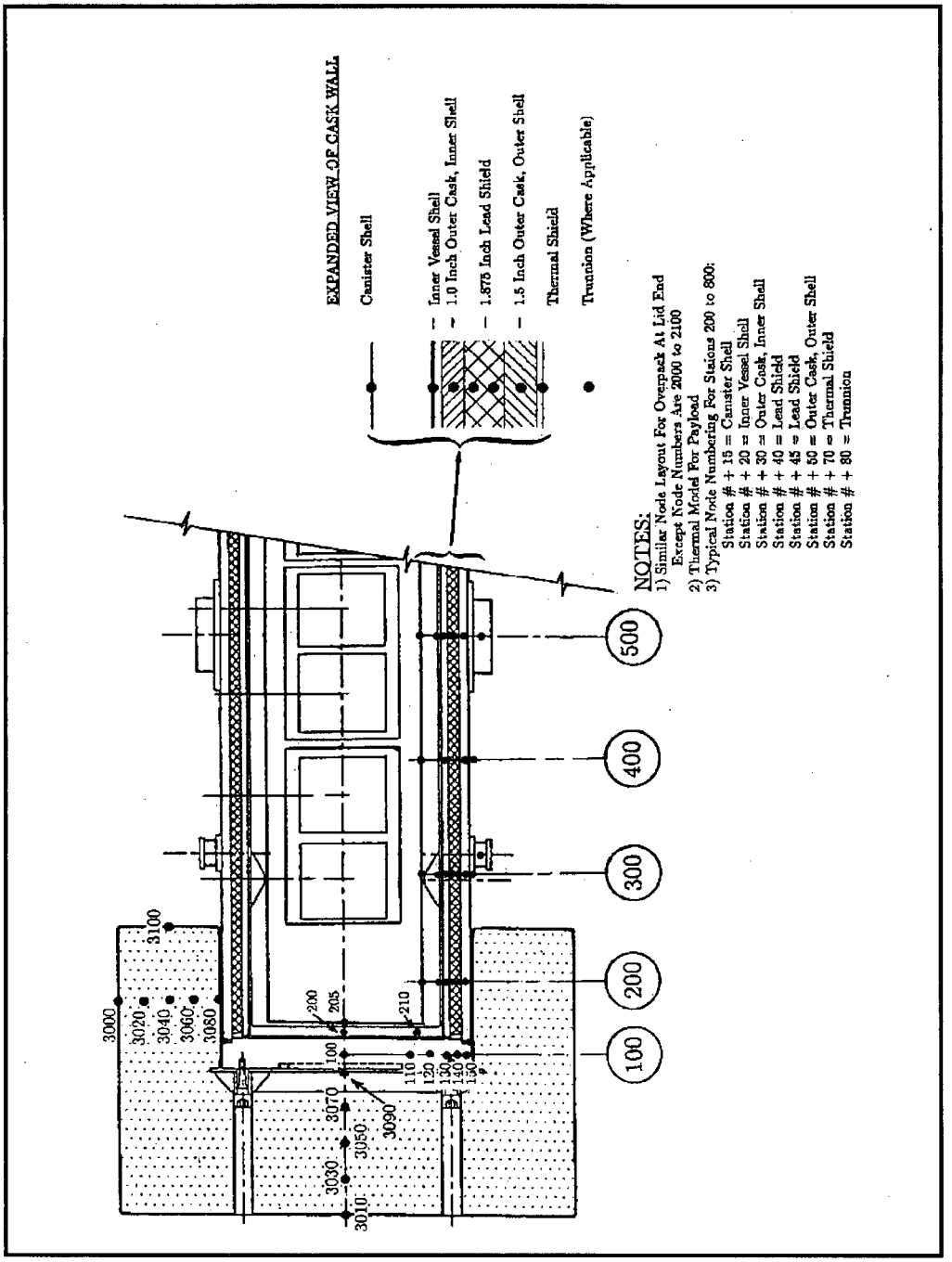

Figure 7-2 - Thermal Node Identification Scheme for Cask Body & Limiters

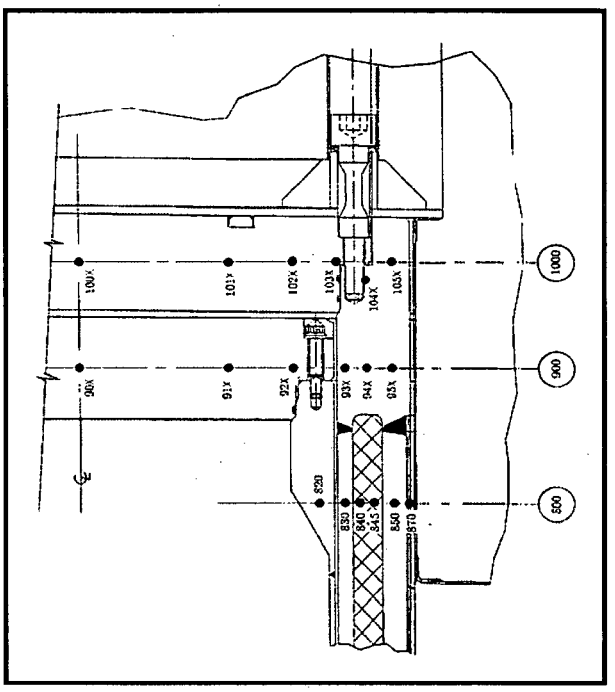

Figure 7-3 - Thermal Node Identification Scheme for Cask Lid End

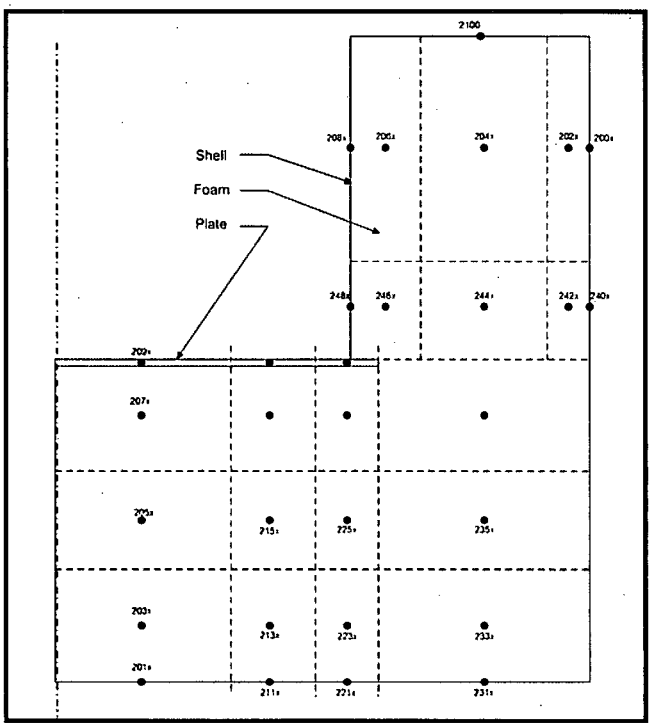

Figure 7-4 - Thermal Node Identification Scheme for Cask Lid End Impact Limiter

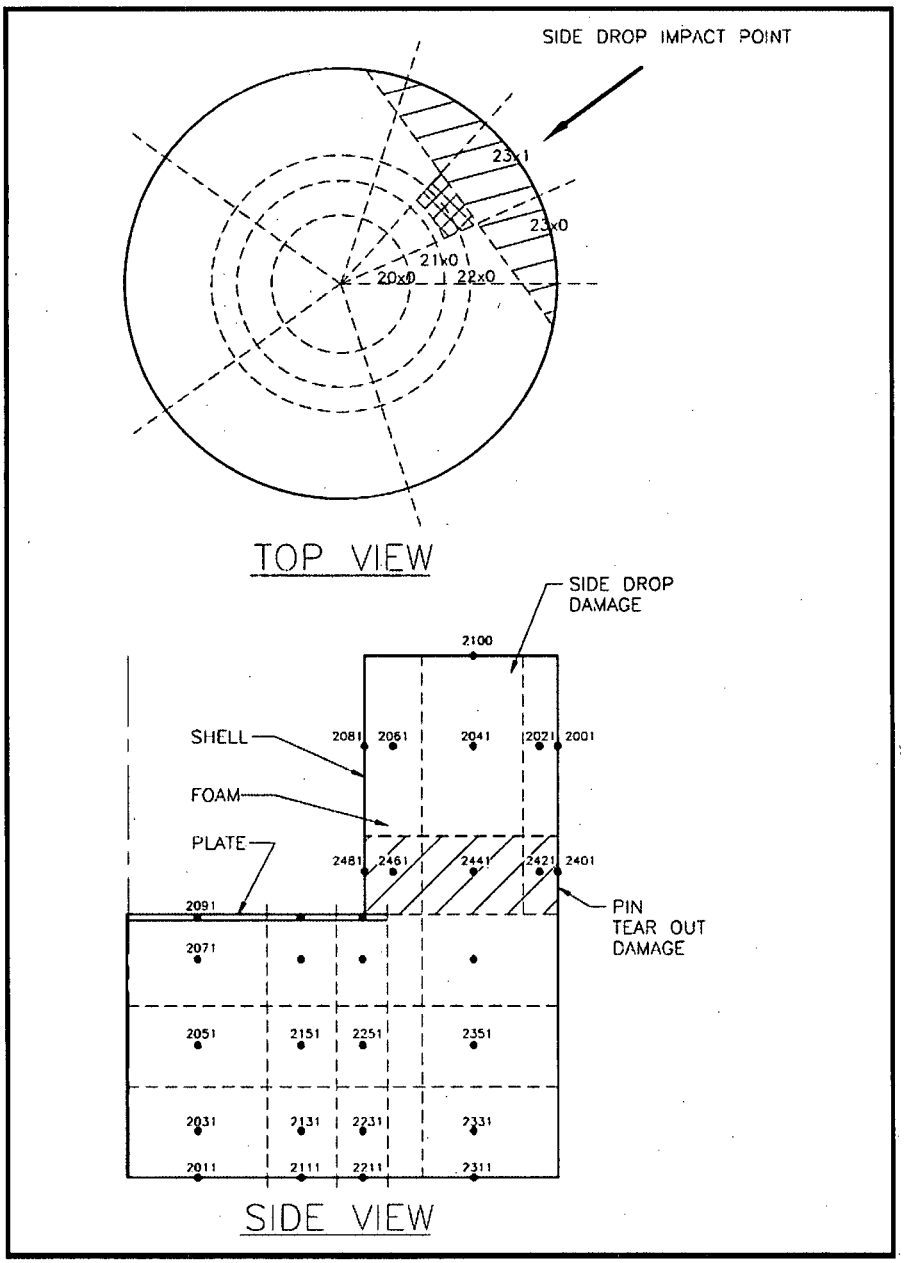

Figure 7-5 - Thermal Node Identification Scheme for Side Drop and Puncture Bar Damage to Impact Limiter

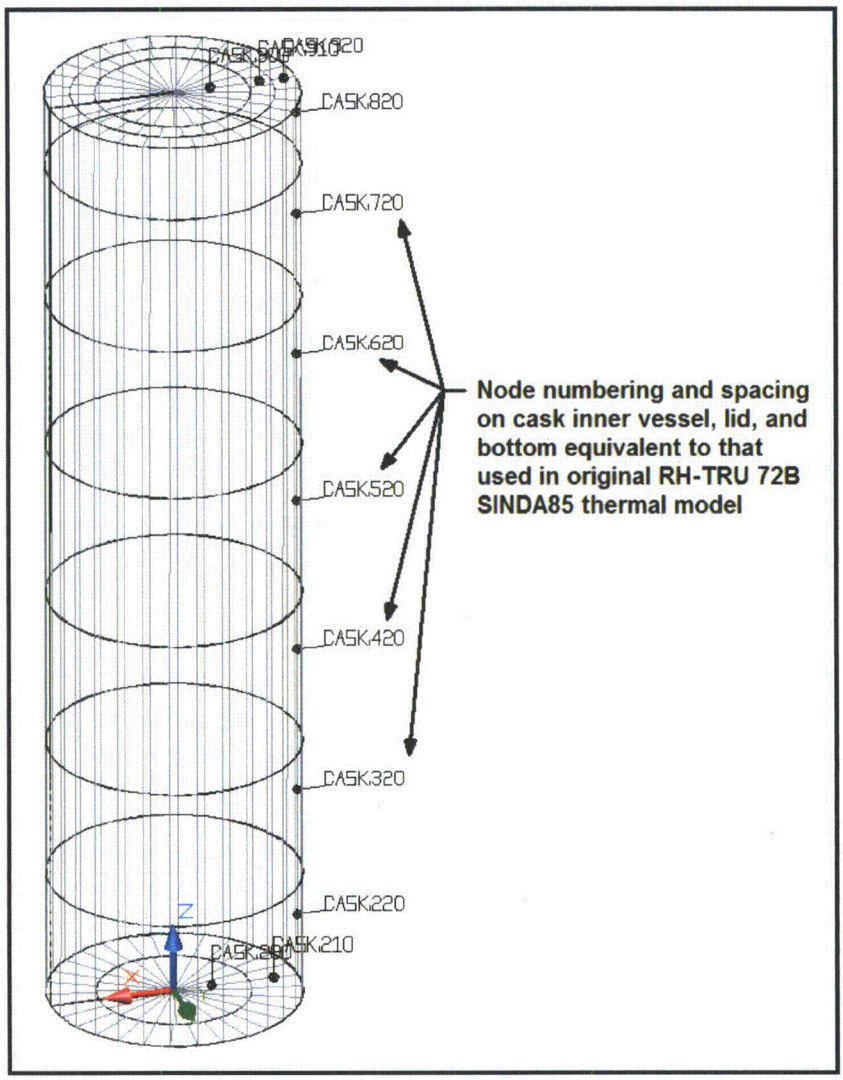

Figure 7-6 - Graphical Representation of RH-TRU 72-B Inner Vessel Sidewall, Base, and Lid Surfaces

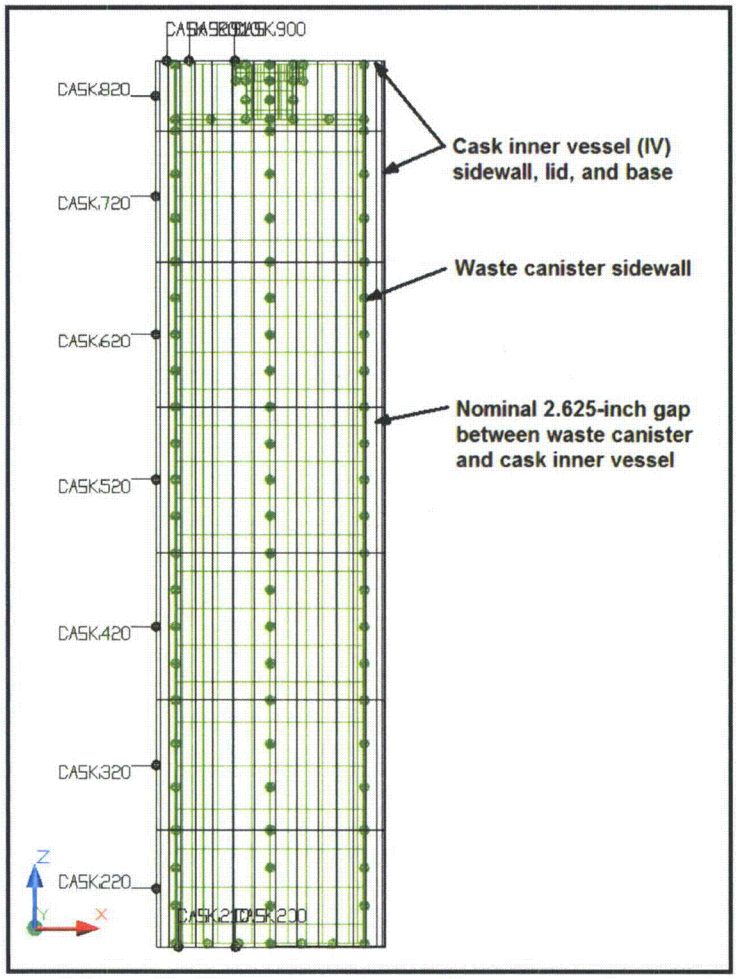

Figure 7-7 - Thermal Interface Scheme between RH-TRU 72-B Cask Model and Waste Canister Model

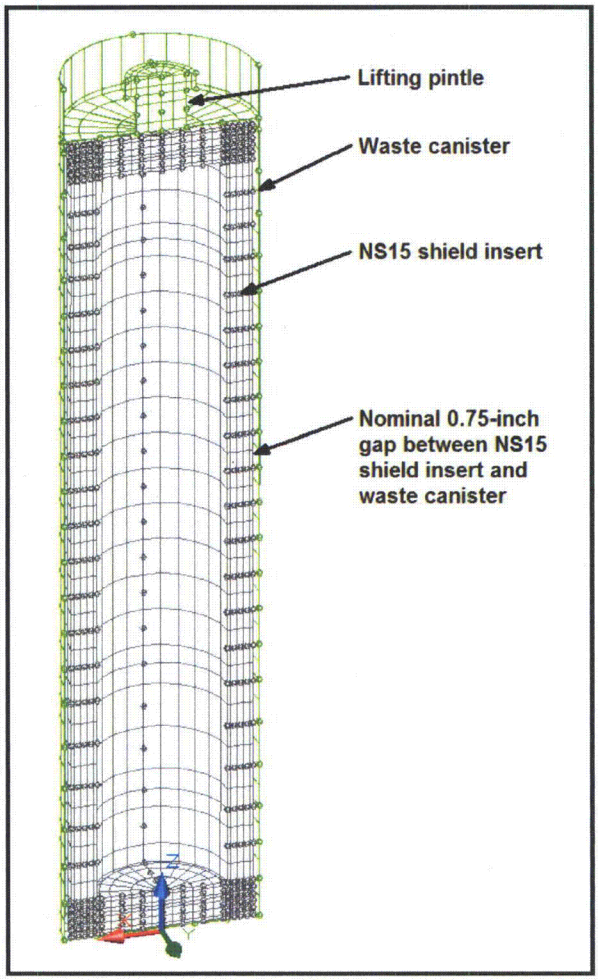

Figure 7-8 - Thermal Model Layout of NS15 Shielded Canister

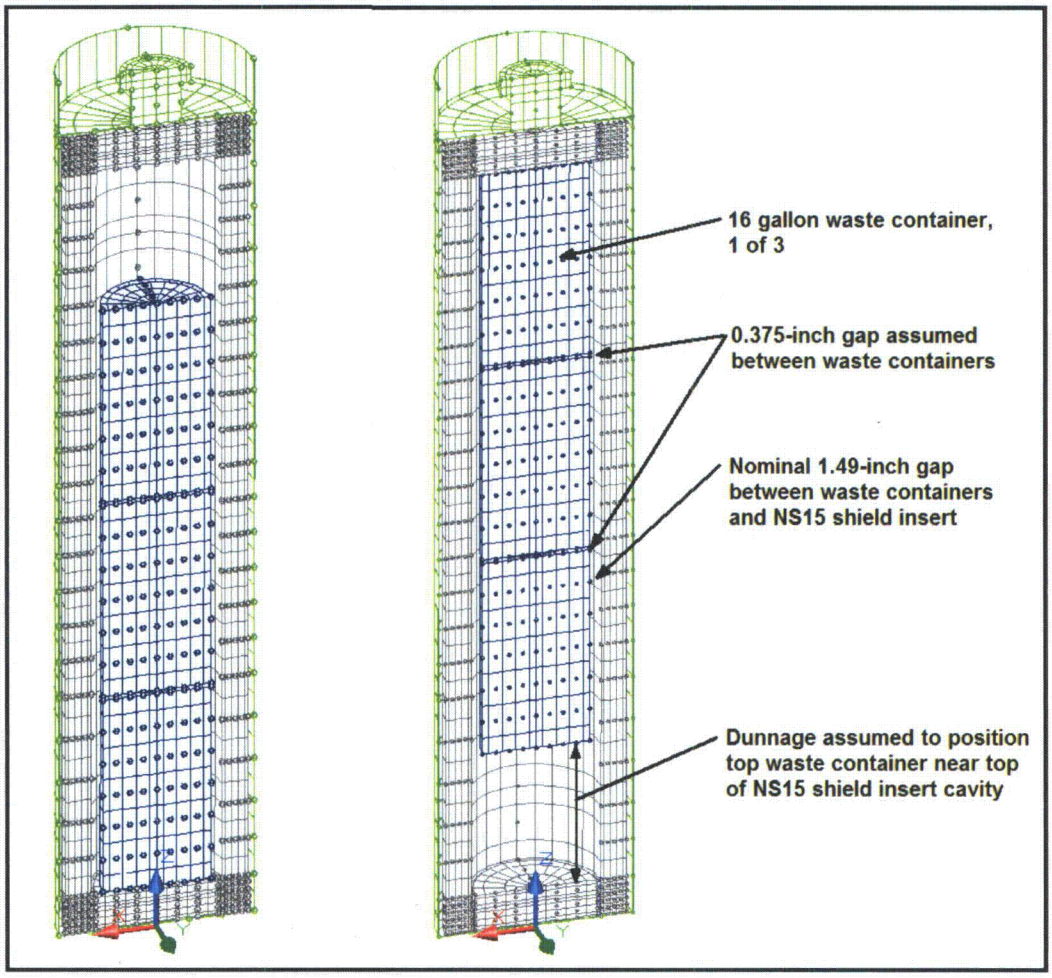

Figure 7-9 - Thermal Modeling of Waste Containers within NS15 Shielded Canister – Bottom and Top Positioning

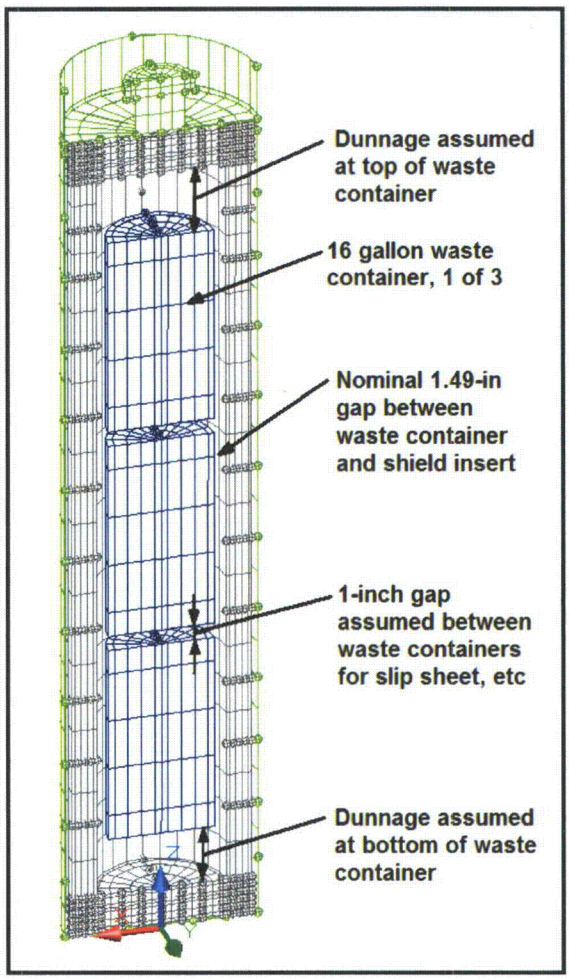

Figure 7-10 - Thermal Model Layout for Middle Positioning of Waste Containers within NS15 Shielded Canister

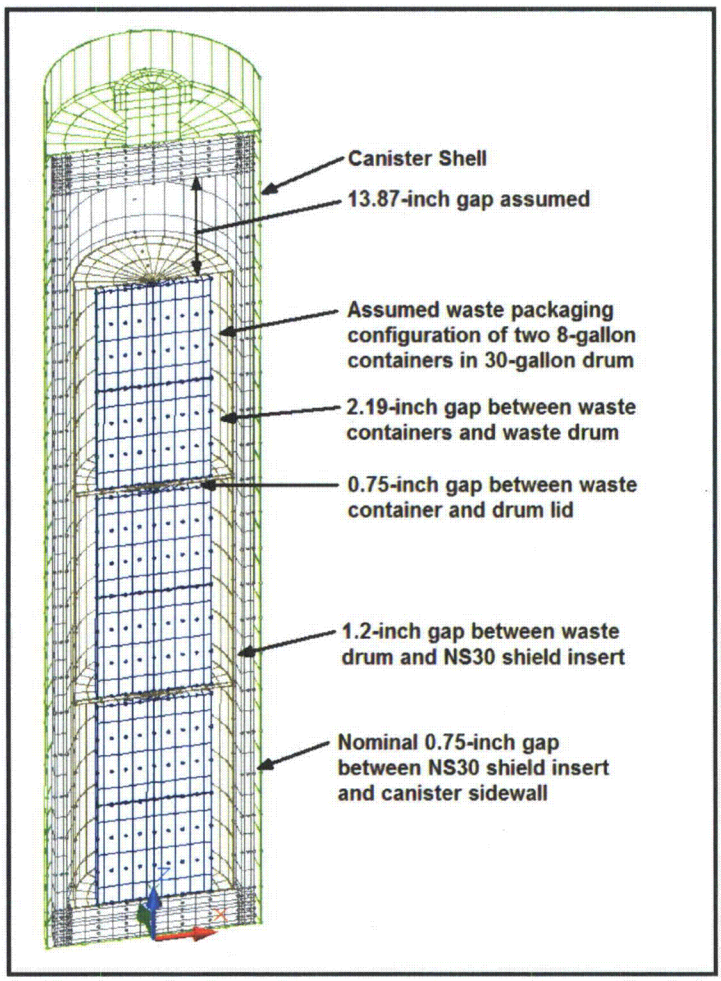

Figure 7-11 - Thermal Model Layout for Nested Waste Containers within NS30 Shielded Canister

Table 7-1 - Comparison of Results for Baseline HAC Thermal Models

Location	50 Watt Payload		300 Watt Payload	
	SAR Results	Re-Run	SAR Results	Re-Run
Waste Centerline	*219°F*	214°F	*196°F*	197°F
Canister Shell	*263°F*	265°F	*247°F*	244°F
IV Inner Shell	*327°F*	328°F	*343°F*	343°F
OC Inner Shell	*488°F*	488°F	*497°F*	497°F
OC Lead Shield	*544°F*	544°F	*554°F*	554°F
OC Outer Shell	*601°F*	602°F	*611°F*	611°F
OC Thermal Shield	*1,232°F*	1,232°F	*1,231°F*	1,226°F
OC Upper Ring Forging	*154°F*	159°F	*166°F*	170°F
IV O-Ring Seal	*150°F*	151°F	*159°F*	160°F
OC O-Ring Seal	*149°F*	150°F	*158°F*	158°F
IV Lid	*148°F*	151°F	*157°F*	160°F
OC Lid	*150°F*	150°F	*159°F*	158°F
Impact Limiter Shell	*1,424°F*	1,427°F	*1,425°F*	1,427°F

7.6 Material Data Sheets

For more information and technical assistance contact:

Performance Pipe, a division of
Chevron Phillips Chemical Company LP
P.O. Box 269006
Plano, TX 75026-9006
800.527.0662

PERFORMANCE PIPE
A Division of Chevron Phillips Chemical Company LP

DriscoPlex®
PE3608 / (PE3408) Pipe
Pipe and Fittings Data Sheet

Typical Material Physical Properties of DriscoPlex® PE3608 / (PE3408)

High Density Polyethylene Materials

Property	Unit	Test Procedure	Typical Value
Material Designation	---	PPI TR-4	PE3608
Cell Classification	---	ASTM D3350	345464C
Pipe Properties			
Density	gms / cm^3	ASTM D1505	0.955 (black)
Melt Index Condition 190 / 2.16	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1600
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	800
Color: UV Stabilizer [C] [E]	---	ASTM D3350	Min 2% carbon Black Color UV Stabilizer
Material Properties			
Flexural Modulus 2% Secant - 16:1 span; depth, 0.5 in / min	psi	ASTM D790	>110,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	3200
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>700
Elastic Modulus	psi	ASTM D638	>150,000
Hardness	Shore D	ASTM D2240	62
PENT	hrs	ASTM F1473	>100
Thermal Properties			
Vicat Softening Temperature	°F	ASTM D1525	256
Brittleness Temperature	°F	ASTM D746	-103
Thermal Expansion	in / in / °F	ASTM D696	1.0×10^{-4}

Bulletin: PP 109 Revision Date September, 2006

Another quality product from
Chevron Phillips Chemical Company LP
The Woodlands, Texas

Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th

(One CD[1] – Document Control Desk)
(One CD[1] – C. Staab)

- Case C, ITOPSIDEBEMOD245.

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  BEBOUND   2  DEN=1.8500                          0.01  293 END

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  H2O       5 DEN=0.9982                          1.0 293 END
  PB      6                                              1.0  293 END
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  CYLINDER  6  1    47.9425   2P154.31
  CYLINDER  4  1    52.07   2P154.31
  CYLINDER  4  1    52.07   187.33    -170.82
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  6012  80.5544  8016  0  94239  4.0118 1 1.0 293 END
  BEBOUND   2  DEN=1.8500                          0.01  293 END

  POLY(H2O) 2 DEN=0.9230                          0.99  293 END
  SS304        4                                          1.0 293 END
  H2O       5 DEN=0.9982                          1.0 293 END
  PB      6                                              1.0  293 END
  END COMPOSITION
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  CYLINDER  4  1    52.07   2P154.31
  CYLINDER  4  1    52.07   187.33    -170.82
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  INFHOMMEDIUM
  ARBMPUHP 0.9652 5 0 0 1 1001  13.5896  4309  1.9133
  6012  80.9151  8016  0  94239  3.582 1 1.0 293 END
  BEBOUND   2  DEN=1.8500                          0.01  293 END

  POLY(H2O) 2 DEN=0.9230                          0.99  293 END
  SS304        4                                          1.0 293 END
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  CYLINDER  6  1    47.9425   2P154.31
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  POLY(H2O) 2 DEN=0.9230                          0.99  293 END
  SS304        4                                          1.0 293 END
  H2O       5 DEN=0.9982                          1.0 293 END
  PB       6                                            1.0  293 END
  END COMPOSITION
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  CYLINDER  6  1    47.9425   2P154.31
  CYLINDER  4  1    52.07   2P154.31
  CYLINDER  4  1    52.07   187.33    -170.82
  CUBOID  5  1    4P72.39   216.54    -200.03
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module csas25   is finished. completion code     0. cpu time used   386.99 (seconds).
module csas25   will be called
  Case C, 6.4-9,99%P/0%W/1%Be/245gPU-TOP-SID;99%P/0%W/1%Be-REFL;H/Pu=1100
  238GROUPNDF5
  INFHOMMEDIUM
  ARBMPUHP 0.9592 5 0 0 1 1001  13.6787  4309  1.9259
  6012  81.4455  8016  0  94239  2.9499 1 1.0 293 END
  BEBOUND   2  DEN=1.8500                          0.01  293 END

  POLY(H2O) 2 DEN=0.9230                          0.99  293 END
  SS304        4                                          1.0 293 END
  H2O       5 DEN=0.9982                          1.0 293 END
  PB       6                                            1.0  293 END
  END COMPOSITION
  Case C, 6.4-9,99%P/0%W/1%Be/245gPU-TOP-SID;99%P/0%W/1%Be-REFL;H/Pu=1100
  READ PARAMETERS  GEN=1000  NPG=1000  NSK=50  TBA=5 END PARAMETERS
  READ GEOMETRY
  UNIT 1
  COM='PU SPHERE'
  SPHERE    1  1     12.7383  ORIGIN  0 0 0
  GLOBAL UNIT 10
  COM='RU-TRU 72-B PACKAGE W/ PU SPHERE'
```

```
CYLINDER  2  1    39.6875   2P154.31
HOLE 1    0.0  26.94   141.57
CYLINDER  4  1    43.18   2P154.31
CYLINDER  6  1    47.9425   2P154.31
CYLINDER  4  1    52.07   2P154.31
CYLINDER  4  1    52.07   187.33    -170.82
CUBOID  5  1    4P72.39   216.54    -200.03
END GEOMETRY
READ BOUNDS
ALL=MIRROR
END BOUNDS
END DATA

secondary module o0o008   has been called.

module o0o008   is finished. completion code     0. cpu time used    13.27 (seconds).

secondary module o0o002   has been called.

module o0o002   is finished. completion code     0. cpu time used    13.26 (seconds).

secondary module o0o009   has been called.

module o0o009   is finished. completion code     0. cpu time used   357.15 (seconds).

module csas25   is finished. completion code     0. cpu time used   387.74 (seconds).

the following data cards precede an = card
```

```
 cccccccccc     sssssssssss     aaaaaaaaa     sssssssssss    22222222222   5555555555555
ccccccccccccc  ssssssssssssss   aaaaaaaaaaa   ssssssssssssss 2222222222222 5555555555555
cc         cc  ss         ss   aa         aa  ss         ss  22        22  55
cc             ss              aa         aa  ss             22        22  55
cc             ss              aa         aa  ss             22        22  55
cc             ssssssssssss    aaaaaaaaaaaaa  ssssssssssss            22   555555555555
cc              ssssssssssss   aaaaaaaaaaaaa   sssssssssss         22     5555555555555
cc                        ss   aa         aa             ss      22                  55
cc                        ss   aa         aa             ss    22                    55
cc         cc  ss         ss   aa         aa  ss         ss  22        55        55
ccccccccccccc  ssssssssssssss   aa         aa  ssssssssssssss 2222222222222 5555555555555
 cccccccccc     sssssssssss    aa         aa   sssssssssss   2222222222222  55555555555


 sssssssssss    cccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                 pppppppppppp    cccccccccc
ssssssssssssss ccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                 pppppppppppppp  ccccccccccccc
ss         ss  cc         cc   aa         aa ll            ee                            pp         pp   cc         cc
ss             cc              aa         aa ll            ee                            pp         pp   cc
ss             cc              aa         aa ll            ee                            pp         pp   cc
ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee     -------------   pppppppppppppp   cc
 ssssssssssss  cc              aaaaaaaaaaaaa ll            eeeeeeeee     -------------   pppppppppppp     cc
           ss  cc              aa         aa ll            ee                            pp               cc
           ss  cc              aa         aa ll            ee                            pp               cc
ss         ss  cc         cc   aa         aa ll            ee                            pp               cc         cc
ssssssssssssss ccccccccccccc   aa         aa llllllllllllll eeeeeeeeeeeee                pp               ccccccccccccc
 sssssssssss    cccccccccc     aa         aa llllllllllllll eeeeeeeeeeeee                pp                cccccccccc


   0000000      666666666666              //  22222222222      0000000                //    0000000      5555555555555
  000000000    6666666666666             //  2222222222222    000000000              //   000000000     5555555555555
 00       00   66                       //   22         22   00       00            //   00       00   55
00         00  66                      //                22  00         00          //   00         00 55
00         00  66                     //                 22  00         00         //   00         00 55
00         00  666666666666          //                22   00         00        //   00         00 555555555555
00         00  6666666666666        //              22      00         00       //   00         00 5555555555555
00         00  66         66       //             22        00         00      //   00         00             55
00         00  66         66      //            22          00         00     //   00         00             55
 00       00   66         66     //            22            00       00     //    00       00   55         55
  000000000    6666666666666   //            2222222222222    000000000    //     000000000    5555555555555
   0000000      66666666666   //             2222222222222     0000000    //       0000000      55555555555


   0000000      666666666666                 33333333333    666666666666                 33333333333    22222222222
  000000000    6666666666666                3333333333333  6666666666666                3333333333333  2222222222222
 00       00   66                  :::     33         33  66                  :::     33         33  22         22
00         00  66                  :::                33  66                  :::                33             22
00         00  66                  :::                33  66                  :::                33             22
00         00  666666666666                         333  666666666666                         333           22
00         00  6666666666666                       333   6666666666666                       333         22
00         00  66         66       :::                33  66         66       :::                33       22
00         00  66         66       :::                33  66         66       :::                33     22
 00       00   66         66       :::     33         33  66         66       :::     33         33   22
  000000000    6666666666666                3333333333333  6666666666666                3333333333333  2222222222222
   0000000      66666666666                 33333333333    66666666666                 33333333333    2222222222222
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   ccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                  pppppppppppppp   ccccccccccccc
ss         ss    cc         cc   aa         aa  ll              ee                             pp         pp    cc         cc
ss               cc              aa         aa  ll              ee                             pp         pp    cc
ss               cc              aa         aa  ll              ee                             pp         pp    cc
ssssssssssss     cc              aaaaaaaaaaaaa  ll              eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss    cc              aaaaaaaaaaaaa  ll              eeeeeeeee       -------------  pppppppppppppp    cc
          ss     cc              aa         aa  ll              ee                             pp               cc
          ss     cc              aa         aa  ll              ee                             pp               cc
ss        ss     cc         cc   aa         aa  ll              ee                             pp               cc         cc
ssssssssssssss   ccccccccccccc   aa         aa  lllllllllllll   eeeeeeeeeeeee                  pp               ccccccccccccc
 sssssssssss      ccccccccccc     aa         aa  lllllllllllll   eeeeeeeeeeeee                  pp                ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:  csas
creation date:  11/18/1999
library:  c:\scale4.4a\bin

production code:  csas
version:  4.4.0
jobname:  scale-pc
machine name:  NFA10385
date of execution:  20_jun_2005
time of execution:  06:36:32.63
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700


**** problem parameters ****

lib 238groupndf5 library
mxx            6 mixtures
msc            6 composition specifications
izm            1 material zones
ge  infhommedium geometry
more           0 0/1 do not read/read optional parameter data
msln           0 fuel solutions


**** problem composition description ****

sc  arbmpuhp     standard composition
mx             1 mixture no.
vf        1.0000 volume fraction
roth      0.9746 specified density
nel            5 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             1001    13.452 wt%
             4309     1.894 wt%
             6012    80.095 wt%
             8016     0.000 wt%
            94239     4.559 wt%
end

sc  bebound      standard composition
mx             2 mixture no.
vf        0.0100 volume fraction
roth      1.8500 specified density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             4309      1.00 atom/molecule
end

sc  poly(h2o)    standard composition
mx             2 mixture no.
vf        0.9900 volume fraction
roth      0.9230 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             6012      1.00 atom/molecule
end

sc  ss304        standard composition
mx             4 mixture no.
vf        1.0000 volume fraction
roth      7.9400 theoretical density
nel            7 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             6012     0.080 wt%
            14000     1.000 wt%
            15031     0.045 wt%
            24304    19.000 wt%
            25055     2.000 wt%
            26304    68.375 wt%
            28304     9.500 wt%
end

sc  h2o          standard composition
mx             5 mixture no.
vf        1.0000 volume fraction
roth      0.9982 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             8016      1.00 atom/molecule
end

sc  pb           standard composition
mx             6 mixture no.
vf        1.0000 volume fraction
roth     11.3440 theoretical density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            82000      1.00 atom/molecule
end


**** problem geometry ****


**** infinite homogeneous medium ****
mfuel          1 mixture no. of the infinite homogeneous medium

mip message number mp-22 follows:
**warning**   standard composition specification card(s) missing
              for mixture number  3
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                                case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700      ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                 ********** data library information **********                          ***
***                                                                                                           ***
***          unit                                                  volume                                     ***
***         number              data set name                       name       unit function                   ***
***         ------              -------------                       ----       -------------                   ***
***                                                                                                           ***
***           89     C:\scale4.4a\data\ft89f001                                standard composition library    ***
***                                                                                                           ***
***           84     C:\scale4.4a\data\ft84f001                                cross section library           ***
***                                                                                                           ***
***           11     C:\scale4.4a\tmpdir\ft11f001                              short cross section library     ***
***                                                                                                           ***
***           90     C:\scale4.4a\tmpdir\ft90f001                              input data direct access        ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                                                                                           ***
***                                     standard composition library data                                     ***
***                                     ---------------------------------                                     ***
***                                                                                                           ***
***           unit number  :  89                                                                              ***
***                                                                                                           ***
***           dataset name :  C:\scale4.4a\data\ft89f001                                                      ***
***                                                                                                           ***
***           library title:  scale-4 standard composition library                                            ***
***                           648 standard compositions, 490 nuclides                                         ***
***                           90 elements with variable isotopic distrbutions.                                ***
***                                                                                                           ***
***           creation date:  11/12/99                                                                        ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                      cross section library data                                           ***
***                                      --------------------------                                           ***
***                                                                                                           ***
***           unit number  :  84                                                                              ***
***                                                                                                           ***
***           dataset name :  C:\scale4.4a\data\ft84f001                                                      ***
***                                                                                                           ***
***           library title:  scale - 238 neutron group library            based on endf-b version 5 data     ***
***                             generated with a chi-1/e-maxwellian weight spectrum                           ***
***                               compiled for doe - 8/18/94          last updated - 5/16/2002                ***
***                                 n.m.greene & l.m.petrie                                                   ***
***                                     nuclear applications & methods analysis - ns&td - ornl                ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************

                        ........    0 io's were used before reading keno v data    ........

                        ........    0 io's were used reading the keno v parameter data    ........

                       *************** data reading completed ***************

                        ........    0 io's were used preparing the keno v input data    ........

                        ........    0 io's were used loading the keno v data    ........

                        ........    0 io's were used loading the data    ........

                        ........    0 io's were used checking the keno v geometry data    ........
                        *****  restart data has been written on unit 95  *****

                        ........    0 io's were used writing the keno v - csas data    ........

                        ........    0 io's were used processing csas input data    ........

control module csas25   is complete.
```

```
 cccccccccc     ssssssssss     aaaaaaaaa     ssssssssss    22222222222   5555555555555
cccccccccccc   ssssssssssss   aaaaaaaaaaa   ssssssssssss  2222222222222  5555555555555
cc         cc  ss         ss  aa         aa  ss         ss  22         22  55
cc             ss             aa         aa  ss             22         22  55
cc             ss             aa         aa  ss             22         22  55
cc             ssssssssssss   aaaaaaaaaaaaa  ssssssssssss           22    555555555555
cc              ssssssssssss  aaaaaaaaaaaaa   ssssssssssss         22     5555555555555
cc                       ss   aa         aa             ss       22                  55
cc                       ss   aa         aa             ss     22                    55
cc         cc  ss         ss  aa         aa  ss         ss   22             55     55
cccccccccccc   ssssssssssss   aa         aa  ssssssssssss  2222222222222  5555555555555
 cccccccccc     ssssssssss    aa         aa   ssssssssss   2222222222222   55555555555
```

```
 ssssssssss     cccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                 pppppppppppp    cccccccccc
ssssssssssss   cccccccccccc   aaaaaaaaaaa   ll            eeeeeeeeeeeee                 pppppppppppppp  cccccccccccc
ss         ss  cc         cc  aa         aa  ll            ee                            pp         pp   cc         cc
ss             cc             aa         aa  ll            ee                            pp         pp   cc
ss             cc             aa         aa  ll            ee                            pp         pp   cc
ssssssssssss   cc             aaaaaaaaaaaaa  ll            eeeeeeeee     -------------   pppppppppppppp   cc
 ssssssssssss  cc             aaaaaaaaaaaaa  ll            eeeeeeeee     -------------   pppppppppppp     cc
          ss   cc             aa         aa  ll            ee                            pp               cc
          ss   cc             aa         aa  ll            ee                            pp               cc
ss         ss  cc         cc  aa         aa  ll            ee                            pp               cc         cc
ssssssssssss   cccccccccccc   aa         aa  llllllllllll  eeeeeeeeeeeee                 pp               cccccccccccc
 ssssssssss     cccccccccc    aa         aa  llllllllllll  eeeeeeeeeeeee                 pp                cccccccccc
```

```
   0000000      666666666666          //  22222222222     0000000              //    0000000     5555555555555
  000000000    6666666666666          //  2222222222222    000000000           //    000000000    5555555555555
 00       00   66                    //   22         22   00       00         //    00       00   55
00         00  66                   //                22  00         00       //    00         00  55
00         00  66                  //                 22  00         00      //    00         00  55
00         00  666666666666       //                22    00         00     //    00         00  555555555555
00         00  6666666666666     //              22      00         00    //    00         00  5555555555555
00         00  66         66    //            22        00         00   //    00         00             55
00         00  66         66   //           22          00         00  //    00         00             55
 00       00   66         66  //            22           00       00 //      00       00   55         55
  000000000    6666666666666 //             2222222222222   000000000 //       000000000    5555555555555
   0000000      66666666666 //              2222222222222    0000000 //         0000000      55555555555
```

```
   0000000      666666666666                        44     22222222222                        44     88888888888
  000000000    6666666666666                       444    2222222222222                      444    8888888888888
 00       00   66                  :::           4444    22         22        :::           4444    88         88
00         00  66                  :::         44 44     22         22        :::         44 44     88         88
00         00  66                  :::        44  44     22         22        :::        44  44     88         88
00         00  666666666666                  44   44               22                  44   44      88888888888
00         00  6666666666666                44    44             22                   44    44      88888888888
00         00  66         66        :::    444444444444         22             :::    444444444444  88         88
00         00  66         66        :::   4444444444444       22               :::   4444444444444  88         88
 00       00   66         66        :::            44       22                 :::            44     88         88
  000000000    6666666666666                        44     2222222222222                      44     8888888888888
   0000000      66666666666                         44     2222222222222                      44      88888888888
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc    aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss   cc         cc    aa         aa  ll             ee                             pp         pp    cc         cc
ss              cc               aa         aa  ll             ee                             pp         pp    cc
ss              cc               aa         aa  ll             ee                             pp         pp    cc
ssssssssssss    cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss   cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppppp    cc
          ss    cc               aa         aa  ll             ee                             pp                cc
          ss    cc               aa         aa  ll             ee                             pp                cc
ss        ss    cc         cc    aa         aa  ll             ee                             pp                cc         cc
ssssssssssssss  cccccccccccccc   aa         aa  lllllllllllll  eeeeeeeeeeeee                  pp                cccccccccccccc
 sssssssssss     ccccccccccc     aa         aa  lllllllllllll  eeeeeeeeeeeee                  pp                 ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                                code system:  scale-pc version:  4.4a                                  *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  csas                                                                           *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  csas                                                                           *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:42:48.07                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

**** problem parameters ****

lib 238groupndf5 library
mxx            6 mixtures
msc            6 composition specifications
izm            1 material zones
ge  infhommedium geometry
more           0 0/1 do not read/read optional parameter data
msln           0 fuel solutions


**** problem composition description ****

sc  arbmpuhp     standard composition
mx             1 mixture no.
vf        1.0000 volume fraction
roth      0.9693 specified density
nel            5 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             1001    13.529 wt%
             4309     1.905 wt%
             6012    80.554 wt%
             8016     0.000 wt%
            94239     4.012 wt%
end

sc  bebound      standard composition
mx             2 mixture no.
vf        0.0100 volume fraction
roth      1.8500 specified density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             4309      1.00 atom/molecule
end

sc  poly(h2o)    standard composition
mx             2 mixture no.
vf        0.9900 volume fraction
roth      0.9230 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             6012      1.00 atom/molecule
end

sc  ss304        standard composition
mx             4 mixture no.
vf        1.0000 volume fraction
roth      7.9400 theoretical density
nel            7 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             6012     0.080 wt%
            14000     1.000 wt%
            15031     0.045 wt%
            24304    19.000 wt%
            25055     2.000 wt%
            26304    68.375 wt%
            28304     9.500 wt%
end

sc  h2o          standard composition
mx             5 mixture no.
vf        1.0000 volume fraction
roth      0.9982 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             8016      1.00 atom/molecule
end

sc  pb           standard composition
mx             6 mixture no.
vf        1.0000 volume fraction
roth     11.3440 theoretical density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            82000      1.00 atom/molecule
end


**** problem geometry ****


**** infinite homogeneous medium ****
mfuel          1 mixture no. of the infinite homogeneous medium

mip message number mp-22 follows:
**warning**   standard composition specification card(s) missing
              for mixture number  3
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                            ********** data library information **********                               ***
***                                                                                                           ***
***        unit                                                    volume                                     ***
***       number              data set name                         name        unit function                ***
***       ------              -------------                         ----        -------------                ***
***                                                                                                           ***
***         89     C:\scale4.4a\data\ft89f001                                  standard composition library  ***
***                                                                                                           ***
***         84     C:\scale4.4a\data\ft84f001                                  cross section library         ***
***                                                                                                           ***
***         11     C:\scale4.4a\tmpdir\ft11f001                                short cross section library   ***
***                                                                                                           ***
***         90     C:\scale4.4a\tmpdir\ft90f001                                input data direct access      ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                                                                                           ***
***                                   standard composition library data                                       ***
***                                   ---------------------------------                                       ***
***                                                                                                           ***
***          unit number  :  89                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft89f001                                                       ***
***                                                                                                           ***
***          library title:  scale-4 standard composition library                                             ***
***                          648 standard compositions, 490 nuclides                                          ***
***                          90 elements with variable isotopic distrbutions.                                 ***
***                                                                                                           ***
***          creation date:  11/12/99                                                                         ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                     cross section library data                                            ***
***                                    ---------------------------                                            ***
***                                                                                                           ***
***          unit number  :  84                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft84f001                                                       ***
***                                                                                                           ***
***          library title:  scale - 238 neutron group library          based on endf-b version 5 data        ***
***                            generated with a chi-1/e-maxwellian weight spectrum                            ***
***                              compiled for doe - 8/18/94          last updated - 5/16/2002                 ***
***                                n.m.greene & l.m.petrie                                                    ***
***                                  nuclear applications & methods analysis - ns&td - ornl                   ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************

                        .......    0 io's were used before reading keno v data    .......

                        .......    0 io's were used reading the keno v parameter data    .......

                       *************** data reading completed ***************

                        .......    0 io's were used preparing the keno v input data    .......

                        .......    0 io's were used loading the keno v data    .......

                        .......    0 io's were used loading the data    .......

                        .......    0 io's were used checking the keno v geometry data    .......
                        *****  restart data has been written on unit 95  *****

                        .......    0 io's were used writing the keno v - csas data    .......

                        .......    0 io's were used processing csas input data    .......

control module csas25   is complete.
```

```
 cccccccccc     sssssssssss     aaaaaaaaa     sssssssssss    22222222222   5555555555555
ccccccccccccc  ssssssssssssss   aaaaaaaaaaa   ssssssssssssss 2222222222222 5555555555555
cc        cc   ss         ss   aa         aa  ss         ss  22         22  55
cc             ss              aa         aa  ss             22         22  55
cc             ss              aa         aa  ss             22         22  55
cc             ssssssssssss    aaaaaaaaaaaaa  ssssssssssssss           22  555555555555
cc              ssssssssssss   aaaaaaaaaaaaa   sssssssssssss         22   5555555555555
cc                      ss     aa         aa              ss       22                55
cc                      ss     aa         aa              ss     22                  55
cc        cc   ss         ss   aa         aa  ss         ss  22         55         55
ccccccccccccc  ssssssssssssss   aa         aa  ssssssssssssss 2222222222222 5555555555555
 cccccccccc     sssssssssss     aa         aa   sssssssssss  2222222222222  55555555555
```

```
 sssssssssss    cccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                  ppppppppppp    cccccccccc
ssssssssssssss ccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                  pppppppppppppp ccccccccccccc
ss         ss  cc         cc  aa         aa ll            ee                             pp         pp  cc         cc
ss             cc             aa         aa ll            ee                             pp         pp  cc
ss             cc             aa         aa ll            ee                             pp         pp  cc
ssssssssssss   cc             aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppppp cc
 ssssssssssss  cc             aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppp   cc
          ss   cc             aa         aa ll            ee                             pp             cc
          ss   cc             aa         aa ll            ee                             pp             cc
ss         ss  cc         cc  aa         aa ll            ee                             pp             cc         cc
ssssssssssssss ccccccccccccc   aa         aa llllllllllllll eeeeeeeeeeeee                 pp             ccccccccccccc
 ssssssssssss   cccccccccccc   aa         aa llllllllllllll eeeeeeeeeeeee                 pp              cccccccccccc
```

```
   0000000      666666666666            //  22222222222     0000000              //    0000000     5555555555555
  000000000    6666666666666            //  2222222222222   000000000            //    000000000   5555555555555
 00       00   66                      //  22          22  00       00           //    00       00 55
00         00 66                      //                22 00         00         //    00         00 55
00         00 66                     //                 22 00         00        //    00         00 55
00         00 666666666666          //                22  00         00       //    00         00 555555555555
00         00 6666666666666        //              22    00         00      //    00         00 5555555555555
00         00 66         66       //            22      00         00     //    00         00             55
00         00 66         66      //          22        00         00    //    00         00             55
 00       00  66         66     //          22          00       00    //      00       00  55         55
  000000000   6666666666666    //           2222222222222   000000000   //      000000000   5555555555555
   0000000     66666666666    //            2222222222222    0000000   //        0000000    55555555555
```

```
   0000000      666666666666                          44    99999999999                    0000000     99999999999
  000000000    6666666666666                         444   9999999999999                  000000000   9999999999999
 00       00   66                  :::             4444   99         99        :::      00       00 99         99
00         00 66                  :::            44 44   99         99        :::     00         00 99         99
00         00 66                  :::           44  44   99         99        :::     00         00 99         99
00         00 666666666666                     44   44   9999999999999                00         00 9999999999999
00         00 6666666666666                   44    44    999999999999                00         00  999999999999
00         00 66         66       :::       444444444444             99        :::     00         00             99
00         00 66         66       :::      4444444444444             99        :::     00         00             99
 00       00  66         66       :::               44               99        :::      00       00              99
  000000000   6666666666666                          44   9999999999999                  000000000   9999999999999
   0000000     66666666666                           44   999999999999                    0000000    999999999999
```

```
 sssssssssss    ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss  cc          cc   aa         aa  ll              ee                              pp         pp    cc          cc
ss             cc               aa         aa  ll              ee                              pp         pp    cc
ss             cc               aa         aa  ll              ee                              pp         pp    cc
ssssssssssss   cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssss  cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppp      cc
          ss   cc               aa         aa  ll              ee                              pp                cc
          ss   cc               aa         aa  ll              ee                              pp                cc
ss        ss   cc          cc   aa         aa  ll              ee                              pp                cc          cc
ssssssssssss   cccccccccccccc   aa         aa  lllllllllllll   eeeeeeeeeeeee                   pp                cccccccccccccc
 sssssssssss    ccccccccccc     aa         aa  lllllllllllll   eeeeeeeeeeeee                   pp                 ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                           *****
*****                                program verification information                                            *****
*****                                                                                                           *****
*****                           code system:  scale-pc version:  4.4a                                           *****
*****                                                                                                           *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                           *****
*****                                                                                                           *****
*****          program:  csas                                                                                   *****
*****                                                                                                           *****
*****     creation date:  11/18/1999                                                                            *****
*****                                                                                                           *****
*****          library:  c:\scale4.4a\bin                                                                       *****
*****                                                                                                           *****
*****                                                                                                           *****
*****   production code:  csas                                                                                  *****
*****                                                                                                           *****
*****          version:  4.4.0                                                                                  *****
*****                                                                                                           *****
*****          jobname:  scale-pc                                                                               *****
*****                                                                                                           *****
*****      machine name:  NFA10385                                                                              *****
*****                                                                                                           *****
*****  date of execution:  20_jun_2005                                                                          *****
*****                                                                                                           *****
*****  time of execution:  06:49:09.15                                                                          *****
*****                                                                                                           *****
*****                                                                                                           *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900


**** problem parameters ****

lib 238groupndf5 library
mxx            6 mixtures
msc            6 composition specifications
izm            1 material zones
ge  infhommedium geometry
more           0 0/1 do not read/read optional parameter data
msln           0 fuel solutions


**** problem composition description ****

sc  arbmpuhp     standard composition
mx             1 mixture no.
vf        1.0000 volume fraction
roth      0.9652 specified density
nel            5 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
            1001    13.590 wt%
            4309     1.913 wt%
            6012    80.915 wt%
            8016     0.000 wt%
           94239     3.582 wt%
end

sc  bebound      standard composition
mx             2 mixture no.
vf        0.0100 volume fraction
roth      1.8500 specified density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            4309      1.00 atom/molecule
end

sc  poly(h2o)    standard composition
mx             2 mixture no.
vf        0.9900 volume fraction
roth      0.9230 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            1001      2.00 atoms/molecule
            6012      1.00 atom/molecule
end

sc  ss304        standard composition
mx             4 mixture no.
vf        1.0000 volume fraction
roth      7.9400 theoretical density
nel            7 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
            6012     0.080 wt%
           14000     1.000 wt%
           15031     0.045 wt%
           24304    19.000 wt%
           25055     2.000 wt%
           26304    68.375 wt%
           28304     9.500 wt%
end

sc  h2o          standard composition
mx             5 mixture no.
vf        1.0000 volume fraction
roth      0.9982 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            1001      2.00 atoms/molecule
            8016      1.00 atom/molecule
end

sc  pb           standard composition
mx             6 mixture no.
vf        1.0000 volume fraction
roth     11.3440 theoretical density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
           82000      1.00 atom/molecule
end


**** problem geometry ****


**** infinite homogeneous medium ****
mfuel          1 mixture no. of the infinite homogeneous medium

mip message number mp-22 follows:
**warning**   standard composition specification card(s) missing
              for mixture number  3
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                            ********** data library information **********                               ***
***                                                                                                           ***
***        unit                                                  volume                                       ***
***       number                data set name                     name        unit function                   ***
***       ------                -------------                     ----        -------------                   ***
***                                                                                                           ***
***         89     C:\scale4.4a\data\ft89f001                                standard composition library    ***
***                                                                                                           ***
***         84     C:\scale4.4a\data\ft84f001                                cross section library           ***
***                                                                                                           ***
***         11     C:\scale4.4a\tmpdir\ft11f001                              short cross section library     ***
***                                                                                                           ***
***         90     C:\scale4.4a\tmpdir\ft90f001                              input data direct access        ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                                                                                           ***
***                                   standard composition library data                                       ***
***                                   ---------------------------------                                       ***
***                                                                                                           ***
***          unit number  :  89                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft89f001                                                       ***
***                                                                                                           ***
***          library title:  scale-4 standard composition library                                             ***
***                          648 standard compositions, 490 nuclides                                          ***
***                          90 elements with variable isotopic distrbutions.                                 ***
***                                                                                                           ***
***          creation date:  11/12/99                                                                         ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                      cross section library data                                           ***
***                                      --------------------------                                           ***
***                                                                                                           ***
***          unit number  :  84                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft84f001                                                       ***
***                                                                                                           ***
***          library title:  scale - 238 neutron group library            based on endf-b version 5 data      ***
***                            generated with a chi-1/e-maxwellian weight spectrum                            ***
***                              compiled for doe - 8/18/94           last updated - 5/16/2002                 ***
***                                n.m.greene & l.m.petrie                                                    ***
***                                  nuclear applications & methods analysis - ns&td - ornl                   ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************

                    ........    0 io's were used before reading keno v data    ........

                    ........    0 io's were used reading the keno v parameter data    ........

                   ************** data reading completed **************

                    ........    0 io's were used preparing the keno v input data    ........

                    ........    0 io's were used loading the keno v data    ........

                    ........    0 io's were used loading the data    ........

                    ........    0 io's were used checking the keno v geometry data    ........
                    *****  restart data has been written on unit 95  *****

                    ........    0 io's were used writing the keno v - csas data    ........

                    ........    0 io's were used processing csas input data    ........

control module csas25   is complete.
```

```
 cccccccccc     sssssssssss      aaaaaaaaa      sssssssssss     22222222222    5555555555555
cccccccccccc   ssssssssssss    aaaaaaaaaaa    ssssssssssss   2222222222222   5555555555555
cc         cc  ss         ss   aa         aa   ss         ss   22         22   55
cc             ss              aa         aa   ss                      22   55
cc             ss              aa         aa   ss                      22   55
cc             sssssssssss     aaaaaaaaaaaa    sssssssssss            22    555555555555
cc              ssssssssssss   aaaaaaaaaaaaa    ssssssssssss         22     5555555555555
cc                        ss   aa         aa             ss       22                 55
cc                        ss   aa         aa             ss     22                   55
cc         cc  ss         ss   aa         aa   ss         ss   22             55    55
cccccccccccc   sssssssssssss   aa         aa   sssssssssssss  2222222222222  5555555555555
 cccccccccc     sssssssssss    aa         aa    sssssssssss   2222222222222    55555555555


 sssssssssss    cccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     cccccccccc
ssssssssssss   cccccccccccc     aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppppp   cccccccccccc
ss         ss  cc         cc   aa         aa   ll             ee                             pp         pp    cc         cc
ss             cc              aa         aa   ll             ee                             pp         pp    cc
ss             cc              aa         aa   ll             ee                             pp         pp    cc
ssssssssssss   cc              aaaaaaaaaaaaa   ll             eeeeeeeee      -------------   pppppppppppppp   cc
 ssssssssssss  cc              aaaaaaaaaaaaa   ll             eeeeeeeee      -------------   pppppppppppppp   cc
          ss   cc              aa         aa   ll             ee                             pp               cc
          ss   cc              aa         aa   ll             ee                             pp               cc
ss        ss   cc         cc   aa         aa   ll             ee                             pp               cc         cc
ssssssssssssss cccccccccccccc  aa         aa   lllllllllllll  eeeeeeeeeeeee                  pp               cccccccccccccc
 ssssssssssss   cccccccccccc   aa         aa   lllllllllllll  eeeeeeeeeeeee                  pp                cccccccccccc


   0000000      666666666666              //   22222222222      0000000                //    0000000      5555555555555
  000000000    6666666666666             //   2222222222222    000000000              //    000000000    5555555555555
 00       00   66                       //   22         22    00       00            //    00       00   55
00         00  66                      //                22   00         00          //    00         00  55
00         00  66                     //                 22   00         00         //    00         00  55
00         00  666666666666          //                22    00         00        //    00         00  555555555555
00         00  6666666666666        //               22      00         00       //    00         00  5555555555555
00         00  66         66       //              22        00         00      //    00         00              55
00         00  66         66      //             22          00         00     //    00         00              55
 00       00   66         66     //            22             00       00    //     00       00   55         55
  000000000    6666666666666   //            2222222222222     000000000   //      000000000    5555555555555
   0000000      66666666666   //             2222222222222      0000000   //        0000000      55555555555


   0000000      666666666666                 5555555555555   5555555555555                    33333333333      0000000
  000000000    6666666666666                 5555555555555   5555555555555                   3333333333333    000000000
 00       00   66                   :::     55              55                   :::       33         33   00       00
00         00  66                   :::     55              55                   :::                33   00         00
00         00  66                   :::     55              55                   :::                33   00         00
00         00  666666666666                 555555555555    555555555555                      333   00         00
00         00  6666666666666                555555555555    555555555555                     333   00         00
00         00  66         66        :::                55              55        :::                33   00         00
00         00  66         66        :::     55         55   55         55        :::       33         33   00         00
 00       00   66         66        :::     555555555555    555555555555                   3333333333333    000000000
  000000000    6666666666666                 55555555555     55555555555                    33333333333      0000000
   0000000      66666666666                  55555555555     55555555555
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssss   cccccccccccc    aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppp   cccccccccccc
ss         ss   cc         cc   aa         aa   ll             ee                             pp         pp   cc         cc
ss              cc              aa         aa   ll             ee                             pp         pp   cc
ss              cc              aa         aa   ll             ee                             pp         pp   cc
ssssssssssss   cc              aaaaaaaaaaaaa   ll             eeeeeeeee       -------------  pppppppppppp   cc
 ssssssssssss   cc              aaaaaaaaaaaaa   ll             eeeeeeeee       -------------  pppppppppppp   cc
           ss   cc              aa         aa   ll             ee                             pp             cc
           ss   cc              aa         aa   ll             ee                             pp             cc
ss         ss   cc         cc   aa         aa   ll             ee                             pp             cc         cc
ssssssssssss   cccccccccccc   aa         aa   lllllllllllll   eeeeeeeeeeeee                  pp             cccccccccccc
 sssssssssss     ccccccccccc    aa         aa   lllllllllllll   eeeeeeeeeeeee                  pp              ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                program verification information                                        *****
*****                                                                                                       *****
*****                             code system:  scale-pc version:  4.4a                                     *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  csas                                                                           *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  csas                                                                           *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:55:30.22                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000


**** problem parameters ****

lib 238groupndf5 library
mxx            6 mixtures
msc            6 composition specifications
izm            1 material zones
ge  infhommedium geometry
more           0 0/1 do not read/read optional parameter data
msln           0 fuel solutions


**** problem composition description ****

sc  arbmpuhp     standard composition
mx             1 mixture no.
vf        1.0000 volume fraction
roth      0.9619 specified density
nel            5 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             1001    13.638 wt%
             4309     1.920 wt%
             6012    81.206 wt%
             8016     0.000 wt%
            94239     3.235 wt%
end

sc  bebound      standard composition
mx             2 mixture no.
vf        0.0100 volume fraction
roth      1.8500 specified density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             4309      1.00 atom/molecule
end

sc  poly(h2o)    standard composition
mx             2 mixture no.
vf        0.9900 volume fraction
roth      0.9230 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             6012      1.00 atom/molecule
end

sc  ss304        standard composition
mx             4 mixture no.
vf        1.0000 volume fraction
roth      7.9400 theoretical density
nel            7 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             6012     0.080 wt%
            14000     1.000 wt%
            15031     0.045 wt%
            24304    19.000 wt%
            25055     2.000 wt%
            26304    68.375 wt%
            28304     9.500 wt%
end

sc  h2o          standard composition
mx             5 mixture no.
vf        1.0000 volume fraction
roth      0.9982 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             8016      1.00 atom/molecule
end

sc  pb           standard composition
mx             6 mixture no.
vf        1.0000 volume fraction
roth     11.3440 theoretical density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            82000      1.00 atom/molecule
end


**** problem geometry ****


**** infinite homogeneous medium ****
mfuel          1 mixture no. of the infinite homogeneous medium

mip message number mp-22 follows:
**warning**   standard composition specification card(s) missing
              for mixture number  3
```

```
*****************************************************************************************************
***                                                                                               ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000 ***
***                                                                                               ***
*****************************************************************************************************
*****************************************************************************************************
***                                                                                               ***
***                          ********** data library information **********                      ***
***                                                                                               ***
***        unit                                                  volume                             ***
***       number              data set name                       name       unit function         ***
***       ------              -------------                       ----       -------------         ***
***                                                                                               ***
***         89     C:\scale4.4a\data\ft89f001                               standard composition library ***
***                                                                                               ***
***         84     C:\scale4.4a\data\ft84f001                               cross section library ***
***                                                                                               ***
***         11     C:\scale4.4a\tmpdir\ft11f001                             short cross section library ***
***                                                                                               ***
***         90     C:\scale4.4a\tmpdir\ft90f001                             input data direct access ***
***                                                                                               ***
*****************************************************************************************************
*****************************************************************************************************
***                                                                                               ***
***                                                                                               ***
***                                  standard composition library data                            ***
***                                  ---------------------------------                            ***
***                                                                                               ***
***          unit number  :  89                                                                   ***
***                                                                                               ***
***          dataset name :  C:\scale4.4a\data\ft89f001                                           ***
***                                                                                               ***
***          library title:  scale-4 standard composition library                                 ***
***                          648 standard compositions, 490 nuclides                              ***
***                          90 elements with variable isotopic distrbutions.                     ***
***                                                                                               ***
***          creation date:  11/12/99                                                             ***
***                                                                                               ***
***                                                                                               ***
***                                                                                               ***
***                                   cross section library data                                  ***
***                                   --------------------------                                  ***
***                                                                                               ***
***          unit number  :  84                                                                   ***
***                                                                                               ***
***          dataset name :  C:\scale4.4a\data\ft84f001                                           ***
***                                                                                               ***
***          library title:  scale - 238 neutron group library          based on endf-b version 5 data ***
***                           generated with a chi-1/e-maxwellian weight spectrum                 ***
***                             compiled for doe - 8/18/94          last updated - 5/16/2002      ***
***                               n.m.greene & l.m.petrie                                         ***
***                                 nuclear applications & methods analysis - ns&td - ornl        ***
***                                                                                               ***
***                                                                                               ***
***                                                                                               ***
***                                                                                               ***
*****************************************************************************************************
*****************************************************************************************************

                    ........    0 io's were used before reading keno v data    ........

                    ........    0 io's were used reading the keno v parameter data    ........

                   ************** data reading completed **************

                    ........    0 io's were used preparing the keno v input data    ........

                    ........    0 io's were used loading the keno v data    ........

                    ........    0 io's were used loading the data    ........

                    ........    0 io's were used checking the keno v geometry data    ........
                    *****  restart data has been written on unit 95  *****

                    ........    0 io's were used writing the keno v - csas data    ........

                    ........    0 io's were used processing csas input data    ........

control module csas25   is complete.
```

```
 cccccccccc     ssssssssss     aaaaaaaaa     ssssssssss    22222222222   5555555555555
cccccccccccc   ssssssssssss   aaaaaaaaaa   ssssssssssss  2222222222222  5555555555555
cc        cc   ss        ss   aa        aa   ss        ss  22        22   55
cc             ss             aa        aa   ss                 22      55
cc             ss             aa        aa   ss                 22      55
cc             ssssssssssss   aaaaaaaaaaaa   ssssssssssss          22   555555555555
cc              ssssssssssss  aaaaaaaaaaaa    ssssssssssss       22      5555555555555
cc                       ss   aa        aa             ss     22                 55
cc                       ss   aa        aa             ss   22                   55
cc        cc   ss        ss   aa        aa   ss        ss  22        55       55
cccccccccccc   ssssssssssss   aa        aa   ssssssssssss  2222222222222  5555555555555
 cccccccccc     ssssssssss    aa        aa    ssssssssss   2222222222222   55555555555
```

```
 ssssssssss     cccccccccc     aaaaaaaaa     ll            eeeeeeeeeeee                  pppppppppppp    cccccccccc
ssssssssssss   cccccccccccc   aaaaaaaaaa    ll            eeeeeeeeeeee                  pppppppppppppp  cccccccccccc
ss        ss   cc        cc   aa        aa   ll            ee                            pp        pp    cc        cc
ss             cc             aa        aa   ll            ee                            pp        pp    cc
ss             cc             aa        aa   ll            ee                            pp        pp    cc
ssssssssssss   cc             aaaaaaaaaaaa   ll            eeeeeeeee     -------------   pppppppppppppp  cc
 ssssssssssss  cc             aaaaaaaaaaaa   ll            eeeeeeeee     -------------   pppppppppppp    cc
          ss   cc             aa        aa   ll            ee                            pp              cc
          ss   cc             aa        aa   ll            ee                            pp              cc
ss        ss   cc        cc   aa        aa   ll            ee                            pp              cc        cc
ssssssssssss   cccccccccccc   aa        aa   llllllllllll  eeeeeeeeeeee                  pp              cccccccccccc
 ssssssssss     cccccccccc    aa        aa   llllllllllll  eeeeeeeeeeee                  pp               cccccccccc
```

```
   0000000      666666666666        //   22222222222      0000000                //    0000000      5555555555555
  000000000    6666666666666        //  2222222222222    000000000               //   000000000     5555555555555
 00       00   66                  //   22        22   00       00             //   00       00    55
00         00 66                  //                22 00         00           //  00         00  55
00         00 66                 //                 22 00         00          //  00         00  55
00         00 666666666666      //                22  00         00         //  00         00  555555555555
00         00 6666666666666    //              22    00         00        //  00         00  5555555555555
00         00 66         66   //            22      00         00       //  00         00             55
00         00 66         66  //           22        00         00      //  00         00             55
 00       00  66         66 //          22          00       00      //   00       00    55         55
  000000000   6666666666666//          2222222222222   000000000     //    000000000    5555555555555
   0000000     66666666666//           2222222222222    0000000     //      0000000     55555555555
```

```
   0000000     7777777777777                  0000000          11                    5555555555555  7777777777777
  000000000    777777777777                  000000000        111                    5555555555555  777777777777
 00       00   77        77        :::      00       00      1111          :::       55             77        77
00         00          77          :::     00         00      11          :::       55                     77
00         00         77           :::     00         00      11          :::       55                    77
00         00        77                     00         00      11                    555555555555          77
00         00        77                     00         00      11                    5555555555555         77
00         00       77           :::       00         00      11          :::                 55        77
00         00       77           :::       00         00      11          :::                 55        77
 00       00       77           :::        00       00       11          :::       55        55       77
  000000000        77                       000000000      11111111                5555555555555       77
   0000000         77                        0000000       11111111                 55555555555        77
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll            eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa    ll            eeeeeeeeeeeee                  pppppppppppppp  cccccccccccccc
ss         ss   cc         cc   aa         aa   ll            ee                             pp        pp    cc         cc
ss              cc              aa         aa   ll            ee                             pp        pp    cc
ss              cc              aa         aa   ll            ee                             pp        pp    cc
ssssssssssss    cc              aaaaaaaaaaaaa   ll            eeeeeeeee       -------------  pppppppppppppp  cc
 ssssssssssss   cc              aaaaaaaaaaaaa   ll            eeeeeeeee       -------------  pppppppppppppp  cc
          ss    cc              aa         aa   ll            ee                             pp              cc
          ss    cc              aa         aa   ll            ee                             pp              cc
ss        ss    cc         cc   aa         aa   ll            ee                             pp              cc         cc
ssssssssssssss  cccccccccccccc   aa         aa   llllllllllll  eeeeeeeeeeeee                  pp              cccccccccccccc
 sssssssssss     ccccccccccc     aa         aa   llllllllllll  eeeeeeeeeeeee                  pp               ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  csas                                                                           *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  csas                                                                           *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  07:01:57.18                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100


**** problem parameters ****

lib 238groupndf5 library
mxx            6 mixtures
msc            6 composition specifications
izm            1 material zones
ge  infhommedium geometry
more           0 0/1 do not read/read optional parameter data
msln           0 fuel solutions


**** problem composition description ****

sc  arbmpuhp     standard composition
mx             1 mixture no.
vf        1.0000 volume fraction
roth      0.9592 specified density
nel            5 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             1001    13.679 wt%
             4309     1.926 wt%
             6012    81.446 wt%
             8016     0.000 wt%
            94239     2.950 wt%
end

sc  bebound      standard composition
mx             2 mixture no.
vf        0.0100 volume fraction
roth      1.8500 specified density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             4309      1.00 atom/molecule
end

sc  poly(h2o)    standard composition
mx             2 mixture no.
vf        0.9900 volume fraction
roth      0.9230 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             6012      1.00 atom/molecule
end

sc  ss304        standard composition
mx             4 mixture no.
vf        1.0000 volume fraction
roth      7.9400 theoretical density
nel            7 no. elements
icp            0 0/1 mixture/compound
temp       293.0 deg kelvin
             6012     0.080 wt%
            14000     1.000 wt%
            15031     0.045 wt%
            24304    19.000 wt%
            25055     2.000 wt%
            26304    68.375 wt%
            28304     9.500 wt%
end

sc  h2o          standard composition
mx             5 mixture no.
vf        1.0000 volume fraction
roth      0.9982 specified density
nel            2 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
             1001      2.00 atoms/molecule
             8016      1.00 atom/molecule
end

sc  pb           standard composition
mx             6 mixture no.
vf        1.0000 volume fraction
roth     11.3440 theoretical density
nel            1 no. elements
icp            1 0/1 mixture/compound
temp       293.0 deg kelvin
            82000      1.00 atom/molecule
end


**** problem geometry ****


**** infinite homogeneous medium ****
mfuel          1 mixture no. of the infinite homogeneous medium

mip message number mp-22 follows:
**warning**   standard composition specification card(s) missing
              for mixture number  3
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100          ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                          ********** data library information **********                                 ***
***                                                                                                           ***
***        unit                                                  volume                                       ***
***       number              data set name                       name        unit function                   ***
***       ------              -------------                       ----        -------------                   ***
***                                                                                                           ***
***         89     C:\scale4.4a\data\ft89f001                                standard composition library    ***
***                                                                                                           ***
***         84     C:\scale4.4a\data\ft84f001                                cross section library           ***
***                                                                                                           ***
***         11     C:\scale4.4a\tmpdir\ft11f001                              short cross section library     ***
***                                                                                                           ***
***         90     C:\scale4.4a\tmpdir\ft90f001                              input data direct access        ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                                                                                           ***
***                                  standard composition library data                                        ***
***                                  ---------------------------------                                        ***
***                                                                                                           ***
***          unit number  :  89                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft89f001                                                       ***
***                                                                                                           ***
***          library title:  scale-4 standard composition library                                             ***
***                          648 standard compositions, 490 nuclides                                          ***
***                          90 elements with variable isotopic distrbutions.                                 ***
***                                                                                                           ***
***          creation date:  11/12/99                                                                         ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                     cross section library data                                            ***
***                                    ---------------------------                                            ***
***                                                                                                           ***
***          unit number  :  84                                                                               ***
***                                                                                                           ***
***          dataset name :  C:\scale4.4a\data\ft84f001                                                       ***
***                                                                                                           ***
***          library title:  scale - 238 neutron group library          based on endf-b version 5 data        ***
***                            generated with a chi-1/e-maxwellian weight spectrum                            ***
***                              compiled for doe - 8/18/94          last updated - 5/16/2002                 ***
***                                n.m.greene & l.m.petrie                                                    ***
***                                  nuclear applications & methods analysis - ns&td - ornl                   ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************

                    ........    0 io's were used before reading keno v data    ........

                    ........    0 io's were used reading the keno v parameter data    ........

                   *************** data reading completed ***************

                    ........    0 io's were used preparing the keno v input data    ........

                    ........    0 io's were used loading the keno v data    ........

                    ........    0 io's were used loading the data    ........

                    ........    0 io's were used checking the keno v geometry data    ........
                    *****  restart data has been written on unit 95  *****

                    ........    0 io's were used writing the keno v - csas data    ........

                    ........    0 io's were used processing csas input data    ........

control module csas25   is complete.
```

```
bbbbbbbbbbbb     oooooooooooo    nn          nn                    aaaaaaaaaa     mm           mm  iiiiiiiiiiii     22222222222
bbbbbbbbbbbbb    oooooooooooooo  nnn         nn                   aaaaaaaaaaaa    mmm         mmm  iiiiiiiiiiii    2222222222222
bb         bb    oo          oo  nnnn        nn                  aa         aa   mmmm       mmmm      ii          22          22
bb         bb    oo          oo  nn nn       nn                  aa         aa   mm mm     mm mm      ii                      22
bb         bb    oo          oo  nn   nn     nn                  aa         aa   mm   mm mm   mm      ii                      22
bbbbbbbbbbbbb    oo          oo  nn    nn    nn  -------------   aaaaaaaaaaaaa   mm    mmm    mm      ii                 22
bbbbbbbbbbbbb    oo          oo  nn     nn   nn  -------------   aaaaaaaaaaaaa   mm     m     mm      ii              22
bb         bb    oo          oo  nn      nn  nn                  aa         aa   mm           mm      ii           22
bb         bb    oo          oo  nn       nn nn                  aa         aa   mm           mm      ii        22
bb         bb    oo          oo  nn        nnnn                  aa         aa   mm           mm      ii     22
bbbbbbbbbbbbb    oooooooooooooo  nn         nnn                  aa         aa   mm           mm  iiiiiiiiiiii    2222222222222
bbbbbbbbbbbb     oooooooooooo    nn          nn                  aa         aa   mm           mm  iiiiiiiiiiii    2222222222222


 sssssssssss     cccccccccccc     aaaaaaaaa     ll              eeeeeeeeeeeee                    pppppppppppp     cccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa    ll              eeeeeeeeeeeee                   ppppppppppppp    ccccccccccccc
ss         ss    cc          cc  aa         aa   ll              ee                              pp         pp    cc          cc
ss               cc              aa         aa   ll              ee                              pp         pp    cc
ss               cc              aa         aa   ll              ee                              pp         pp    cc
ssssssssssss     cc              aaaaaaaaaaaaa   ll              eeeeeeeee       -------------   pppppppppppp     cc
 ssssssssssss    cc              aaaaaaaaaaaaa   ll              eeeeeeeee       -------------   pppppppppppp     cc
          ss     cc              aa         aa   ll              ee                              pp               cc
          ss     cc              aa         aa   ll              ee                              pp               cc
ss         ss    cc          cc  aa         aa   ll              ee                              pp               cc          cc
ssssssssssssss   cccccccccccccc   aa         aa   llllllllllllll  eeeeeeeeeeeeee                  pp               cccccccccccccc
 ssssssssssss     cccccccccccc    aa         aa   llllllllllllll  eeeeeeeeeeeeee                  pp                cccccccccccc


   0000000       666666666666              //   22222222222       0000000                  //     0000000      5555555555555
  000000000     6666666666666             //   2222222222222    000000000                 //    000000000     5555555555555
 00       00    66                       //    22          22   00       00              //    00       00    55
00         00   66                      //                 22   00         00            //   00         00   55
00         00   66                     //                  22   00         00           //   00         00   55
00         00   666666666666          //                  22   00         00          //   00         00   555555555555
00         00   6666666666666       //                 22      00         00         //   00         00   5555555555555
00         00   66         66     //                22         00         00        //   00         00              55
00         00   66         66    //               22           00         00       //   00         00              55
 00       00    66         66   //              22             00       00       //    00       00    55         55
  000000000     6666666666666  //              2222222222222     000000000      //      000000000     5555555555555
   0000000       66666666666  //               2222222222222      0000000       //        0000000      55555555555


   0000000       666666666666                   33333333333     666666666666                   33333333333    7777777777777
  000000000     6666666666666                  3333333333333   6666666666666                  3333333333333   777777777777
 00       00    66                  :::       33         33   66                  :::       33         33   77         77
00         00   66                  :::                 33   66                  :::                 33            77
00         00   66                  :::                 33   66                  :::                 33           77
00         00   666666666666                         333   666666666666                         333          77
00         00   6666666666666                        333   6666666666666                        333          77
00         00   66         66       :::                 33   66         66       :::                 33         77
00         00   66         66       :::                 33   66         66       :::                 33         77
 00       00    66         66       :::       33        33   66         66       :::       33        33        77
  000000000     6666666666666                  3333333333333   6666666666666                  3333333333333        77
   0000000       66666666666                   33333333333     66666666666                   33333333333         77
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp    ccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppppp  cccccccccccccc
ss         ss    cc         cc   aa         aa  ll             ee                             pp         pp   cc         cc
ss               cc              aa         aa  ll             ee                             pp         pp   cc
ss               cc              aa         aa  ll             ee                             pp         pp   cc
ssssssssssss     cc              aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppppp   cc
 ssssssssssss    cc              aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppp     cc
          ss     cc              aa         aa  ll             ee                             pp               cc
          ss     cc              aa         aa  ll             ee                             pp               cc
ss        ss     cc         cc   aa         aa  ll             ee                             pp               cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  lllllllllllll  eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  lllllllllllll  eeeeeeeeeeeee                  pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                program verification information                                        *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o008                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/11/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  bonami                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:36:37.29                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
-1q array has      1 entries.
 0q array has      4 entries.
 1q array has      6 entries.
 2q array has      2 entries.
```

```
logical assignments

master library   11
working library   0
scratch file     18
new library       1

p r o b l e m   d e s c r i p t i o n

igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1

izm--number of zones or material regions                       6

ms--mixing table length                                       18

ibl--shielded cross section edit option (0/1--no/yes)          0

ibr--bondarenko factor edit option (0/1--no/yes)               0

issopt--dancoff factor option                                  0

convergence criterion    1.00000E-03

geometry correction factor for wigner rational approximation  1.000E+00

        3q array has     18 entries.

        4q array has     18 entries.

        5q array has     18 entries.

        6q array has      6 entries.

        7q array has      6 entries.

        8q array has      6 entries.

        9q array has      6 entries.

       10q array has     18 entries.

       11q array has      6 entries.

m i x i n g   t a b l e

entry   mixture   isotope   number density   new identifier   explicit temperature
   1       1         1001     7.83405E-02        1001001            293.0
   2       2         1001     7.85246E-02        2001001            293.0
   3       5         1001     6.67692E-02        5001001            293.0
   4       1         4309     1.23340E-03        1004309            293.0
   5       2         4309     1.23621E-03        2004309            293.0
   6       1         6012     3.91745E-02        1006012            293.0
   7       2         6012     3.92623E-02        2006012            293.0
   8       4         6012     3.18772E-04        4006012            293.0
   9       1         8016     0.00000E+00        1008016            293.0
  10       5         8016     3.33846E-02        5008016            293.0
  11       1        94239     1.11927E-04        1094239            293.0
  12       4        14000     1.70252E-03        4014000            293.0
  13       4        15031     6.94680E-05        4015031            293.0
  14       4        24304     1.74726E-02        4024304            293.0
  15       4        25055     1.74071E-03        4025055            293.0
  16       4        26304     5.85446E-02        4026304            293.0
  17       4        28304     7.74020E-03        4028304            293.0
  18       6        82000     3.29690E-02        6082000            293.0

geometry and material description

zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1          1.00000E+00    2.93000E+02    0.00000E+00            0
   2      2          6.00000E+00    2.93000E+02    0.00000E+00            0
   3      3          1.10000E+01   -2.93000E+02    0.00000E+00            0
   4      4          1.60000E+01    2.93000E+02    0.00000E+00            0
   5      5          2.10000E+01    2.93000E+02    0.00000E+00            0
   6      6          2.60000E+01    2.93000E+02    0.00000E+00            0

this calculation requires    36777 locations of  2000000 available to this module

power fitting for:     14000-- processes:  3-- sig0's: 8-- temperatures: 3-- max groups: 238

warning-nuclide:    14000 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

power fitting for:     94239-- processes:  5-- sig0's: 7-- temperatures: 3-- max groups:  21

warning-nuclide:    94239 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

zone     volume   outer radius
   1   1.000E+00   1.000E+00
   2   5.000E+00   6.000E+00
   3   5.000E+00   1.100E+01
   4   5.000E+00   1.600E+01
   5   5.000E+00   2.100E+01
   6   5.000E+00   2.600E+01

fuel region volume            2.60E+01
moderator region volume       0.00E+00
fuel region radius            2.60E+01
moderator region radius       2.60E+01

  elapsed time   0.01 min.
```

infinite dilution macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.003E-01	1.063E-01	1.090E-01	1.074E-01	1.124E-01	1.202E-01	1.311E-01	1.485E-01	1.713E-01	2.057E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.944E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.766E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.618E-01	4.679E-01	4.732E-01	4.811E-01	4.985E-01	5.221E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.250E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.556E-01	5.754E-01	5.869E-01	6.062E-01	6.290E-01	6.480E-01	6.652E-01	6.801E-01	7.179E-01	7.835E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.702E-01	2.774E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.688E-01	9.762E-01	1.061E+00	1.134E+00	1.209E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.375E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.471E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.279E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.488E+00	1.555E+00	1.606E+00	1.655E+00	1.688E+00	1.710E+00	1.727E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.758E+00	1.763E+00	1.769E+00	1.773E+00	1.775E+00	1.777E+00	1.781E+00	1.782E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

infinite dilution macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.795E+00	1.797E+00	1.801E+00	1.799E+00	1.797E+00	1.803E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.805E+00	1.809E+00	1.797E+00	1.804E+00	1.805E+00	1.809E+00	1.800E+00	1.798E+00	1.824E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.824E+00	1.801E+00	1.814E+00	1.806E+00	1.842E+00	1.798E+00	1.815E+00	1.799E+00	1.805E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.835E+00	1.797E+00	1.827E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.797E+00	1.797E+00	1.799E+00	1.797E+00	1.797E+00	1.797E+00	1.806E+00	1.799E+00	1.821E+00	1.797E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.798E+00	1.820E+00	1.800E+00	1.810E+00	1.863E+00	1.818E+00	1.799E+00	1.813E+00	1.839E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.833E+00	1.799E+00	1.799E+00	1.833E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

infinite dilution macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.828E+00	1.822E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.837E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.848E+00	1.851E+00	1.853E+00	1.855E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.856E+00	1.855E+00	1.848E+00	1.846E+00	1.851E+00	1.855E+00	1.858E+00	1.861E+00	1.864E+00	1.865E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.859E+00	1.868E+00	1.874E+00	1.874E+00	1.882E+00	1.894E+00	1.902E+00	1.915E+00	1.933E+00	1.939E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.962E+00	1.997E+00	2.045E+00	2.131E+00	2.233E+00	2.346E+00	2.515E+00	2.722E+00	2.796E+00	2.714E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

infinite dilution macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.607E+00	2.567E+00	2.582E+00	2.639E+00	2.727E+00	2.865E+00	2.979E+00	3.067E+00	3.175E+00	3.314E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.499E+00	3.750E+00	4.094E+00	4.419E+00	5.055E+00	5.950E+00	6.395E+00	6.874E+00	7.283E+00	7.748E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.654E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.177E+00	8.777E+00	9.554E+00	1.025E+01	1.116E+01	1.275E+01	1.761E+01	3.702E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.335E+00	2.534E+00	2.878E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

bondarenko iteration statistics

iteration	mt	max change	group	zone	new value	nuclide	sig0	first	last
1	1	-5.749E-02	50	4	6.492E+00	4014000	2.44454E+02	1	238
1	1	-2.464E-02	56	1	1.370E+01	1094239	1.47687E+04	55	75
2	all groups for nuclide		4014000 are converged to less than eps= 1.00E-03						
2	all groups for nuclide		1094239 are converged to less than eps= 1.00E-03						

elapsed time 0.01 min.

shielded macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.003E-01	1.063E-01	1.090E-01	1.074E-01	1.124E-01	1.202E-01	1.311E-01	1.485E-01	1.713E-01	2.057E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.944E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.765E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.618E-01	4.679E-01	4.732E-01	4.811E-01	4.985E-01	5.221E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.249E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.556E-01	5.754E-01	5.869E-01	6.062E-01	6.290E-01	6.480E-01	6.652E-01	6.801E-01	7.179E-01	7.835E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.701E-01	2.773E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.688E-01	9.762E-01	1.061E+00	1.134E+00	1.209E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.375E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.469E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.272E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.488E+00	1.555E+00	1.606E+00	1.655E+00	1.688E+00	1.710E+00	1.727E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.758E+00	1.763E+00	1.769E+00	1.773E+00	1.775E+00	1.777E+00	1.781E+00	1.782E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

shielded macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.795E+00	1.797E+00	1.801E+00	1.799E+00	1.797E+00	1.803E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.805E+00	1.809E+00	1.797E+00	1.804E+00	1.805E+00	1.809E+00	1.800E+00	1.798E+00	1.824E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.824E+00	1.801E+00	1.814E+00	1.806E+00	1.842E+00	1.798E+00	1.815E+00	1.799E+00	1.805E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.835E+00	1.797E+00	1.827E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.797E+00	1.797E+00	1.799E+00	1.797E+00	1.797E+00	1.797E+00	1.806E+00	1.799E+00	1.821E+00	1.797E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.798E+00	1.820E+00	1.800E+00	1.810E+00	1.863E+00	1.818E+00	1.799E+00	1.813E+00	1.839E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.833E+00	1.799E+00	1.799E+00	1.833E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

shielded macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.828E+00	1.822E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.837E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.848E+00	1.851E+00	1.853E+00	1.855E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.856E+00	1.855E+00	1.848E+00	1.846E+00	1.851E+00	1.855E+00	1.858E+00	1.861E+00	1.864E+00	1.865E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.859E+00	1.868E+00	1.874E+00	1.874E+00	1.882E+00	1.894E+00	1.902E+00	1.915E+00	1.933E+00	1.939E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.962E+00	1.997E+00	2.045E+00	2.131E+00	2.233E+00	2.346E+00	2.515E+00	2.722E+00	2.796E+00	2.714E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

shielded macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.607E+00	2.567E+00	2.582E+00	2.639E+00	2.727E+00	2.865E+00	2.979E+00	3.067E+00	3.175E+00	3.314E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.499E+00	3.750E+00	4.094E+00	4.419E+00	5.055E+00	5.950E+00	6.395E+00	6.874E+00	7.283E+00	7.748E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.655E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.177E+00	8.777E+00	9.554E+00	1.025E+01	1.116E+01	1.275E+01	1.761E+01	3.702E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.336E+00	2.534E+00	2.879E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

number of separate processes to treat: 8
number treated (including multi-zone): 8
maximum number of sigma-0's: 8
maximum number of temperatures: 3
offset of origen for interpolation: 2.0E+01

macroscopic escape cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

36777 locations of 36992 available are required to make a new master containing the self-shielded values

```
copy      4309   Be-metal (1304/ from log 11 to log 18    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy     24304   24CR BNL EVALDE from log 11 to log  1    bondarenko trigger 0

copy     26304   26FE 0 ORNL EVA from log 11 to log  1    bondarenko trigger 0

copy     28304   28NI 0 BNL NNDC from log 11 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 11 to log 18    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy     14000   14si 0 ornl eva from log 11 to log  1    bondarenko trigger 1

copy     25055   25mn 55 bnl eva from log 11 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 11 to log 18    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 11 to log 18    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy     15031   15p 31 lll eval from log 11 to log  1    bondarenko trigger 0

copy     82000   82pb ornl evalj from log 11 to log  1    bondarenko trigger 0

copy     94239   94pu239 lanl ju from log 11 to log  1    bondarenko trigger 1
```

```
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
   compiled for doe - 8/18/94            last updated - 5/16/2002
      n.m.greene & l.m.petrie
        nuclear applications & methods analysis - ns&td - ornl
   tape id                          4321          number of nuclides                  18
   number of neutron groups          238          number of gamma groups               0
   first thermal group               149          logical unit                         1
                                table of contents
  Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
  Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
  24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
  26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
  28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
 6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
 6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
 6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
  14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
  25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
  8O 16 from version 6 evaluation                                               id   1008016
  8O 16 from version 6 evaluation                                               id   5008016
  hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
  hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
  hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
  15p 31 111 evaloct77 howerton                    mod1 12/20/88                id   4015031
  82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
  94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

   tape copy used      0 i/o's, and took    8.11 seconds
```

```
nn          nn  iiiiiiiiiiii    tttttttttttt      aaaaaaaaa     ww          ww  ll
nnn         nn  iiiiiiiiiiii    tttttttttttt     aaaaaaaaaaa    ww          ww  ll
nnnn        nn      ii              tt         aa         aa   ww          ww  ll
nn nn       nn      ii              tt         aa         aa   ww          ww  ll
nn   nn     nn      ii              tt         aa         aa   ww          ww  ll
nn    nn    nn      ii              tt         aaaaaaaaaaaaa   ww     w    ww  ll
nn     nn   nn      ii              tt         aaaaaaaaaaaaa   ww    www   ww  ll
nn      nn  nn      ii              tt         aa         aa   ww   ww ww  ww  ll
nn       nn nn      ii              tt         aa         aa   ww ww    ww ww  ll
nn        nnnn      ii              tt         aa         aa   wwww      wwww  ll
nn         nnn  iiiiiiiiiiii        tt         aa         aa   www        www  llllllllllll
nn          nn  iiiiiiiiiiii        tt         aa         aa   ww          ww  llllllllllll
```

```
 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                  ppppppppppp     ccccccccccc
sssssssssssss   ccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                  pppppppppppp    cccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                             pp        pp    cc         cc
ss              cc              aa         aa ll            ee                             pp        pp    cc
ss              cc              aa         aa ll            ee                             pp        pp    cc
sssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppp    cc
 sssssssssssss  cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppp    cc
          ss    cc              aa         aa ll            ee                             pp              cc
          ss    cc              aa         aa ll            ee                             pp              cc
ss        ss    cc         cc   aa         aa ll            ee                             pp              cc         cc
sssssssssssss   ccccccccccccc   aa         aa llllllllllll  eeeeeeeeeeeee                  pp              ccccccccccccc
 sssssssssss     ccccccccccc    aa         aa llllllllllll  eeeeeeeeeeeee                  pp               cccccccccccc
```

```
   0000000       666666666666              //   22222222222      0000000                //    0000000      5555555555555
  000000000     6666666666666             //   2222222222222    000000000              //    000000000    5555555555555
 00       00    66                       //    22         22    00       00           //    00       00    55
00         00   66                      //                22   00         00         //    00         00  55
00         00   66                     //                 22   00         00        //    00         00  55
00         00   666666666666          //                22    00         00       //    00         00  555555555555
00         00   6666666666666        //               22      00         00      //    00         00  5555555555555
00         00   66         66       //              22        00         00     //    00         00            55
00         00   66         66      //             22          00         00    //    00         00            55
 00       00    66         66     //            22             00       00    //     00       00   55         55
  000000000     6666666666666   //            2222222222222     000000000   //      000000000   5555555555555
   0000000       66666666666   //             2222222222222      0000000   //        0000000     55555555555
```

```
   0000000       666666666666                 33333333333    666666666666                 5555555555555      0000000
  000000000     6666666666666                3333333333333  6666666666666                5555555555555     000000000
 00       00    66                  :::      33         33  66                  :::      55               00       00
00         00   66                  :::                33  66                  :::      55             00         00
00         00   66                  :::                33  66                  :::      55             00         00
00         00   666666666666                           333  666666666666               555555555555    00         00
00         00   6666666666666                        333  6666666666666              5555555555555   00         00
00         00   66         66       :::                33  66         66       :::                55  00         00
00         00   66         66       :::                33  66         66       :::                55  00         00
 00       00    66         66       :::      33        33  66         66       :::      55         55   00       00
  000000000     6666666666666                3333333333333  6666666666666                5555555555555     000000000
   0000000       66666666666                  33333333333    66666666666                  55555555555       0000000
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa        aa  ll              ee                              pp         pp    cc         cc
ss               cc               aa        aa  ll              ee                              pp         pp    cc
ss               cc               aa        aa  ll              ee                              pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppppp   cc
 ssssssssssss    cc               aaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppp     cc
          ss     cc               aa        aa  ll              ee                              pp               cc
          ss     cc               aa        aa  ll              ee                              pp               cc
ss        ss     cc          cc   aa        aa  ll              ee                              pp               cc         cc
ssssssssssssss   cccccccccccccc   aa        aa  llllllllllll    eeeeeeeeeeeee                   pp               cccccccccccccc
 sssssssssss      ccccccccccc     aa        aa  llllllllllll    eeeeeeeeeeeee                   pp                ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:  o0o002
creation date:  11/11/1999
library:  c:\scale4.4a\bin
production code:  nitawl
version:  4.4.0
jobname:  scale-pc
machine name:  NFA10385
date of execution:  20_jun_2005
time of execution:  06:36:50.35
```

```
      -1q array has      1 entries.

       0q array has      9 entries.

       1q array has     12 entries.

select 18 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

        2 resonance calculations have been requested
       -1 output option for ampx formatted cross section data
     2001 maximum number of resonance mesh intervals
        2 order of resonance level processing

the storage allocated for this case is   2000000 words

        2q array has     18 entries.

        3q array has     30 entries.

        4q array has     18 entries.

 general information concerning cross section library
   tape identification number                4321
   number of nuclides on tape                  18
   number of neutron energy groups            238
   first thermal neutron energy group         149
   number of gamma energy groups                0

   direct access unit number  9 requires 280 blocks of length  8172 words
 xsdrn tape   4321
                        scale - 238 neutron group library            based on endf-b version 5 data
                          generated with a chi-1/e-maxwellian weight spectrum
                            compiled for doe - 8/18/94           last updated - 5/16/2002
                              n.m.greene & l.m.petrie
                                nuclear applications & methods analysis - ns&td - ornl

 nuclides from xsdrn tape
    1     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  1004309
    2     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  2004309
    3     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91         4024304
    4     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91         4026304
    5     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91         4028304
    6    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               1006012
    7    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               2006012
    8    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               4006012
    9     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88              4014000
   10     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88              4025055
   11     8O 16 from version 6 evaluation                                             1008016
   12     8O 16 from version 6 evaluation                                             5008016
   13     hydrogen in water 1301/1002    mod1   11/23/92                              1001001
   14     hydrogen in water 1301/1002    mod1   11/23/92                              2001001
   15     hydrogen in water 1301/1002    mod1   11/23/92                              5001001
   16     15p 31 111 evaloct77 howerton                    mod1 12/20/88              4015031
   17     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89              6082000
   18     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89              1094239

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                1004309     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                2004309     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91       4024304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91       4026304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91       4028304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            1006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            2006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            4006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88            4014000     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88            4025055     temperature=   293.00

geometry has been set to homogeneous as lbar is  0.0000E+00

resonance data for this nuclide

mass number (a)          =    54.466              temperature(kelvin)       =   293.000

potential scatter sigma  =     3.801              lumped nuclear density    = 1.7407142E-03

spin factor (g)          =     0.000              lump dimension (a-bar)    = 0.0000000E+00

inner radius             = 0.0000000E+00          dancoff correction (c)    = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1    =    55.845              sigma(per absorber atom)= 3.4101929E+02
```

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 53.766 sigma(per absorber atom)= 1.2864024E+02

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
44	-2.573557E-05	0.000000E+00	-4.815655E-02
45	-1.291448E-04	0.000000E+00	-3.816337E-02
46	-1.606563E-04	0.000000E+00	-1.332381E-02
47	-1.056918E-04	0.000000E+00	-2.060706E-02
48	-4.179799E-05	0.000000E+00	-9.612578E-02
49	-1.779133E-04	0.000000E+00	-1.038285E-01
50	-2.606053E-04	0.000000E+00	-1.521462E-01
51	-6.117731E-05	0.000000E+00	-7.269186E-04
52	-2.276834E-04	0.000000E+00	-6.778821E-03
53	-4.136545E-04	0.000000E+00	-3.950535E-01
54	-9.016085E-04	0.000000E+00	-3.850810E-01
55	-1.889857E-03	0.000000E+00	-8.663202E-01
56	-1.682722E-04	0.000000E+00	-2.095040E-04
57	-8.006894E-04	0.000000E+00	-6.747544E-02
58	-5.832270E-03	0.000000E+00	-5.143185E+00
59	-6.111082E-03	0.000000E+00	-3.758587E+00
60	-3.959768E-03	0.000000E+00	-3.334263E-02
61	-1.836192E-06	0.000000E+00	-2.387732E-03
62	-4.381017E-04	0.000000E+00	-4.759451E-01
63	-9.039582E-03	0.000000E+00	-7.946639E+00
64	-1.435731E-02	0.000000E+00	-9.543545E+00
65	-4.290072E-03	0.000000E+00	-3.739039E+00
66	-1.355880E-02	0.000000E+00	-1.010358E+01
67	-2.306789E-04	0.000000E+00	-1.431424E-01
68	-3.245916E-06	0.000000E+00	-1.800902E-03
69	-3.050841E-03	0.000000E+00	-1.654186E-01
70	-2.155581E+00	0.000000E+00	-6.385146E+01
71	9.803476E-06	0.000000E+00	-9.597841E-04
72	-6.031858E-09	0.000000E+00	-1.791791E-06
73	-3.683254E-05	0.000000E+00	-4.341343E-03
74	-6.284016E+00	0.000000E+00	-3.027933E+02
75	-1.065459E-01	0.000000E+00	-4.692756E+00
76	-2.623990E-02	0.000000E+00	-1.060597E+00
77	-7.989248E-04	0.000000E+00	-2.867110E-02
78	-4.575271E-06	0.000000E+00	-1.544029E-04
79	-5.029187E-05	0.000000E+00	-1.677382E-03
80	-6.286984E-06	0.000000E+00	-2.025635E-04
81	-8.363011E-05	0.000000E+00	-2.566171E-03
82	-1.235011E-07	0.000000E+00	-2.377236E-06
83	-8.699079E-08	0.000000E+00	-1.242513E-06
84	6.870753E-08	0.000000E+00	3.754665E-06
85	7.176524E-07	0.000000E+00	1.973096E-06

excess resonance integrals

	resolved
absorption	3.13724E+00
fission	0.00000E+00

elapsed time 0.04 min.

process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 1008016 temperature= 293.00
process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 5008016 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 1001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 2001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 5001001 temperature= 293.00
process number 1007 is at temperature= 296.00

15p 31 111 evaloct77 howerton mod1 12/20/88 4015031 temperature= 293.00
process number 1007 is at temperature= 296.00

82pb ornl evaljul71 c.y.fu and f.g. mod2 01/04/89 6082000 temperature= 293.00
process number 1007 is at temperature= 296.00

94pu239 lanl jun83 e.arthur p.you mod2 02/28/89 1094239 temperature= 293.00

geometry has been set to homogeneous as lbar is 0.0000E+00

resonance data for this nuclide

mass number (a) = 237.000 temperature(kelvin) = 293.000

potential scatter sigma = 10.200 lumped nuclear density = 1.1192681E-04

spin factor (g) = 0.000 lump dimension (a-bar) = 0.0000000E+00

inner radius = 0.0000000E+00 dancoff correction (c) = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1 = 1.008 sigma(per absorber atom)= 1.4265104E+04

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 11.852 sigma(per absorber atom)= 1.7239011E+03

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
75	-3.744730E-02	-1.450048E-02	-6.180827E-03
76	-4.295681E-01	-1.477368E-01	-2.443082E-01
77	-1.354907E-01	-2.710102E-02	-2.544746E-02
78	-1.196797E-01	-1.771129E-02	-1.344728E-02
79	-4.465794E-01	-3.447672E-01	-6.648712E-02
80	-1.036201E-02	-3.534953E-03	-5.562434E-04
81	-3.038212E-01	-7.777100E-02	-1.227765E-01
82	-1.006744E+00	-4.929545E-01	-2.677389E-01
83	-2.193624E+00	-1.097498E+00	-5.412579E-01
84	-3.898077E-03	-1.429899E-03	-1.555083E-04
85	-8.404615E-01	-2.627289E-01	-1.258386E-01
86	-1.145414E+00	-2.269429E-01	-2.661161E-01
87	-8.736379E-01	-3.091704E-01	-1.099464E-01
88	-5.754826E-03	-5.505703E-03	-1.266291E-04
89	-2.880801E-03	-2.142332E-03	-1.218945E-03
90	-9.129732E+00	-6.284624E+00	-1.473484E+00
91	-4.504888E-04	-3.205934E-04	-7.025284E-05
92	-6.321007E+00	-3.040433E+00	-6.010711E-01
93	-2.496564E-02	-1.701517E-02	5.153509E-05
94	-1.498195E+00	-1.088379E+00	-4.043908E-02
95	-3.244729E-01	-2.291959E-01	-6.612416E-03
96	-1.451534E+01	-2.337344E+00	-2.701702E+00
97	-6.849565E-03	-3.046983E-03	-1.945077E-03
98	-1.846179E+00	-4.461679E-01	-1.055004E-01
99	-1.491298E-02	-1.282357E-02	-1.283940E-04
100	-2.041659E-01	-1.644538E-01	-3.915267E-03
101	-4.127553E-03	-2.372607E-03	-6.246047E-04
102	-1.050411E+01	-1.013003E+00	-1.461928E+00
103	-3.388190E-03	-5.921256E-04	-6.611400E-04
104	-5.449155E+00	-6.592744E-01	-3.988738E-01
105	-6.416267E-03	-8.985414E-04	3.958325E-04
106	-1.229522E-04	-2.686961E-05	6.912401E-05
107	-3.832422E-05	-9.815471E-06	2.674462E-05
108	-1.547003E-05	-3.543945E-06	5.261322E-06
109	-2.973895E-02	-2.881520E-03	4.492356E-04
110	-9.233599E-03	-8.973510E-04	-1.271484E-03
111	-8.739158E-05	-3.082072E-05	1.274849E-05
112	-2.395098E-04	-1.663302E-04	-2.141843E-05
113	-2.382268E-02	-1.690739E-02	-8.845142E-05
114	-1.142325E-03	-8.109374E-04	6.132093E-05
115	-7.109043E-05	-5.033631E-05	7.386911E-06
116	-1.557938E-03	-1.832293E-04	-1.067486E-04
117	-1.386307E+00	-7.019759E-01	-2.601724E-02
118	-7.776634E-02	-4.562826E-02	-4.765009E-03
119	-6.714222E+00	-4.018114E+00	-1.756328E-01
120	-3.899778E-04	-2.333393E-04	4.834360E-05
121	-1.715140E-04	-9.333593E-05	-2.109062E-05
122	-8.478721E-04	-4.118178E-04	-1.476130E-04
123	-6.651674E+00	-3.096955E+00	-1.544048E-01
124	-1.038142E-02	-9.100321E-03	8.861719E-06
125	-3.419842E-02	-2.868036E-02	-5.655990E-04
126	-1.845172E+01	-8.386815E+00	-4.664618E-01
127	-1.741480E+00	-1.115715E+00	-1.678677E-02
128	-2.146188E-03	-1.336172E-03	1.106475E-04
129	-4.585231E+00	-1.719711E+00	-9.228001E-02
130	-1.056561E+01	-3.967687E+00	-1.740246E-01
131	-9.511924E+00	-7.378658E+00	-1.006811E-01
132	-2.186364E-03	-1.667414E-03	1.083463E-04
133	-1.746794E-02	-9.355236E-03	-9.924224E-04
134	-1.197875E+01	-6.385672E+00	-1.295653E-01
135	-2.061519E-03	-1.103203E-03	1.041661E-04
136	-8.415395E-04	-4.522168E-04	5.643215E-05
137	-3.246529E-04	-1.760005E-04	2.812778E-05
138	-1.548430E-04	-8.496686E-05	1.629021E-05
139	-8.483104E-05	-4.714231E-05	1.041046E-05
140	-7.451113E-05	-4.106047E-05	1.453882E-05
141	-1.903647E-05	-1.105933E-05	3.429023E-06
142	-1.230264E-05	-7.305282E-06	2.313000E-06
143	-8.401810E-06	-5.067363E-06	1.849588E-06
144	-4.992769E-06	-3.113502E-06	1.061710E-06
145	-4.193296E-06	-2.641689E-06	9.018254E-07
146	-3.512759E-06	-2.235604E-06	7.648797E-07
147	-3.081304E-06	-1.976576E-06	6.682214E-07
148	-2.960833E-06	-1.903811E-06	6.416093E-07
149	-2.900141E-06	-1.867085E-06	6.281402E-07
150	-2.806904E-06	-1.810565E-06	6.075201E-07
151	-2.654085E-06	-1.719157E-06	5.730112E-07
152	-1.215328E-06	-9.429182E-07	2.136835E-07
153	-1.179831E-06	-9.153775E-07	2.061313E-07
154	-1.146866E-06	-8.898010E-07	1.989290E-07
155	-1.117803E-06	-8.672529E-07	1.923900E-07
156	-1.815328E-07	-1.408431E-07	3.126695E-08

excess resonance integrals

	resolved
absorption	3.08978E+02
fission	1.74136E+02

elapsed time 0.07 min.

process number 1007 is at temperature= 296.00

elapsed time 0.07 min.

```
this xsdrn working tape was created 06/20/05 at 06:36:50
the title of the parent case is as follows
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94           last updated - 5/16/2002
    tape id                            4321          number of nuclides                    18
    number of neutron groups            238          number of gamma groups                 0
    first thermal group                 149          logical unit                           4
                                 table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77, s.f. mughabghab           mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 111 evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    7.45 seconds
```

```
kk          kk  eeeeeeeeeeeee  nn .        nn  oooooooooooo                  vv          vv
kk         kk   eeeeeeeeeeeee  nnn         nn  oooooooooooooo                vv          vv
kk        kk    ee             nnnn        nn  oo         oo                 vv          vv
kk       kk     ee             nn nn       nn  oo         oo                 vv          vv
kk      kk      ee             nn   nn     nn  oo         oo                 vv          vv
kkkkkkkk        eeeeeeeee      nn    nn    nn  oo         oo  -------------  vv          vv
kkkkkkkk        eeeeeeeee      nn     nn   nn  oo         oo  -------------   vv        vv
kk      kk      ee             nn      nn  nn  oo         oo                    vv    vv
kk       kk     ee             nn       nn nn  oo         oo                     vv  vv
kk        kk    ee             nn        nnnn  oo         oo                      vvv
kk         kk   eeeeeeeeeeeee  nn         nnn  oooooooooooooo                       v
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooooo
```

```
 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                  pppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc  aaaaaaaaaaa  ll            eeeeeeeeeeeee                  pppppppppppppp  cccccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                             pp         pp   cc         cc
ss              cc              aa         aa ll            ee                             pp         pp   cc
ss              cc              aa         aa ll            ee                             pp         pp   cc
ssssssssssss    cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppppp   cc
 ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppp     cc
          ss    cc              aa         aa ll            ee                             pp               cc
          ss    cc              aa         aa ll            ee                             pp               cc
ss         ss   cc         cc   aa         aa ll            ee                             pp               cc         cc
ssssssssssssss  cccccccccccccc  aa         aa llllllllllllll eeeeeeeeeeeeee                 pp               cccccccccccccc
 sssssssssss     ccccccccccc    aa         aa llllllllllllll eeeeeeeeeeeeee                 pp                ccccccccccc
```

```
   0000000      666666666666          //  22222222222     0000000              //    0000000     5555555555555
  000000000    6666666666666          //  2222222222222    000000000           //     000000000   5555555555555
 00       00   66                    //   22         22   00       00         //     00       00   55
00         00  66                   //                22  00         00       //     00         00 55
00         00  66                  //                 22  00         00      //      00         00 55
00         00  666666666666       //                22    00         00     //       00         00 555555555555
00         00  6666666666666     //              22       00         00    //        00         00 5555555555555
00         00  66         66    //            22         00         00   //         00         00           55
00         00  66         66   //           22          00         00  //          00         00           55
 00       00   66         66  //           22            00         00 //           00         00 55        55
  000000000    6666666666666 //           2222222222222    000000000 //             000000000   5555555555555
   0000000      66666666666 //            2222222222222     0000000 //               0000000     55555555555
```

```
   0000000      666666666666                 33333333333   7777777777777                  0000000     22222222222
  000000000    6666666666666                3333333333333  777777777777                  000000000   2222222222222
 00       00   66                  :::      33         33 77         77        :::      00       00 22         22
00         00  66                  :::                 33           77         :::     00         00           22
00         00  66                  :::                 33          77          :::     00         00           22
00         00  666666666666                       333          77                     00         00         22
00         00  6666666666666                      333          77                     00         00       22
00         00  66         66        :::            33         77          :::     00         00     22
00         00  66         66        :::            33        77           :::     00         00   22
 00       00   66         66        :::      33         33       77        :::      00       00 22
  000000000    6666666666666                3333333333333       77                  000000000   2222222222222
   0000000      66666666666                  33333333333        77                   0000000    2222222222222
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa    ll            eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa   ll            eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss    cc         cc    aa         aa  ll            ee                             pp         pp    cc         cc
ss               cc               aa         aa  ll            ee                             pp         pp    cc
ss               cc               aa         aa  ll            ee                             pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------  pppppppppppppp    cc
         ss      cc               aa         aa  ll            ee                             pp               cc
         ss      cc               aa         aa  ll            ee                             pp               cc
ss       ss      cc         cc    aa         aa  ll            ee                             pp               cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  llllllllllll  eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  llllllllllll  eeeeeeeeeeeee                  pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                program verification information                                        *****
*****                                                                                                       *****
*****                            code system:  scale-pc version:  4.4a                                      *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o009                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****            library:  c:\scale4.4a\bin                                                                 *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  kenova                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:37:02.65                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
*****************************************************************************************************
***                                                                                                 ***
***                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700       ***
***                                                                                                 ***
*****************************************************************************************************
***                        ******      numeric parameters      ******                               ***
***                                                                                                 ***
***                                                                                                 ***
***          tme     maximum problem time (min)                          120.00                     ***
***                                                                                                 ***
***          tba     time per generation (min)                             5.00                     ***
***                                                                                                 ***
***          gen     number of generations                                 1000                     ***
***                                                                                                 ***
***          npg     number per generation                                 1000                     ***
***                                                                                                 ***
***          nsk     number of generations to be skipped                     50                     ***
***                                                                                                 ***
***          beg     beginning generation number                              1                     ***
***                                                                                                 ***
***          res     generations between checkpoints                          0                     ***
***                                                                                                 ***
***          x1d     number of extra 1-d cross sections                       1                     ***
***                                                                                                 ***
***          nbk     neutron bank size                                     1025                     ***
***                                                                                                 ***
***          xnb     extra positions in neutron bank                          0                     ***
***                                                                                                 ***
***          nfb     fission bank size                                     1000                     ***
***                                                                                                 ***
***          xfb     extra positions in fission bank                          0                     ***
***                                                                                                 ***
***          wta     default value of weight average                     0.5000                     ***
***                                                                                                 ***
***          wth     weight high for splitting                           3.0000                     ***
***                                                                                                 ***
***          wtl     weight low for russian roulette                     0.3333                     ***
***                                                                                                 ***
***          rnd     starting random number                        BB827100001                      ***
***                                                                                                 ***
***          nb8     number of d.a. blocks on unit  8                      200                     ***
***                                                                                                 ***
***          nl8     length of d.a. blocks on unit  8                      512                     ***
***                                                                                                 ***
***          adj     mode of calculation                               forward                     ***
***                                                                                                 ***
***                  input data written on restart unit                     no                     ***
***                                                                                                 ***
***                  binary data interface                                 yes                     ***
***                                                                                                 ***
***                                                                                                 ***
*****************************************************************************************************
*****************************************************************************************************
```

```
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700           ***
***                                                                                                           ***
*****************************************************************************************************************
***                                 ******      logical parameters        ******                              ***
***                                                                                                           ***
***  run  execute problem after checking data    yes          plt  plot picture map(s)                    yes ***
***                                                                                                           ***
***  flx  compute flux                            no          fdn  compute fission densities               no ***
***                                                                                                           ***
***  smu  compute avg unit self-multiplication    no          nub  compute nu-bar & avg fission group     yes ***
***                                                                                                           ***
***  mku  compute matrix k-eff by unit number     no          mkp  compute matrix k-eff by unit location   no ***
***                                                                                                           ***
***  cku  compute cofactor k-eff by unit number   no          ckp  compute cofactor k-eff by unit location  no ***
***                                                                                                           ***
***  fmu  print fiss prod matrix by unit number   no          fmp  print fiss prod matrix by unit location  no ***
***                                                                                                           ***
***  mkh  compute matrix k-eff by hole number     no          mka  compute matrix k-eff by array number    no ***
***                                                                                                           ***
***  ckh  compute cofactor k-eff by hole number   no          cka  compute cofactor k-eff by array number  no ***
***                                                                                                           ***
***  fmh  print fiss prod matrix by hole number   no          fma  print fiss prod matrix by array number  no ***
***                                                                                                           ***
***  hhl  collect matrix by highest hole level    no          hal  collect matrix by highest array level   no ***
***                                                                                                           ***
***  amx  print all mixed cross sections          no          far  print fis. and abs. by region           no ***
***                                                                                                           ***
***  xs1  print 1-d mixture x-sections            no          gas  print far by group                      no ***
***                                                                                                           ***
***  xs2  print 2-d mixture x-sections            no          pax  print xsec-albedo correlation tables    no ***
***                                                                                                           ***
***  xap  print mixture angles & probabilities    no          pwt  print weight average array              no ***
***                                                                                                           ***
***  pki  print fission spectrum                  no          pgm  print input geometry                    no ***
***                                                                                                           ***
***  p1d  print extra 1-d cross sections          no          bug  print debug information                 no ***
***                                                                                                           ***
***                                                           trk  print tracking information              no ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
                                   parameter input completed

                        ........    0 io's were used reading the parameter data      ........

                      *************** data reading completed ***************
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***          unit                                                  volume                                      ***
***         number              data set name                       name        unit function                 ***
***         ------              -------------                       ----        -------------                 ***
***                                                                                                           ***
***      xsc  14     C:\scale4.4a\tmpdir\ft14f001                   0           mixed cross sections          ***
***                                                                                                           ***
***      alb  79     C:\scale4.4a\data\ft79f001                                 input albedos                 ***
***                                                                                                           ***
***      wts  80     C:\scale4.4a\data\ft80f001                                 input weights                 ***
***                                                                                                           ***
***      skt  16      unknown                                                   write scratch data            ***
***                                                                                                           ***
***      bin  95     C:\scale4.4a\tmpdir\ft95f001                               binary input data             ***
***                                                                                                           ***
***      rst  95     C:\scale4.4a\tmpdir\ft95f001                               read restart data             ***
***                                                                                                           ***
***      lib   4     C:\scale4.4a\tmpdir\ft04f001                               input ampx working library    ***
***                                                                                                           ***
***            8     C:\scale4.4a\tmpdir\ft08f001                               input data direct access      ***
***                                                                                                           ***
***            9      unknown                                                   super grouped direct access   ***
***                                                                                                           ***
***           10      unknown                                                   xsec mixing direct access     ***
***                                                                                                           ***
*****************************************************************************************************************

                    ........    0 io's were used preparing input data    ........


                     cross sections read from the ampx working library on unit    4
```

```
                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

                                mixing table

                        number of scattering angles =  2
                    cross section message threshold =3.0E-05


mixture =     1          density(g/cc) = 0.97459
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   1001001  7.83405E-02  1.34502E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   1004309  1.23340E-03  1.89397E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   1006012  3.91745E-02  8.00970E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   1008016  0.00000E+00  0.00000E+00    8016    15.9904      8O 16 from version 6 evaluation
   1094239  1.11927E-04  4.55886E-02   94239   239.0526      94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

mixture =     2          density(g/cc) = 0.93226
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   2001001  7.85246E-02  1.40939E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   2004309  1.23621E-03  1.98448E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   2006012  3.92623E-02  8.39216E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas

mixture =     4          density(g/cc) =  7.9400
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   4006012  3.18772E-04  8.00006E-04    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   4014000  1.70252E-03  9.99998E-03   14000    28.0853      14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
   4015031  6.94680E-05  4.50000E-04   15031    30.9741      15p 31 lll evaloct77 howerton                    mod1 12/20/88
   4024304  1.74726E-02  1.90000E-01   24000    51.9957      24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
   4025055  1.74071E-03  1.99999E-02   25055    54.9379      25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
   4026304  5.85446E-02  6.83750E-01   26000    55.8447      26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
   4028304  7.74020E-03  9.50001E-02   28000    58.6872      28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91

mixture =     5          density(g/cc) = 0.99817
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   5001001  6.67692E-02  1.11927E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   5008016  3.33846E-02  8.88074E-01    8016    15.9904      8O 16 from version 6 evaluation

mixture =     6          density(g/cc) =  11.344
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   6082000  3.29690E-02  1.00000E+00   82000   207.2100      82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89


                    1004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    2004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    4024304     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
                    4026304     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
                    4028304     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91
                    1006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    2006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4014000     14si 0 ornl evalfeb74 larson perey dr           mod3 12/20/88
                    4025055     25mn 55 bnl evalmar77 s.f. mughabghab           mod2 12/20/88
                    1008016     8O 16 from version 6 evaluation
                    5008016     8O 16 from version 6 evaluation
                    1001001     hydrogen in water 1301/1002    mod1   11/23/92
                    2001001     hydrogen in water 1301/1002    mod1   11/23/92
                    5001001     hydrogen in water 1301/1002    mod1   11/23/92
                    4015031     15p 31 lll evaloct77 howerton                   mod1 12/20/88
                    6082000     82pb ornl evaljul71 c.y.fu and f.g.             mod2 01/04/89
                    1094239     94pu239 lanl jun83 e.arthur p.you               mod2 02/28/89

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   61 to group  114
                1 moments were accepted. the p0 coefficient is  1.16500E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  101
                1 moments were accepted. the p0 coefficient is  7.14241E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  139
                2 moments were accepted. the p0 coefficient is  9.91999E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   72 to group  162
                2 moments were accepted. the p0 coefficient is  1.18606E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  193
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        7.560729E-05   4.207219E-06  -3.745248E-05  -6.278259E-06
            the moments corresponding to this distribution are
        5.564568E-02   3.096443E-03   1.723122E-04
            the moments corresponding to the generated distribution are
        5.564568E-02   3.096443E-03   1.723037E-04
            the legendre expansion corresponding to these moments is
        7.560729E-05   4.207219E-06  -3.745248E-05  -6.278261E-06
            the weights/angles for this distribution are
        9.999998E-01   2.304428E-07
        5.564569E-02  -1.286298E-08
            the moments corresponding to this distribution are
        5.564568E-02   3.096443E-03   1.723037E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   76 to group  216
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        8.528397E-05   1.770609E-06  -4.258684E-05  -2.654005E-06
            the moments corresponding to this distribution are
        2.076134E-02   4.310372E-04   8.953489E-06
            the moments corresponding to the generated distribution are
        2.076134E-02   4.310372E-04   8.952460E-06
            the legendre expansion corresponding to these moments is
        8.528397E-05   1.770609E-06  -4.258684E-05  -2.654005E-06
            the weights/angles for this distribution are
        1.000000E+00   5.509564E-09
        2.076134E-02   8.708605E-01
            the moments corresponding to this distribution are
        2.076134E-02   4.310372E-04   8.952460E-06
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k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   80 to group  206
                1 moments were accepted. the p0 coefficient is  1.17840E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   82 to group  162
                2 moments were accepted. the p0 coefficient is  6.65546E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   83 to group  164
                2 moments were accepted. the p0 coefficient is  6.85680E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   88 to group  100
                2 moments were accepted. the p0 coefficient is  1.43170E-02

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   88 to group  188
                2 moments were accepted. the p0 coefficient is  1.10144E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   89 to group  148
                2 moments were accepted. the p0 coefficient is  5.71859E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   90 to group  185
                2 moments were accepted. the p0 coefficient is  1.20375E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  205
                1 moments were accepted. the p0 coefficient is  5.34318E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  114 to group  207
                2 moments were accepted. the p0 coefficient is  7.07973E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  123 to group  228
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        5.029621E-05   8.010775E-07  -2.512896E-05  -1.201102E-06
             the moments corresponding to this distribution are
        1.592719E-02   2.537133E-04   4.085801E-06
             the moments corresponding to the generated distribution are
        1.592719E-02   2.537133E-04   4.072875E-06
             the legendre expansion corresponding to these moments is
        5.029621E-05   8.010775E-07  -2.512896E-05  -1.201104E-06
             the weights/angles for this distribution are
        9.999999E-01   5.717282E-08
        1.592715E-02   8.289913E-01
             the moments corresponding to this distribution are
        1.592719E-02   2.537133E-04   4.072875E-06

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  130 to group  175
                2 moments were accepted. the p0 coefficient is  7.62349E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  142 to group  175
                2 moments were accepted. the p0 coefficient is  1.83020E-03

keno message number k5-222     123 transfers for mixture     1 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   17 to group   73
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
             the moments corresponding to this distribution are
        2.103383E-02   4.424545E-04   9.340116E-06
             the moments corresponding to the generated distribution are
        2.103383E-02   4.424545E-04   9.338884E-06
             the legendre expansion corresponding to these moments is
        6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
             the weights/angles for this distribution are
        1.000000E+00   3.506203E-08
        2.103380E-02   9.809266E-01
             the moments corresponding to this distribution are
        2.103383E-02   4.424545E-04   9.338884E-06

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   31 to group   67
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        3.020880E-04   1.552948E-05  -1.498463E-04  -2.319124E-05
             the moments corresponding to this distribution are
        5.140713E-02   2.643117E-03   1.363483E-04
             the moments corresponding to the generated distribution are
        5.140713E-02   2.643117E-03   1.362936E-04
             the legendre expansion corresponding to these moments is
        3.020880E-04   1.552948E-05  -1.498463E-04  -2.319128E-05
             the weights/angles for this distribution are
        9.999995E-01   5.426291E-07
        5.140665E-02   9.355055E-01
             the moments corresponding to this distribution are
        5.140713E-02   2.643117E-03   1.362936E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   36 to group   75
                1 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        3.436553E-05   8.753364E-07  -1.714932E-05  -1.311583E-06
             the moments corresponding to this distribution are
        2.547135E-02   6.487885E-04   1.654347E-05
             the moments corresponding to the generated distribution are
        2.547135E-02   6.487908E-04   1.652561E-05
             the legendre expansion corresponding to these moments is
        3.436553E-05   8.753364E-07  -1.714932E-05  -1.311585E-06
             the weights/angles for this distribution are
        9.999982E-01   1.759111E-06
        2.547139E-02  -4.483616E-08
             the moments corresponding to this distribution are
        2.547135E-02   6.487908E-04   1.652561E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   86
                1 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        1.550883E-04   6.403348E-06  -7.714756E-05  -9.577728E-06
             the moments corresponding to this distribution are
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    4.128841E-02   1.704733E-03   7.039822E-05
        the moments corresponding to the generated distribution are
    4.128841E-02   1.704733E-03   7.038573E-05
        the legendre expansion corresponding to these moments is
    1.550883E-04   6.403348E-06  -7.714756E-05  -9.577732E-06
        the weights/angles for this distribution are
    9.999999E-01   1.260091E-07
    4.128842E-02  -5.211604E-09
        the moments corresponding to this distribution are
    4.128841E-02   1.704733E-03   7.038573E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    6.978938E-05   2.469208E-06  -3.476364E-05  -3.696076E-06
        the moments corresponding to this distribution are
    3.538085E-02   1.251836E-03   4.433614E-05
        the moments corresponding to the generated distribution are
    3.538085E-02   1.251836E-03   4.431055E-05
        the legendre expansion corresponding to these moments is
    6.978938E-05   2.469208E-06  -3.476364E-05  -3.696081E-06
        the weights/angles for this distribution are
    9.999999E-01   1.014716E-07
    3.538080E-02   5.900701E-01
        the moments corresponding to this distribution are
    3.538085E-02   1.251836E-03   4.431055E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   51 to group   87
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    1.360841E-04   5.588769E-06  -6.769771E-05  -8.359530E-06
        the moments corresponding to this distribution are
    4.106850E-02   1.686766E-03   6.943713E-05
        the moments corresponding to the generated distribution are
    4.106850E-02   1.686766E-03   6.940783E-05
        the legendre expansion corresponding to these moments is
    1.360841E-04   5.588769E-06  -6.769771E-05  -8.359540E-06
        the weights/angles for this distribution are
    9.999998E-01   1.956027E-07
    4.106834E-02   8.979992E-01
        the moments corresponding to this distribution are
    4.106850E-02   1.686766E-03   6.940783E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   65 to group  101
            1 moments were accepted. the p0 coefficient is  7.14843E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   68 to group  107
            2 moments were accepted. the p0 coefficient is  6.43298E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   75 to group  194
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    1.513644E-04   8.247675E-06  -7.500807E-05  -1.231030E-05
        the moments corresponding to this distribution are
    5.448889E-02   2.969040E-03   1.617684E-04
        the moments corresponding to the generated distribution are
    5.448889E-02   2.969040E-03   1.617797E-04
        the legendre expansion corresponding to these moments is
    1.513644E-04   8.247675E-06  -7.500807E-05  -1.231029E-05
        the weights/angles for this distribution are
    9.999997E-01   2.777653E-07
    5.448890E-02  -1.518020E-08
        the moments corresponding to this distribution are
    5.448889E-02   2.969040E-03   1.617797E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   77 to group  209
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    9.945100E-05   3.561977E-06  -4.953412E-05  -5.331510E-06
        the moments corresponding to this distribution are
    3.581641E-02   1.282931E-03   4.607786E-05
        the moments corresponding to the generated distribution are
    3.581641E-02   1.282931E-03   4.606247E-05
        the legendre expansion corresponding to these moments is
    9.945100E-05   3.561977E-06  -4.953412E-05  -5.331513E-06
        the weights/angles for this distribution are
    9.999999E-01   1.439254E-07
    3.581628E-02   9.337027E-01
        the moments corresponding to this distribution are
    3.581641E-02   1.282931E-03   4.606247E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   80 to group  172
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
        the moments corresponding to this distribution are
    8.005312E-02   6.408680E-03   5.132358E-04
        the moments corresponding to the generated distribution are
    8.005312E-02   6.408680E-03   5.132162E-04
        the legendre expansion corresponding to these moments is
    1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
        the weights/angles for this distribution are
    9.999998E-01   2.368696E-07
    8.005292E-02   9.445136E-01
        the moments corresponding to this distribution are
    8.005312E-02   6.408680E-03   5.132162E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   82 to group  162
            2 moments were accepted. the p0 coefficient is  6.66650E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   98 to group  214
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    4.471841E-04   2.551503E-05  -2.214081E-04  -3.806459E-05
        the moments corresponding to this distribution are
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5.705712E-02   3.255749E-03   1.860170E-04
     the moments corresponding to the generated distribution are
5.705712E-02   3.255749E-03   1.860059E-04
     the legendre expansion corresponding to these moments is
4.471841E-04   2.551503E-05  -2.214081E-04  -3.806460E-05
     the weights/angles for this distribution are
9.999997E-01   2.774108E-07
5.705686E-02   9.762922E-01
     the moments corresponding to this distribution are
5.705712E-02   3.255749E-03   1.860059E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  100 to group  190
          2 moments were accepted. the p0 coefficient is  4.68299E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  104 to group  205
          1 moments were accepted. the p0 coefficient is  5.35149E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  105 to group  210
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
5.537484E-04   4.469354E-05  -2.714633E-04  -6.631247E-05
     the moments corresponding to this distribution are
8.071091E-02   6.514266E-03   5.257494E-04
     the moments corresponding to the generated distribution are
8.071091E-02   6.514266E-03   5.257672E-04
     the legendre expansion corresponding to these moments is
5.537484E-04   4.469354E-05  -2.714633E-04  -6.631245E-05
     the weights/angles for this distribution are
9.999999E-01   6.184942E-08
8.071094E-02  -4.163174E-01
     the moments corresponding to this distribution are
8.071091E-02   6.514266E-03   5.257672E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  192
          2 moments were accepted. the p0 coefficient is  7.08334E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  207
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
7.083302E-04   7.331732E-05  -3.427817E-04  -1.080120E-04
     the moments corresponding to this distribution are
1.035073E-01   1.071382E-02   1.109050E-03
     the moments corresponding to the generated distribution are
1.035073E-01   1.071382E-02   1.109007E-03
     the legendre expansion corresponding to these moments is
7.083302E-04   7.331732E-05  -3.427817E-04  -1.080121E-04
     the weights/angles for this distribution are
9.999998E-01   2.029094E-07
1.035072E-01   6.642933E-01
     the moments corresponding to this distribution are
1.035073E-01   1.071382E-02   1.109007E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  122 to group  229
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
4.760356E-05   6.498871E-07  -2.378847E-05  -9.745249E-07
     the moments corresponding to this distribution are
1.365207E-02   1.863943E-04   2.568987E-06
     the moments corresponding to the generated distribution are
1.365207E-02   1.863943E-04   2.551278E-06
     the legendre expansion corresponding to these moments is
4.760356E-05   6.498871E-07  -2.378847E-05  -9.745271E-07
     the weights/angles for this distribution are
9.999999E-01   9.257298E-08
1.365203E-02   4.196166E-01
     the moments corresponding to this distribution are
1.365207E-02   1.863943E-04   2.551278E-06

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  130 to group  175
          2 moments were accepted. the p0 coefficient is  7.62811E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  144 to group  230
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
     the moments corresponding to this distribution are
2.667994E-02   7.118417E-04   1.901619E-05
     the moments corresponding to the generated distribution are
2.667994E-02   7.118417E-04   1.901414E-05
     the legendre expansion corresponding to these moments is
1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
     the weights/angles for this distribution are
1.000000E+00   2.632260E-08
2.667991E-02   9.547741E-01
     the moments corresponding to this distribution are
2.667994E-02   7.118417E-04   1.901414E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  147 to group  177
          2 moments were accepted. the p0 coefficient is  2.87948E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  149 to group  149
          1 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
3.392408E-02   3.268915E-02   3.028554E-02   2.745581E-02
     the moments corresponding to this distribution are
9.635975E-01   9.284965E-01   9.018909E-01
     the moments corresponding to the generated distribution are
9.635975E-01   9.285436E-01   8.947650E-01
     the legendre expansion corresponding to these moments is
3.392408E-02   3.268915E-02   3.028794E-02   2.685146E-02
     the weights/angles for this distribution are
9.999746E-01   2.536909E-05
9.636219E-01  -3.422353E-04
     the moments corresponding to this distribution are
9.635975E-01   9.285436E-01   8.947650E-01
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k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  150 to group  150
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.160285E-02   4.909516E-02   4.461168E-02   3.940127E-02
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.762618E-01
          the moments corresponding to the generated distribution are
     9.514041E-01   9.096799E-01   8.714495E-01
          the legendre expansion corresponding to these moments is
     5.160285E-02   4.909516E-02   4.461168E-02   3.878044E-02
          the weights/angles for this distribution are
     9.870113E-01   1.298868E-02
     9.591081E-01   3.659778E-01
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.714495E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  151 to group  151
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.254969E-02   4.995038E-02   4.532984E-02   3.997005E-02
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.745673E-01
          the moments corresponding to the generated distribution are
     9.505360E-01   9.084061E-01   8.704781E-01
          the legendre expansion corresponding to these moments is
     5.254969E-02   4.995038E-02   4.532984E-02   3.943283E-02
          the weights/angles for this distribution are
     9.790505E-01   2.094948E-02
     9.607624E-01   4.726190E-01
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.704781E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  152 to group  152
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.445168E-02   5.164695E-02   4.673397E-02   4.110458E-02
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.710476E-01
          the moments corresponding to the generated distribution are
     9.484915E-01   9.055100E-01   8.682405E-01
          the legendre expansion corresponding to these moments is
     5.445168E-02   5.164695E-02   4.673397E-02   4.072245E-02
          the weights/angles for this distribution are
     9.456984E-01   5.430165E-02
     9.668567E-01   6.286492E-01
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.682405E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  153 to group  153
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.650781E-02   5.348388E-02   4.824280E-02   4.225094E-02
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.669722E-01
          the moments corresponding to the generated distribution are
     9.464864E-01   9.024911E-01   8.656703E-01
          the legendre expansion corresponding to these moments is
     5.650781E-02   5.348388E-02   4.824280E-02   4.206703E-02
          the weights/angles for this distribution are
     8.593679E-01   1.406321E-01
     9.794865E-01   7.448307E-01
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.656703E-01

keno message number k5-222     149 transfers for mixture     2 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   25 to group   63
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947598E-05
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764563E-04
          the moments corresponding to the generated distribution are
     5.606000E-02   3.142957E-03   1.764250E-04
          the legendre expansion corresponding to these moments is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947601E-05
          the weights/angles for this distribution are
     9.999997E-01   3.036038E-07
     5.605973E-02   9.328158E-01
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764250E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   46 to group   75
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867983E-05
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.099896E-04
          the moments corresponding to the generated distribution are
     5.944100E-02   3.533259E-03   2.100019E-04
          the legendre expansion corresponding to these moments is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867982E-05
          the weights/angles for this distribution are
     1.000000E+00   3.845905E-08
     5.944103E-02  -7.662296E-01
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.100019E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     7.176521E-05   2.539114E-06  -3.574785E-05  -3.800717E-06
          the moments corresponding to this distribution are
     3.538085E-02   1.251842E-03   4.433718E-05
```

```
            the moments corresponding to the generated distribution are
      3.538085E-02   1.251842E-03   4.432188E-05
            the legendre expansion corresponding to these moments is
      7.176521E-05   2.539114E-06  -3.574785E-05  -3.800719E-06
            the weights/angles for this distribution are
      9.999999E-01   6.443804E-08
      3.538080E-02   7.931237E-01
            the moments corresponding to this distribution are
      3.538085E-02   1.251842E-03   4.432188E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   65 to group  101
                2 moments were accepted. the p0 coefficient is  7.31570E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  209
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.017605E-04   3.644696E-06  -5.068443E-05  -5.455322E-06
            the moments corresponding to this distribution are
      3.581641E-02   1.282915E-03   4.607288E-05
            the moments corresponding to the generated distribution are
      3.581641E-02   1.282915E-03   4.603329E-05
            the legendre expansion corresponding to these moments is
      1.017605E-04   3.644696E-06  -5.068443E-05  -5.455332E-06
            the weights/angles for this distribution are
      9.999998E-01   1.703986E-07
      3.581627E-02   8.022606E-01
            the moments corresponding to this distribution are
      3.581641E-02   1.282915E-03   4.603329E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  213
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.017610E-04   2.943045E-06  -5.075281E-05  -4.408409E-06
            the moments corresponding to this distribution are
      2.892116E-02   8.364365E-04   2.420515E-05
            the moments corresponding to the generated distribution are
      2.892116E-02   8.364365E-04   2.419080E-05
            the legendre expansion corresponding to these moments is
      1.017610E-04   2.943045E-06  -5.075281E-05  -4.408413E-06
            the weights/angles for this distribution are
      9.999962E-01   3.840111E-06
      2.892127E-02  -1.111543E-07
            the moments corresponding to this distribution are
      2.892116E-02   8.364365E-04   2.419080E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  171
                2 moments were accepted. the p0 coefficient is  1.20653E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  206
                1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.206511E-04   5.280875E-06  -5.997885E-05  -7.896021E-06
            the moments corresponding to this distribution are
      4.376979E-02   1.915793E-03   8.384988E-05
            the moments corresponding to the generated distribution are
      4.376979E-02   1.915796E-03   8.385408E-05
            the legendre expansion corresponding to these moments is
      1.206511E-04   5.280875E-06  -5.997885E-05  -7.896020E-06
            the weights/angles for this distribution are
      9.999992E-01   8.131593E-07
      4.376983E-02  -3.566019E-08
            the moments corresponding to this distribution are
      4.376979E-02   1.915796E-03   8.385408E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  222
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      4.826018E-05   7.438963E-07  -2.411289E-05  -1.115404E-06
            the moments corresponding to this distribution are
      1.541429E-02   2.376060E-04   3.652759E-06
            the moments corresponding to the generated distribution are
      1.541429E-02   2.376060E-04   3.660935E-06
            the legendre expansion corresponding to these moments is
      4.826018E-05   7.438963E-07  -2.411289E-05  -1.115403E-06
            the weights/angles for this distribution are
      9.999999E-01   6.128777E-08
      1.541431E-02  -2.913944E-01
            the moments corresponding to this distribution are
      1.541429E-02   2.376060E-04   3.660935E-06

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   83 to group  161
                2 moments were accepted. the p0 coefficient is  6.24506E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   84 to group  160
                2 moments were accepted. the p0 coefficient is  4.91713E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   89 to group  148
                2 moments were accepted. the p0 coefficient is  5.85610E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   90 to group  169
                2 moments were accepted. the p0 coefficient is  6.17329E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   93 to group  181
                2 moments were accepted. the p0 coefficient is  1.45037E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   94 to group  112
                2 moments were accepted. the p0 coefficient is  7.61129E-03

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   97 to group  189
                1 moments were accepted. the p0 coefficient is  1.78001E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   99 to group  176
                1 moments were accepted. the p0 coefficient is  1.87371E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  104 to group  205
```

```
)
                1 moments were accepted. the p0 coefficient is  5.47573E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  105 to group  210
                2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785186E-05
          the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257461E-04
          the moments corresponding to the generated distribution are
        8.071091E-02   6.514271E-03   5.257637E-04
          the legendre expansion corresponding to these moments is
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785183E-05
          the weights/angles for this distribution are
        1.000000E+00   4.936485E-08
        8.071094E-02  -5.467504E-01
          the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257637E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  106 to group  177
                2 moments were accepted. the p0 coefficient is  2:32080E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  114 to group  192
                2 moments were accepted. the p0 coefficient is  7.24779E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725976E-06
          the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.901552E-05
          the moments corresponding to the generated distribution are
        2.667994E-02   7.118348E-04   1.900025E-05
          the legendre expansion corresponding to these moments is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725981E-06
          the weights/angles for this distribution are
        9.999999E-01   6.598613E-08
        2.667990E-02   5.153067E-01
          the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.900025E-05

keno message number k5-222     129 transfers for mixture     5 were corrected for bad moments.

                               ........    0 io's were used mixing cross-sections       ........

                                1-d cross section array id numbers
                                   1  2002  1452    27    18  1018

*****************************************************************************************************************************

                            the number of direct access blocks for unit  8 has been increased to 1079.

*****************************************************************************************************************************

                               ........    0 io's were used preparing the cross sections    ........
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                                ****** additional information ******                ***
***                                                                                   ***
***  number of energy groups             238       use lattice geometry                no  ***
***                                                                                   ***
***  no. of fission spectrum source group  1       global array number                  0  ***
***                                                                                   ***
***  no. of scattering angles in xsecs     2       number of units in the global x dir.  0  ***
***                                                                                   ***
***  entries/neutron in the neutron bank  17       number of units in the global y dir.  0  ***
***                                                                                   ***
***  entries/neutron in the fission bank  10       number of units in the global z dir.  0  ***
***                                                                                   ***
***  number of mixtures used               5       use a global reflector            yes  ***
***                                                                                   ***
***  number of bias id's used              1       use nested holes                   no  ***
***                                                                                   ***
***  number of differential albedos used   0       number of holes                     1  ***
***                                                                                   ***
***  total input geometry regions          7       maximum hole nesting level          1  ***
***                                                                                   ***
***  number of geometry regions used       7       use nested arrays                  no  ***
***                                                                                   ***
***  largest geometry unit number         10       number of arrays used               0  ***
***                                                                                   ***
***  largest array number                  1       maximum array nesting level         0  ***
***                                                                                   ***
***                                                                                   ***
***  +x boundary condition            mirror       -x boundary condition          mirror  ***
***                                                                                   ***
***  +y boundary condition            mirror       -y boundary condition          mirror  ***
***                                                                                   ***
***  +z boundary condition            mirror       -z boundary condition          mirror  ***
***                                                                                   ***
*****************************************************************************************
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    ****** space and supergroup information ******                 ***
***                                                                                   ***
***      2000000 words is the total space available.                                  ***
***                                                                                   ***
***        30661 words were used for non-supergroup storage.                          ***
***                                                                                   ***
***      1969339 words of storage are available for supergrouped data.                ***
***                                                                                   ***
***      1999416 words of storage are available for constructing the supergroups.     ***
***                                                                                   ***
***      1968857 words of storage are available to each supergroup.                   ***
***                                                                                   ***
***         5835 words are needed for the largest group.                              ***
***                                                                                   ***
***        38400 words of storage is sufficient to run this problem.                  ***
***                                                                                   ***
***       469323 words of storage will allow the problem to run with one supergroup.  ***
***                                                                                   ***
***       469632 words of storage will be used to run this problem.                   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    starting      ending       xsec       albedo      total        ***
***   supergroup         group        group      length      length      length       ***
***                                                                                   ***
***                                                                                   ***
***         1            1            238       105618           0      438180        ***
***                                                                                   ***
*****************************************************************************************

            ........    0 io's were used in supergrouping    ........

            ........    0 io's were used loading the data    ........
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

```
                    media bias      geometry description for those units utilized in this problem
region               num   id

                                                  -----   unit     1   -----

pu sphere

  1 sphere           1  1  radius =  10.960     the center is located at ( 0.00000    , 0.00000    , 0.00000    ).

                                        ******************   global   ******************
                                                  -----   unit    10   -----

ru-tru 72-b package w/ pu sphere

  1 cylinder         2  1  radius =  39.688     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

    hole number      1        at x = 0.00000     y =  28.720      z =  143.35     is unit number      1

  2 cylinder         4  1  radius =  43.180     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  3 cylinder         6  1  radius =  47.943     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  4 cylinder         4  1  radius =  52.070     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  5 cylinder         4  1  radius =  52.070     +z =  187.33     -z = -170.82     centerline is at  x = 0.00000      y = 0.00000

  6 cuboid           5  1      +x =  72.390     -x = -72.390     +y =  72.390     -y = -72.390     +z =  216.54     -z = -200.03
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	5.51423E+03 cm**3	5.51423E+03 cm**3
10	1	2	1.52163E+06 cm**3	1.52715E+06 cm**3
	2	3	2.80605E+05 cm**3	1.80775E+06 cm**3
	3	4	4.20760E+05 cm**3	2.22851E+06 cm**3
	4	5	4.00235E+05 cm**3	2.62875E+06 cm**3
	5	6	4.21884E+05 cm**3	3.05063E+06 cm**3
	6	7	5.68119E+06 cm**3	8.73183E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	5.51423E+03 cm**3
10	1	1	2	1.52163E+06 cm**3
		2	4	2.80605E+05 cm**3
		3	6	4.20760E+05 cm**3
		4	4	4.00235E+05 cm**3
		5	4	4.21884E+05 cm**3
		6	5	5.68119E+06 cm**3

total mixture volumes

mixture	total volume	mass(g)
1	5.51423E+03 cm**3	5.37410E+03
2	1.52163E+06 cm**3	1.41856E+06
4	1.10272E+06 cm**3	8.75563E+06
5	5.68119E+06 cm**3	5.67080E+06
6	4.20760E+05 cm**3	4.77310E+06

```
*****************************************************************************************************
***                                                                                               ***
***                                    biasing information                                        ***
***                                                                                               ***
***     a default weight of    0.500 will be used for all bias id's.                              ***
***                                                                                               ***
*****************************************************************************************************
```

..... 0 io's were used in keno-v before tracking .....

..... 0.06433 minutes were used processing data. .....

volume fraction of fissile material in the core= 6.31509E-04

start type 0 was used.

the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
the flag to start neutrons in the reflector was turned off

0.07850 minutes were required for starting. total elapsed time is 0.14250 minutes.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
1	9.34689E-01	1.48667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	954 independent fission points were generated			
2	9.01731E-01	1.56833E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.36698E-01	1.62000E-01	9.36698E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	8.91555E-01	1.67000E-01	9.14126E-01	2.25715E-02	0.00000E+00	0.00000E+00
5	9.07425E-01	1.75833E-01	9.11893E-01	1.32217E-02	0.00000E+00	0.00000E+00
6	9.47256E-01	1.80667E-01	9.20733E-01	1.28673E-02	0.00000E+00	0.00000E+00
7	9.25833E-01	1.86000E-01	9.21753E-01	1.00190E-02	0.00000E+00	0.00000E+00
8	9.14706E-01	1.94000E-01	9.20579E-01	8.26436E-03	0.00000E+00	0.00000E+00
9	9.25312E-01	1.99000E-01	9.21255E-01	7.01730E-03	0.00000E+00	0.00000E+00
10	9.21620E-01	2.07000E-01	9.21300E-01	6.07733E-03	0.00000E+00	0.00000E+00
11	9.51626E-01	2.12500E-01	9.24670E-01	6.33088E-03	0.00000E+00	0.00000E+00
12	8.77516E-01	2.18000E-01	9.19955E-01	7.36880E-03	0.00000E+00	0.00000E+00
13	9.06645E-01	2.26833E-01	9.18745E-01	6.77425E-03	0.00000E+00	0.00000E+00
14	9.67974E-01	2.32833E-01	9.22847E-01	7.42104E-03	0.00000E+00	0.00000E+00
15	9.29254E-01	2.39833E-01	9.23340E-01	6.84414E-03	0.00000E+00	0.00000E+00
16	9.20685E-01	2.45333E-01	9.23150E-01	6.33927E-03	0.00000E+00	0.00000E+00
17	9.45271E-01	2.50500E-01	9.24625E-01	6.08300E-03	0.00000E+00	0.00000E+00
18	9.39142E-01	2.57500E-01	9.25532E-01	5.76201E-03	0.00000E+00	0.00000E+00
19	9.50807E-01	2.62833E-01	9.27019E-01	5.61296E-03	0.00000E+00	0.00000E+00
20	9.38394E-01	2.67667E-01	9.27651E-01	5.32955E-03	0.00000E+00	0.00000E+00
21	9.46403E-01	2.74500E-01	9.28638E-01	5.13695E-03	0.00000E+00	0.00000E+00
22	8.75778E-01	2.80500E-01	9.25995E-01	5.54389E-03	0.00000E+00	0.00000E+00
23	9.46741E-01	2.85667E-01	9.26983E-01	5.36503E-03	0.00000E+00	0.00000E+00
24	9.71084E-01	2.92000E-01	9.28987E-01	5.49411E-03	0.00000E+00	0.00000E+00
25	9.27673E-01	2.97167E-01	9.28930E-01	5.25011E-03	0.00000E+00	0.00000E+00
26	9.35034E-01	3.02333E-01	9.29185E-01	5.03303E-03	0.00000E+00	0.00000E+00
27	9.13818E-01	3.09167E-01	9.28570E-01	4.86649E-03	0.00000E+00	0.00000E+00
28	9.23552E-01	3.14333E-01	9.28377E-01	4.67955E-03	0.00000E+00	0.00000E+00
29	9.44684E-01	3.19500E-01	9.28981E-01	4.54322E-03	0.00000E+00	0.00000E+00
30	9.12174E-01	3.25833E-01	9.28381E-01	4.41892E-03	0.00000E+00	0.00000E+00
31	9.35347E-01	3.31000E-01	9.28621E-01	4.27058E-03	0.00000E+00	0.00000E+00
32	9.18169E-01	3.36167E-01	9.28272E-01	4.14046E-03	0.00000E+00	0.00000E+00
33	9.33917E-01	3.42500E-01	9.28455E-01	4.00881E-03	0.00000E+00	0.00000E+00
34	9.07749E-01	3.48500E-01	9.27808E-01	3.93507E-03	0.00000E+00	0.00000E+00
35	9.09958E-01	3.55167E-01	9.27267E-01	3.85213E-03	0.00000E+00	0.00000E+00
36	9.38428E-01	3.61000E-01	9.27595E-01	3.75150E-03	0.00000E+00	0.00000E+00
37	9.11334E-01	3.66167E-01	9.27130E-01	3.67225E-03	0.00000E+00	0.00000E+00
38	8.98928E-01	3.71667E-01	9.26347E-01	3.65375E-03	0.00000E+00	0.00000E+00
39	9.32186E-01	3.77333E-01	9.26505E-01	3.55713E-03	0.00000E+00	0.00000E+00
40	9.33194E-01	3.83000E-01	9.26681E-01	3.46673E-03	0.00000E+00	0.00000E+00
41	9.82319E-01	3.89333E-01	9.28107E-01	3.66568E-03	0.00000E+00	0.00000E+00
42	9.36124E-01	3.95333E-01	9.28308E-01	3.57848E-03	0.00000E+00	0.00000E+00
43	9.60130E-01	4.01333E-01	9.29084E-01	3.57536E-03	0.00000E+00	0.00000E+00
44	9.33892E-01	4.08000E-01	9.29198E-01	3.49108E-03	0.00000E+00	0.00000E+00
45	9.36178E-01	4.14000E-01	9.29361E-01	3.41278E-03	0.00000E+00	0.00000E+00
46	9.23992E-01	4.19500E-01	9.29239E-01	3.33655E-03	0.00000E+00	0.00000E+00
47	9.28292E-01	4.25000E-01	9.29218E-01	3.26163E-03	0.00000E+00	0.00000E+00
48	9.79357E-01	4.30000E-01	9.30308E-01	3.37102E-03	0.00000E+00	0.00000E+00
49	9.62797E-01	4.35167E-01	9.30999E-01	3.37017E-03	0.00000E+00	0.00000E+00
50	9.16846E-01	4.40667E-01	9.30704E-01	3.31236E-03	0.00000E+00	0.00000E+00
51	9.47784E-01	4.45833E-01	9.31053E-01	3.26273E-03	0.00000E+00	0.00000E+00
52	9.29194E-01	4.51000E-01	9.31015E-01	3.19703E-03	0.00000E+00	0.00000E+00
53	9.19343E-01	4.56167E-01	9.30787E-01	3.14206E-03	0.00000E+00	0.00000E+00
54	9.15949E-01	4.61167E-01	9.30501E-01	3.09423E-03	0.00000E+00	0.00000E+00
55	9.47478E-01	4.67000E-01	9.30822E-01	3.05214E-03	0.00000E+00	0.00000E+00
56	8.96086E-01	4.72667E-01	9.30178E-01	3.06338E-03	0.00000E+00	0.00000E+00
57	9.55332E-01	4.78167E-01	9.30636E-01	3.04175E-03	0.00000E+00	0.00000E+00
58	9.01477E-01	4.84167E-01	9.30115E-01	3.03198E-03	0.00000E+00	0.00000E+00
59	9.68719E-01	4.90667E-01	9.30792E-01	3.05434E-03	0.00000E+00	0.00000E+00
60	9.44116E-01	4.96333E-01	9.31022E-01	3.01000E-03	0.00000E+00	0.00000E+00
61	9.70603E-01	5.02333E-01	9.31693E-01	3.03365E-03	0.00000E+00	0.00000E+00
62	9.74987E-01	5.08667E-01	9.32414E-01	3.06870E-03	0.00000E+00	0.00000E+00
63	9.66287E-01	5.14000E-01	9.32970E-01	3.06864E-03	0.00000E+00	0.00000E+00
64	9.98218E-01	5.19500E-01	9.34022E-01	3.19692E-03	0.00000E+00	0.00000E+00
65	9.03751E-01	5.25500E-01	9.33542E-01	3.18225E-03	0.00000E+00	0.00000E+00
66	9.39947E-01	5.31000E-01	9.33642E-01	3.13373E-03	0.00000E+00	0.00000E+00
67	9.08353E-01	5.36167E-01	9.33253E-01	3.10958E-03	0.00000E+00	0.00000E+00
68	8.77126E-01	5.41667E-01	9.32402E-01	3.17800E-03	0.00000E+00	0.00000E+00
69	9.29095E-01	5.47167E-01	9.32353E-01	3.13059E-03	0.00000E+00	0.00000E+00
70	9.21438E-01	5.52667E-01	9.32192E-01	3.08839E-03	0.00000E+00	0.00000E+00
71	8.74134E-01	5.58333E-01	9.31351E-01	3.15748E-03	0.00000E+00	0.00000E+00
72	8.91077E-01	5.64000E-01	9.30776E-01	3.16478E-03	0.00000E+00	0.00000E+00
73	9.16064E-01	5.69500E-01	9.30568E-01	3.12676E-03	0.00000E+00	0.00000E+00
74	8.34736E-01	5.75500E-01	9.29237E-01	3.35807E-03	0.00000E+00	0.00000E+00
75	9.23887E-01	5.80667E-01	9.29164E-01	3.31256E-03	0.00000E+00	0.00000E+00
76	8.99305E-01	5.86167E-01	9.28761E-01	3.29231E-03	0.00000E+00	0.00000E+00
77	9.04404E-01	5.92000E-01	9.28436E-01	3.26431E-03	0.00000E+00	0.00000E+00
78	9.35859E-01	5.97333E-01	9.28534E-01	3.22255E-03	0.00000E+00	0.00000E+00
79	9.20697E-01	6.02833E-01	9.28432E-01	3.18206E-03	0.00000E+00	0.00000E+00
80	9.24184E-01	6.08667E-01	9.28377E-01	3.14147E-03	0.00000E+00	0.00000E+00
81	8.82577E-01	6.14000E-01	9.27798E-01	3.15517E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	995 independent fission points were generated			
82	9.16213E-01	6.20333E-01	9.27653E-01	3.11884E-03	0.00000E+00	0.00000E+00
83	9.71904E-01	6.26833E-01	9.28199E-01	3.12817E-03	0.00000E+00	0.00000E+00
84	9.01160E-01	6.32333E-01	9.27869E-01	3.10733E-03	0.00000E+00	0.00000E+00
85	9.32183E-01	6.37500E-01	9.27921E-01	3.07011E-03	0.00000E+00	0.00000E+00
86	8.89863E-01	6.43500E-01	9.27468E-01	3.06699E-03	0.00000E+00	0.00000E+00
87	9.41233E-01	6.49167E-01	9.27630E-01	3.03501E-03	0.00000E+00	0.00000E+00
88	9.40371E-01	6.55000E-01	9.27778E-01	3.00317E-03	0.00000E+00	0.00000E+00
89	8.96275E-01	6.60333E-01	9.27416E-01	2.99046E-03	0.00000E+00	0.00000E+00
90	9.00947E-01	6.65833E-01	9.27115E-01	2.97154E-03	0.00000E+00	0.00000E+00
91	9.15540E-01	6.71333E-01	9.26985E-01	2.94084E-03	0.00000E+00	0.00000E+00
92	9.48990E-01	6.77000E-01	9.27230E-01	2.91824E-03	0.00000E+00	0.00000E+00
93	9.10532E-01	6.82833E-01	9.27046E-01	2.89182E-03	0.00000E+00	0.00000E+00
94	9.31520E-01	6.88500E-01	9.27095E-01	2.86063E-03	0.00000E+00	0.00000E+00
95	9.37211E-01	6.93667E-01	9.27204E-01	2.83179E-03	0.00000E+00	0.00000E+00
96	8.95707E-01	6.99000E-01	9.26869E-01	2.82147E-03	0.00000E+00	0.00000E+00
97	9.66426E-01	7.04167E-01	9.27285E-01	2.82250E-03	0.00000E+00	0.00000E+00
98	9.81679E-01	7.09833E-01	9.27852E-01	2.84984E-03	0.00000E+00	0.00000E+00
99	9.42439E-01	7.15667E-01	9.28002E-01	2.82431E-03	0.00000E+00	0.00000E+00

100	9.55969E-01	7.21333E-01	9.28287E-01	2.80987E-03	0.00000E+00	0.00000E+00
101	9.89784E-01	7.26833E-01	9.28909E-01	2.84987E-03	0.00000E+00	0.00000E+00
102	9.45093E-01	7.32500E-01	9.29070E-01	2.82586E-03	0.00000E+00	0.00000E+00
103	8.91043E-01	7.38333E-01	9.28694E-01	2.82296E-03	0.00000E+00	0.00000E+00
104	9.13188E-01	7.43667E-01	9.28542E-01	2.79928E-03	0.00000E+00	0.00000E+00
105	9.34475E-01	7.49167E-01	9.28600E-01	2.77257E-03	0.00000E+00	0.00000E+00
106	9.19885E-01	7.55167E-01	9.28516E-01	2.74706E-03	0.00000E+00	0.00000E+00
107	9.26841E-01	7.61167E-01	9.28500E-01	2.72082E-03	0.00000E+00	0.00000E+00
108	8.94408E-01	7.67167E-01	9.28178E-01	2.71415E-03	0.00000E+00	0.00000E+00
109	9.06478E-01	7.73500E-01	9.27975E-01	2.69630E-03	0.00000E+00	0.00000E+00
110	9.49573E-01	7.78833E-01	9.28175E-01	2.67869E-03	0.00000E+00	0.00000E+00
111	8.90725E-01	7.84833E-01	9.27832E-01	2.67615E-03	0.00000E+00	0.00000E+00
112	9.22578E-01	7.91167E-01	9.27784E-01	2.65214E-03	0.00000E+00	0.00000E+00
113	9.50963E-01	7.97167E-01	9.27993E-01	2.63642E-03	0.00000E+00	0.00000E+00
114	9.46858E-01	8.02333E-01	9.28161E-01	2.61820E-03	0.00000E+00	0.00000E+00
115	9.25000E-01	8.08333E-01	9.28133E-01	2.59508E-03	0.00000E+00	0.00000E+00
116	9.14906E-01	8.14000E-01	9.28017E-01	2.57483E-03	0.00000E+00	0.00000E+00
117	9.48560E-01	8.19333E-01	9.28196E-01	2.55859E-03	0.00000E+00	0.00000E+00
118	9.68528E-01	8.24500E-01	9.28544E-01	2.56015E-03	0.00000E+00	0.00000E+00
119	9.39540E-01	8.29667E-01	9.28638E-01	2.53992E-03	0.00000E+00	0.00000E+00
120	9.23657E-01	8.35333E-01	9.28595E-01	2.51865E-03	0.00000E+00	0.00000E+00
121	9.06068E-01	8.40667E-01	9.28406E-01	2.50456E-03	0.00000E+00	0.00000E+00
122	9.40137E-01	8.45833E-01	9.28504E-01	2.48553E-03	0.00000E+00	0.00000E+00
123	8.71200E-01	8.51833E-01	9.28030E-01	2.50998E-03	0.00000E+00	0.00000E+00
124	9.19589E-01	8.57333E-01	9.27961E-01	2.49029E-03	0.00000E+00	0.00000E+00
125	8.94910E-01	8.62500E-01	9.27692E-01	2.48453E-03	0.00000E+00	0.00000E+00
126	9.37890E-01	8.67667E-01	9.27775E-01	2.46578E-03	0.00000E+00	0.00000E+00
127	8.94901E-01	8.73667E-01	9.27512E-01	2.46008E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 996 independent fission points were generated

128	8.61979E-01	8.79667E-01	9.26991E-01	2.49528E-03	0.00000E+00	0.00000E+00
129	9.58544E-01	8.84833E-01	9.27240E-01	2.48799E-03	0.00000E+00	0.00000E+00
130	9.39879E-01	8.90667E-01	9.27339E-01	2.47045E-03	0.00000E+00	0.00000E+00
131	9.09590E-01	8.96667E-01	9.27201E-01	2.45508E-03	0.00000E+00	0.00000E+00
132	9.13558E-01	9.02667E-01	9.27096E-01	2.43838E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 975 independent fission points were generated

133	8.89267E-01	9.08500E-01	9.26807E-01	2.43687E-03	0.00000E+00	0.00000E+00
134	8.78228E-01	9.14000E-01	9.26439E-01	2.44618E-03	0.00000E+00	0.00000E+00
135	9.05797E-01	9.19500E-01	9.26284E-01	2.43267E-03	0.00000E+00	0.00000E+00
136	9.24253E-01	9.25000E-01	9.26269E-01	2.41450E-03	0.00000E+00	0.00000E+00
137	9.68521E-01	9.30667E-01	9.26582E-01	2.41690E-03	0.00000E+00	0.00000E+00
138	9.51103E-01	9.36167E-01	9.26762E-01	2.40583E-03	0.00000E+00	0.00000E+00
139	9.02223E-01	9.41667E-01	9.26583E-01	2.39491E-03	0.00000E+00	0.00000E+00
140	9.08645E-01	9.47167E-01	9.26453E-01	2.38104E-03	0.00000E+00	0.00000E+00
141	9.60379E-01	9.52667E-01	9.26697E-01	2.37642E-03	0.00000E+00	0.00000E+00
142	9.17213E-01	9.58500E-01	9.26629E-01	2.36035E-03	0.00000E+00	0.00000E+00
143	9.18253E-01	9.64500E-01	9.26570E-01	2.34430E-03	0.00000E+00	0.00000E+00
144	9.62484E-01	9.70333E-01	9.26823E-01	2.34144E-03	0.00000E+00	0.00000E+00
145	8.86723E-01	9.76500E-01	9.26543E-01	2.34186E-03	0.00000E+00	0.00000E+00
146	9.26461E-01	9.82500E-01	9.26542E-01	2.32554E-03	0.00000E+00	0.00000E+00
147	9.10370E-01	9.88000E-01	9.26430E-01	2.31213E-03	0.00000E+00	0.00000E+00
148	8.83873E-01	9.94333E-01	9.26139E-01	2.31467E-03	0.00000E+00	0.00000E+00
149	9.39249E-01	1.00000E+00	9.26228E-01	2.30060E-03	0.00000E+00	0.00000E+00
150	9.48109E-01	1.00550E+00	9.26376E-01	2.28978E-03	0.00000E+00	0.00000E+00
151	8.50444E-01	1.01117E+00	9.25866E-01	2.33075E-03	0.00000E+00	0.00000E+00
152	9.53540E-01	1.01667E+00	9.26051E-01	2.32250E-03	0.00000E+00	0.00000E+00
153	9.34577E-01	1.02233E+00	9.26107E-01	2.30776E-03	0.00000E+00	0.00000E+00
154	9.49476E-01	1.02817E+00	9.26261E-01	2.29768E-03	0.00000E+00	0.00000E+00
155	9.04943E-01	1.03383E+00	9.26122E-01	2.28686E-03	0.00000E+00	0.00000E+00
156	9.14361E-01	1.03933E+00	9.26045E-01	2.27325E-03	0.00000E+00	0.00000E+00
157	9.61316E-01	1.04450E+00	9.26273E-01	2.26997E-03	0.00000E+00	0.00000E+00
158	9.10754E-01	1.05000E+00	9.26173E-01	2.25756E-03	0.00000E+00	0.00000E+00
159	8.99743E-01	1.05550E+00	9.26005E-01	2.24944E-03	0.00000E+00	0.00000E+00
160	9.01309E-01	1.06100E+00	9.25849E-01	2.24062E-03	0.00000E+00	0.00000E+00
161	9.17332E-01	1.06633E+00	9.25795E-01	2.22713E-03	0.00000E+00	0.00000E+00
162	8.90797E-01	1.07183E+00	9.25576E-01	2.22395E-03	0.00000E+00	0.00000E+00
163	9.64656E-01	1.07700E+00	9.25819E-01	2.22338E-03	0.00000E+00	0.00000E+00
164	9.06712E-01	1.08233E+00	9.25701E-01	2.21276E-03	0.00000E+00	0.00000E+00
165	9.13356E-01	1.08767E+00	9.25626E-01	2.20044E-03	0.00000E+00	0.00000E+00
166	9.11140E-01	1.09317E+00	9.25537E-01	2.18877E-03	0.00000E+00	0.00000E+00
167	8.87843E-01	1.09867E+00	9.25309E-01	2.18743E-03	0.00000E+00	0.00000E+00
168	9.40139E-01	1.10417E+00	9.25398E-01	2.17604E-03	0.00000E+00	0.00000E+00
169	9.49215E-01	1.11017E+00	9.25541E-01	2.16767E-03	0.00000E+00	0.00000E+00
170	9.20926E-01	1.11583E+00	9.25513E-01	2.15490E-03	0.00000E+00	0.00000E+00
171	8.79995E-01	1.12167E+00	9.25244E-01	2.15898E-03	0.00000E+00	0.00000E+00
172	9.63486E-01	1.12700E+00	9.25469E-01	2.15800E-03	0.00000E+00	0.00000E+00
173	9.23737E-01	1.13283E+00	9.25459E-01	2.14537E-03	0.00000E+00	0.00000E+00
174	8.72346E-01	1.13833E+00	9.25150E-01	2.15510E-03	0.00000E+00	0.00000E+00
175	9.17290E-01	1.14367E+00	9.25104E-01	2.14308E-03	0.00000E+00	0.00000E+00
176	8.96066E-01	1.14967E+00	9.24938E-01	2.13726E-03	0.00000E+00	0.00000E+00
177	8.64742E-01	1.15567E+00	9.24594E-01	2.15267E-03	0.00000E+00	0.00000E+00
178	9.46483E-01	1.16083E+00	9.24718E-01	2.14401E-03	0.00000E+00	0.00000E+00
179	9.39677E-01	1.16583E+00	9.24803E-01	2.13354E-03	0.00000E+00	0.00000E+00
180	9.33514E-01	1.17133E+00	9.24851E-01	2.12209E-03	0.00000E+00	0.00000E+00
181	9.55407E-01	1.17650E+00	9.25022E-01	2.11709E-03	0.00000E+00	0.00000E+00
182	9.45132E-01	1.18167E+00	9.25134E-01	2.10826E-03	0.00000E+00	0.00000E+00
183	9.15054E-01	1.18717E+00	9.25078E-01	2.09732E-03	0.00000E+00	0.00000E+00
184	9.17592E-01	1.19300E+00	9.25037E-01	2.08617E-03	0.00000E+00	0.00000E+00
185	9.69227E-01	1.19817E+00	9.25279E-01	2.08874E-03	0.00000E+00	0.00000E+00
186	9.25846E-01	1.20383E+00	9.25282E-01	2.07736E-03	0.00000E+00	0.00000E+00
187	9.09374E-01	1.20967E+00	9.25196E-01	2.06789E-03	0.00000E+00	0.00000E+00
188	9.77457E-01	1.21533E+00	9.25477E-01	2.07585E-03	0.00000E+00	0.00000E+00
189	9.03168E-01	1.22083E+00	9.25357E-01	2.06816E-03	0.00000E+00	0.00000E+00
190	9.98309E-01	1.22650E+00	9.25745E-01	2.09341E-03	0.00000E+00	0.00000E+00
191	8.63850E-01	1.23250E+00	9.25418E-01	2.10790E-03	0.00000E+00	0.00000E+00
192	9.41404E-01	1.23850E+00	9.25502E-01	2.09846E-03	0.00000E+00	0.00000E+00
193	8.99966E-01	1.24417E+00	9.25368E-01	2.09172E-03	0.00000E+00	0.00000E+00
194	9.39660E-01	1.25000E+00	9.25443E-01	2.08213E-03	0.00000E+00	0.00000E+00
195	9.20673E-01	1.25550E+00	9.25418E-01	2.07146E-03	0.00000E+00	0.00000E+00
196	9.07996E-01	1.26083E+00	9.25328E-01	2.06271E-03	0.00000E+00	0.00000E+00
197	8.91512E-01	1.26633E+00	9.25155E-01	2.05942E-03	0.00000E+00	0.00000E+00
198	9.21165E-01	1.27217E+00	9.25134E-01	2.04899E-03	0.00000E+00	0.00000E+00
199	9.83227E-01	1.27817E+00	9.25429E-01	2.05978E-03	0.00000E+00	0.00000E+00
200	8.69781E-01	1.28417E+00	9.25148E-01	2.06853E-03	0.00000E+00	0.00000E+00
201	9.94297E-01	1.29000E+00	9.25496E-01	2.08724E-03	0.00000E+00	0.00000E+00
202	9.46576E-01	1.29583E+00	9.25601E-01	2.07945E-03	0.00000E+00	0.00000E+00

203	9.10945E-01	1.30150E+00	9.25528E-01	2.07036E-03	0.00000E+00	0.00000E+00
204	9.57816E-01	1.30733E+00	9.25688E-01	2.06628E-03	0.00000E+00	0.00000E+00
205	9.05364E-01	1.31350E+00	9.25588E-01	2.05851E-03	0.00000E+00	0.00000E+00
206	9.16404E-01	1.31917E+00	9.25543E-01	2.04889E-03	0.00000E+00	0.00000E+00
207	9.41225E-01	1.32500E+00	9.25619E-01	2.04030E-03	0.00000E+00	0.00000E+00
208	9.20387E-01	1.33150E+00	9.25594E-01	2.03053E-03	0.00000E+00	0.00000E+00
209	9.00695E-01	1.33700E+00	9.25474E-01	2.02428E-03	0.00000E+00	0.00000E+00
210	9.51485E-01	1.34300E+00	9.25599E-01	2.01840E-03	0.00000E+00	0.00000E+00
211	9.30910E-01	1.34867E+00	9.25624E-01	2.00888E-03	0.00000E+00	0.00000E+00
212	9.75177E-01	1.35467E+00	9.25860E-01	2.01317E-03	0.00000E+00	0.00000E+00
213	9.26760E-01	1.36033E+00	9.25864E-01	2.00361E-03	0.00000E+00	0.00000E+00
214	9.62213E-01	1.36583E+00	9.26036E-01	2.00149E-03	0.00000E+00	0.00000E+00
215	9.46621E-01	1.37167E+00	9.26133E-01	1.99442E-03	0.00000E+00	0.00000E+00
216	9.20372E-01	1.37700E+00	9.26106E-01	1.98526E-03	0.00000E+00	0.00000E+00
217	9.21033E-01	1.38250E+00	9.26082E-01	1.97614E-03	0.00000E+00	0.00000E+00
218	9.36007E-01	1.38767E+00	9.26128E-01	1.96751E-03	0.00000E+00	0.00000E+00
219	9.32070E-01	1.39417E+00	9.26155E-01	1.95861E-03	0.00000E+00	0.00000E+00
220	9.34192E-01	1.40017E+00	9.26192E-01	1.94996E-03	0.00000E+00	0.00000E+00
221	9.65163E-01	1.40617E+00	9.26370E-01	1.94917E-03	0.00000E+00	0.00000E+00
222	9.54655E-01	1.41117E+00	9.26499E-01	1.94455E-03	0.00000E+00	0.00000E+00
223	9.17217E-01	1.41667E+00	9.26457E-01	1.93618E-03	0.00000E+00	0.00000E+00
224	9.41998E-01	1.42267E+00	9.26527E-01	1.92871E-03	0.00000E+00	0.00000E+00
225	9.05025E-01	1.42783E+00	9.26430E-01	1.92246E-03	0.00000E+00	0.00000E+00
226	9.57804E-01	1.43300E+00	9.26570E-01	1.91898E-03	0.00000E+00	0.00000E+00
227	9.77387E-01	1.43883E+00	9.26796E-01	1.92374E-03	0.00000E+00	0.00000E+00
228	9.36581E-01	1.44417E+00	9.26840E-01	1.91570E-03	0.00000E+00	0.00000E+00
229	9.38495E-01	1.44950E+00	9.26891E-01	1.90793E-03	0.00000E+00	0.00000E+00
230	9.26217E-01	1.45467E+00	9.26888E-01	1.89954E-03	0.00000E+00	0.00000E+00
231	9.58211E-01	1.45983E+00	9.27025E-01	1.89617E-03	0.00000E+00	0.00000E+00
232	8.96555E-01	1.46533E+00	9.26892E-01	1.89255E-03	0.00000E+00	0.00000E+00
233	9.06122E-01	1.47133E+00	9.26802E-01	1.88648E-03	0.00000E+00	0.00000E+00
234	9.14125E-01	1.47783E+00	9.26748E-01	1.87913E-03	0.00000E+00	0.00000E+00
235	9.36741E-01	1.48467E+00	9.26791E-01	1.87154E-03	0.00000E+00	0.00000E+00
236	9.56185E-01	1.49067E+00	9.26916E-01	1.86775E-03	0.00000E+00	0.00000E+00
237	8.99051E-01	1.49600E+00	9.26798E-01	1.86356E-03	0.00000E+00	0.00000E+00
238	9.32027E-01	1.50150E+00	9.26820E-01	1.85578E-03	0.00000E+00	0.00000E+00
239	9.36067E-01	1.50700E+00	9.26859E-01	1.84835E-03	0.00000E+00	0.00000E+00
240	9.30957E-01	1.51300E+00	9.26876E-01	1.84065E-03	0.00000E+00	0.00000E+00
241	9.31231E-01	1.51900E+00	9.26894E-01	1.83302E-03	0.00000E+00	0.00000E+00
242	9.86097E-01	1.52417E+00	9.27141E-01	1.84196E-03	0.00000E+00	0.00000E+00
243	8.72849E-01	1.52983E+00	9.26916E-01	1.84808E-03	0.00000E+00	0.00000E+00
244	8.98589E-01	1.53567E+00	9.26799E-01	1.84415E-03	0.00000E+00	0.00000E+00
245	9.43219E-01	1.54117E+00	9.26866E-01	1.83779E-03	0.00000E+00	0.00000E+00
246	8.74339E-01	1.54767E+00	9.26651E-01	1.84286E-03	0.00000E+00	0.00000E+00
247	9.34308E-01	1.55317E+00	9.26682E-01	1.83558E-03	0.00000E+00	0.00000E+00
248	8.66919E-01	1.55933E+00	9.26439E-01	1.84418E-03	0.00000E+00	0.00000E+00
249	9.43954E-01	1.56483E+00	9.26510E-01	1.83807E-03	0.00000E+00	0.00000E+00
250	9.10688E-01	1.57050E+00	9.26446E-01	1.83175E-03	0.00000E+00	0.00000E+00
251	9.16090E-01	1.57600E+00	9.26405E-01	1.82485E-03	0.00000E+00	0.00000E+00
252	9.46965E-01	1.58117E+00	9.26487E-01	1.81940E-03	0.00000E+00	0.00000E+00
253	8.77055E-01	1.58650E+00	9.26290E-01	1.82281E-03	0.00000E+00	0.00000E+00
254	9.29653E-01	1.59167E+00	9.26303E-01	1.81561E-03	0.00000E+00	0.00000E+00
255	9.39745E-01	1.59683E+00	9.26356E-01	1.80920E-03	0.00000E+00	0.00000E+00
256	9.17861E-01	1.60183E+00	9.26323E-01	1.80237E-03	0.00000E+00	0.00000E+00
257	8.83835E-01	1.60783E+00	9.26156E-01	1.80300E-03	0.00000E+00	0.00000E+00
258	9.47193E-01	1.61300E+00	9.26239E-01	1.79783E-03	0.00000E+00	0.00000E+00
259	9.63266E-01	1.61850E+00	9.26383E-01	1.79660E-03	0.00000E+00	0.00000E+00
260	9.57771E-01	1.62400E+00	9.26504E-01	1.79376E-03	0.00000E+00	0.00000E+00
261	8.81707E-01	1.62967E+00	9.26331E-01	1.79517E-03	0.00000E+00	0.00000E+00
262	9.42578E-01	1.63567E+00	9.26394E-01	1.78934E-03	0.00000E+00	0.00000E+00
263	8.53879E-01	1.64117E+00	9.26116E-01	1.80400E-03	0.00000E+00	0.00000E+00
264	9.22660E-01	1.64650E+00	9.26103E-01	1.79715E-03	0.00000E+00	0.00000E+00
265	9.23725E-01	1.65183E+00	9.26094E-01	1.79032E-03	0.00000E+00	0.00000E+00
266	9.18686E-01	1.65733E+00	9.26066E-01	1.78375E-03	0.00000E+00	0.00000E+00
267	9.49106E-01	1.66250E+00	9.26153E-01	1.77913E-03	0.00000E+00	0.00000E+00
268	9.19235E-01	1.66800E+00	9.26127E-01	1.77262E-03	0.00000E+00	0.00000E+00
269	9.84093E-01	1.67317E+00	9.26344E-01	1.77926E-03	0.00000E+00	0.00000E+00
270	9.45783E-01	1.67833E+00	9.26416E-01	1.77410E-03	0.00000E+00	0.00000E+00
271	9.33626E-01	1.68350E+00	9.26443E-01	1.76769E-03	0.00000E+00	0.00000E+00
272	9.66591E-01	1.68900E+00	9.26592E-01	1.76740E-03	0.00000E+00	0.00000E+00
273	9.20179E-01	1.69483E+00	9.26568E-01	1.76102E-03	0.00000E+00	0.00000E+00
274	9.68538E-01	1.70000E+00	9.26722E-01	1.76131E-03	0.00000E+00	0.00000E+00
275	9.39328E-01	1.70517E+00	9.26769E-01	1.75545E-03	0.00000E+00	0.00000E+00
276	9.79748E-01	1.71083E+00	9.26962E-01	1.75969E-03	0.00000E+00	0.00000E+00
277	9.54827E-01	1.71583E+00	9.27063E-01	1.75621E-03	0.00000E+00	0.00000E+00
278	8.90022E-01	1.72217E+00	9.26929E-01	1.75497E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 988 independent fission points were generated

279	9.08444E-01	1.72783E+00	9.26862E-01	1.74990E-03	0.00000E+00	0.00000E+00
280	8.92798E-01	1.73383E+00	9.26740E-01	1.74789E-03	0.00000E+00	0.00000E+00
281	8.89005E-01	1.73933E+00	9.26605E-01	1.74686E-03	0.00000E+00	0.00000E+00
282	9.82515E-01	1.74450E+00	9.26804E-01	1.75202E-03	0.00000E+00	0.00000E+00
283	9.45497E-01	1.75017E+00	9.26871E-01	1.74704E-03	0.00000E+00	0.00000E+00
284	9.41958E-01	1.75617E+00	9.26924E-01	1.74166E-03	0.00000E+00	0.00000E+00
285	9.29464E-01	1.76167E+00	9.26933E-01	1.73552E-03	0.00000E+00	0.00000E+00
286	8.88266E-01	1.76767E+00	9.26797E-01	1.73475E-03	0.00000E+00	0.00000E+00
287	9.34792E-01	1.77317E+00	9.26825E-01	1.72888E-03	0.00000E+00	0.00000E+00
288	9.79553E-01	1.77800E+00	9.27010E-01	1.73266E-03	0.00000E+00	0.00000E+00
289	9.70476E-01	1.78350E+00	9.27161E-01	1.73324E-03	0.00000E+00	0.00000E+00
290	9.01780E-01	1.78900E+00	9.27073E-01	1.72946E-03	0.00000E+00	0.00000E+00
291	9.24139E-01	1.79467E+00	9.27063E-01	1.72349E-03	0.00000E+00	0.00000E+00
292	9.15013E-01	1.80050E+00	9.27021E-01	1.71804E-03	0.00000E+00	0.00000E+00
293	9.40550E-01	1.80667E+00	9.27068E-01	1.71276E-03	0.00000E+00	0.00000E+00
294	9.70417E-01	1.81250E+00	9.27216E-01	1.71333E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 962 independent fission points were generated

295	8.85187E-01	1.81817E+00	9.27073E-01	1.71349E-03	0.00000E+00	0.00000E+00
296	9.03888E-01	1.82450E+00	9.26994E-01	1.70947E-03	0.00000E+00	0.00000E+00
297	9.65917E-01	1.83100E+00	9.27126E-01	1.70876E-03	0.00000E+00	0.00000E+00
298	9.34717E-01	1.83633E+00	9.27151E-01	1.70317E-03	0.00000E+00	0.00000E+00
299	9.46306E-01	1.84217E+00	9.27216E-01	1.69866E-03	0.00000E+00	0.00000E+00
300	9.32027E-01	1.84733E+00	9.27232E-01	1.69302E-03	0.00000E+00	0.00000E+00
301	9.12325E-01	1.85250E+00	9.27182E-01	1.68809E-03	0.00000E+00	0.00000E+00
302	9.74313E-01	1.85750E+00	9.27339E-01	1.68977E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 994 independent fission points were generated

303	8.80831E-01	1.86300E+00	9.27185E-01	1.69122E-03	0.00000E+00	0.00000E+00
304	9.54988E-01	1.86817E+00	9.27277E-01	1.68812E-03	0.00000E+00	0.00000E+00

305	9.93289E-01	1.87367E+00	9.27495E-01	1.69659E-03	0.00000E+00	0.00000E+00
306	9.50186E-01	1.87917E+00	9.27569E-01	1.69264E-03	0.00000E+00	0.00000E+00
307	9.54768E-01	1.88467E+00	9.27658E-01	1.68944E-03	0.00000E+00	0.00000E+00
308	9.30067E-01	1.89033E+00	9.27666E-01	1.68393E-03	0.00000E+00	0.00000E+00
309	9.24227E-01	1.89600E+00	9.27655E-01	1.67847E-03	0.00000E+00	0.00000E+00
310	8.95075E-01	1.90200E+00	9.27549E-01	1.67635E-03	0.00000E+00	0.00000E+00
311	9.76805E-01	1.90750E+00	9.27709E-01	1.67851E-03	0.00000E+00	0.00000E+00
312	9.50372E-01	1.91383E+00	9.27782E-01	1.67468E-03	0.00000E+00	0.00000E+00
313	9.31722E-01	1.91950E+00	9.27795E-01	1.66933E-03	0.00000E+00	0.00000E+00
314	9.24867E-01	1.92550E+00	9.27785E-01	1.66400E-03	0.00000E+00	0.00000E+00
315	9.28059E-01	1.93150E+00	9.27786E-01	1.65868E-03	0.00000E+00	0.00000E+00
316	9.11655E-01	1.93700E+00	9.27735E-01	1.65418E-03	0.00000E+00	0.00000E+00
317	8.93717E-01	1.94267E+00	9.27627E-01	1.65246E-03	0.00000E+00	0.00000E+00
318	8.77828E-01	1.94883E+00	9.27469E-01	1.65474E-03	0.00000E+00	0.00000E+00
319	9.22386E-01	1.95467E+00	9.27453E-01	1.64959E-03	0.00000E+00	0.00000E+00
320	8.99336E-01	1.96017E+00	9.27365E-01	1.64677E-03	0.00000E+00	0.00000E+00
321	8.64920E-01	1.96617E+00	9.27169E-01	1.65323E-03	0.00000E+00	0.00000E+00
322	9.19711E-01	1.97217E+00	9.27146E-01	1.64822E-03	0.00000E+00	0.00000E+00
323	9.55843E-01	1.97783E+00	9.27235E-01	1.64551E-03	0.00000E+00	0.00000E+00
324	9.67453E-01	1.98350E+00	9.27360E-01	1.64514E-03	0.00000E+00	0.00000E+00
325	9.12622E-01	1.98900E+00	9.27314E-01	1.64067E-03	0.00000E+00	0.00000E+00
326	9.67268E-01	1.99450E+00	9.27438E-01	1.64024E-03	0.00000E+00	0.00000E+00
327	9.26705E-01	2.00017E+00	9.27435E-01	1.63519E-03	0.00000E+00	0.00000E+00
328	9.35530E-01	2.00567E+00	9.27460E-01	1.63035E-03	0.00000E+00	0.00000E+00
329	9.02212E-01	2.01117E+00	9.27383E-01	1.62719E-03	0.00000E+00	0.00000E+00
330	9.36837E-01	2.01667E+00	9.27412E-01	1.62248E-03	0.00000E+00	0.00000E+00
331	8.96020E-01	2.02233E+00	9.27316E-01	1.62035E-03	0.00000E+00	0.00000E+00
332	9.34533E-01	2.02783E+00	9.27338E-01	1.61558E-03	0.00000E+00	0.00000E+00
333	8.98586E-01	2.03350E+00	9.27251E-01	1.61304E-03	0.00000E+00	0.00000E+00
334	9.23133E-01	2.03983E+00	9.27239E-01	1.60822E-03	0.00000E+00	0.00000E+00
335	9.68228E-01	2.04500E+00	9.27362E-01	1.60810E-03	0.00000E+00	0.00000E+00
336	9.34739E-01	2.05067E+00	9.27384E-01	1.60343E-03	0.00000E+00	0.00000E+00
337	9.32906E-01	2.05600E+00	9.27401E-01	1.59872E-03	0.00000E+00	0.00000E+00
338	9.22548E-01	2.06167E+00	9.27386E-01	1.59402E-03	0.00000E+00	0.00000E+00
339	9.57475E-01	2.06683E+00	9.27475E-01	1.59179E-03	0.00000E+00	0.00000E+00
340	9.46589E-01	2.07267E+00	9.27532E-01	1.58808E-03	0.00000E+00	0.00000E+00
341	8.93869E-01	2.07883E+00	9.27433E-01	1.58650E-03	0.00000E+00	0.00000E+00
342	9.27619E-01	2.08433E+00	9.27433E-01	1.58183E-03	0.00000E+00	0.00000E+00
343	9.28694E-01	2.08983E+00	9.27437E-01	1.57719E-03	0.00000E+00	0.00000E+00
344	9.08820E-01	2.09550E+00	9.27382E-01	1.57351E-03	0.00000E+00	0.00000E+00
345	9.09548E-01	2.10100E+00	9.27330E-01	1.56978E-03	0.00000E+00	0.00000E+00
346	9.09483E-01	2.10667E+00	9.27279E-01	1.56607E-03	0.00000E+00	0.00000E+00
347	9.21504E-01	2.11217E+00	9.27262E-01	1.56161E-03	0.00000E+00	0.00000E+00
348	9.36754E-01	2.11733E+00	9.27289E-01	1.55733E-03	0.00000E+00	0.00000E+00
349	9.26897E-01	2.12283E+00	9.27288E-01	1.55284E-03	0.00000E+00	0.00000E+00
350	9.26882E-01	2.12800E+00	9.27287E-01	1.54837E-03	0.00000E+00	0.00000E+00
351	9.53821E-01	2.13350E+00	9.27363E-01	1.54580E-03	0.00000E+00	0.00000E+00
352	9.39607E-01	2.13933E+00	9.27398E-01	1.54177E-03	0.00000E+00	0.00000E+00
353	9.22438E-01	2.14550E+00	9.27384E-01	1.53744E-03	0.00000E+00	0.00000E+00
354	8.99694E-01	2.15117E+00	9.27305E-01	1.53508E-03	0.00000E+00	0.00000E+00
355	8.88011E-01	2.15717E+00	9.27194E-01	1.53477E-03	0.00000E+00	0.00000E+00
356	9.14432E-01	2.16267E+00	9.27158E-01	1.53085E-03	0.00000E+00	0.00000E+00
357	9.26576E-01	2.16817E+00	9.27156E-01	1.52653E-03	0.00000E+00	0.00000E+00
358	9.09977E-01	2.17450E+00	9.27108E-01	1.52300E-03	0.00000E+00	0.00000E+00
359	9.57048E-01	2.17983E+00	9.27192E-01	1.52105E-03	0.00000E+00	0.00000E+00
360	9.12311E-01	2.18533E+00	9.27150E-01	1.51736E-03	0.00000E+00	0.00000E+00
361	9.93252E-01	2.19117E+00	9.27334E-01	1.52429E-03	0.00000E+00	0.00000E+00
362	9.52350E-01	2.19683E+00	9.27404E-01	1.52164E-03	0.00000E+00	0.00000E+00
363	9.64937E-01	2.20200E+00	9.27508E-01	1.52097E-03	0.00000E+00	0.00000E+00
364	9.57178E-01	2.20750E+00	9.27590E-01	1.51898E-03	0.00000E+00	0.00000E+00
365	9.23544E-01	2.21317E+00	9.27579E-01	1.51483E-03	0.00000E+00	0.00000E+00
366	9.24001E-01	2.21850E+00	9.27569E-01	1.51070E-03	0.00000E+00	0.00000E+00
367	9.60732E-01	2.22383E+00	9.27660E-01	1.50929E-03	0.00000E+00	0.00000E+00
368	9.37109E-01	2.22933E+00	9.27686E-01	1.50538E-03	0.00000E+00	0.00000E+00
369	9.61634E-01	2.23483E+00	9.27778E-01	1.50412E-03	0.00000E+00	0.00000E+00
370	9.62992E-01	2.24033E+00	9.27874E-01	1.50308E-03	0.00000E+00	0.00000E+00
371	9.51629E-01	2.24550E+00	9.27938E-01	1.50038E-03	0.00000E+00	0.00000E+00
372	9.34330E-01	2.25117E+00	9.27955E-01	1.49642E-03	0.00000E+00	0.00000E+00
373	9.00244E-01	2.25650E+00	9.27881E-01	1.49425E-03	0.00000E+00	0.00000E+00
374	9.11427E-01	2.26217E+00	9.27836E-01	1.49088E-03	0.00000E+00	0.00000E+00
375	9.33442E-01	2.26783E+00	9.27851E-01	1.48695E-03	0.00000E+00	0.00000E+00
376	9.44764E-01	2.27317E+00	9.27897E-01	1.48366E-03	0.00000E+00	0.00000E+00
377	9.36783E-01	2.27883E+00	9.27920E-01	1.47989E-03	0.00000E+00	0.00000E+00
378	8.98882E-01	2.28433E+00	9.27843E-01	1.47797E-03	0.00000E+00	0.00000E+00
379	9.59961E-01	2.28983E+00	9.27928E-01	1.47650E-03	0.00000E+00	0.00000E+00
380	9.30169E-01	2.29500E+00	9.27934E-01	1.47260E-03	0.00000E+00	0.00000E+00
381	9.06722E-01	2.30017E+00	9.27878E-01	1.46978E-03	0.00000E+00	0.00000E+00
382	9.24791E-01	2.30533E+00	9.27870E-01	1.46593E-03	0.00000E+00	0.00000E+00
383	9.27796E-01	2.31083E+00	9.27870E-01	1.46208E-03	0.00000E+00	0.00000E+00
384	9.26322E-01	2.31633E+00	9.27866E-01	1.45825E-03	0.00000E+00	0.00000E+00
385	8.99612E-01	2.32200E+00	9.27792E-01	1.45631E-03	0.00000E+00	0.00000E+00
386	9.29102E-01	2.32750E+00	9.27796E-01	1.45251E-03	0.00000E+00	0.00000E+00
387	9.24357E-01	2.33283E+00	9.27787E-01	1.44876E-03	0.00000E+00	0.00000E+00
388	9.13548E-01	2.33817E+00	9.27750E-01	1.44548E-03	0.00000E+00	0.00000E+00
389	9.13102E-01	2.34350E+00	9.27712E-01	1.44223E-03	0.00000E+00	0.00000E+00
390	8.69521E-01	2.34917E+00	9.27562E-01	1.44631E-03	0.00000E+00	0.00000E+00
391	8.95363E-01	2.35467E+00	9.27479E-01	1.44496E-03	0.00000E+00	0.00000E+00
392	9.47910E-01	2.36017E+00	9.27532E-01	1.44220E-03	0.00000E+00	0.00000E+00
393	9.60271E-01	2.36550E+00	9.27615E-01	1.44094E-03	0.00000E+00	0.00000E+00
394	9.64649E-01	2.37100E+00	9.27710E-01	1.44036E-03	0.00000E+00	0.00000E+00
395	9.13969E-01	2.37683E+00	9.27675E-01	1.43712E-03	0.00000E+00	0.00000E+00
396	9.27332E-01	2.38217E+00	9.27674E-01	1.43347E-03	0.00000E+00	0.00000E+00
397	9.52380E-01	2.38767E+00	9.27736E-01	1.43120E-03	0.00000E+00	0.00000E+00
398	9.20324E-01	2.39317E+00	9.27718E-01	1.42770E-03	0.00000E+00	0.00000E+00
399	9.68280E-01	2.39867E+00	9.27820E-01	1.42776E-03	0.00000E+00	0.00000E+00
400	9.28596E-01	2.40383E+00	9.27822E-01	1.42417E-03	0.00000E+00	0.00000E+00
401	9.28364E-01	2.41033E+00	9.27823E-01	1.42060E-03	0.00000E+00	0.00000E+00
402	9.14966E-01	2.41550E+00	9.27791E-01	1.41741E-03	0.00000E+00	0.00000E+00
403	9.52709E-01	2.42200E+00	9.27853E-01	1.41523E-03	0.00000E+00	0.00000E+00
404	9.24566E-01	2.42783E+00	9.27845E-01	1.41173E-03	0.00000E+00	0.00000E+00
405	9.44328E-01	2.43333E+00	9.27886E-01	1.40882E-03	0.00000E+00	0.00000E+00
406	9.09423E-01	2.43867E+00	9.27840E-01	1.40607E-03	0.00000E+00	0.00000E+00
407	9.03597E-01	2.44467E+00	9.27780E-01	1.40387E-03	0.00000E+00	0.00000E+00
408	9.56584E-01	2.45617E+00	9.27851E-01	1.40221E-03	0.00000E+00	0.00000E+00
409	8.91133E-01	2.46183E+00	9.27761E-01	1.40166E-03	0.00000E+00	0.00000E+00

410	9.49704E-01	2.46783E+00	9.27815E-01	1.39926E-03	0.00000E+00	0.00000E+00
411	9.23297E-01	2.47367E+00	9.27804E-01	1.39587E-03	0.00000E+00	0.00000E+00
412	9.50132E-01	2.47850E+00	9.27858E-01	1.39353E-03	0.00000E+00	0.00000E+00
413	9.34767E-01	2.48450E+00	9.27875E-01	1.39024E-03	0.00000E+00	0.00000E+00
414	9.37723E-01	2.48983E+00	9.27899E-01	1.38706E-03	0.00000E+00	0.00000E+00
415	9.17397E-01	2.49550E+00	9.27874E-01	1.38394E-03	0.00000E+00	0.00000E+00
416	8.93246E-01	2.50067E+00	9.27790E-01	1.38312E-03	0.00000E+00	0.00000E+00
417	9.68970E-01	2.50667E+00	9.27889E-01	1.38335E-03	0.00000E+00	0.00000E+00
418	9.29130E-01	2.51267E+00	9.27892E-01	1.38002E-03	0.00000E+00	0.00000E+00
419	9.35490E-01	2.51850E+00	9.27910E-01	1.37683E-03	0.00000E+00	0.00000E+00
420	9.34214E-01	2.52367E+00	9.27925E-01	1.37361E-03	0.00000E+00	0.00000E+00
421	9.64755E-01	2.52917E+00	9.28013E-01	1.37315E-03	0.00000E+00	0.00000E+00
422	9.21092E-01	2.53450E+00	9.27997E-01	1.36997E-03	0.00000E+00	0.00000E+00
423	9.18251E-01	2.54050E+00	9.27974E-01	1.36691E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 992 independent fission points were generated

424	8.98718E-01	2.54633E+00	9.27904E-01	1.36543E-03	0.00000E+00	0.00000E+00
425	9.08919E-01	2.55183E+00	9.27860E-01	1.36294E-03	0.00000E+00	0.00000E+00
426	9.01117E-01	2.55717E+00	9.27796E-01	1.36118E-03	0.00000E+00	0.00000E+00
427	9.08556E-01	2.56300E+00	9.27751E-01	1.35873E-03	0.00000E+00	0.00000E+00
428	9.76392E-01	2.56850E+00	9.27865E-01	1.36034E-03	0.00000E+00	0.00000E+00
429	9.66711E-01	2.57383E+00	9.27956E-01	1.36019E-03	0.00000E+00	0.00000E+00
430	9.32352E-01	2.57917E+00	9.27967E-01	1.35705E-03	0.00000E+00	0.00000E+00
431	9.76814E-01	2.58433E+00	9.28080E-01	1.35866E-03	0.00000E+00	0.00000E+00
432	9.47276E-01	2.58983E+00	9.28125E-01	1.35623E-03	0.00000E+00	0.00000E+00
433	9.05311E-01	2.59517E+00	9.28072E-01	1.35412E-03	0.00000E+00	0.00000E+00
434	9.06946E-01	2.60067E+00	9.28023E-01	1.35186E-03	0.00000E+00	0.00000E+00
435	9.03183E-01	2.60600E+00	9.27966E-01	1.34996E-03	0.00000E+00	0.00000E+00
436	9.27708E-01	2.61167E+00	9.27965E-01	1.34684E-03	0.00000E+00	0.00000E+00
437	9.14565E-01	2.61717E+00	9.27934E-01	1.34410E-03	0.00000E+00	0.00000E+00
438	8.90510E-01	2.62267E+00	9.27849E-01	1.34375E-03	0.00000E+00	0.00000E+00
439	9.30516E-01	2.62783E+00	9.27855E-01	1.34069E-03	0.00000E+00	0.00000E+00
440	9.52200E-01	2.63300E+00	9.27910E-01	1.33878E-03	0.00000E+00	0.00000E+00
441	9.47972E-01	2.63817E+00	9.27956E-01	1.33651E-03	0.00000E+00	0.00000E+00
442	9.07289E-01	2.64367E+00	9.27909E-01	1.33429E-03	0.00000E+00	0.00000E+00
443	8.93643E-01	2.64933E+00	9.27831E-01	1.33353E-03	0.00000E+00	0.00000E+00
444	9.55849E-01	2.65483E+00	9.27895E-01	1.33202E-03	0.00000E+00	0.00000E+00
445	9.21608E-01	2.66067E+00	9.27881E-01	1.32909E-03	0.00000E+00	0.00000E+00
446	9.27709E-01	2.66550E+00	9.27880E-01	1.32609E-03	0.00000E+00	0.00000E+00
447	9.31660E-01	2.67133E+00	9.27889E-01	1.32313E-03	0.00000E+00	0.00000E+00
448	9.35553E-01	2.67733E+00	9.27906E-01	1.32027E-03	0.00000E+00	0.00000E+00
449	8.97831E-01	2.68267E+00	9.27839E-01	1.31903E-03	0.00000E+00	0.00000E+00
450	1.00351E+00	2.68817E+00	9.28008E-01	1.32688E-03	0.00000E+00	0.00000E+00
451	9.20058E-01	2.69417E+00	9.27990E-01	1.32404E-03	0.00000E+00	0.00000E+00
452	9.42486E-01	2.70000E+00	9.28022E-01	1.32149E-03	0.00000E+00	0.00000E+00
453	9.16112E-01	2.70533E+00	9.27996E-01	1.31882E-03	0.00000E+00	0.00000E+00
454	9.25740E-01	2.71133E+00	9.27991E-01	1.31591E-03	0.00000E+00	0.00000E+00
455	8.90240E-01	2.71733E+00	9.27907E-01	1.31564E-03	0.00000E+00	0.00000E+00
456	8.97570E-01	2.72317E+00	9.27840E-01	1.31444E-03	0.00000E+00	0.00000E+00
457	8.67781E-01	2.72917E+00	9.27708E-01	1.31818E-03	0.00000E+00	0.00000E+00
458	9.45028E-01	2.73433E+00	9.27746E-01	1.31583E-03	0.00000E+00	0.00000E+00
459	9.52455E-01	2.73950E+00	9.27801E-01	1.31406E-03	0.00000E+00	0.00000E+00
460	9.63439E-01	2.74500E+00	9.27878E-01	1.31349E-03	0.00000E+00	0.00000E+00
461	9.31013E-01	2.75100E+00	9.27885E-01	1.31065E-03	0.00000E+00	0.00000E+00
462	9.02048E-01	2.75650E+00	9.27829E-01	1.30900E-03	0.00000E+00	0.00000E+00
463	8.83284E-01	2.76250E+00	9.27732E-01	1.30973E-03	0.00000E+00	0.00000E+00
464	9.93594E-01	2.76783E+00	9.27875E-01	1.31464E-03	0.00000E+00	0.00000E+00
465	8.72563E-01	2.77333E+00	9.27755E-01	1.31723E-03	0.00000E+00	0.00000E+00
466	9.39426E-01	2.77883E+00	9.27781E-01	1.31463E-03	0.00000E+00	0.00000E+00
467	9.32585E-01	2.78433E+00	9.27791E-01	1.31184E-03	0.00000E+00	0.00000E+00
468	8.86701E-01	2.79000E+00	9.27703E-01	1.31199E-03	0.00000E+00	0.00000E+00
469	9.06260E-01	2.79550E+00	9.27657E-01	1.30998E-03	0.00000E+00	0.00000E+00
470	9.28398E-01	2.80067E+00	9.27658E-01	1.30718E-03	0.00000E+00	0.00000E+00
471	9.26112E-01	2.80617E+00	9.27655E-01	1.30439E-03	0.00000E+00	0.00000E+00
472	9.14949E-01	2.81133E+00	9.27628E-01	1.30189E-03	0.00000E+00	0.00000E+00
473	9.26642E-01	2.81683E+00	9.27626E-01	1.29913E-03	0.00000E+00	0.00000E+00
474	9.26413E-01	2.82200E+00	9.27623E-01	1.29638E-03	0.00000E+00	0.00000E+00
475	9.19906E-01	2.82750E+00	9.27607E-01	1.29373E-03	0.00000E+00	0.00000E+00
476	9.26214E-01	2.83250E+00	9.27604E-01	1.29101E-03	0.00000E+00	0.00000E+00
477	8.82767E-01	2.83817E+00	9.27510E-01	1.29174E-03	0.00000E+00	0.00000E+00
478	9.27886E-01	2.84333E+00	9.27511E-01	1.28902E-03	0.00000E+00	0.00000E+00
479	9.33470E-01	2.84867E+00	9.27523E-01	1.28638E-03	0.00000E+00	0.00000E+00
480	9.21863E-01	2.85417E+00	9.27511E-01	1.28374E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 968 independent fission points were generated

481	8.84089E-01	2.85950E+00	9.27421E-01	1.28426E-03	0.00000E+00	0.00000E+00
482	8.64704E-01	2.86500E+00	9.27290E-01	1.28822E-03	0.00000E+00	0.00000E+00
483	8.67855E-01	2.87017E+00	9.27166E-01	1.29147E-03	0.00000E+00	0.00000E+00
484	9.13052E-01	2.87567E+00	9.27137E-01	1.28912E-03	0.00000E+00	0.00000E+00
485	9.48863E-01	2.88067E+00	9.27182E-01	1.28723E-03	0.00000E+00	0.00000E+00
486	9.14550E-01	2.88583E+00	9.27156E-01	1.28484E-03	0.00000E+00	0.00000E+00
487	9.44570E-01	2.89083E+00	9.27192E-01	1.28269E-03	0.00000E+00	0.00000E+00
488	9.29736E-01	2.89633E+00	9.27197E-01	1.28005E-03	0.00000E+00	0.00000E+00
489	9.13601E-01	2.90117E+00	9.27169E-01	1.27773E-03	0.00000E+00	0.00000E+00
490	9.81925E-01	2.90617E+00	9.27281E-01	1.28003E-03	0.00000E+00	0.00000E+00
491	9.04771E-01	2.91133E+00	9.27235E-01	1.27824E-03	0.00000E+00	0.00000E+00
492	9.22907E-01	2.91667E+00	9.27227E-01	1.27566E-03	0.00000E+00	0.00000E+00
493	9.00578E-01	2.92200E+00	9.27172E-01	1.27422E-03	0.00000E+00	0.00000E+00
494	9.27829E-01	2.92750E+00	9.27174E-01	1.27163E-03	0.00000E+00	0.00000E+00
495	8.99670E-01	2.93300E+00	9.27118E-01	1.27027E-03	0.00000E+00	0.00000E+00
496	9.29435E-01	2.93817E+00	9.27122E-01	1.26770E-03	0.00000E+00	0.00000E+00
497	9.35111E-01	2.94333E+00	9.27139E-01	1.26524E-03	0.00000E+00	0.00000E+00
498	9.29092E-01	2.94883E+00	9.27143E-01	1.26270E-03	0.00000E+00	0.00000E+00
499	8.99971E-01	2.95417E+00	9.27088E-01	1.26134E-03	0.00000E+00	0.00000E+00
500	9.75928E-01	2.95900E+00	9.27186E-01	1.26262E-03	0.00000E+00	0.00000E+00
501	8.93754E-01	2.96450E+00	9.27119E-01	1.26187E-03	0.00000E+00	0.00000E+00
502	9.55505E-01	2.96967E+00	9.27176E-01	1.26062E-03	0.00000E+00	0.00000E+00
503	9.49068E-01	2.97500E+00	9.27219E-01	1.25886E-03	0.00000E+00	0.00000E+00
504	9.37392E-01	2.98017E+00	9.27240E-01	1.25651E-03	0.00000E+00	0.00000E+00
505	9.12910E-01	2.98567E+00	9.27211E-01	1.25433E-03	0.00000E+00	0.00000E+00
506	9.37708E-01	2.99083E+00	9.27232E-01	1.25202E-03	0.00000E+00	0.00000E+00
507	9.83682E-01	2.99583E+00	9.27344E-01	1.25452E-03	0.00000E+00	0.00000E+00
508	9.05376E-01	3.00167E+00	9.27300E-01	1.25280E-03	0.00000E+00	0.00000E+00
509	9.47831E-01	3.00767E+00	9.27341E-01	1.25098E-03	0.00000E+00	0.00000E+00
510	9.58864E-01	3.01317E+00	9.27403E-01	1.25005E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 994 independent fission points were generated

511	8.69914E-01	3.01917E+00	9.27290E-01	1.25270E-03	0.00000E+00	0.00000E+00

512	9.63790E-01	3.02467E+00	9.27362E-01	1.25229E-03	0.00000E+00	0.00000E+00
513	9.93523E-01	3.03017E+00	9.27491E-01	1.25652E-03	0.00000E+00	0.00000E+00
514	9.11721E-01	3.03617E+00	9.27460E-01	1.25444E-03	0.00000E+00	0.00000E+00
515	9.42457E-01	3.04183E+00	9.27489E-01	1.25234E-03	0.00000E+00	0.00000E+00
516	9.41059E-01	3.04733E+00	9.27516E-01	1.25018E-03	0.00000E+00	0.00000E+00
517	8.88919E-01	3.05483E+00	9.27441E-01	1.24999E-03	0.00000E+00	0.00000E+00
518	9.36942E-01	3.06117E+00	9.27459E-01	1.24771E-03	0.00000E+00	0.00000E+00
519	9.27689E-01	3.06683E+00	9.27460E-01	1.24529E-03	0.00000E+00	0.00000E+00
520	9.23158E-01	3.07283E+00	9.27451E-01	1.24291E-03	0.00000E+00	0.00000E+00
521	9.25457E-01	3.07833E+00	9.27448E-01	1.24052E-03	0.00000E+00	0.00000E+00
522	9.26571E-01	3.08483E+00	9.27446E-01	1.23813E-03	0.00000E+00	0.00000E+00
523	9.40083E-01	3.09150E+00	9.27470E-01	1.23599E-03	0.00000E+00	0.00000E+00
524	9.13931E-01	3.09750E+00	9.27444E-01	1.23390E-03	0.00000E+00	0.00000E+00
525	9.33125E-01	3.10350E+00	9.27455E-01	1.23158E-03	0.00000E+00	0.00000E+00
526	9.68380E-01	3.10950E+00	9.27533E-01	1.23171E-03	0.00000E+00	0.00000E+00
527	9.29742E-01	3.11533E+00	9.27537E-01	1.22937E-03	0.00000E+00	0.00000E+00
528	9.53656E-01	3.12100E+00	9.27587E-01	1.22803E-03	0.00000E+00	0.00000E+00
529	9.68349E-01	3.12667E+00	9.27664E-01	1.22814E-03	0.00000E+00	0.00000E+00
530	9.50506E-01	3.13200E+00	9.27708E-01	1.22657E-03	0.00000E+00	0.00000E+00
531	9.36183E-01	3.13733E+00	9.27724E-01	1.22436E-03	0.00000E+00	0.00000E+00
532	9.25391E-01	3.14267E+00	9.27719E-01	1.22205E-03	0.00000E+00	0.00000E+00
533	9.17842E-01	3.14833E+00	9.27701E-01	1.21989E-03	0.00000E+00	0.00000E+00
534	9.01804E-01	3.15400E+00	9.27652E-01	1.21857E-03	0.00000E+00	0.00000E+00
535	9.21489E-01	3.15933E+00	9.27640E-01	1.21633E-03	0.00000E+00	0.00000E+00
536	9.65550E-01	3.16417E+00	9.27711E-01	1.21613E-03	0.00000E+00	0.00000E+00
537	9.84994E-01	3.17100E+00	9.27819E-01	1.21857E-03	0.00000E+00	0.00000E+00
538	9.18743E-01	3.17750E+00	9.27802E-01	1.21641E-03	0.00000E+00	0.00000E+00
539	9.43071E-01	3.18267E+00	9.27830E-01	1.21447E-03	0.00000E+00	0.00000E+00
540	9.63096E-01	3.18800E+00	9.27896E-01	1.21399E-03	0.00000E+00	0.00000E+00
541	9.05638E-01	3.19333E+00	9.27854E-01	1.21243E-03	0.00000E+00	0.00000E+00
542	9.71285E-01	3.19883E+00	9.27935E-01	1.21286E-03	0.00000E+00	0.00000E+00
543	9.52850E-01	3.20433E+00	9.27981E-01	1.21149E-03	0.00000E+00	0.00000E+00
544	9.62070E-01	3.20950E+00	9.28044E-01	1.21089E-03	0.00000E+00	0.00000E+00
545	9.12536E-01	3.21533E+00	9.28015E-01	1.20899E-03	0.00000E+00	0.00000E+00
546	9.04821E-01	3.22067E+00	9.27972E-01	1.20752E-03	0.00000E+00	0.00000E+00
547	8.88645E-01	3.22617E+00	9.27900E-01	1.20746E-03	0.00000E+00	0.00000E+00
548	9.36568E-01	3.23150E+00	9.27916E-01	1.20535E-03	0.00000E+00	0.00000E+00
549	9.11153E-01	3.23667E+00	9.27886E-01	1.20354E-03	0.00000E+00	0.00000E+00
550	9.50916E-01	3.24233E+00	9.27928E-01	1.20207E-03	0.00000E+00	0.00000E+00
551	9.80354E-01	3.24817E+00	9.28023E-01	1.20367E-03	0.00000E+00	0.00000E+00
552	9.35422E-01	3.25383E+00	9.28037E-01	1.20156E-03	0.00000E+00	0.00000E+00
553	9.66114E-01	3.25883E+00	9.28106E-01	1.20137E-03	0.00000E+00	0.00000E+00
554	9.23428E-01	3.26400E+00	9.28097E-01	1.19922E-03	0.00000E+00	0.00000E+00
555	9.35453E-01	3.26917E+00	9.28110E-01	1.19712E-03	0.00000E+00	0.00000E+00
556	9.84150E-01	3.27433E+00	9.28212E-01	1.19923E-03	0.00000E+00	0.00000E+00
557	9.45503E-01	3.28033E+00	9.28243E-01	1.19747E-03	0.00000E+00	0.00000E+00
558	9.05348E-01	3.28583E+00	9.28202E-01	1.19603E-03	0.00000E+00	0.00000E+00
559	9.46737E-01	3.29100E+00	9.28235E-01	1.19434E-03	0.00000E+00	0.00000E+00
560	9.36182E-01	3.29633E+00	9.28249E-01	1.19229E-03	0.00000E+00	0.00000E+00
561	1.00369E+00	3.30167E+00	9.28384E-01	1.19778E-03	0.00000E+00	0.00000E+00
562	9.44808E-01	3.30700E+00	9.28413E-01	1.19600E-03	0.00000E+00	0.00000E+00
563	9.15541E-01	3.31233E+00	9.28390E-01	1.19408E-03	0.00000E+00	0.00000E+00
564	9.49643E-01	3.31817E+00	9.28428E-01	1.19256E-03	0.00000E+00	0.00000E+00
565	8.88607E-01	3.32417E+00	9.28358E-01	1.19254E-03	0.00000E+00	0.00000E+00
566	9.20503E-01	3.33033E+00	9.28344E-01	1.19050E-03	0.00000E+00	0.00000E+00
567	9.52781E-01	3.33683E+00	9.28387E-01	1.18918E-03	0.00000E+00	0.00000E+00
568	9.55427E-01	3.34267E+00	9.28435E-01	1.18804E-03	0.00000E+00	0.00000E+00
569	9.27975E-01	3.34783E+00	9.28434E-01	1.18594E-03	0.00000E+00	0.00000E+00
570	8.98022E-01	3.35333E+00	9.28380E-01	1.18506E-03	0.00000E+00	0.00000E+00
571	9.68029E-01	3.35900E+00	9.28450E-01	1.18503E-03	0.00000E+00	0.00000E+00
572	9.22377E-01	3.36450E+00	9.28439E-01	1.18299E-03	0.00000E+00	0.00000E+00
573	9.25250E-01	3.37000E+00	9.28434E-01	1.18093E-03	0.00000E+00	0.00000E+00
574	9.55349E-01	3.37550E+00	9.28481E-01	1.17981E-03	0.00000E+00	0.00000E+00
575	9.21838E-01	3.38083E+00	9.28469E-01	1.17780E-03	0.00000E+00	0.00000E+00
576	9.46165E-01	3.38633E+00	9.28500E-01	1.17615E-03	0.00000E+00	0.00000E+00
577	8.90328E-01	3.39217E+00	9.28434E-01	1.17598E-03	0.00000E+00	0.00000E+00
578	9.61842E-01	3.39733E+00	9.28492E-01	1.17537E-03	0.00000E+00	0.00000E+00
579	9.41821E-01	3.40283E+00	9.28515E-01	1.17356E-03	0.00000E+00	0.00000E+00
580	9.05277E-01	3.40850E+00	9.28475E-01	1.17221E-03	0.00000E+00	0.00000E+00
581	8.85715E-01	3.41450E+00	9.28401E-01	1.17252E-03	0.00000E+00	0.00000E+00
582	9.18732E-01	3.41967E+00	9.28384E-01	1.17061E-03	0.00000E+00	0.00000E+00
583	8.98907E-01	3.42550E+00	9.28333E-01	1.16970E-03	0.00000E+00	0.00000E+00
584	8.95023E-01	3.43083E+00	9.28276E-01	1.16909E-03	0.00000E+00	0.00000E+00
585	9.33671E-01	3.43617E+00	9.28285E-01	1.16712E-03	0.00000E+00	0.00000E+00
586	9.13862E-01	3.44183E+00	9.28261E-01	1.16538E-03	0.00000E+00	0.00000E+00
587	9.31710E-01	3.44700E+00	9.28266E-01	1.16340E-03	0.00000E+00	0.00000E+00
588	9.15094E-01	3.45283E+00	9.28244E-01	1.16163E-03	0.00000E+00	0.00000E+00
589	8.91377E-01	3.45850E+00	9.28181E-01	1.16135E-03	0.00000E+00	0.00000E+00
590	9.11466E-01	3.46400E+00	9.28153E-01	1.15972E-03	0.00000E+00	0.00000E+00
591	9.49247E-01	3.46917E+00	9.28189E-01	1.15830E-03	0.00000E+00	0.00000E+00
592	8.96156E-01	3.47483E+00	9.28134E-01	1.15761E-03	0.00000E+00	0.00000E+00
593	8.85084E-01	3.48033E+00	9.28061E-01	1.15795E-03	0.00000E+00	0.00000E+00
594	9.11594E-01	3.48583E+00	9.28034E-01	1.15632E-03	0.00000E+00	0.00000E+00
595	9.44056E-01	3.49150E+00	9.28061E-01	1.15469E-03	0.00000E+00	0.00000E+00
596	9.51964E-01	3.49733E+00	9.28101E-01	1.15344E-03	0.00000E+00	0.00000E+00
597	8.87843E-01	3.50283E+00	9.28033E-01	1.15349E-03	0.00000E+00	0.00000E+00
598	8.76710E-01	3.50850E+00	9.27947E-01	1.15477E-03	0.00000E+00	0.00000E+00
599	9.15540E-01	3.51400E+00	9.27926E-01	1.15302E-03	0.00000E+00	0.00000E+00
600	9.15776E-01	3.51950E+00	9.27906E-01	1.15127E-03	0.00000E+00	0.00000E+00
601	9.49579E-01	3.52483E+00	9.27942E-01	1.14991E-03	0.00000E+00	0.00000E+00
602	9.40895E-01	3.53017E+00	9.27964E-01	1.14820E-03	0.00000E+00	0.00000E+00
603	9.51287E-01	3.53533E+00	9.28003E-01	1.14694E-03	0.00000E+00	0.00000E+00
604	9.15484E-01	3.54150E+00	9.27982E-01	1.14523E-03	0.00000E+00	0.00000E+00

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605	9.10082E-01	3.54783E+00	9.27952E-01	1.14371E-03	0.00000E+00	0.00000E+00
606	8.95128E-01	3.55383E+00	9.27898E-01	1.14311E-03	0.00000E+00	0.00000E+00
607	9.56216E-01	3.55933E+00	9.27945E-01	1.14218E-03	0.00000E+00	0.00000E+00
608	9.75156E-01	3.56467E+00	9.28022E-01	1.14295E-03	0.00000E+00	0.00000E+00
609	9.06730E-01	3.57100E+00	9.27987E-01	1.14160E-03	0.00000E+00	0.00000E+00
610	8.67735E-01	3.57667E+00	9.27888E-01	1.14402E-03	0.00000E+00	0.00000E+00
611	8.92486E-01	3.58267E+00	9.27830E-01	1.14362E-03	0.00000E+00	0.00000E+00
612	8.93793E-01	3.58867E+00	9.27774E-01	1.14311E-03	0.00000E+00	0.00000E+00
613	9.50783E-01	3.59450E+00	9.27812E-01	1.14186E-03	0.00000E+00	0.00000E+00
614	9.58686E-01	3.59967E+00	9.27862E-01	1.14111E-03	0.00000E+00	0.00000E+00
615	9.53937E-01	3.60483E+00	9.27905E-01	1.14004E-03	0.00000E+00	0.00000E+00

616	9.44500E-01	3.61000E+00	9.27932E-01	1.13850E-03	0.00000E+00	0.00000E+00
617	9.57852E-01	3.61500E+00	9.27981E-01	1.13769E-03	0.00000E+00	0.00000E+00
618	9.51736E-01	3.62050E+00	9.28019E-01	1.13649E-03	0.00000E+00	0.00000E+00
619	9.19609E-01	3.62617E+00	9.28006E-01	1.13473E-03	0.00000E+00	0.00000E+00
620	8.76432E-01	3.63217E+00	9.27922E-01	1.13596E-03	0.00000E+00	0.00000E+00
621	9.43285E-01	3.63767E+00	9.27947E-01	1.13440E-03	0.00000E+00	0.00000E+00
622	9.18351E-01	3.64333E+00	9.27932E-01	1.13267E-03	0.00000E+00	0.00000E+00
623	9.19508E-01	3.64917E+00	9.27918E-01	1.13093E-03	0.00000E+00	0.00000E+00
624	9.43406E-01	3.65467E+00	9.27943E-01	1.12938E-03	0.00000E+00	0.00000E+00
625	8.94414E-01	3.66050E+00	9.27889E-01	1.12885E-03	0.00000E+00	0.00000E+00
626	9.60902E-01	3.66633E+00	9.27942E-01	1.12828E-03	0.00000E+00	0.00000E+00
627	9.40281E-01	3.67183E+00	9.27962E-01	1.12665E-03	0.00000E+00	0.00000E+00
628	9.13984E-01	3.67717E+00	9.27939E-01	1.12507E-03	0.00000E+00	0.00000E+00
629	9.14338E-01	3.68267E+00	9.27918E-01	1.12348E-03	0.00000E+00	0.00000E+00
630	9.01347E-01	3.68817E+00	9.27875E-01	1.12249E-03	0.00000E+00	0.00000E+00
631	9.38694E-01	3.69500E+00	9.27893E-01	1.12084E-03	0.00000E+00	0.00000E+00
632	9.37715E-01	3.70117E+00	9.27908E-01	1.11917E-03	0.00000E+00	0.00000E+00
633	9.28751E-01	3.70700E+00	9.27909E-01	1.11739E-03	0.00000E+00	0.00000E+00
634	8.94169E-01	3.71350E+00	9.27856E-01	1.11690E-03	0.00000E+00	0.00000E+00
635	9.17437E-01	3.71883E+00	9.27840E-01	1.11525E-03	0.00000E+00	0.00000E+00
636	9.73071E-01	3.72433E+00	9.27911E-01	1.11578E-03	0.00000E+00	0.00000E+00
637	9.53418E-01	3.73017E+00	9.27951E-01	1.11474E-03	0.00000E+00	0.00000E+00
638	8.80931E-01	3.73617E+00	9.27877E-01	1.11544E-03	0.00000E+00	0.00000E+00
639	9.06378E-01	3.74200E+00	9.27843E-01	1.11420E-03	0.00000E+00	0.00000E+00
640	9.21112E-01	3.74800E+00	9.27833E-01	1.11250E-03	0.00000E+00	0.00000E+00
641	9.28478E-01	3.75400E+00	9.27834E-01	1.11076E-03	0.00000E+00	0.00000E+00
642	9.41518E-01	3.75950E+00	9.27855E-01	1.10923E-03	0.00000E+00	0.00000E+00
643	9.04016E-01	3.76500E+00	9.27818E-01	1.10812E-03	0.00000E+00	0.00000E+00
644	9.50045E-01	3.77050E+00	9.27853E-01	1.10694E-03	0.00000E+00	0.00000E+00
645	9.28079E-01	3.77600E+00	9.27853E-01	1.10521E-03	0.00000E+00	0.00000E+00
646	9.66030E-01	3.78133E+00	9.27912E-01	1.10509E-03	0.00000E+00	0.00000E+00
647	9.33004E-01	3.78683E+00	9.27920E-01	1.10340E-03	0.00000E+00	0.00000E+00
648	8.98037E-01	3.79233E+00	9.27874E-01	1.10266E-03	0.00000E+00	0.00000E+00
649	9.17980E-01	3.79800E+00	9.27859E-01	1.10106E-03	0.00000E+00	0.00000E+00
650	9.31881E-01	3.80383E+00	9.27865E-01	1.09938E-03	0.00000E+00	0.00000E+00
651	9.95406E-01	3.80933E+00	9.27969E-01	1.10261E-03	0.00000E+00	0.00000E+00
652	9.16396E-01	3.81783E+00	9.27951E-01	1.10105E-03	0.00000E+00	0.00000E+00
653	9.28807E-01	3.82567E+00	9.27953E-01	1.09936E-03	0.00000E+00	0.00000E+00
654	9.50173E-01	3.83083E+00	9.27987E-01	1.09820E-03	0.00000E+00	0.00000E+00
655	9.15984E-01	3.83683E+00	9.27968E-01	1.09667E-03	0.00000E+00	0.00000E+00
656	9.11331E-01	3.84267E+00	9.27943E-01	1.09529E-03	0.00000E+00	0.00000E+00
657	9.37256E-01	3.84783E+00	9.27957E-01	1.09371E-03	0.00000E+00	0.00000E+00
658	8.99484E-01	3.85300E+00	9.27914E-01	1.09290E-03	0.00000E+00	0.00000E+00
659	9.12904E-01	3.85933E+00	9.27891E-01	1.09148E-03	0.00000E+00	0.00000E+00
660	9.85898E-01	3.86417E+00	9.27979E-01	1.09338E-03	0.00000E+00	0.00000E+00
661	9.37864E-01	3.86967E+00	9.27994E-01	1.09182E-03	0.00000E+00	0.00000E+00
662	9.17143E-01	3.87517E+00	9.27977E-01	1.09029E-03	0.00000E+00	0.00000E+00
663	9.05743E-01	3.88033E+00	9.27944E-01	1.08916E-03	0.00000E+00	0.00000E+00
664	9.36544E-01	3.88617E+00	9.27957E-01	1.08759E-03	0.00000E+00	0.00000E+00
665	8.84302E-01	3.89183E+00	9.27891E-01	1.08794E-03	0.00000E+00	0.00000E+00
666	9.65863E-01	3.89683E+00	9.27948E-01	1.08781E-03	0.00000E+00	0.00000E+00
667	9.51799E-01	3.90200E+00	9.27984E-01	1.08676E-03	0.00000E+00	0.00000E+00
668	9.27990E-01	3.90767E+00	9.27984E-01	1.08513E-03	0.00000E+00	0.00000E+00
669	9.25550E-01	3.91317E+00	9.27980E-01	1.08351E-03	0.00000E+00	0.00000E+00
670	8.91721E-01	3.91867E+00	9.27926E-01	1.08324E-03	0.00000E+00	0.00000E+00
671	9.13724E-01	3.92433E+00	9.27905E-01	1.08183E-03	0.00000E+00	0.00000E+00
672	9.39988E-01	3.92983E+00	9.27923E-01	1.08037E-03	0.00000E+00	0.00000E+00
673	9.56280E-01	3.93550E+00	9.27965E-01	1.07958E-03	0.00000E+00	0.00000E+00
674	9.32119E-01	3.94100E+00	9.27971E-01	1.07799E-03	0.00000E+00	0.00000E+00
675	8.99534E-01	3.94650E+00	9.27929E-01	1.07722E-03	0.00000E+00	0.00000E+00
676	9.22830E-01	3.95200E+00	9.27922E-01	1.07565E-03	0.00000E+00	0.00000E+00
677	9.46202E-01	3.95717E+00	9.27949E-01	1.07439E-03	0.00000E+00	0.00000E+00
678	9.50408E-01	3.96267E+00	9.27982E-01	1.07332E-03	0.00000E+00	0.00000E+00
679	9.22271E-01	3.96817E+00	9.27973E-01	1.07176E-03	0.00000E+00	0.00000E+00
680	9.20988E-01	3.97367E+00	9.27963E-01	1.07023E-03	0.00000E+00	0.00000E+00
681	9.16518E-01	3.97933E+00	9.27946E-01	1.06879E-03	0.00000E+00	0.00000E+00
682	9.80352E-01	3.98450E+00	9.28023E-01	1.06999E-03	0.00000E+00	0.00000E+00
683	8.99370E-01	3.99100E+00	9.27981E-01	1.06925E-03	0.00000E+00	0.00000E+00

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684	8.92890E-01	3.99683E+00	9.27930E-01	1.06892E-03	0.00000E+00	0.00000E+00
685	9.23690E-01	4.00217E+00	9.27924E-01	1.06737E-03	0.00000E+00	0.00000E+00
686	9.06647E-01	4.00817E+00	9.27892E-01	1.06626E-03	0.00000E+00	0.00000E+00
687	9.60014E-01	4.01367E+00	9.27939E-01	1.06574E-03	0.00000E+00	0.00000E+00
688	9.44572E-01	4.01950E+00	9.27964E-01	1.06446E-03	0.00000E+00	0.00000E+00
689	8.85364E-01	4.02467E+00	9.27902E-01	1.06471E-03	0.00000E+00	0.00000E+00
690	9.18606E-01	4.02983E+00	9.27888E-01	1.06325E-03	0.00000E+00	0.00000E+00
691	9.77964E-01	4.03500E+00	9.27961E-01	1.06419E-03	0.00000E+00	0.00000E+00
692	9.71506E-01	4.04000E+00	9.28024E-01	1.06452E-03	0.00000E+00	0.00000E+00
693	9.30126E-01	4.04550E+00	9.28027E-01	1.06298E-03	0.00000E+00	0.00000E+00
694	9.48215E-01	4.05067E+00	9.28056E-01	1.06185E-03	0.00000E+00	0.00000E+00
695	9.94457E-01	4.05567E+00	9.28152E-01	1.06463E-03	0.00000E+00	0.00000E+00
696	9.12361E-01	4.06100E+00	9.28129E-01	1.06334E-03	0.00000E+00	0.00000E+00
697	9.33821E-01	4.06783E+00	9.28137E-01	1.06184E-03	0.00000E+00	0.00000E+00
698	9.23913E-01	4.07667E+00	9.28131E-01	1.06033E-03	0.00000E+00	0.00000E+00
699	9.32628E-01	4.08217E+00	9.28138E-01	1.05883E-03	0.00000E+00	0.00000E+00
700	9.58006E-01	4.08767E+00	9.28181E-01	1.05818E-03	0.00000E+00	0.00000E+00
701	9.39558E-01	4.09283E+00	9.28197E-01	1.05679E-03	0.00000E+00	0.00000E+00
702	9.67152E-01	4.09800E+00	9.28252E-01	1.05674E-03	0.00000E+00	0.00000E+00
703	9.26981E-01	4.10383E+00	9.28251E-01	1.05524E-03	0.00000E+00	0.00000E+00
704	9.33621E-01	4.10900E+00	9.28258E-01	1.05376E-03	0.00000E+00	0.00000E+00
705	9.38835E-01	4.11417E+00	9.28273E-01	1.05237E-03	0.00000E+00	0.00000E+00
706	8.96764E-01	4.12000E+00	9.28229E-01	1.05183E-03	0.00000E+00	0.00000E+00
707	9.40732E-01	4.12517E+00	9.28246E-01	1.05048E-03	0.00000E+00	0.00000E+00
708	9.25143E-01	4.13033E+00	9.28242E-01	1.04900E-03	0.00000E+00	0.00000E+00
709	8.97844E-01	4.13550E+00	9.28199E-01	1.04840E-03	0.00000E+00	0.00000E+00
710	8.86989E-01	4.14133E+00	9.28141E-01	1.04853E-03	0.00000E+00	0.00000E+00
711	8.88659E-01	4.14700E+00	9.28085E-01	1.04853E-03	0.00000E+00	0.00000E+00
712	9.17791E-01	4.15250E+00	9.28071E-01	1.04716E-03	0.00000E+00	0.00000E+00
713	8.52108E-01	4.15850E+00	9.27964E-01	1.05113E-03	0.00000E+00	0.00000E+00
714	9.19514E-01	4.16400E+00	9.27952E-01	1.04972E-03	0.00000E+00	0.00000E+00
715	9.53713E-01	4.17017E+00	9.27988E-01	1.04887E-03	0.00000E+00	0.00000E+00
716	8.70927E-01	4.17567E+00	9.27908E-01	1.05044E-03	0.00000E+00	0.00000E+00
717	9.07574E-01	4.18117E+00	9.27880E-01	1.04936E-03	0.00000E+00	0.00000E+00
718	8.91029E-01	4.18683E+00	9.27828E-01	1.04915E-03	0.00000E+00	0.00000E+00
719	9.17942E-01	4.19233E+00	9.27814E-01	1.04778E-03	0.00000E+00	0.00000E+00

720	9.27193E-01	4.19833E+00	9.27813E-01	1.04632E-03	0.00000E+00	0.00000E+00
721	9.16701E-01	4.20400E+00	9.27798E-01	1.04498E-03	0.00000E+00	0.00000E+00
722	9.35785E-01	4.20983E+00	9.27809E-01	1.04358E-03	0.00000E+00	0.00000E+00
723	9.07978E-01	4.21550E+00	9.27782E-01	1.04250E-03	0.00000E+00	0.00000E+00
724	9.49902E-01	4.22067E+00	9.27812E-01	1.04150E-03	0.00000E+00	0.00000E+00
725	9.13694E-01	4.22600E+00	9.27793E-01	1.04024E-03	0.00000E+00	0.00000E+00
726	9.73180E-01	4.23133E+00	9.27855E-01	1.04070E-03	0.00000E+00	0.00000E+00
727	9.11193E-01	4.23717E+00	9.27832E-01	1.03951E-03	0.00000E+00	0.00000E+00
728	9.71559E-01	4.24233E+00	9.27893E-01	1.03983E-03	0.00000E+00	0.00000E+00
729	9.24576E-01	4.24800E+00	9.27888E-01	1.03841E-03	0.00000E+00	0.00000E+00
730	9.15103E-01	4.25350E+00	9.27871E-01	1.03713E-03	0.00000E+00	0.00000E+00
731	9.69046E-01	4.25867E+00	9.27927E-01	1.03724E-03	0.00000E+00	0.00000E+00
732	9.58194E-01	4.26417E+00	9.27968E-01	1.03665E-03	0.00000E+00	0.00000E+00
733	9.14010E-01	4.26967E+00	9.27949E-01	1.03541E-03	0.00000E+00	0.00000E+00
734	9.54709E-01	4.27517E+00	9.27986E-01	1.03464E-03	0.00000E+00	0.00000E+00
735	9.45810E-01	4.28067E+00	9.28010E-01	1.03351E-03	0.00000E+00	0.00000E+00
736	9.04902E-01	4.28633E+00	9.27979E-01	1.03258E-03	0.00000E+00	0.00000E+00
737	9.10364E-01	4.29200E+00	9.27955E-01	1.03146E-03	0.00000E+00	0.00000E+00
738	9.02905E-01	4.29733E+00	9.27921E-01	1.03062E-03	0.00000E+00	0.00000E+00
739	9.53626E-01	4.30267E+00	9.27956E-01	1.02981E-03	0.00000E+00	0.00000E+00
740	9.20312E-01	4.30800E+00	9.27945E-01	1.02846E-03	0.00000E+00	0.00000E+00
741	9.56081E-01	4.31350E+00	9.27983E-01	1.02778E-03	0.00000E+00	0.00000E+00
742	8.85020E-01	4.31883E+00	9.27925E-01	1.02803E-03	0.00000E+00	0.00000E+00
743	9.53560E-01	4.32467E+00	9.27960E-01	1.02722E-03	0.00000E+00	0.00000E+00
744	9.26758E-01	4.33017E+00	9.27958E-01	1.02584E-03	0.00000E+00	0.00000E+00
745	9.62170E-01	4.33550E+00	9.28004E-01	1.02549E-03	0.00000E+00	0.00000E+00
746	9.60216E-01	4.34100E+00	9.28048E-01	1.02502E-03	0.00000E+00	0.00000E+00
747	9.16686E-01	4.34683E+00	9.28032E-01	1.02376E-03	0.00000E+00	0.00000E+00
748	8.95917E-01	4.35250E+00	9.27989E-01	1.02329E-03	0.00000E+00	0.00000E+00
749	9.57357E-01	4.35817E+00	9.28029E-01	1.02268E-03	0.00000E+00	0.00000E+00
750	9.39506E-01	4.36367E+00	9.28044E-01	1.02143E-03	0.00000E+00	0.00000E+00
751	9.53311E-01	4.36917E+00	9.28078E-01	1.02062E-03	0.00000E+00	0.00000E+00
752	8.90313E-01	4.37483E+00	9.28027E-01	1.02050E-03	0.00000E+00	0.00000E+00
753	9.18471E-01	4.38067E+00	9.28015E-01	1.01922E-03	0.00000E+00	0.00000E+00
754	9.15971E-01	4.38600E+00	9.27999E-01	1.01799E-03	0.00000E+00	0.00000E+00
755	9.54177E-01	4.39133E+00	9.28033E-01	1.01723E-03	0.00000E+00	0.00000E+00
756	9.34081E-01	4.39650E+00	9.28041E-01	1.01591E-03	0.00000E+00	0.00000E+00
757	9.93807E-01	4.40167E+00	9.28128E-01	1.01830E-03	0.00000E+00	0.00000E+00
758	9.36235E-01	4.40717E+00	9.28139E-01	1.01701E-03	0.00000E+00	0.00000E+00
759	9.23196E-01	4.41267E+00	9.28133E-01	1.01568E-03	0.00000E+00	0.00000E+00
760	9.19953E-01	4.41817E+00	9.28122E-01	1.01440E-03	0.00000E+00	0.00000E+00
761	9.30427E-01	4.42383E+00	9.28125E-01	1.01307E-03	0.00000E+00	0.00000E+00
762	9.88263E-01	4.42883E+00	9.28204E-01	1.01482E-03	0.00000E+00	0.00000E+00
763	9.70159E-01	4.43400E+00	9.28259E-01	1.01499E-03	0.00000E+00	0.00000E+00
764	9.72362E-01	4.43917E+00	9.28317E-01	1.01531E-03	0.00000E+00	0.00000E+00
765	9.16423E-01	4.44467E+00	9.28301E-01	1.01409E-03	0.00000E+00	0.00000E+00
766	9.50096E-01	4.44983E+00	9.28330E-01	1.01317E-03	0.00000E+00	0.00000E+00
767	9.36826E-01	4.45567E+00	9.28341E-01	1.01190E-03	0.00000E+00	0.00000E+00
768	9.18732E-01	4.46083E+00	9.28329E-01	1.01066E-03	0.00000E+00	0.00000E+00
769	9.20685E-01	4.46650E+00	9.28319E-01	1.00939E-03	0.00000E+00	0.00000E+00
770	9.49718E-01	4.47200E+00	9.28346E-01	1.00846E-03	0.00000E+00	0.00000E+00
771	9.48004E-01	4.47750E+00	9.28372E-01	1.00747E-03	0.00000E+00	0.00000E+00
772	9.38332E-01	4.48267E+00	9.28385E-01	1.00625E-03	0.00000E+00	0.00000E+00
773	9.91459E-01	4.48833E+00	9.28467E-01	1.00826E-03	0.00000E+00	0.00000E+00
774	9.50539E-01	4.49383E+00	9.28495E-01	1.00736E-03	0.00000E+00	0.00000E+00
775	9.26625E-01	4.49933E+00	9.28493E-01	1.00606E-03	0.00000E+00	0.00000E+00
776	9.60734E-01	4.50500E+00	9.28535E-01	1.00562E-03	0.00000E+00	0.00000E+00
777	9.68499E-01	4.51000E+00	9.28586E-01	1.00565E-03	0.00000E+00	0.00000E+00
778	9.62246E-01	4.51550E+00	9.28630E-01	1.00529E-03	0.00000E+00	0.00000E+00
779	9.43006E-01	4.52050E+00	9.28648E-01	1.00416E-03	0.00000E+00	0.00000E+00
780	9.99631E-01	4.52583E+00	9.28739E-01	1.00701E-03	0.00000E+00	0.00000E+00
781	9.23245E-01	4.53133E+00	9.28732E-01	1.00575E-03	0.00000E+00	0.00000E+00
782	9.14720E-01	4.53683E+00	9.28714E-01	1.00462E-03	0.00000E+00	0.00000E+00
783	9.13995E-01	4.54233E+00	9.28695E-01	1.00351E-03	0.00000E+00	0.00000E+00
784	9.02998E-01	4.54783E+00	9.28663E-01	1.00276E-03	0.00000E+00	0.00000E+00
785	9.46409E-01	4.55350E+00	9.28685E-01	1.00174E-03	0.00000E+00	0.00000E+00
786	9.51285E-01	4.55900E+00	9.28714E-01	1.00087E-03	0.00000E+00	0.00000E+00
787	9.35607E-01	4.56450E+00	9.28723E-01	9.99635E-04	0.00000E+00	0.00000E+00
788	9.33129E-01	4.57017E+00	9.28728E-01	9.98378E-04	0.00000E+00	0.00000E+00
789	9.25336E-01	4.57583E+00	9.28724E-01	9.97118E-04	0.00000E+00	0.00000E+00
790	9.57845E-01	4.58133E+00	9.28761E-01	9.96537E-04	0.00000E+00	0.00000E+00
791	8.88631E-01	4.58717E+00	9.28710E-01	9.96572E-04	0.00000E+00	0.00000E+00
792	9.43326E-01	4.59233E+00	9.28729E-01	9.95482E-04	0.00000E+00	0.00000E+00
793	9.01443E-01	4.59783E+00	9.28694E-01	9.94821E-04	0.00000E+00	0.00000E+00
794	9.05725E-01	4.60333E+00	9.28665E-01	9.93987E-04	0.00000E+00	0.00000E+00
795	9.91308E-01	4.60900E+00	9.28744E-01	9.95871E-04	0.00000E+00	0.00000E+00
796	9.19472E-01	4.61467E+00	9.28733E-01	9.94684E-04	0.00000E+00	0.00000E+00
797	9.26941E-01	4.62017E+00	9.28730E-01	9.93435E-04	0.00000E+00	0.00000E+00
798	8.61999E-01	4.62567E+00	9.28646E-01	9.95721E-04	0.00000E+00	0.00000E+00
799	9.24221E-01	4.63117E+00	9.28641E-01	9.94487E-04	0.00000E+00	0.00000E+00
800	9.59965E-01	4.63600E+00	9.28680E-01	9.94015E-04	0.00000E+00	0.00000E+00
801	9.62506E-01	4.64150E+00	9.28722E-01	9.93673E-04	0.00000E+00	0.00000E+00
802	9.39434E-01	4.64700E+00	9.28736E-01	9.92520E-04	0.00000E+00	0.00000E+00
803	9.11706E-01	4.65267E+00	9.28715E-01	9.91508E-04	0.00000E+00	0.00000E+00
804	9.33466E-01	4.65817E+00	9.28721E-01	9.90289E-04	0.00000E+00	0.00000E+00
805	9.71273E-01	4.66333E+00	9.28774E-01	9.90473E-04	0.00000E+00	0.00000E+00
806	9.31505E-01	4.66883E+00	9.28777E-01	9.89247E-04	0.00000E+00	0.00000E+00
807	9.13795E-01	4.67483E+00	9.28758E-01	9.88192E-04	0.00000E+00	0.00000E+00
808	9.01285E-01	4.68033E+00	9.28724E-01	9.87554E-04	0.00000E+00	0.00000E+00
809	9.22086E-01	4.68583E+00	9.28716E-01	9.86364E-04	0.00000E+00	0.00000E+00
810	9.04192E-01	4.69133E+00	9.28686E-01	9.85609E-04	0.00000E+00	0.00000E+00
811	9.46239E-01	4.69700E+00	9.28707E-01	9.84630E-04	0.00000E+00	0.00000E+00
812	9.41944E-01	4.70217E+00	9.28724E-01	9.83549E-04	0.00000E+00	0.00000E+00
813	9.10741E-01	4.70767E+00	9.28702E-01	9.82586E-04	0.00000E+00	0.00000E+00
814	9.87144E-01	4.71283E+00	9.28773E-01	9.84011E-04	0.00000E+00	0.00000E+00
815	9.27019E-01	4.71867E+00	9.28771E-01	9.82802E-04	0.00000E+00	0.00000E+00
816	9.89940E-01	4.72350E+00	9.28846E-01	9.84466E-04	0.00000E+00	0.00000E+00
817	9.79628E-01	4.72900E+00	9.28909E-01	9.85230E-04	0.00000E+00	0.00000E+00
818	9.12468E-01	4.73417E+00	9.28889E-01	9.84228E-04	0.00000E+00	0.00000E+00
819	9.04133E-01	4.74000E+00	9.28858E-01	9.83489E-04	0.00000E+00	0.00000E+00
820	9.50794E-01	4.74567E+00	9.28885E-01	9.82652E-04	0.00000E+00	0.00000E+00
821	9.40957E-01	4.75150E+00	9.28900E-01	9.81562E-04	0.00000E+00	0.00000E+00
822	9.18398E-01	4.75683E+00	9.28887E-01	9.80448E-04	0.00000E+00	0.00000E+00
823	9.04947E-01	4.76233E+00	9.28858E-01	9.79687E-04	0.00000E+00	0.00000E+00
824	8.87817E-01	4.76817E+00	9.28808E-01	9.79768E-04	0.00000E+00	0.00000E+00

825	9.14771E-01	4.77350E+00	9.28791E-01	9.78725E-04	0.00000E+00	0.00000E+00
826	9.24574E-01	4.77883E+00	9.28786E-01	9.77550E-04	0.00000E+00	0.00000E+00
827	9.02314E-01	4.78500E+00	9.28754E-01	9.76891E-04	0.00000E+00	0.00000E+00
828	9.64196E-01	4.79017E+00	9.28797E-01	9.76651E-04	0.00000E+00	0.00000E+00
829	9.15780E-01	4.79600E+00	9.28781E-01	9.75596E-04	0.00000E+00	0.00000E+00
830	9.71658E-01	4.80150E+00	9.28833E-01	9.75792E-04	0.00000E+00	0.00000E+00
831	8.98691E-01	4.80667E+00	9.28796E-01	9.75293E-04	0.00000E+00	0.00000E+00
832	9.49949E-01	4.81233E+00	9.28822E-01	9.74450E-04	0.00000E+00	0.00000E+00
833	9.41919E-01	4.81783E+00	9.28838E-01	9.73404E-04	0.00000E+00	0.00000E+00
834	9.20987E-01	4.82300E+00	9.28828E-01	9.72279E-04	0.00000E+00	0.00000E+00
835	9.37365E-01	4.82883E+00	9.28838E-01	9.71166E-04	0.00000E+00	0.00000E+00
836	9.03328E-01	4.83417E+00	9.28808E-01	9.70483E-04	0.00000E+00	0.00000E+00
837	8.93128E-01	4.84000E+00	9.28765E-01	9.70261E-04	0.00000E+00	0.00000E+00
838	9.37755E-01	4.84550E+00	9.28776E-01	9.69159E-04	0.00000E+00	0.00000E+00
839	9.49797E-01	4.85067E+00	9.28801E-01	9.68327E-04	0.00000E+00	0.00000E+00
840	1.01649E+00	4.85583E+00	9.28906E-01	9.72815E-04	0.00000E+00	0.00000E+00
841	9.56053E-01	4.86133E+00	9.28938E-01	9.72194E-04	0.00000E+00	0.00000E+00
842	8.86662E-01	4.86700E+00	9.28888E-01	9.72339E-04	0.00000E+00	0.00000E+00
843	9.33161E-01	4.87250E+00	9.28893E-01	9.71195E-04	0.00000E+00	0.00000E+00
844	9.28115E-01	4.87800E+00	9.28892E-01	9.70042E-04	0.00000E+00	0.00000E+00
845	9.34442E-01	4.88317E+00	9.28898E-01	9.68913E-04	0.00000E+00	0.00000E+00
846	9.02756E-01	4.88833E+00	9.28867E-01	9.68260E-04	0.00000E+00	0.00000E+00
847	9.36567E-01	4.89367E+00	9.28877E-01	9.67156E-04	0.00000E+00	0.00000E+00
848	9.44607E-01	4.89883E+00	9.28895E-01	9.66191E-04	0.00000E+00	0.00000E+00
849	9.21161E-01	4.90400E+00	9.28886E-01	9.65093E-04	0.00000E+00	0.00000E+00
850	9.42496E-01	4.90950E+00	9.28902E-01	9.64088E-04	0.00000E+00	0.00000E+00
851	9.27492E-01	4.91467E+00	9.28900E-01	9.62953E-04	0.00000E+00	0.00000E+00
852	9.09244E-01	4.91983E+00	9.28877E-01	9.62097E-04	0.00000E+00	0.00000E+00
853	9.14750E-01	4.92533E+00	9.28861E-01	9.61109E-04	0.00000E+00	0.00000E+00
854	9.05684E-01	4.93083E+00	9.28833E-01	9.60366E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 993 independent fission points were generated

855	8.94540E-01	4.93650E+00	9.28793E-01	9.60082E-04	0.00000E+00	0.00000E+00
856	9.30787E-01	4.94200E+00	9.28796E-01	9.58960E-04	0.00000E+00	0.00000E+00
857	9.32032E-01	4.94733E+00	9.28799E-01	9.57845E-04	0.00000E+00	0.00000E+00
858	9.26236E-01	4.95317E+00	9.28796E-01	9.56730E-04	0.00000E+00	0.00000E+00
859	9.48327E-01	4.95867E+00	9.28819E-01	9.55885E-04	0.00000E+00	0.00000E+00
860	9.26993E-01	4.96417E+00	9.28817E-01	9.54772E-04	0.00000E+00	0.00000E+00
861	9.35808E-01	4.96967E+00	9.28825E-01	9.53695E-04	0.00000E+00	0.00000E+00
862	9.16878E-01	4.97533E+00	9.28811E-01	9.52686E-04	0.00000E+00	0.00000E+00
863	8.85807E-01	4.98083E+00	9.28761E-01	9.52889E-04	0.00000E+00	0.00000E+00
864	9.17469E-01	4.98633E+00	9.28748E-01	9.51873E-04	0.00000E+00	0.00000E+00
865	9.22324E-01	4.99200E+00	9.28741E-01	9.50799E-04	0.00000E+00	0.00000E+00
866	9.30044E-01	4.99750E+00	9.28742E-01	9.49699E-04	0.00000E+00	0.00000E+00
867	9.24527E-01	5.00300E+00	9.28737E-01	9.48613E-04	0.00000E+00	0.00000E+00
868	8.92694E-01	5.00850E+00	9.28696E-01	9.48431E-04	0.00000E+00	0.00000E+00
869	9.54376E-01	5.01383E+00	9.28725E-01	9.47799E-04	0.00000E+00	0.00000E+00
870	9.50690E-01	5.01917E+00	9.28751E-01	9.47045E-04	0.00000E+00	0.00000E+00
871	9.23748E-01	5.02483E+00	9.28745E-01	9.45972E-04	0.00000E+00	0.00000E+00
872	9.57162E-01	5.03033E+00	9.28778E-01	9.45448E-04	0.00000E+00	0.00000E+00
873	9.38239E-01	5.03583E+00	9.28788E-01	9.44424E-04	0.00000E+00	0.00000E+00
874	9.56675E-01	5.04150E+00	9.28820E-01	9.43883E-04	0.00000E+00	0.00000E+00
875	9.05308E-01	5.04700E+00	9.28794E-01	9.43185E-04	0.00000E+00	0.00000E+00
876	9.33141E-01	5.05250E+00	9.28798E-01	9.42119E-04	0.00000E+00	0.00000E+00
877	9.32936E-01	5.05767E+00	9.28803E-01	9.41053E-04	0.00000E+00	0.00000E+00
878	9.46061E-01	5.06317E+00	9.28823E-01	9.40185E-04	0.00000E+00	0.00000E+00
879	9.20980E-01	5.06917E+00	9.28814E-01	9.39155E-04	0.00000E+00	0.00000E+00
880	9.24689E-01	5.07483E+00	9.28809E-01	9.38096E-04	0.00000E+00	0.00000E+00
881	9.36049E-01	5.08033E+00	9.28818E-01	9.37065E-04	0.00000E+00	0.00000E+00
882	9.05344E-01	5.08600E+00	9.28791E-01	9.36379E-04	0.00000E+00	0.00000E+00
883	9.19534E-01	5.09183E+00	9.28780E-01	9.35375E-04	0.00000E+00	0.00000E+00
884	9.56897E-01	5.09750E+00	9.28812E-01	9.34857E-04	0.00000E+00	0.00000E+00
885	9.23519E-01	5.10300E+00	9.28806E-01	9.33817E-04	0.00000E+00	0.00000E+00
886	9.38415E-01	5.10817E+00	9.28817E-01	9.32824E-04	0.00000E+00	0.00000E+00
887	9.11289E-01	5.11367E+00	9.28797E-01	9.31979E-04	0.00000E+00	0.00000E+00
888	9.14958E-01	5.11917E+00	9.28782E-01	9.31058E-04	0.00000E+00	0.00000E+00
889	8.99075E-01	5.12483E+00	9.28748E-01	9.30611E-04	0.00000E+00	0.00000E+00
890	9.36578E-01	5.13000E+00	9.28757E-01	9.29604E-04	0.00000E+00	0.00000E+00
891	9.25556E-01	5.13533E+00	9.28753E-01	9.28565E-04	0.00000E+00	0.00000E+00
892	9.31176E-01	5.14100E+00	9.28756E-01	9.27525E-04	0.00000E+00	0.00000E+00
893	9.45706E-01	5.14650E+00	9.28775E-01	9.26678E-04	0.00000E+00	0.00000E+00
894	9.39330E-01	5.15317E+00	9.28787E-01	9.25714E-04	0.00000E+00	0.00000E+00
895	9.21713E-01	5.15867E+00	9.28779E-01	9.24711E-04	0.00000E+00	0.00000E+00
896	9.12508E-01	5.16383E+00	9.28761E-01	9.23856E-04	0.00000E+00	0.00000E+00
897	9.30828E-01	5.16933E+00	9.28763E-01	9.22826E-04	0.00000E+00	0.00000E+00
898	9.39823E-01	5.17483E+00	9.28776E-01	9.21878E-04	0.00000E+00	0.00000E+00
899	9.08156E-01	5.18033E+00	9.28753E-01	9.21136E-04	0.00000E+00	0.00000E+00
900	9.49289E-01	5.18550E+00	9.28775E-01	9.20394E-04	0.00000E+00	0.00000E+00
901	9.35917E-01	5.19150E+00	9.28783E-01	9.19404E-04	0.00000E+00	0.00000E+00
902	9.59129E-01	5.19700E+00	9.28817E-01	9.19001E-04	0.00000E+00	0.00000E+00
903	9.07398E-01	5.20267E+00	9.28793E-01	9.18288E-04	0.00000E+00	0.00000E+00
904	9.54339E-01	5.20817E+00	9.28822E-01	9.17706E-04	0.00000E+00	0.00000E+00
905	9.32603E-01	5.21367E+00	9.28826E-01	9.16699E-04	0.00000E+00	0.00000E+00
906	8.95245E-01	5.21933E+00	9.28789E-01	9.16438E-04	0.00000E+00	0.00000E+00
907	9.53364E-01	5.22517E+00	9.28816E-01	9.15827E-04	0.00000E+00	0.00000E+00
908	9.03855E-01	5.23117E+00	9.28788E-01	9.15230E-04	0.00000E+00	0.00000E+00
909	9.21563E-01	5.23650E+00	9.28780E-01	9.14256E-04	0.00000E+00	0.00000E+00
910	9.33411E-01	5.24233E+00	9.28785E-01	9.13262E-04	0.00000E+00	0.00000E+00
911	9.44350E-01	5.24783E+00	9.28802E-01	9.12418E-04	0.00000E+00	0.00000E+00
912	9.38102E-01	5.25317E+00	9.28813E-01	9.11472E-04	0.00000E+00	0.00000E+00
913	9.02190E-01	5.25900E+00	9.28783E-01	9.10940E-04	0.00000E+00	0.00000E+00
914	9.14739E-01	5.26450E+00	9.28768E-01	9.10071E-04	0.00000E+00	0.00000E+00
915	9.50118E-01	5.27017E+00	9.28791E-01	9.09374E-04	0.00000E+00	0.00000E+00
916	8.83313E-01	5.27567E+00	9.28742E-01	9.09740E-04	0.00000E+00	0.00000E+00
917	9.46908E-01	5.28133E+00	9.28762E-01	9.08962E-04	0.00000E+00	0.00000E+00
918	9.41799E-01	5.28683E+00	9.28776E-01	9.08081E-04	0.00000E+00	0.00000E+00
919	9.24445E-01	5.29250E+00	9.28771E-01	9.07102E-04	0.00000E+00	0.00000E+00
920	8.92923E-01	5.29833E+00	9.28732E-01	9.06955E-04	0.00000E+00	0.00000E+00
921	9.14994E-01	5.30383E+00	9.28717E-01	9.06091E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 973 independent fission points were generated

922	8.59320E-01	5.30950E+00	9.28642E-01	9.08243E-04	0.00000E+00	0.00000E+00
923	9.50763E-01	5.31500E+00	9.28666E-01	9.07574E-04	0.00000E+00	0.00000E+00
924	9.21494E-01	5.32067E+00	9.28658E-01	9.06623E-04	0.00000E+00	0.00000E+00
925	9.01636E-01	5.32583E+00	9.28629E-01	9.06113E-04	0.00000E+00	0.00000E+00
926	9.29775E-01	5.33167E+00	9.28630E-01	9.05133E-04	0.00000E+00	0.00000E+00
927	9.13874E-01	5.33700E+00	9.28614E-01	9.04295E-04	0.00000E+00	0.00000E+00

928	9.18012E-01	5.34283E+00	9.28602E-01	9.03390E-04	0.00000E+00	0.00000E+00
929	9.50377E-01	5.34833E+00	9.28626E-01	9.02721E-04	0.00000E+00	0.00000E+00
930	9.24848E-01	5.35400E+00	9.28622E-01	9.01756E-04	0.00000E+00	0.00000E+00
931	8.96545E-01	5.35950E+00	9.28587E-01	9.01447E-04	0.00000E+00	0.00000E+00
932	9.19107E-01	5.36517E+00	9.28577E-01	9.00535E-04	0.00000E+00	0.00000E+00
933	8.89928E-01	5.37100E+00	9.28536E-01	9.00524E-04	0.00000E+00	0.00000E+00
934	9.03854E-01	5.37667E+00	9.28509E-01	8.99947E-04	0.00000E+00	0.00000E+00
935	8.83448E-01	5.38217E+00	9.28461E-01	9.00279E-04	0.00000E+00	0.00000E+00
936	9.27592E-01	5.38783E+00	9.28460E-01	8.99315E-04	0.00000E+00	0.00000E+00
937	9.73069E-01	5.39333E+00	9.28508E-01	8.99618E-04	0.00000E+00	0.00000E+00
938	9.69631E-01	5.39883E+00	9.28552E-01	8.99730E-04	0.00000E+00	0.00000E+00
939	9.49263E-01	5.40400E+00	9.28574E-01	8.99041E-04	0.00000E+00	0.00000E+00
940	9.38170E-01	5.40950E+00	9.28584E-01	8.98140E-04	0.00000E+00	0.00000E+00
941	9.58962E-01	5.41500E+00	9.28616E-01	8.97766E-04	0.00000E+00	0.00000E+00
942	9.18829E-01	5.42033E+00	9.28606E-01	8.96871E-04	0.00000E+00	0.00000E+00
943	9.27605E-01	5.42583E+00	9.28605E-01	8.95918E-04	0.00000E+00	0.00000E+00
944	9.27875E-01	5.43133E+00	9.28604E-01	8.94967E-04	0.00000E+00	0.00000E+00
945	9.40419E-01	5.43683E+00	9.28617E-01	8.94105E-04	0.00000E+00	0.00000E+00
946	9.09659E-01	5.44233E+00	9.28596E-01	8.93383E-04	0.00000E+00	0.00000E+00
947	8.68053E-01	5.44833E+00	9.28532E-01	8.94734E-04	0.00000E+00	0.00000E+00
948	9.37512E-01	5.45433E+00	9.28542E-01	8.93838E-04	0.00000E+00	0.00000E+00
949	9.36892E-01	5.46000E+00	9.28551E-01	8.92937E-04	0.00000E+00	0.00000E+00
950	9.61379E-01	5.46550E+00	9.28585E-01	8.92667E-04	0.00000E+00	0.00000E+00
951	9.61031E-01	5.47117E+00	9.28620E-01	8.92381E-04	0.00000E+00	0.00000E+00
952	9.30423E-01	5.47667E+00	9.28621E-01	8.91443E-04	0.00000E+00	0.00000E+00
953	9.56233E-01	5.48217E+00	9.28650E-01	8.90979E-04	0.00000E+00	0.00000E+00
954	9.24804E-01	5.48733E+00	9.28646E-01	8.90051E-04	0.00000E+00	0.00000E+00
955	9.44207E-01	5.49300E+00	9.28663E-01	8.89267E-04	0.00000E+00	0.00000E+00
956	8.77303E-01	5.49850E+00	9.28609E-01	8.89964E-04	0.00000E+00	0.00000E+00
957	9.33312E-01	5.50400E+00	9.28614E-01	8.89045E-04	0.00000E+00	0.00000E+00
958	9.14616E-01	5.50967E+00	9.28599E-01	8.88236E-04	0.00000E+00	0.00000E+00
959	9.12716E-01	5.51517E+00	9.28583E-01	8.87462E-04	0.00000E+00	0.00000E+00
960	9.05027E-01	5.52117E+00	9.28558E-01	8.86876E-04	0.00000E+00	0.00000E+00
961	9.29764E-01	5.52633E+00	9.28559E-01	8.85952E-04	0.00000E+00	0.00000E+00
962	9.74311E-01	5.53217E+00	9.28607E-01	8.86311E-04	0.00000E+00	0.00000E+00
963	9.66285E-01	5.53783E+00	9.28646E-01	8.86256E-04	0.00000E+00	0.00000E+00
964	9.37584E-01	5.54300E+00	9.28655E-01	8.85383E-04	0.00000E+00	0.00000E+00
965	9.34208E-01	5.54883E+00	9.28661E-01	8.84482E-04	0.00000E+00	0.00000E+00
966	9.51018E-01	5.55400E+00	9.28684E-01	8.83868E-04	0.00000E+00	0.00000E+00
967	9.09475E-01	5.55950E+00	9.28664E-01	8.83176E-04	0.00000E+00	0.00000E+00
968	9.24491E-01	5.56500E+00	9.28660E-01	8.82272E-04	0.00000E+00	0.00000E+00
969	9.05680E-01	5.57067E+00	9.28636E-01	8.81679E-04	0.00000E+00	0.00000E+00
970	9.30935E-01	5.57617E+00	9.28639E-01	8.80771E-04	0.00000E+00	0.00000E+00
971	9.04004E-01	5.58167E+00	9.28613E-01	8.80229E-04	0.00000E+00	0.00000E+00
972	9.34105E-01	5.58733E+00	9.28619E-01	8.79339E-04	0.00000E+00	0.00000E+00
973	9.35186E-01	5.59283E+00	9.28626E-01	8.78459E-04	0.00000E+00	0.00000E+00
974	9.24508E-01	5.59800E+00	9.28622E-01	8.77565E-04	0.00000E+00	0.00000E+00
975	9.22245E-01	5.60533E+00	9.28615E-01	8.76687E-04	0.00000E+00	0.00000E+00
976	9.59319E-01	5.61367E+00	9.28646E-01	8.76354E-04	0.00000E+00	0.00000E+00
977	9.37518E-01	5.62117E+00	9.28656E-01	8.75502E-04	0.00000E+00	0.00000E+00
978	9.41502E-01	5.62633E+00	9.28669E-01	8.74703E-04	0.00000E+00	0.00000E+00
979	8.75446E-01	5.63183E+00	9.28614E-01	8.75504E-04	0.00000E+00	0.00000E+00
980	9.40373E-01	5.63733E+00	9.28626E-01	8.74691E-04	0.00000E+00	0.00000E+00
981	9.20544E-01	5.64250E+00	9.28618E-01	8.73836E-04	0.00000E+00	0.00000E+00
982	9.69617E-01	5.64783E+00	9.28660E-01	8.73946E-04	0.00000E+00	0.00000E+00
983	9.37805E-01	5.65317E+00	9.28669E-01	8.73104E-04	0.00000E+00	0.00000E+00
984	9.73018E-01	5.65817E+00	9.28714E-01	8.73383E-04	0.00000E+00	0.00000E+00
985	9.96834E-01	5.66317E+00	9.28784E-01	8.75242E-04	0.00000E+00	0.00000E+00
986	9.43031E-01	5.66833E+00	9.28798E-01	8.74472E-04	0.00000E+00	0.00000E+00
987	9.15888E-01	5.67400E+00	9.28785E-01	8.73682E-04	0.00000E+00	0.00000E+00
988	9.58054E-01	5.67933E+00	9.28815E-01	8.73300E-04	0.00000E+00	0.00000E+00
989	8.98363E-01	5.68467E+00	9.28784E-01	8.72960E-04	0.00000E+00	0.00000E+00
990	9.06718E-01	5.69017E+00	9.28762E-01	8.72362E-04	0.00000E+00	0.00000E+00
991	8.82026E-01	5.69617E+00	9.28714E-01	8.72760E-04	0.00000E+00	0.00000E+00
992	9.67803E-01	5.70167E+00	9.28754E-01	8.72771E-04	0.00000E+00	0.00000E+00
993	8.96227E-01	5.70867E+00	9.28721E-01	8.72508E-04	0.00000E+00	0.00000E+00
994	9.27594E-01	5.71383E+00	9.28720E-01	8.71629E-04	0.00000E+00	0.00000E+00
995	9.30978E-01	5.71933E+00	9.28722E-01	8.70753E-04	0.00000E+00	0.00000E+00
996	9.57725E-01	5.72450E+00	9.28751E-01	8.70366E-04	0.00000E+00	0.00000E+00
997	9.36371E-01	5.73000E+00	9.28759E-01	8.69525E-04	0.00000E+00	0.00000E+00
998	9.42511E-01	5.73550E+00	9.28773E-01	8.68761E-04	0.00000E+00	0.00000E+00
999	9.42299E-01	5.74183E+00	9.28786E-01	8.67995E-04	0.00000E+00	0.00000E+00
1000	9.52890E-01	5.74667E+00	9.28810E-01	8.67461E-04	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

lifetime = 7.47230E-05 + or - 1.11709E-07 generation time = 3.56519E-05 + or - 5.45320E-08
nu bar = 2.89123E+00 + or - 3.69022E-06 average fission group = 2.16451E+02 + or - 5.15026E-03
energy(ev) of the average lethargy causing fission = 5.89799E-02 + or - 4.27305E-05

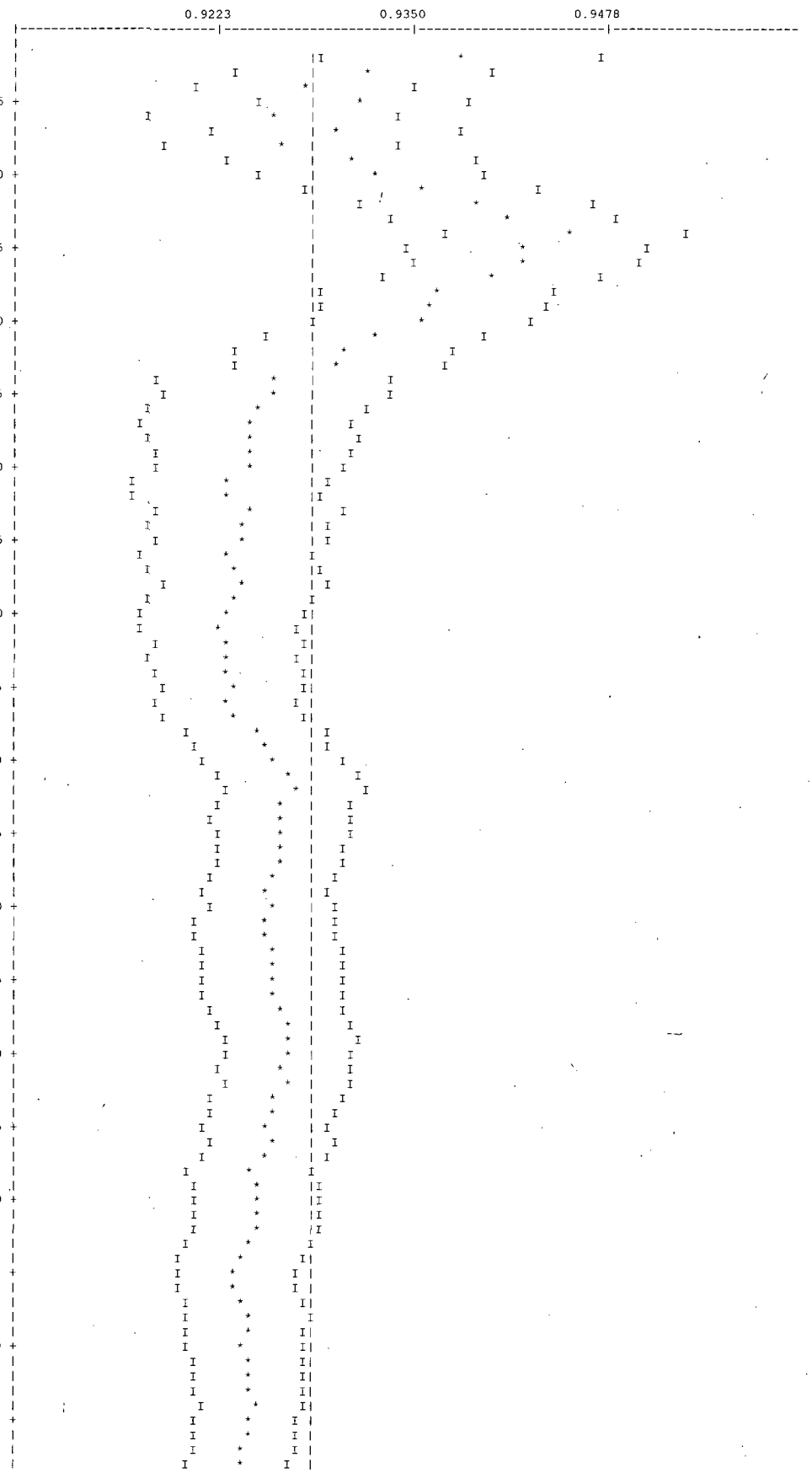
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
50	0.92871	+ or - 0.00116	0.92755 to 0.92988	0.92639 to 0.93104	0.92523 to 0.93220	950000
51	0.92869	+ or - 0.00119	0.92751 to 0.92988	0.92632 to 0.93107	0.92513 to 0.93226	949000
52	0.92869	+ or - 0.00114	0.92755 to 0.92984	0.92641 to 0.93098	0.92527 to 0.93212	948000
53	0.92870	+ or - 0.00114	0.92756 to 0.92984	0.92642 to 0.93098	0.92528 to 0.93212	947000
54	0.92872	+ or - 0.00116	0.92756 to 0.92988	0.92640 to 0.93104	0.92524 to 0.93220	946000
55	0.92870	+ or - 0.00108	0.92761 to 0.92978	0.92653 to 0.93087	0.92544 to 0.93195	945000
56	0.92873	+ or - 0.00108	0.92765 to 0.92982	0.92657 to 0.93090	0.92548 to 0.93198	944000
57	0.92870	+ or - 0.00108	0.92762 to 0.92978	0.92654 to 0.93086	0.92546 to 0.93194	943000
58	0.92873	+ or - 0.00112	0.92762 to 0.92985	0.92650 to 0.93096	0.92539 to 0.93208	942000
59	0.92869	+ or - 0.00110	0.92759 to 0.92979	0.92649 to 0.93089	0.92539 to 0.93199	941000
81	0.92890	+ or - 0.00111	0.92778 to 0.93001	0.92667 to 0.93112	0.92556 to 0.93224	919000
103	0.92882	+ or - 0.00112	0.92770 to 0.92994	0.92658 to 0.93106	0.92546 to 0.93218	897000
125	0.92897	+ or - 0.00117	0.92779 to 0.93014	0.92662 to 0.93131	0.92545 to 0.93249	875000
147	0.92922	+ or - 0.00122	0.92799 to 0.93044	0.92677 to 0.93166	0.92555 to 0.93288	853000
169	0.92947	+ or - 0.00112	0.92835 to 0.93058	0.92724 to 0.93170	0.92612 to 0.93282	831000
191	0.92960	+ or - 0.00121	0.92840 to 0.93081	0.92719 to 0.93202	0.92598 to 0.93322	809000
213	0.92960	+ or - 0.00119	0.92841 to 0.93079	0.92721 to 0.93199	0.92602 to 0.93318	787000
235	0.92943	+ or - 0.00120	0.92823 to 0.93063	0.92703 to 0.93183	0.92583 to 0.93303	765000
257	0.92972	+ or - 0.00121	0.92851 to 0.93093	0.92731 to 0.93214	0.92610 to 0.93334	743000
279	0.92956	+ or - 0.00124	0.92832 to 0.93080	0.92707 to 0.93204	0.92583 to 0.93328	721000
301	0.92951	+ or - 0.00130	0.92821 to 0.93080	0.92691 to 0.93210	0.92562 to 0.93340	699000
323	0.92956	+ or - 0.00138	0.92817 to 0.93094	0.92679 to 0.93233	0.92540 to 0.93371	677000
345	0.92959	+ or - 0.00134	0.92824 to 0.93093	0.92690 to 0.93227	0.92555 to 0.93362	655000
367	0.92947	+ or - 0.00129	0.92818 to 0.93076	0.92689 to 0.93205	0.92560 to 0.93334	633000
389	0.92951	+ or - 0.00134	0.92816 to 0.93085	0.92682 to 0.93219	0.92547 to 0.93354	611000
411	0.92951	+ or - 0.00137	0.92814 to 0.93088	0.92678 to 0.93224	0.92541 to 0.93361	589000

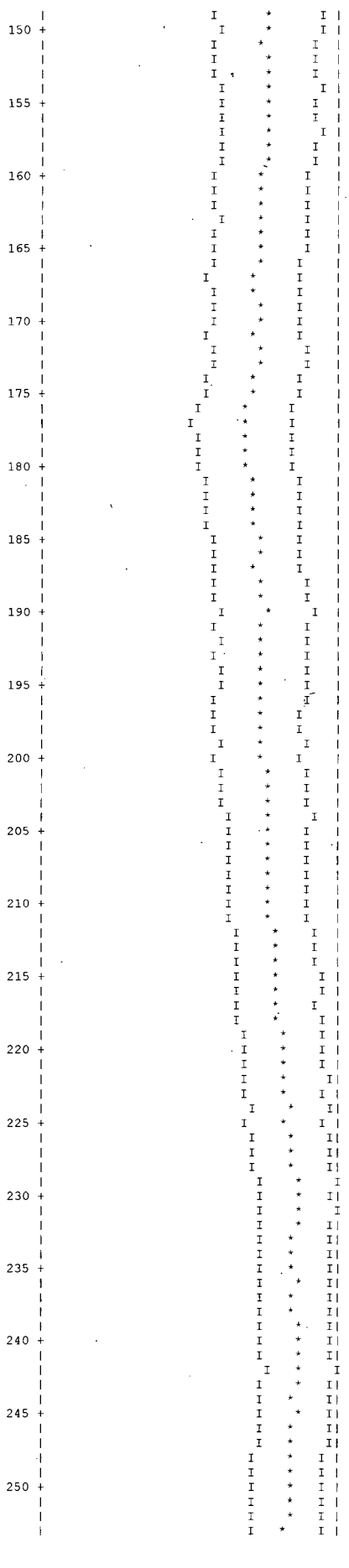
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
433	0.92937	+ or - 0.00149	0.92788 to 0.93086	0.92640 to 0.93235	0.92491 to 0.93383	567000
455	0.92956	+ or - 0.00157	0.92799 to 0.93113	0.92642 to 0.93270	0.92485 to 0.93427	545000
477	0.92999	+ or - 0.00163	0.92836 to 0.93162	0.92673 to 0.93325	0.92510 to 0.93488	523000
499	0.93052	+ or - 0.00162	0.92890 to 0.93214	0.92727 to 0.93376	0.92565 to 0.93539	501000
521	0.93029	+ or - 0.00169	0.92860 to 0.93197	0.92691 to 0.93366	0.92522 to 0.93535	479000
543	0.92979	+ or - 0.00167	0.92812 to 0.93147	0.92644 to 0.93314	0.92477 to 0.93481	457000
565	0.92940	+ or - 0.00161	0.92778 to 0.93101	0.92617 to 0.93263	0.92455 to 0.93424	435000
587	0.92958	+ or - 0.00162	0.92796 to 0.93120	0.92634 to 0.93283	0.92471 to 0.93445	413000
609	0.93009	+ or - 0.00190	0.92819 to 0.93198	0.92630 to 0.93388	0.92440 to 0.93578	391000
631	0.93038	+ or - 0.00176	0.92861 to 0.93214	0.92685 to 0.93390	0.92509 to 0.93566	369000
653	0.93042	+ or - 0.00194	0.92848 to 0.93236	0.92654 to 0.93430	0.92460 to 0.93624	347000
675	0.93064	+ or - 0.00203	0.92861 to 0.93266	0.92658 to 0.93469	0.92455 to 0.93672	325000
697	0.93035	+ or - 0.00201	0.92834 to 0.93237	0.92633 to 0.93438	0.92432 to 0.93639	303000
719	0.93135	+ or - 0.00197	0.92938 to 0.93333	0.92741 to 0.93530	0.92543 to 0.93727	281000
741	0.93117	+ or - 0.00212	0.92905 to 0.93329	0.92693 to 0.93541	0.92480 to 0.93754	259000
763	0.93058	+ or - 0.00222	0.92836 to 0.93280	0.92615 to 0.93501	0.92393 to 0.93723	237000
785	0.92927	+ or - 0.00206	0.92720 to 0.93133	0.92514 to 0.93340	0.92307 to 0.93546	215000
807	0.92903	+ or - 0.00204	0.92699 to 0.93107	0.92495 to 0.93311	0.92291 to 0.93515	193000
829	0.92895	+ or - 0.00222	0.92673 to 0.93117	0.92451 to 0.93340	0.92229 to 0.93562	171000
851	0.92830	+ or - 0.00301	0.92529 to 0.93130	0.92229 to 0.93431	0.91928 to 0.93731	149000
873	0.92896	+ or - 0.00266	0.92631 to 0.93162	0.92365 to 0.93427	0.92099 to 0.93693	127000
895	0.92908	+ or - 0.00441	0.92467 to 0.93349	0.92026 to 0.93789	0.91585 to 0.94230	105000
917	0.92935	+ or - 0.00525	0.92410 to 0.93460	0.91885 to 0.93985	0.91360 to 0.94510	83000
939	0.93245	+ or - 0.00473	0.92772 to 0.93718	0.92299 to 0.94190	0.91826 to 0.94663	61000
961	0.93499	+ or - 0.00656	0.92843 to 0.94155	0.92187 to 0.94810	0.91531 to 0.95466	39000
983	0.93696	+ or - 0.01593	0.92103 to 0.95289	0.90510 to 0.96882	0.88917 to 0.98475	17000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

plot of average k-effective by generation run.
the line represents k-eff = 0.9286 + or - 0.0012 which occurs for 995 generations run.

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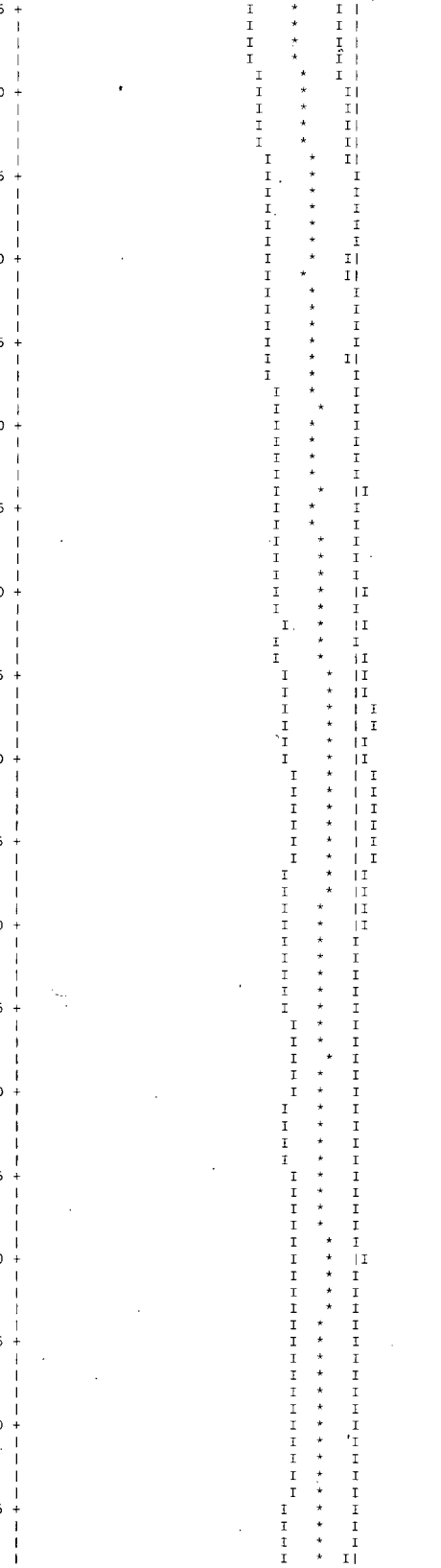

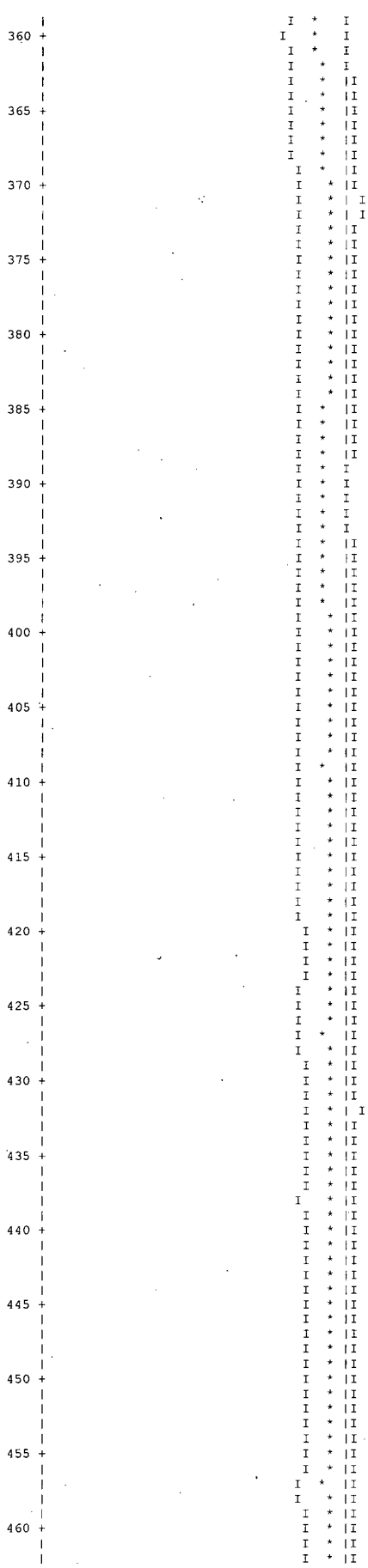

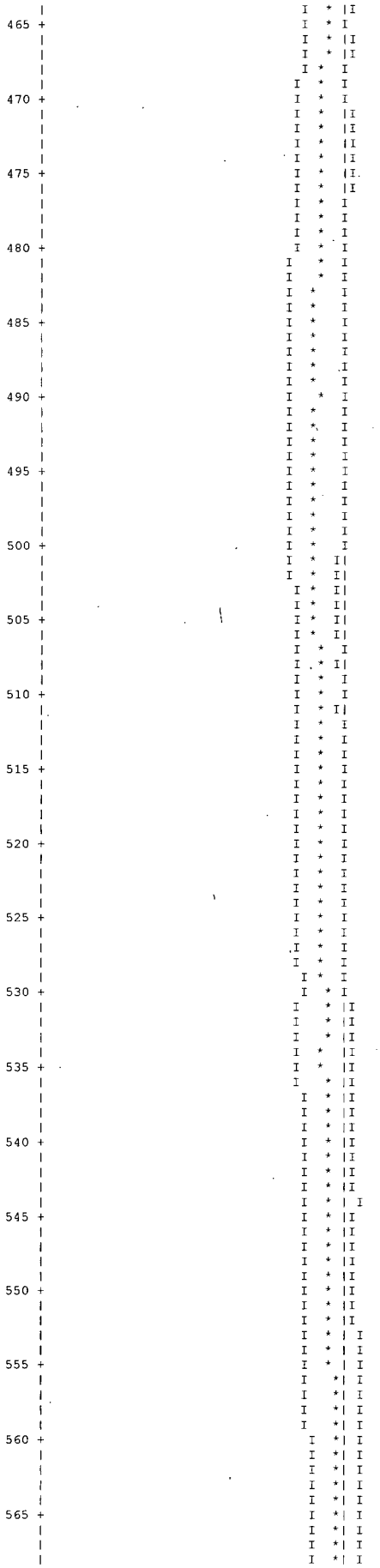

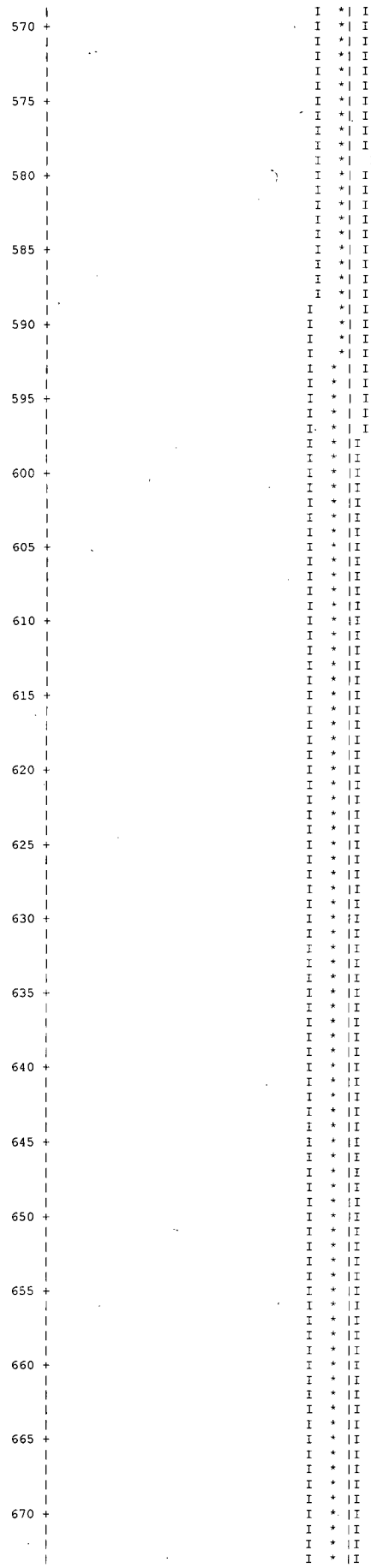

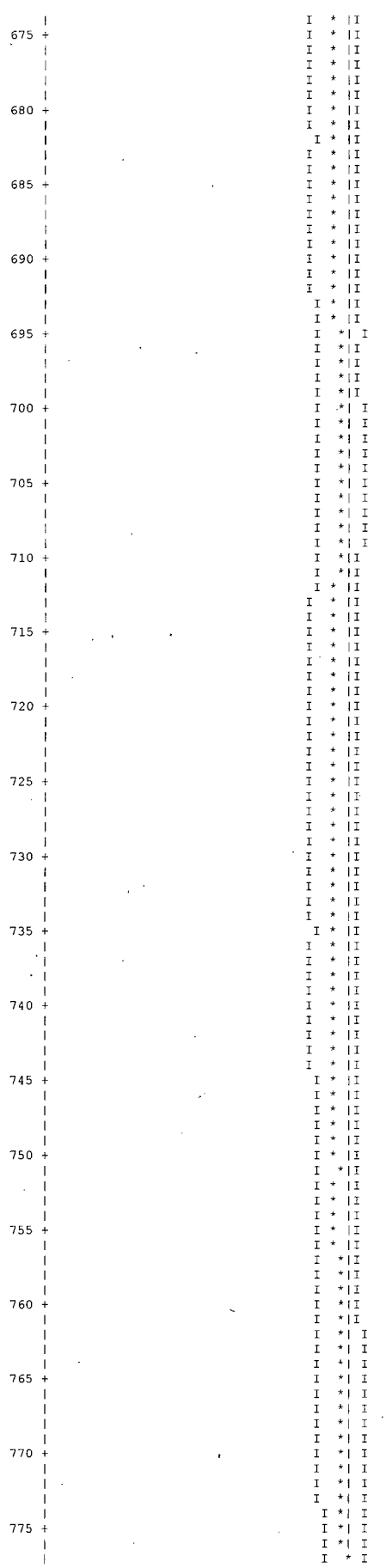
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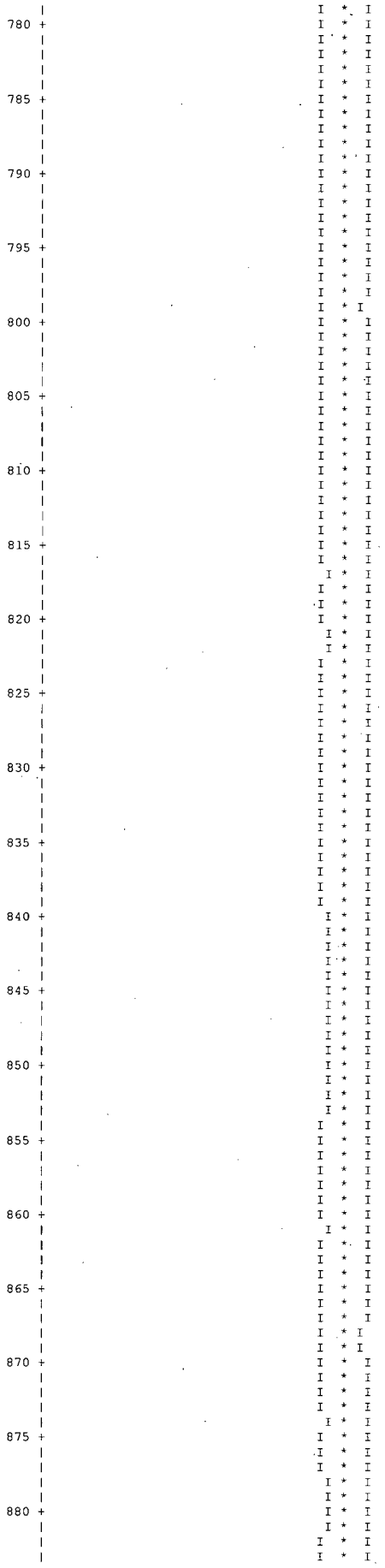

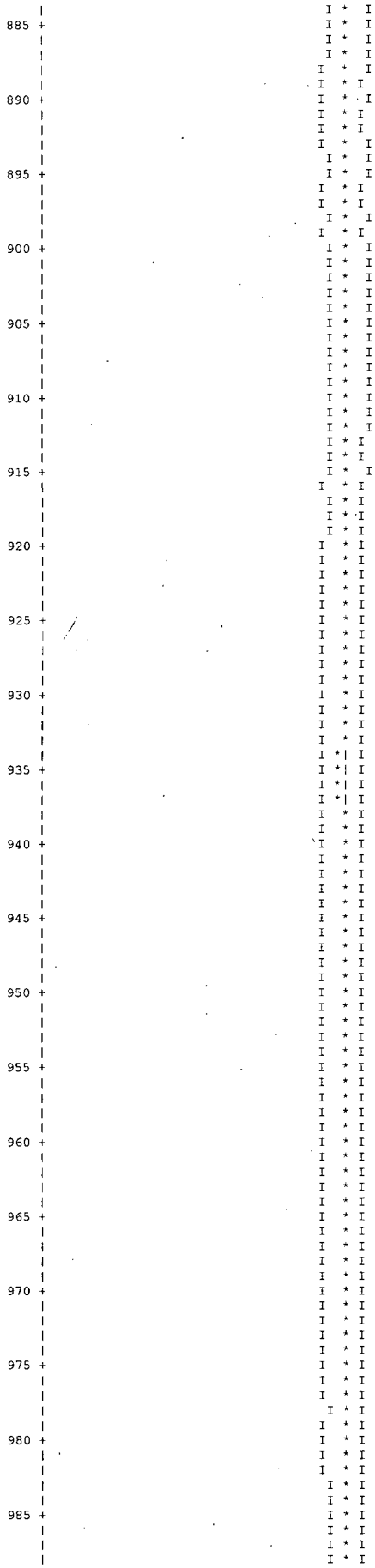

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 995 +                                I * I
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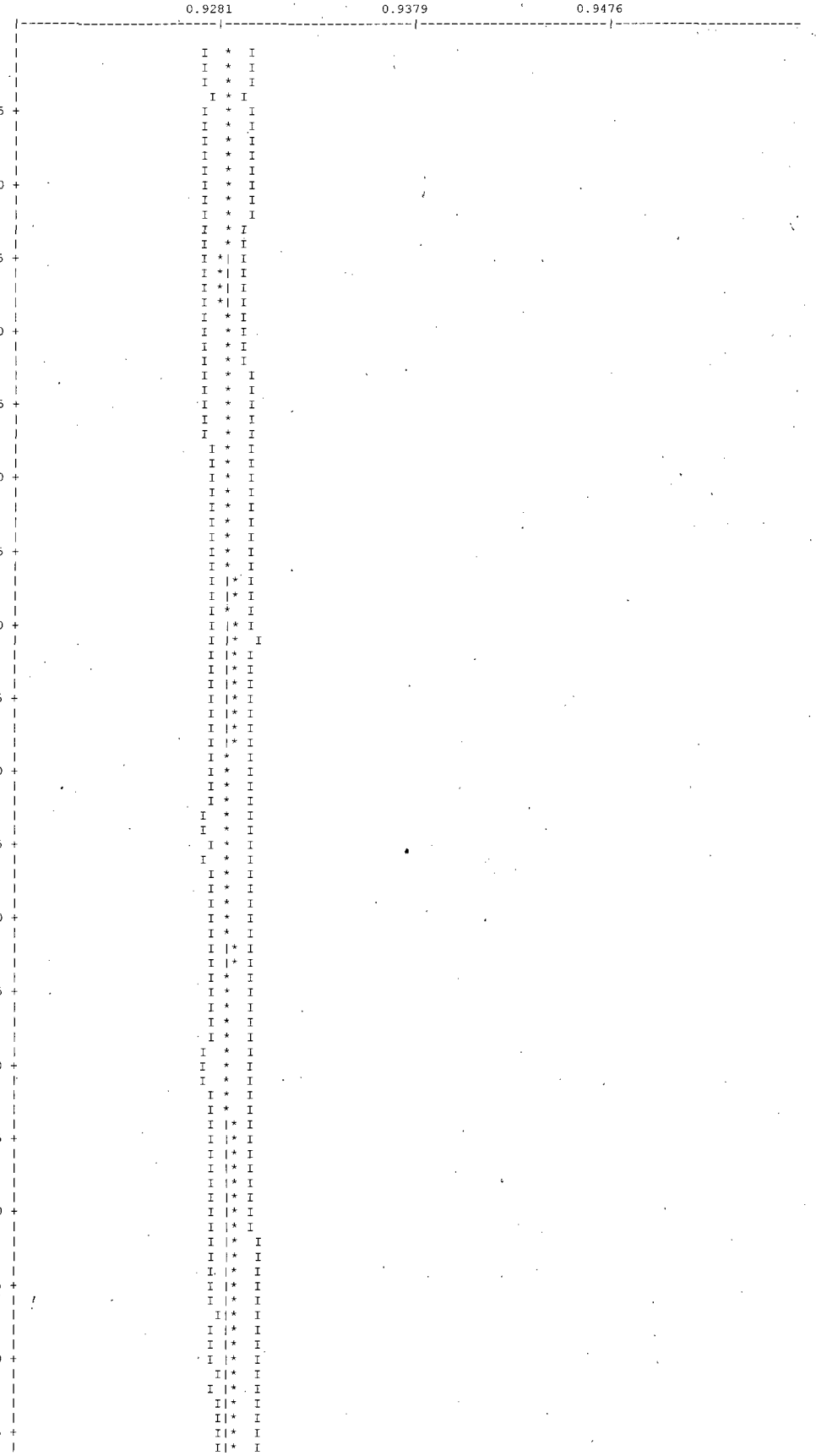
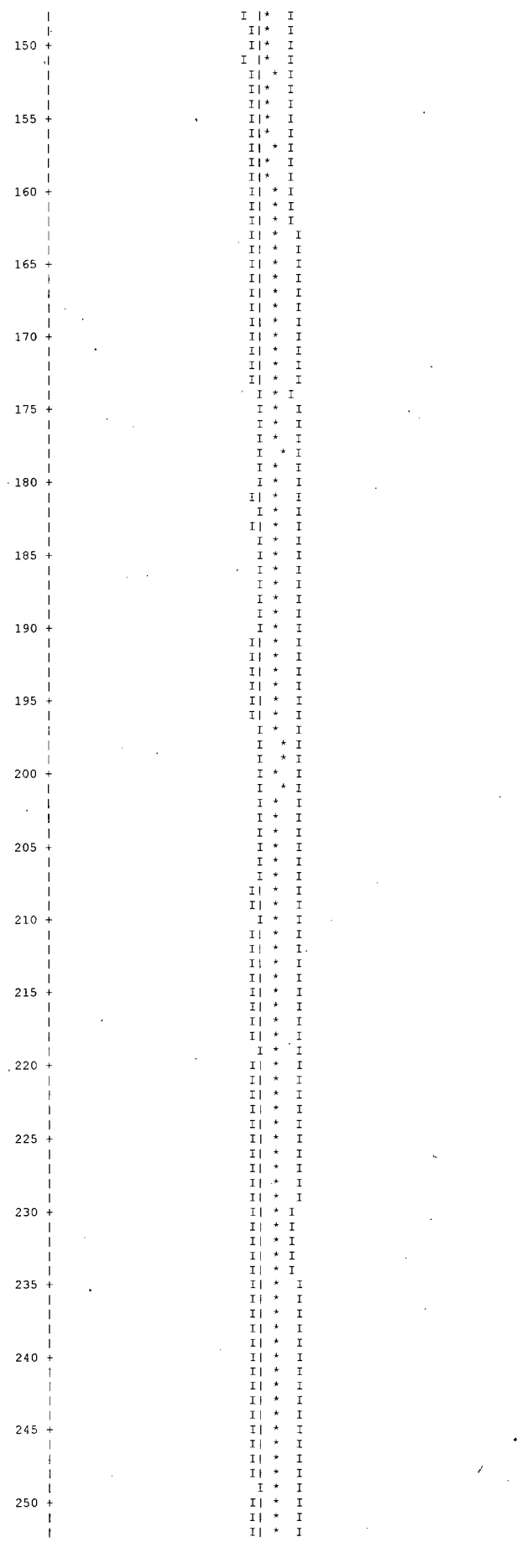
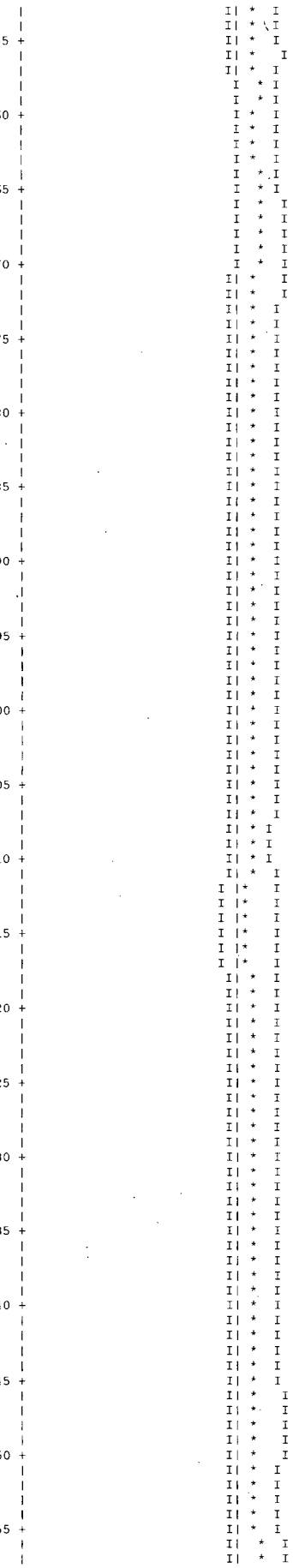
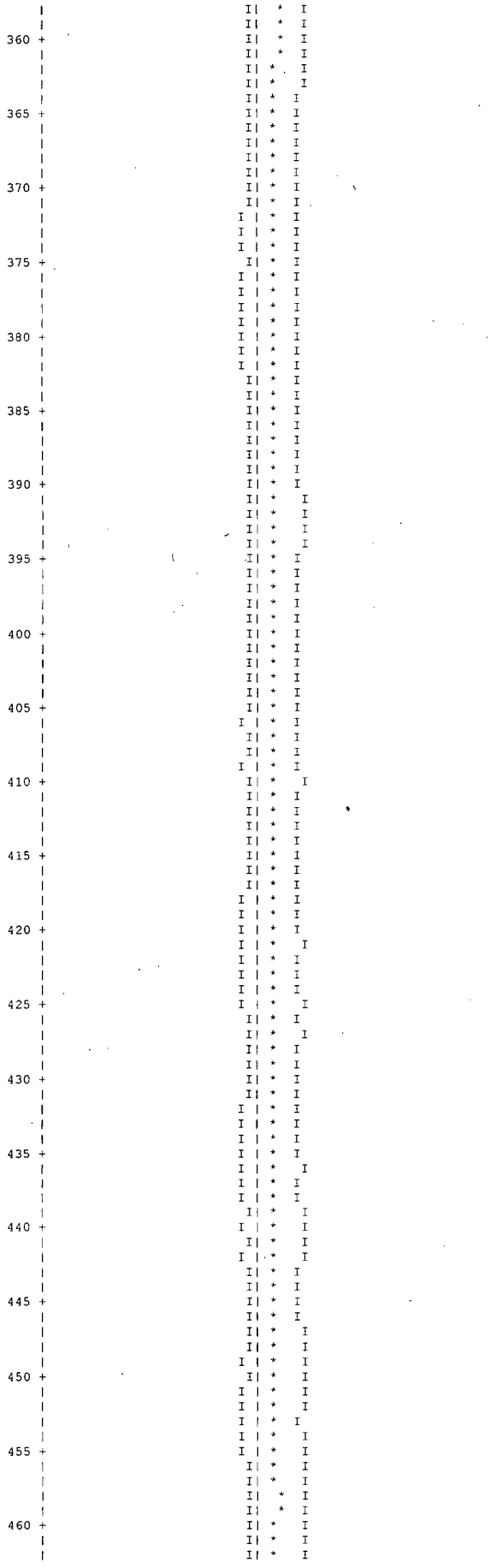
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

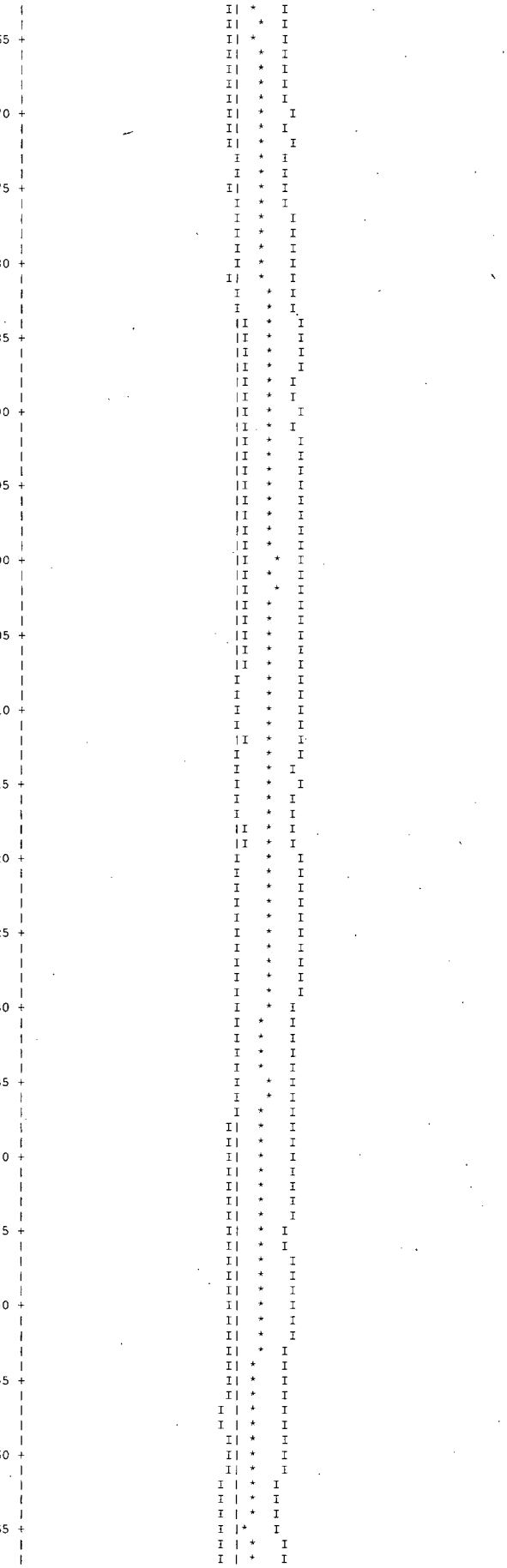
plot of average k-effective by generation skipped.
the line represents k-eff = 0.9287 + or - 0.0011 which occurs for 57 generations skipped.

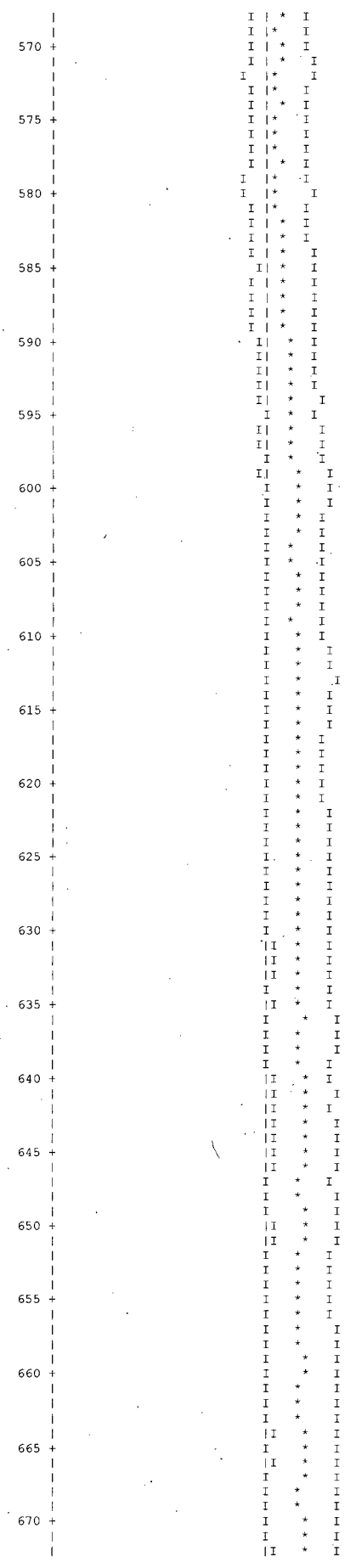


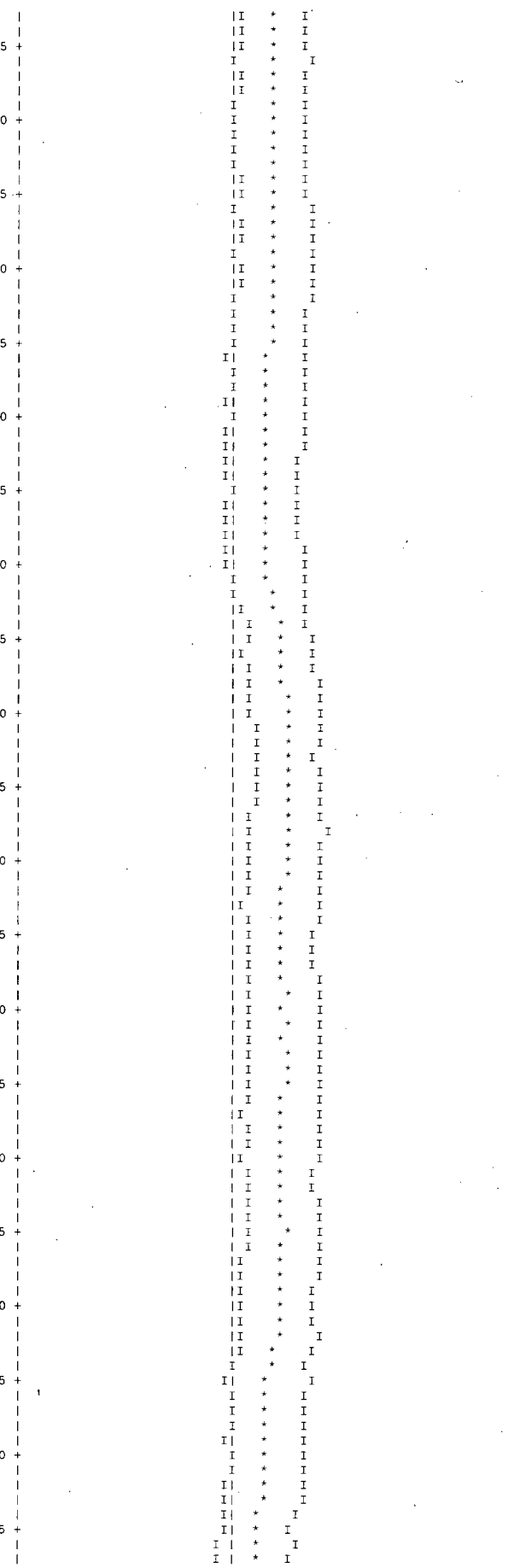


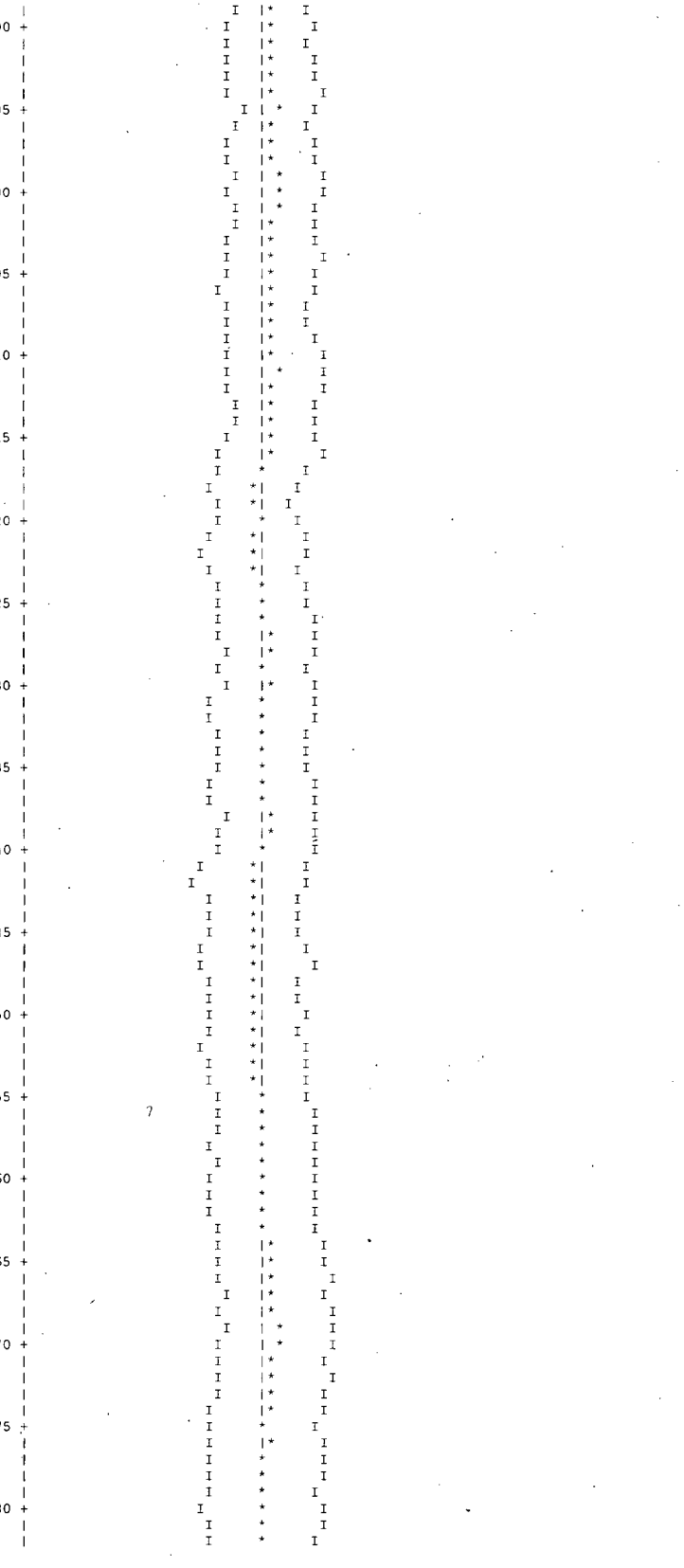








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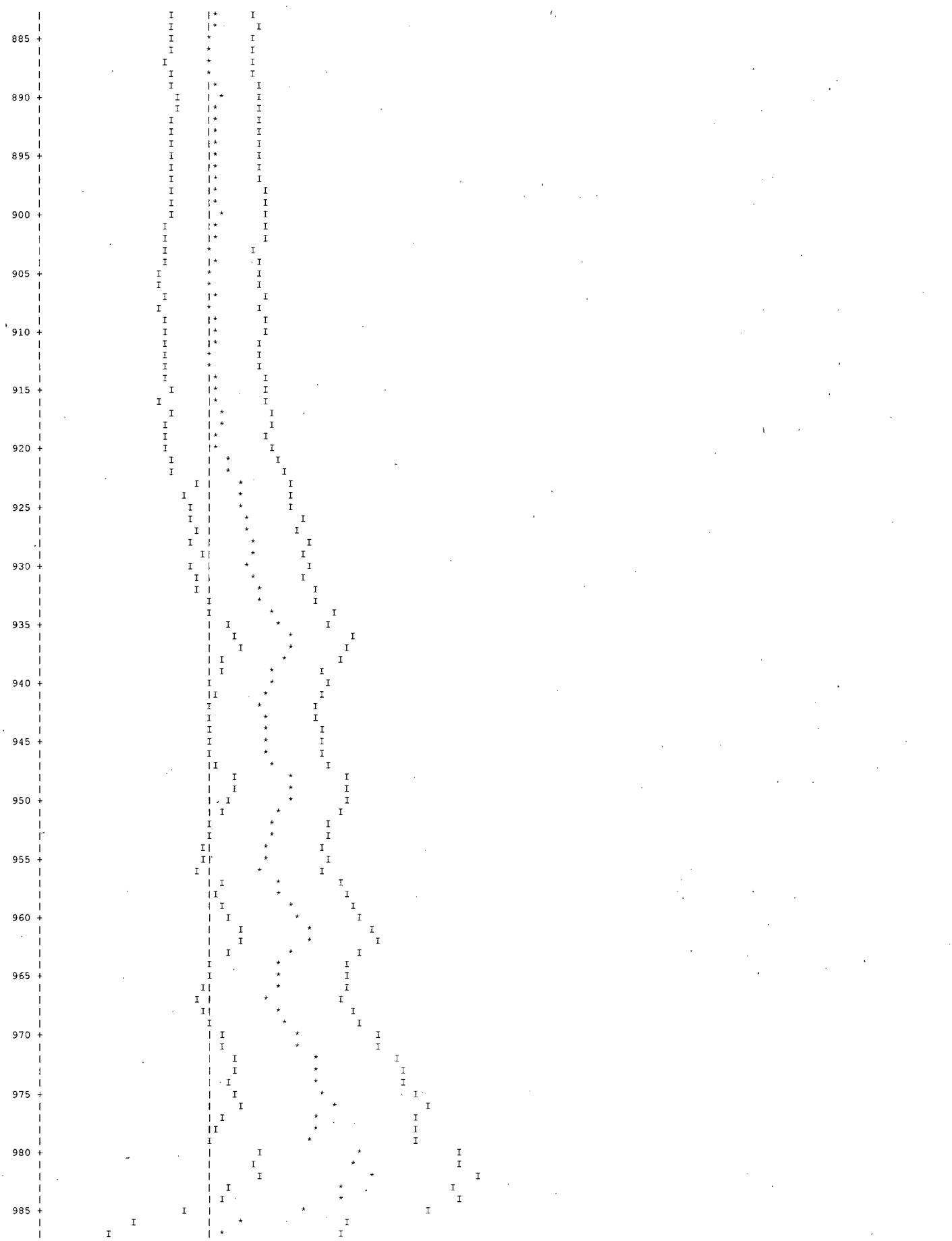
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     |                 I        |         *                  I
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     |                          |I                 *                I
     |                          |                    I          *         I
995 +                          |                        I           *         I
     |                          |                                I         *         I
     |                          |                          I        *       I
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```

k-effective satisfies the chi**2 test for normality at the 95 % level

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			1.59771E-08	100.0000	3.39587E-07	47.9184	0.00000E+00	0.0000
2	0.0000			1.50134E-07	34.4260	8.19775E-07	28.7162	0.00000E+00	0.0000
3	0.0000			2.99506E-07	23.5655	1.69102E-06	34.4402	0.00000E+00	0.0000
4	0.0000			3.31004E-07	23.9901	1.77802E-06	19.9121	0.00000E+00	0.0000
5	0.0000			9.99660E-07	12.3349	6.86808E-06	12.0887	0.00000E+00	0.0000
6	0.0000			8.86848E-06	3.9020	8.80887E-05	3.5007	0.00000E+00	0.0000
7	0.0000			2.50575E-05	2.0525	3.03699E-04	1.6788	0.00000E+00	0.0000
8	0.0001			7.45082E-05	1.0394	3.63177E-04	1.2762	0.00000E+00	0.0000
9	0.0002			1.64251E-04	0.5646	3.31539E-04	1.2756	0.00000E+00	0.0000
10	0.0001			8.92733E-05	0.6800	1.40610E-04	1.3047	0.00000E+00	0.0000
11	0.0004			4.03603E-04	0.3125	4.99711E-04	0.5600	0.00000E+00	0.0000
12	0.0003			2.86168E-04	0.3374	2.73308E-04	0.5114	0.00000E+00	0.0000
13	0.0001			8.57045E-05	0.5896	6.94467E-05	0.6900	0.00000E+00	0.0000
14	0.0004			4.00365E-04	0.2734	2.65364E-04	0.3364	0.00000E+00	0.0000
15	0.0004			3.28214E-04	0.2687	1.88514E-04	0.3334	0.00000E+00	0.0000
16	0.0001			1.03102E-04	0.4627	5.83123E-05	0.5043	0.00000E+00	0.0000
17	0.0000			4.63507E-05	0.6560	2.88677E-05	0.7766	0.00000E+00	0.0000
18	0.0000			4.09757E-05	0.6681	2.44769E-05	0.7547	0.00000E+00	0.0000
19	0.0001			6.95077E-05	0.4918	4.52134E-05	0.6241	0.00000E+00	0.0000
20	0.0001			5.26270E-05	0.5754	3.80971E-05	0.7053	0.00000E+00	0.0000
21	0.0001			1.05613E-04	0.3935	9.49168E-05	0.7211	0.00000E+00	0.0000
22	0.0001			9.63478E-05	0.3839	9.11909E-05	0.7186	0.00000E+00	0.0000
23	0.0001			9.86061E-05	0.3927	1.15631E-04	0.7662	0.00000E+00	0.0000
24	0.0000			2.21943E-05	0.7519	2.88891E-05	1.1299	0.00000E+00	0.0000
25	0.0000			2.84161E-05	0.6427	4.20761E-05	1.1295	0.00000E+00	0.0000
26	0.0000			1.57844E-05	0.8883	2.09840E-05	1.2430	0.00000E+00	0.0000
27	0.0001			4.80182E-05	0.5251	8.36955E-05	0.9812	0.00000E+00	0.0000
28	0.0001			8.36916E-05	0.3951	1.55794E-04	0.8718	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
29	0.0001			8.53659E-05	0.3750	1.95822E-04	0.8210	0.00000E+00	0.0000
30	0.0000			1.08173E-05	1.0071	2.28304E-05	1.1708	0.00000E+00	0.0000
31	0.0001			8.61384E-05	0.3601	1.67109E-04	0.7702	0.00000E+00	0.0000
32	0.0000			3.45801E-05	0.5452	5.45940E-05	0.8350	0.00000E+00	0.0000
33	0.0000			2.96648E-05	0.5973	4.18417E-05	0.8527	0.00000E+00	0.0000
34	0.0001			6.56518E-05	0.3722	9.26592E-05	0.7263	0.00000E+00	0.0000
35	0.0000			4.02918E-05	0.4748	4.99838E-05	0.6717	0.00000E+00	0.0000
36	0.0000			4.17161E-05	0.4826	6.57014E-05	0.7592	0.00000E+00	0.0000
37	0.0000			2.78711E-05	0.5526	3.84728E-05	0.7489	0.00000E+00	0.0000
38	0.0000			2.85446E-05	0.5432	3.36741E-05	0.6881	0.00000E+00	0.0000
39	0.0001			1.04475E-04	0.2881	2.51782E-04	0.8138	0.00000E+00	0.0000
40	0.0001			9.71304E-05	0.2876	1.66448E-04	0.7684	0.00000E+00	0.0000
41	0.0001			1.24514E-04	0.2382	2.68147E-04	0.7562	0.00000E+00	0.0000
42	0.0001			1.02016E-04	0.2578	3.17345E-04	0.8853	0.00000E+00	0.0000
43	0.0001			5.09945E-05	0.3305	1.08734E-04	0.8273	0.00000E+00	0.0000
44	0.0001			7.72905E-05	0.2754	3.00692E-04	0.9614	0.00000E+00	0.0000
45	0.0000			4.46639E-05	0.3147	5.89273E-05	0.7101	0.00000E+00	0.0000
46	0.0000			9.27241E-06	0.6865	2.25800E-05	1.0205	0.00000E+00	0.0000
47	0.0000			2.36697E-05	0.4310	1.50280E-04	1.0487	0.00000E+00	0.0000
48	0.0000			7.42681E-06	0.7931	1.61795E-05	1.0140	0.00000E+00	0.0000
49	0.0001			5.13762E-05	0.2961	1.52297E-04	0.9372	0.00000E+00	0.0000
50	0.0000			3.68652E-05	0.3650	1.81742E-04	1.0647	0.00000E+00	0.0000
51	0.0000			9.64029E-06	0.6260	1.46069E-05	0.8180	0.00000E+00	0.0000
52	0.0000			2.42345E-05	0.3916	7.24345E-05	0.9458	0.00000E+00	0.0000
53	0.0001			9.05651E-05	0.2265	2.54337E-04	0.9020	0.00000E+00	0.0000
54	0.0000			3.92649E-05	0.3293	2.91873E-04	1.1055	0.00000E+00	0.0000
55	0.0001			8.36453E-05	0.2359	3.44999E-04	0.9904	0.00000E+00	0.0000
56	0.0001			5.88315E-05	0.2590	2.82425E-04	1.0794	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0001			7.08991E-05	0.2613	3.12040E-04	1.0923	0.00000E+00	0.0000
58	0.0000			4.25004E-05	0.3314	1.24365E-04	1.0236	0.00000E+00	0.0000
59	0.0001			7.11936E-05	0.2721	2.86451E-04	0.9911	0.00000E+00	0.0000
60	0.0001			1.15806E-04	0.2341	3.18220E-04	0.8255	0.00000E+00	0.0000
61	0.0000			1.29690E-05	0.6548	3.16418E-05	0.8108	0.00000E+00	0.0000
62	0.0001			7.87978E-05	0.3041	1.35975E-04	0.7259	0.00000E+00	0.0000
63	0.0001			6.14068E-05	0.3556	8.77886E-05	0.5767	0.00000E+00	0.0000
64	0.0000			4.63148E-05	0.4136	8.20621E-05	0.6375	0.00000E+00	0.0000
65	0.0000			1.27703E-05	0.6733	5.15994E-05	0.9001	0.00000E+00	0.0000
66	0.0001			6.76036E-05	0.3279	1.42259E-04	0.6865	0.00000E+00	0.0000
67	0.0001			5.25920E-05	0.3629	2.71213E-04	0.9533	0.00000E+00	0.0000
68	0.0000			1.04099E-05	0.7607	2.17554E-05	0.7247	0.00000E+00	0.0000
69	0.0002			1.55879E-04	0.2832	5.28389E-04	0.9526	0.00000E+00	0.0000
70	0.0002			1.48814E-04	0.3220	2.14297E-03	1.1102	0.00000E+00	0.0000
71	0.0002			1.87542E-04	0.2609	2.76625E-04	0.5487	0.00000E+00	0.0000
72	0.0000			8.73705E-06	0.9412	1.70253E-05	0.8230	0.00000E+00	0.0000
73	0.0002			1.70196E-04	0.3103	2.36240E-04	0.4615	0.00000E+00	0.0000
74	0.0007			6.55222E-04	0.2086	1.50183E-03	0.7386	0.00000E+00	0.0000
75	0.0001			7.43515E-05	0.5465	2.19782E-04	0.8253	0.00000E+00	0.0000
76	0.0004			4.07776E-04	0.3357	5.52068E-04	0.5607	0.00000E+00	0.0000
77	0.0001			1.38870E-04	0.3772	3.27400E-04	0.6308	0.00000E+00	0.0000
78	0.0000			3.25778E-06	1.1799	1.92676E-05	1.1750	0.00000E+00	0.0000
79	0.0003			3.15416E-04	0.5030	2.42259E-04	0.4878	0.00000E+00	0.0000
80	0.0000			1.63518E-05	0.7288	5.41164E-05	0.8212	0.00000E+00	0.0000
81	0.0007			6.55951E-04	0.2483	9.70323E-04	0.5051	0.00000E+00	0.0000
82	0.0001			7.54394E-05	0.8415	8.56507E-05	0.7139	0.00000E+00	0.0000
83	0.0002			1.94888E-04	0.7178	1.61114E-04	0.5999	0.00000E+00	0.0000
84	0.0000			2.30969E-05	0.5533	9.86070E-05	0.7964	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
85	0.0002			1.82266E-04	0.5098	2.77212E-04	0.4973	0.00000E+00	0.0000
86	0.0004			3.27594E-04	0.4292	3.97015E-04	0.4617	0.00000E+00	0.0000
87	0.0008			7.17596E-04	0.4421	4.79517E-04	0.4227	0.00000E+00	0.0000
88	0.0001			7.28916E-05	0.8447	6.59062E-05	0.7881	0.00000E+00	0.0000
89	0.0000			3.82473E-05	0.6068	1.00963E-04	0.7820	0.00000E+00	0.0000
90	0.0008			7.60151E-04	0.5987	4.85365E-04	0.5156	0.00000E+00	0.0000
91	0.0001			7.28479E-05	0.5378	1.32583E-04	0.7543	0.00000E+00	0.0000
92	0.0005			4.72071E-04	0.6797	3.60863E-04	0.5950	0.00000E+00	0.0000
93	0.0002			2.31102E-04	0.5534	2.01663E-04	0.5656	0.00000E+00	0.0000
94	0.0004			4.04020E-04	0.7650	2.34288E-04	0.6432	0.00000E+00	0.0000
95	0.0008			7.13372E-04	0.4229	4.88737E-04	0.4559	0.00000E+00	0.0000
96	0.0002			1.50245E-04	0.8585	3.54017E-04	0.7672	0.00000E+00	0.0000
97	0.0000			2.13710E-05	0.8063	6.56726E-05	0.8621	0.00000E+00	0.0000
98	0.0002			1.77799E-04	0.8341	2.09838E-04	0.6982	0.00000E+00	0.0000
99	0.0000			3.13370E-05	1.0257	5.05124E-05	0.9464	0.00000E+00	0.0000
100	0.0002			1.69050E-04	0.8173	1.28288E-04	0.6580	0.00000E+00	0.0000
101	0.0000			2.66926E-05	0.6780	9.20197E-05	0.8266	0.00000E+00	0.0000
102	0.0001			8.18067E-05	0.8168	3.26301E-04	0.7162	0.00000E+00	0.0000
103	0.0000			7.46877E-06	0.7044	8.59235E-05	0.8880	0.00000E+00	0.0000
104	0.0002			1.56879E-04	0.7583	3.62188E-04	0.6570	0.00000E+00	0.0000
105	0.0000			5.88150E-06	0.7463	8.06928E-05	0.9175	0.00000E+00	0.0000
106	0.0000			1.96154E-06	1.2189	2.82397E-05	1.4065	0.00000E+00	0.0000
107	0.0000			4.50404E-06	0.8323	6.45264E-05	0.9968	0.00000E+00	0.0000
108	0.0000			4.02171E-06	0.8411	5.99117E-05	1.0233	0.00000E+00	0.0000
109	0.0000			8.14129E-06	0.6517	1.01939E-04	0.8748	0.00000E+00	0.0000
110	0.0000			7.58206E-06	0.8665	7.27019E-05	0.9231	0.00000E+00	0.0000
111	0.0000			4.11772E-06	0.8441	5.86895E-05	1.0454	0.00000E+00	0.0000
112	0.0000			2.74984E-06	1.1236	3.43171E-05	1.3598	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0001			6.05580E-05	0.6323	1.33265E-04	0.7570	0.00000E+00	0.0000
114	0.0000			3.55737E-06	1.0707	3.82106E-05	1.2618	0.00000E+00	0.0000
115	0.0000			5.63225E-06	0.6786	9.78475E-05	0.9451	0.00000E+00	0.0000
116	0.0000			1.72072E-05	0.4695	2.21336E-04	0.8707	0.00000E+00	0.0000
117	0.0004			3.59921E-04	0.4692	4.96595E-04	0.5222	0.00000E+00	0.0000
118	0.0001			1.19514E-04	0.4305	3.50577E-04	0.7625	0.00000E+00	0.0000
119	0.0009			8.54280E-04	0.5241	6.79441E-04	0.4662	0.00000E+00	0.0000
120	0.0000			1.91196E-05	0.6497	1.44343E-04	0.9303	0.00000E+00	0.0000
121	0.0000			2.41445E-05	0.5802	1.56418E-04	0.8807	0.00000E+00	0.0000
122	0.0000			1.95831E-05	0.8304	8.46677E-05	1.0008	0.00000E+00	0.0000
123	0.0009			7.92166E-04	0.4872	8.10954E-04	0.4587	0.00000E+00	0.0000
124	0.0002			1.46584E-04	0.5708	2.46121E-04	0.7013	0.00000E+00	0.0000
125	0.0006			5.44669E-04	0.5620	4.00110E-04	0.5366	0.00000E+00	0.0000
126	0.0014			1.25686E-03	0.6272	1.04063E-03	0.5683	0.00000E+00	0.0000
127	0.0006			5.37215E-04	0.6088	4.44157E-04	0.5235	0.00000E+00	0.0000
128	0.0001			8.94326E-05	0.5660	2.58064E-04	0.7809	0.00000E+00	0.0000
129	0.0005			4.54892E-04	0.4923	6.41858E-04	0.5053	0.00000E+00	0.0000
130	0.0005			5.06214E-04	0.7522	5.36825E-04	0.6404	0.00000E+00	0.0000
131	0.0036			3.31980E-03	0.3789	1.97704E-03	0.3842	0.00000E+00	0.0000
132	0.0001			9.03104E-05	0.4693	3.93702E-04	0.8528	0.00000E+00	0.0000
133	0.0001			1.12005E-04	0.4237	5.22803E-04	0.8352	0.00000E+00	0.0000
134	0.0021			1.96896E-03	0.3968	1.77562E-03	0.3989	0.00000E+00	0.0000
135	0.0000			2.16576E-05	0.9414	9.92580E-05	1.0564	0.00000E+00	0.0000
136	0.0000			3.21525E-05	0.7522	1.67661E-04	0.9007	0.00000E+00	0.0000
137	0.0000			3.18750E-05	0.6805	1.75746E-04	0.8989	0.00000E+00	0.0000
138	0.0000			3.28676E-05	0.6603	1.82277E-04	0.9391	0.00000E+00	0.0000
139	0.0000			3.28272E-05	0.6726	1.92491E-04	0.9065	0.00000E+00	0.0000
140	0.0001			8.38421E-05	0.4215	5.06044E-04	0.9009	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
141	0.0001			6.14748E-05	0.4948	3.77473E-04	0.8625	0.00000E+00	0.0000
142	0.0000			4.11510E-05	0.6331	2.54912E-04	0.8971	0.00000E+00	0.0000
143	0.0002			1.43764E-04	0.3526	8.81783E-04	0.8863	0.00000E+00	0.0000
144	0.0001			6.12446E-05	0.5301	3.67137E-04	0.8811	0.00000E+00	0.0000
145	0.0001			5.84813E-05	0.5641	3.38258E-04	0.8951	0.00000E+00	0.0000
146	0.0001			1.05926E-04	0.4432	5.90214E-04	0.9059	0.00000E+00	0.0000
147	0.0000			3.42471E-05	0.7860	1.84822E-04	0.9660	0.00000E+00	0.0000
148	0.0000			1.77728E-05	1.0981	9.51782E-05	1.2765	0.00000E+00	0.0000
149	0.0000			1.16526E-05	1.3524	6.69509E-05	1.6672	0.00000E+00	0.0000
150	0.0000			3.99301E-05	0.7245	2.21987E-04	1.0867	0.00000E+00	0.0000
151	0.0000			4.26300E-05	0.7621	2.17261E-04	1.0887	0.00000E+00	0.0000
152	0.0000			4.62392E-05	0.7289	2.26615E-04	1.0663	0.00000E+00	0.0000
153	0.0001			5.04205E-05	0.6957	2.40565E-04	1.0676	0.00000E+00	0.0000
154	0.0001			5.54549E-05	0.7366	2.56693E-04	1.0059	0.00000E+00	0.0000
155	0.0001			5.27497E-05	0.7452	2.41460E-04	1.0333	0.00000E+00	0.0000
156	0.0001			5.06305E-05	0.7606	2.27129E-04	1.0677	0.00000E+00	0.0000
157	0.0001			6.03319E-05	0.6863	2.68041E-04	1.0248	0.00000E+00	0.0000
158	0.0001			6.53596E-05	0.6998	2.83359E-04	1.0408	0.00000E+00	0.0000
159	0.0001			9.57823E-05	0.5932	4.06538E-04	0.9258	0.00000E+00	0.0000
160	0.0001			5.30076E-05	0.7740	2.17687E-04	1.0890	0.00000E+00	0.0000
161	0.0001			7.57451E-05	0.6862	3.03684E-04	0.9784	0.00000E+00	0.0000
162	0.0001			9.58794E-05	0.6319	3.71105E-04	0.9496	0.00000E+00	0.0000
163	0.0001			1.07367E-04	0.6223	3.89979E-04	0.9439	0.00000E+00	0.0000
164	0.0001			1.21257E-04	0.5888	4.25225E-04	0.9297	0.00000E+00	0.0000
165	0.0001			1.35970E-04	0.5845	4.65119E-04	0.9352	0.00000E+00	0.0000
166	0.0001			8.23325E-05	0.7626	2.74261E-04	1.0499	0.00000E+00	0.0000
167	0.0001			8.92989E-05	0.7414	2.88577E-04	1.0627	0.00000E+00	0.0000
168	0.0001			9.77591E-05	0.7200	3.10532E-04	0.9975	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			1.04927E-04	0.7208	3.19432E-04	1.0038	0.00000E+00	0.0000
170	0.0001			1.12254E-04	0.7079	3.38606E-04	1.0044	0.00000E+00	0.0000
171	0.0001			6.11017E-05	0.9081	1.81658E-04	1.1837	0.00000E+00	0.0000
172	0.0001			6.28802E-05	0.9162	1.84821E-04	1.2268	0.00000E+00	0.0000
173	0.0001			6.57679E-05	0.9328	1.91720E-04	1.1494	0.00000E+00	0.0000
174	0.0001			7.05256E-05	0.9017	1.97618E-04	1.1379	0.00000E+00	0.0000
175	0.0000			2.97157E-05	1.3863	8.41046E-05	1.6223	0.00000E+00	0.0000
176	0.0000			3.02352E-05	1.3531	8.21896E-05	1.5371	0.00000E+00	0.0000
177	0.0000			3.07835E-05	1.3997	8.55588E-05	1.6322	0.00000E+00	0.0000
178	0.0000			3.05661E-05	1.3854	8.56032E-05	1.6343	0.00000E+00	0.0000
179	0.0000			3.09133E-05	1.3772	8.63680E-05	1.6197	0.00000E+00	0.0000
180	0.0000			3.11461E-05	1.4171	8.66374E-05	1.6304	0.00000E+00	0.0000
181	0.0000			3.29495E-05	1.4081	8.99739E-05	1.5977	0.00000E+00	0.0000
182	0.0000			3.37256E-05	1.3916	8.82605E-05	1.5033	0.00000E+00	0.0000
183	0.0000			3.47620E-05	1.3250	9.14673E-05	1.5154	0.00000E+00	0.0000
184	0.0000			3.41971E-05	1.4315	9.23555E-05	1.5297	0.00000E+00	0.0000
185	0.0000			3.55436E-05	1.3798	9.30714E-05	1.5498	0.00000E+00	0.0000
186	0.0000			3.81181E-05	1.2922	9.71143E-05	1.5033	0.00000E+00	0.0000
187	0.0000			3.79932E-05	1.3279	9.91476E-05	1.5690	0.00000E+00	0.0000
188	0.0000			3.84264E-05	1.2824	9.62618E-05	1.5318	0.00000E+00	0.0000
189	0.0000			3.93282E-05	1.2770	9.98378E-05	1.5329	0.00000E+00	0.0000
190	0.0001			1.04571E-04	0.8630	2.56028E-04	1.0612	0.00000E+00	0.0000
191	0.0001			1.13053E-04	0.7964	2.68737E-04	1.0193	0.00000E+00	0.0000
192	0.0001			1.19178E-04	0.8162	2.79374E-04	1.0521	0.00000E+00	0.0000
193	0.0001			1.29261E-04	0.8409	2.93820E-04	1.0481	0.00000E+00	0.0000
194	0.0003			2.92191E-04	0.5806	6.31143E-04	0.8629	0.00000E+00	0.0000
195	0.0004			3.46727E-04	0.5630	6.93001E-04	0.7867	0.00000E+00	0.0000
196	0.0004			4.16728E-04	0.5363	7.76791E-04	0.7831	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
197	0.0006			5.15400E-04	0.5241	8.80970E-04	0.7707	0.00000E+00	0.0000
198	0.0007			6.56170E-04	0.5245	1.01227E-03	0.7002	0.00000E+00	0.0000
199	0.0004			4.02238E-04	0.6579	5.70681E-04	0.7924	0.00000E+00	0.0000
200	0.0005			4.72064E-04	0.6536	6.16990E-04	0.7541	0.00000E+00	0.0000
201	0.0013			1.24858E-03	0.4617	1.48971E-03	0.6006	0.00000E+00	0.0000
202	0.0020			1.89035E-03	0.4358	1.94235E-03	0.5210	0.00000E+00	0.0000
203	0.0034			3.16293E-03	0.4405	2.76765E-03	0.4587	0.00000E+00	0.0000
204	0.0066			6.16869E-03	0.3870	4.61858E-03	0.3850	0.00000E+00	0.0000
205	0.0061			5.65895E-03	0.5107	3.88153E-03	0.4755	0.00000E+00	0.0000
206	0.0096			8.92286E-03	0.4694	5.95935E-03	0.4300	0.00000E+00	0.0000
207	0.0153			1.41843E-02	0.4791	9.15003E-03	0.4477	0.00000E+00	0.0000
208	0.0223			2.07286E-02	0.4353	1.30825E-02	0.4105	0.00000E+00	0.0000
209	0.0256			2.37936E-02	0.4290	1.49986E-02	0.4049	0.00000E+00	0.0000
210	0.0235			2.18565E-02	0.3729	1.40705E-02	0.3513	0.00000E+00	0.0000
211	0.0191			1.77319E-02	0.3557	1.19241E-02	0.3308	0.00000E+00	0.0000
212	0.0166			1.53967E-02	0.3322	1.10879E-02	0.3024	0.00000E+00	0.0000
213	0.0163			1.51446E-02	0.2814	1.19093E-02	0.2568	0.00000E+00	0.0000
214	0.0187			1.73890E-02	0.2278	1.50961E-02	0.2028	0.00000E+00	0.0000
215	0.0256			2.37860E-02	0.1943	2.27291E-02	0.1618	0.00000E+00	0.0000
216	0.0411			3.81619E-02	0.1614	3.95442E-02	0.1262	0.00000E+00	0.0000
217	0.0241			2.23743E-02	0.1750	2.41515E-02	0.1304	0.00000E+00	0.0000
218	0.0303			2.81628E-02	0.1602	3.11561E-02	0.1166	0.00000E+00	0.0000
219	0.0387			3.59078E-02	0.1516	4.03678E-02	0.1028	0.00000E+00	0.0000
220	0.0491			4.56073E-02	0.1400	5.20671E-02	0.0917	0.00000E+00	0.0000
221	0.0623			5.78506E-02	0.1375	6.68824E-02	0.0857	0.00000E+00	0.0000
222	0.0782			7.26154E-02	0.1277	8.46451E-02	0.0795	0.00000E+00	0.0000
223	0.0962			8.93864E-02	0.1231	1.04547E-01	0.0734	0.00000E+00	0.0000
224	0.0512			4.75819E-02	0.1358	5.56224E-02	0.0875	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
225	0.1898			1.76254E-01	0.1218	2.05796E-01	0.0687	0.00000E+00	0.0000
226	0.0301			2.79112E-02	0.1725	3.22333E-02	0.1083	0.00000E+00	0.0000
227	0.0274			2.54820E-02	0.1898	2.92379E-02	0.1228	0.00000E+00	0.0000
228	0.0099			9.15505E-03	0.2469	1.04417E-02	0.1729	0.00000E+00	0.0000
229	0.0089			8.29565E-03	0.2745	9.42970E-03	0.1880	0.00000E+00	0.0000
230	0.0040			3.75503E-03	0.3754	4.23151E-03	0.2573	0.00000E+00	0.0000
231	0.0037			3.42652E-03	0.4008	3.86450E-03	0.2777	0.00000E+00	0.0000
232	0.0034			3.12922E-03	0.4216	3.49197E-03	0.2827	0.00000E+00	0.0000
233	0.0018			1.69222E-03	0.5938	1.86205E-03	0.3910	0.00000E+00	0.0000
234	0.0011			9.97842E-04	0.7303	1.11223E-03	0.4626	0.00000E+00	0.0000
235	0.0012			1.09345E-03	0.7241	1.21123E-03	0.4640	0.00000E+00	0.0000
236	0.0010			8.88537E-04	0.8318	9.84095E-04	0.5382	0.00000E+00	0.0000
237	0.0010			9.30585E-04	0.9148	9.48690E-04	0.5811	0.00000E+00	0.0000
238	0.0001			5.16439E-05	3.7444	5.58569E-05	2.4026	0.00000E+00	0.0000
system total =				9.28715E-01	0.0965	1.00129E+00	0.0282	0.00000E+00	0.0000

elapsed time 5.75017 minutes

random number= 47AE452B23CF

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

frequency for generations 51 to 1000

```
0.8319 to 0.8355     *
0.8355 to 0.8392
0.8392 to 0.8428
0.8428 to 0.8465
0.8465 to 0.8501
0.8501 to 0.8538     **
0.8538 to 0.8574     *
0.8574 to 0.8611     *
0.8611 to 0.8648     *****
0.8648 to 0.8684     ******
0.8684 to 0.8721     *****
0.8721 to 0.8757     ******
0.8757 to 0.8794     *******
0.8794 to 0.8830     *******
0.8830 to 0.8867     **************
0.8867 to 0.8903     **********************
0.8903 to 0.8940     **********************
0.8940 to 0.8976     ************************
0.8976 to 0.9013     *******************************
0.9013 to 0.9050     ***********************************
0.9050 to 0.9086     ************************************
0.9086 to 0.9123     *******************************
0.9123 to 0.9159     ******************************************************
0.9159 to 0.9196     ************************************************
0.9196 to 0.9232     ****************************************************
0.9232 to 0.9269     ************************************************************
0.9269 to 0.9305     ****************************************************
0.9305 to 0.9342     *********************************************
0.9342 to 0.9378     ************************************************************
0.9378 to 0.9415     *****************************************
0.9415 to 0.9451     ************************************
0.9451 to 0.9488     *******************************
0.9488 to 0.9525     ************************************************
0.9525 to 0.9561     *********************************
0.9561 to 0.9598     ****************************
0.9598 to 0.9634     ************************
0.9634 to 0.9671     *******************
0.9671 to 0.9707     ************************
0.9707 to 0.9744     *************
0.9744 to 0.9780     **********
0.9780 to 0.9817     ******
0.9817 to 0.9853     *******
0.9853 to 0.9890     ****
0.9890 to 0.9926     ****
0.9926 to 0.9963     ********
0.9963 to 1.0000     ****
1.0000 to 1.0036     *
1.0036 to 1.0073     *
1.0073 to 1.0109
1.0109 to 1.0146
1.0146 to 1.0182     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

frequency for generations 289 to 1000

```
0.8319 to 0.8355
0.8355 to 0.8392
0.8392 to 0.8428
0.8428 to 0.8465
0.8465 to 0.8501
0.8501 to 0.8538     *
0.8538 to 0.8574
0.8574 to 0.8611     *
0.8611 to 0.8648     **
0.8648 to 0.8684     *****
0.8684 to 0.8721     ***
0.8721 to 0.8757     **
0.8757 to 0.8794     ****
0.8794 to 0.8830     ****
0.8830 to 0.8867     ************
0.8867 to 0.8903     **************
0.8903 to 0.8940     ****************
0.8940 to 0.8976     ***************
0.8976 to 0.9013     ************************
0.9013 to 0.9050     **************************
0.9050 to 0.9086     *************************
0.9086 to 0.9123     **********************
0.9123 to 0.9159     ************************************************
0.9159 to 0.9196     *********************************
0.9196 to 0.9232     ************************************
0.9232 to 0.9269     ************************************************
0.9269 to 0.9305     *************************************************
0.9305 to 0.9342     ************************************
0.9342 to 0.9378     ************************************************
0.9378 to 0.9415     **************************
0.9415 to 0.9451     *************************
0.9451 to 0.9488     ******************
0.9488 to 0.9525     ****************************************
0.9525 to 0.9561     *************************
0.9561 to 0.9598     **********************
0.9598 to 0.9634     ******************
0.9634 to 0.9671     *************
0.9671 to 0.9707     ****************
0.9707 to 0.9744     ************
0.9744 to 0.9780     ******
0.9780 to 0.9817     ***
0.9817 to 0.9853     ****
0.9853 to 0.9890     ***
0.9890 to 0.9926     ***
0.9926 to 0.9963     *******
0.9963 to 1.0000     **
1.0000 to 1.0036     *
1.0036 to 1.0073     *
1.0073 to 1.0109
1.0109 to 1.0146
1.0146 to 1.0182     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

frequency for generations 526 to 1000

```
0.8319 to 0.8355
0.8355 to 0.8392
0.8392 to 0.8428
0.8428 to 0.8465
0.8465 to 0.8501
0.8501 to 0.8538     *
0.8538 to 0.8574
0.8574 to 0.8611     *
0.8611 to 0.8648     *
0.8648 to 0.8684     **
0.8684 to 0.8721     *
0.8721 to 0.8757     *
0.8757 to 0.8794     ***
0.8794 to 0.8830     **
0.8830 to 0.8867     *********
0.8867 to 0.8903     **********
0.8903 to 0.8940     *********
0.8940 to 0.8976     ***********
0.8976 to 0.9013     ***********
0.9013 to 0.9050     *******************
0.9050 to 0.9086     *****************
0.9086 to 0.9123     *************
0.9123 to 0.9159     ******************************
0.9159 to 0.9196     ****************************
0.9196 to 0.9232     **********************
0.9232 to 0.9269     ************************
0.9269 to 0.9305     **********************
0.9305 to 0.9342     ************************
0.9342 to 0.9378     ****************************
0.9378 to 0.9415     *******************
0.9415 to 0.9451     **********************
0.9451 to 0.9488     *************
0.9488 to 0.9525     ****************************
0.9525 to 0.9561     *******************
0.9561 to 0.9598     *****************
0.9598 to 0.9634     *************
0.9634 to 0.9671     ******
0.9671 to 0.9707     **********
0.9707 to 0.9744     ***********
0.9744 to 0.9780     **
0.9780 to 0.9817     ***
0.9817 to 0.9853     **
0.9853 to 0.9890     ***
0.9890 to 0.9926     ***
0.9926 to 0.9963     ***
0.9963 to 1.0000     **
1.0000 to 1.0036
1.0036 to 1.0073     *
1.0073 to 1.0109
1.0109 to 1.0146
1.0146 to 1.0182     *
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=700

                                frequency for generations  763 to 1000
0.8319 to 0.8355
0.8355 to 0.8392
0.8392 to 0.8428
0.8428 to 0.8465
0.8465 to 0.8501
0.8501 to 0.8538
0.8538 to 0.8574
0.8574 to 0.8611     *
0.8611 to 0.8648     *
0.8648 to 0.8684     *
0.8684 to 0.8721
0.8721 to 0.8757     *
0.8757 to 0.8794     *
0.8794 to 0.8830     *
0.8830 to 0.8867     ****
0.8867 to 0.8903     ***
0.8903 to 0.8940     ***
0.8940 to 0.8976     ****
0.8976 to 0.9013     ****
0.9013 to 0.9050     *************
0.9050 to 0.9086     *********
0.9086 to 0.9123     ******
0.9123 to 0.9159     ***************
0.9159 to 0.9196     **********
0.9196 to 0.9232     ***********
0.9232 to 0.9269     ****************
0.9269 to 0.9305     *************
0.9305 to 0.9342     ****************
0.9342 to 0.9378     ******************
0.9378 to 0.9415     ***********
0.9415 to 0.9451     *************
0.9451 to 0.9488     *******
0.9488 to 0.9525     **************
0.9525 to 0.9561     *****
0.9561 to 0.9598     **********
0.9598 to 0.9634     ******
0.9634 to 0.9671     **
0.9671 to 0.9707     *****
0.9707 to 0.9744     ******
0.9744 to 0.9780
0.9780 to 0.9817     *
0.9817 to 0.9853
0.9853 to 0.9890     *
0.9890 to 0.9926     ***
0.9926 to 0.9963
0.9963 to 1.0000     **
1.0000 to 1.0036
1.0036 to 1.0073
1.0073 to 1.0109
1.0109 to 1.0146
1.0146 to 1.0182     *


*************************************************************************************************************************

          congratulations!  you have  successfully traversed the perilous path through keno v in   5.75033 minutes

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

```
bbbbbbbbbbbb     oooooooooooo    nn          nn                    aaaaaaaaaa     mm           mm  iiiiiiiiiiii     22222222222
bbbbbbbbbbbbb    oooooooooooooo  nnn         nn                   aaaaaaaaaaaa    mmm         mmm  iiiiiiiiiiii    2222222222222
bb         bb    oo          oo  nnnn        nn                  aa         aa   mmmm       mmmm       ii         22          22
bb         bb    oo          oo  nn nn       nn                  aa         aa   mm mm     mm mm       ii                     22
bb         bb    oo          oo  nn   nn     nn                  aa         aa   mm   mm mm   mm       ii                     22
bbbbbbbbbbbbb    oo          oo  nn    nn    nn  -------------   aaaaaaaaaaaaa   mm    mmm    mm       ii                 22
bbbbbbbbbbbbb    oo          oo  nn     nn   nn  -------------   aaaaaaaaaaaaa   mm     m     mm       ii               22
bb         bb    oo          oo  nn      nn  nn                  aa         aa   mm           mm       ii             22
bb         bb    oo          oo  nn       nn nn                  aa         aa   mm           mm       ii           22
bb         bb    oo          oo  nn        nnnn                  aa         aa   mm           mm       ii         22
bbbbbbbbbbbbb    oooooooooooooo  nn         nnn                  aa         aa   mm           mm  iiiiiiiiiiii    2222222222222
bbbbbbbbbbbb     oooooooooooo    nn          nn                  aa         aa   mm           mm  iiiiiiiiiiii    2222222222222


 sssssssssss     cccccccccccc     aaaaaaaaa    ll                eeeeeeeeeeeee                   pppppppppppp     cccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa  ll                eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc  aa         aa ll                ee                              pp         pp    cc          cc
ss               cc              aa         aa ll                ee                              pp         pp    cc
ss               cc              aa         aa ll                ee                              pp         pp    cc
ssssssssssss     cc              aaaaaaaaaaaaa ll                eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssss    cc              aaaaaaaaaaaaa ll                eeeeeeeee       -------------   pppppppppppp      cc
          ss     cc              aa         aa ll                ee                              pp                cc
          ss     cc              aa         aa ll                ee                              pp                cc
ss        ss     cc          cc  aa         aa ll                ee                              pp                cc          cc
ssssssssssssss   cccccccccccccc  aa         aa lllllllllllll     eeeeeeeeeeeee                   pp                cccccccccccccc
 sssssssssss     cccccccccccc    aa         aa lllllllllllll     eeeeeeeeeeeee                   pp                 cccccccccccc


   0000000       666666666666              //  22222222222       0000000                //     0000000      5555555555555
  000000000      6666666666666             //  2222222222222     000000000              //     000000000    5555555555555
 00       00     66                       //   22          22    00       00            //     00       00  55
00         00    66                      //                22   00         00          //     00         00 55
00         00    66                     //                 22   00         00         //      00         00 55
00         00    666666666666          //                22     00         00        //       00         00 555555555555
00         00    6666666666666       //              22         00         00       //        00         00 5555555555555
00         00    66          66    //            22             00         00      //         00         00           55
00         00    66          66   //           22              00         00     //          00         00           55
 00       00     66          66  //           22               00       00    //            00       00  55         55
  000000000      6666666666666 //            2222222222222      000000000   //              000000000    5555555555555
   0000000       66666666666  //             2222222222222       0000000   //                0000000      55555555555


   0000000       666666666666                          44      22222222222                  5555555555555    22222222222
  000000000      6666666666666                        444     2222222222222                 5555555555555   2222222222222
 00       00     66                  :::            4444     22         22        :::      55             22         22
00         00    66                  :::          44 44                22        :::      55                         22
00         00    66                  :::         44  44                22        :::      55                         22
00         00    666666666666                   44   44            22                    555555555555            22
00         00    6666666666666                 44    44         22                       5555555555555        22
00         00    66          66        :::     444444444444       22               :::                55      22
00         00    66          66        :::    4444444444444     22                  :::                55    22
 00       00     66          66        :::              44     22                    :::      55         55  22
  000000000      6666666666666                       44     2222222222222                 5555555555555   2222222222222
   0000000       66666666666                         44     2222222222222                  55555555555    2222222222222
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll            eeeeeeeeeeeee                  ppppppppppp     ccccccccccc
ssssssssssssss   ccccccccccccc    aaaaaaaaaaa   ll            eeeeeeeeeeeee                  pppppppppppppp  ccccccccccccc
ss         ss    cc          cc   aa         aa ll            ee                             pp         pp   cc          cc
ss               cc               aa         aa ll            ee                             pp         pp   cc
ss               cc               aa         aa ll            ee                             pp         pp   cc
ssssssssssss     cc               aaaaaaaaaaaaa ll            eeeeeeeee       -------------  pppppppppppppp  cc
 ssssssssssss    cc               aaaaaaaaaaaaa ll            eeeeeeeee       -------------  pppppppppppppp  cc
          ss     cc               aa         aa ll            ee                             pp              cc
          ss     cc               aa         aa ll            ee                             pp              cc
ss        ss     cc          cc   aa         aa ll            ee                             pp              cc          cc
ssssssssssssss   ccccccccccccccc  aa         aa llllllllllll  eeeeeeeeeeeee                  pp              ccccccccccccc
 sssssssssss     ccccccccccc      aa         aa llllllllllll  eeeeeeeeeeeee                  pp               ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:  o0o008
creation date:  11/11/1999
library:  c:\scale4.4a\bin
production code:  bonami
version:  4.4.0
jobname:  scale-pc
machine name:  NFA10385
date of execution:  20_jun_2005
time of execution:  06:42:52.39
```

```
-1q array has      1 entries.
 0q array has      4 entries.
 1q array has      6 entries.
 2q array has      2 entries.
```

```
logical assignments

master library   11
working library   0
scratch file     18
new library       1

p r o b l e m   d e s c r i p t i o n

igr--geometry (0/1/2/3--inf med/slab/cyl/sphere              1

izm--number of zones or material regions                     6

ms--mixing table length                                     18

ibl--shielded cross section edit option (0/1--no/yes)        0

ibr--bondarenko factor edit option (0/1--no/yes)             0

issopt--dancoff factor option                                0

convergence criterion    1.00000E-03

geometry correction factor for wigner rational approximation  1.000E+00

        3q array has     18 entries.

        4q array has     18 entries.

        5q array has     18 entries.

        6q array has      6 entries.

        7q array has      6 entries.

        8q array has      6 entries.

        9q array has      6 entries.

       10q array has     18 entries.

       11q array has      6 entries.

m i x i n g   t a b l e

entry   mixture   isotope   number density   new identifier   explicit temperature
   1       1         1001     7.83610E-02        1001001            293.0
   2       2         1001     7.85246E-02        2001001            293.0
   3       5         1001     6.67692E-02        5001001            293.0
   4       1         4309     1.23375E-03        1004309            293.0
   5       2         4309     1.23621E-03        2004309            293.0
   6       1         6012     3.91847E-02        1006012            293.0
   7       2         6012     3.92623E-02        2006012            293.0
   8       4         6012     3.18772E-04        4006012            293.0
   9       1         8016     0.00000E+00        1008016            293.0
  10       5         8016     3.33846E-02        5008016            293.0
  11       1        94239     9.79613E-05        1094239            293.0
  12       4        14000     1.70252E-03        4014000            293.0
  13       4        15031     6.94680E-05        4015031            293.0
  14       4        24304     1.74726E-02        4024304            293.0
  15       4        25055     1.74071E-03        4025055            293.0
  16       4        26304     5.85446E-02        4026304            293.0
  17       4        28304     7.74020E-03        4028304            293.0
  18       6        82000     3.29690E-02        6082000            293.0

geometry and material description

zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1          1.00000E+00    2.93000E+02    0.00000E+00            0
   2      2          6.00000E+00    2.93000E+02    0.00000E+00            0
   3      3          1.10000E+01   -2.93000E+02    0.00000E+00            0
   4      4          1.60000E+01    2.93000E+02    0.00000E+00            0
   5      5          2.10000E+01    2.93000E+02    0.00000E+00            0
   6      6          2.60000E+01    2.93000E+02    0.00000E+00            0

this calculation requires    36777 locations of  2000000 available to this module

power fitting for:     14000-- processes:  3-- sig0's: 8-- temperatures: 3-- max groups: 238

warning-nuclide:    14000 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

power fitting for:     94239-- processes:  5-- sig0's: 7-- temperatures: 3-- max groups:  21

warning-nuclide:    94239 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

zone     volume   outer radius____      _____    ___________
   1   1.000E+00   1.000E+00
   2   5.000E+00   6.000E+00
   3   5.000E+00   1.100E+01
   4   5.000E+00   1.600E+01
   5   5.000E+00   2.100E+01
   6   5.000E+00   2.600E+01

fuel region volume            2.60E+01
moderator region volume       0.00E+00
fuel region radius            2.60E+01
moderator region radius       2.60E+01

  elapsed time   0.00 min.
```

infinite dilution macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.002E-01	1.063E-01	1.090E-01	1.074E-01	1.124E-01	1.202E-01	1.311E-01	1.484E-01	1.712E-01	2.057E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.766E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.618E-01	4.679E-01	4.732E-01	4.811E-01	4.985E-01	5.221E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.250E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.556E-01	5.754E-01	5.870E-01	6.062E-01	6.290E-01	6.480E-01	6.653E-01	6.801E-01	7.180E-01	7.836E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.702E-01	2.774E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.688E-01	9.763E-01	1.061E+00	1.134E+00	1.209E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.375E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.471E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.279E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.489E+00	1.555E+00	1.606E+00	1.655E+00	1.688E+00	1.710E+00	1.727E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.763E+00	1.769E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.782E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

infinite dilution macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.795E+00	1.797E+00	1.801E+00	1.798E+00	1.797E+00	1.802E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.804E+00	1.807E+00	1.797E+00	1.804E+00	1.804E+00	1.808E+00	1.800E+00	1.798E+00	1.821E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.821E+00	1.801E+00	1.812E+00	1.806E+00	1.837E+00	1.798E+00	1.813E+00	1.799E+00	1.805E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.831E+00	1.798E+00	1.824E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.797E+00	1.797E+00	1.799E+00	1.797E+00	1.797E+00	1.798E+00	1.805E+00	1.799E+00	1.818E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.798E+00	1.817E+00	1.800E+00	1.808E+00	1.855E+00	1.815E+00	1.799E+00	1.811E+00	1.834E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.829E+00	1.799E+00	1.800E+00	1.829E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

infinite dilution macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.800E+00	1.800E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.828E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.853E+00	1.855E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.848E+00	1.846E+00	1.850E+00	1.854E+00	1.858E+00	1.861E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.874E+00	1.873E+00	1.882E+00	1.893E+00	1.901E+00	1.913E+00	1.932E+00	1.938E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.960E+00	1.994E+00	2.040E+00	2.121E+00	2.216E+00	2.318E+00	2.470E+00	2.656E+00	2.726E+00	2.659E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

infinite dilution macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.572E+00	2.544E+00	2.565E+00	2.626E+00	2.717E+00	2.855E+00	2.970E+00	3.058E+00	3.166E+00	3.304E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.489E+00	3.740E+00	4.082E+00	4.406E+00	5.039E+00	5.928E+00	6.370E+00	6.844E+00	7.249E+00	7.709E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.654E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.134E+00	8.727E+00	9.496E+00	1.019E+01	1.109E+01	1.266E+01	1.748E+01	3.671E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.335E+00	2.534E+00	2.878E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

bondarenko iteration statistics

iteration	mt	max change	group	zone	new value	nuclide	sig0	first	last
1	1	-5.749E-02	50	4	6.492E+00	4014000	2.44454E+02	1	238
1	1	-2.464E-02	56	1	1.370E+01	1094239	1.68785E+04	55	75
2	all groups for nuclide		4014000 are converged to less than eps= 1.00E-03						
2	all groups for nuclide		1094239 are converged to less than eps= 1.00E-03						

elapsed time 0.01 min.

shielded macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.002E-01	1.063E-01	1.090E-01	1.074E-01	1.124E-01	1.202E-01	1.311E-01	1.484E-01	1.712E-01	2.057E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.765E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.618E-01	4.679E-01	4.732E-01	4.811E-01	4.985E-01	5.221E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.249E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.556E-01	5.754E-01	5.870E-01	6.062E-01	6.290E-01	6.480E-01	6.653E-01	6.801E-01	7.180E-01	7.836E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.701E-01	2.773E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.688E-01	9.763E-01	1.061E+00	1.134E+00	1.209E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.375E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.469E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.272E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.489E+00	1.555E+00	1.606E+00	1.655E+00	1.688E+00	1.710E+00	1.727E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.763E+00	1.769E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.782E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

shielded macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.795E+00	1.797E+00	1.801E+00	1.798E+00	1.797E+00	1.802E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.804E+00	1.807E+00	1.797E+00	1.804E+00	1.804E+00	1.808E+00	1.800E+00	1.798E+00	1.821E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.821E+00	1.801E+00	1.812E+00	1.806E+00	1.837E+00	1.798E+00	1.813E+00	1.799E+00	1.805E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.831E+00	1.798E+00	1.824E+00	1.797E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.797E+00	1.797E+00	1.799E+00	1.797E+00	1.797E+00	1.798E+00	1.805E+00	1.799E+00	1.818E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.798E+00	1.817E+00	1.800E+00	1.808E+00	1.855E+00	1.815E+00	1.799E+00	1.811E+00	1.834E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.829E+00	1.799E+00	1.800E+00	1.829E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

shielded macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.800E+00	1.800E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.828E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.853E+00	1.855E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.848E+00	1.846E+00	1.850E+00	1.854E+00	1.858E+00	1.861E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.874E+00	1.873E+00	1.882E+00	1.893E+00	1.901E+00	1.913E+00	1.932E+00	1.938E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.960E+00	1.994E+00	2.040E+00	2.121E+00	2.216E+00	2.318E+00	2.470E+00	2.656E+00	2.726E+00	2.659E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

shielded macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.572E+00	2.544E+00	2.565E+00	2.626E+00	2.717E+00	2.855E+00	2.970E+00	3.058E+00	3.166E+00	3.304E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.489E+00	3.740E+00	4.082E+00	4.406E+00	5.039E+00	5.928E+00	6.370E+00	6.844E+00	7.249E+00	7.709E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.655E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.134E+00	8.727E+00	9.496E+00	1.019E+01	1.109E+01	1.266E+01	1.748E+01	3.671E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.336E+00	2.534E+00	2.879E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

number of separate processes to treat: 8
number treated (including multi-zone): 8
maximum number of sigma-0's: 8
maximum number of temperatures: 3
offset of origen for interpolation: 2.0E+01

macroscopic escape cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

36777 locations of 36992 available are required to make a new master containing the self-shielded values

```
copy      4309   Be-metal (1304/ from log 11 to log 18    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy     24304   24CR BNL EVALDE from log 11 to log  1    bondarenko trigger 0

copy     26304   26FE 0 ORNL EVA from log 11 to log  1    bondarenko trigger 0

copy     28304   28NI 0 BNL NNDC from log 11 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 11 to log 18    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy     14000   14si 0 ornl eva from log 11 to log  1    bondarenko trigger 1

copy     25055   25mn 55 bnl eva from log 11 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 11 to log 18    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 11 to log 18    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy     15031   15p 31 lll eval from log 11 to log  1    bondarenko trigger 0

copy     82000   82pb ornl evalj from log 11 to log  1    bondarenko trigger 0

copy     94239   94pu239 lanl ju from log 11 to log  1    bondarenko trigger 1
```

```
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
      n.m.greene & l.m.petrie
        nuclear applications & methods analysis - ns&td - ornl
    tape id                          4321        number of nuclides                  18
    number of neutron groups          238        number of gamma groups               0
    first thermal group               149        logical unit                         1
                                table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 lll evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    9.65 seconds
```

```
nn          nn  iiiiiiiiiiii    tttttttttttt      aaaaaaaaa     ww        ww  ll
nnn         nn  iiiiiiiiiiii    tttttttttttt     aaaaaaaaaaa    ww        ww  ll
nnnn        nn      ii              tt         aa         aa   ww        ww  ll
nn nn       nn      ii              tt         aa         aa   ww        ww  ll
nn   nn     nn      ii              tt         aa         aa   ww        ww  ll
nn    nn    nn      ii              tt         aaaaaaaaaaaaa   ww    w   ww  ll
nn     nn   nn      ii              tt         aaaaaaaaaaaaa   ww   www  ww  ll
nn      nn  nn      ii              tt         aa         aa   ww  ww ww  ww  ll
nn       nn nn      ii              tt         aa         aa   ww ww    ww ww  ll
nn        nnnn      ii              tt         aa         aa   wwww      wwww  ll
nn         nnn  iiiiiiiiiiii        tt         aa         aa   www        www  llllllllllll
nn          nn  iiiiiiiiiiii        tt         aa         aa   ww        ww   llllllllllll
```

```
 sssssssssss    ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                   ppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa    ll             eeeeeeeeeeeee                   pppppppppppppp cccccccccccccc
ss         ss   cc         cc   aa         aa   ll             ee                              pp         pp  cc         cc
ss              cc              aa         aa   ll             ee                              pp         pp  cc
ss              cc              aa         aa   ll             ee                              pp         pp  cc
ssssssssssss    cc              aaaaaaaaaaaaa   ll             eeeeeeeee       -------------   pppppppppppppp  cc
 ssssssssssss   cc              aaaaaaaaaaaaa   ll             eeeeeeeee       -------------   pppppppppppp    cc
          ss    cc              aa         aa   ll             ee                              pp              cc
          ss    cc              aa         aa   ll             ee                              pp              cc
ss         ss   cc         cc   aa         aa   ll             ee                              pp              cc         cc
ssssssssssssss  cccccccccccccc  aa         aa   llllllllllllll eeeeeeeeeeeeee                  pp              cccccccccccccc
 ssssssssssss    ccccccccccc     aa         aa   llllllllllllll eeeeeeeeeeeeee                  pp               ccccccccccc
```

```
   0000000       666666666666              //   22222222222      0000000                //    0000000      5555555555555
  000000000     6666666666666             //   2222222222222    000000000              //    000000000     5555555555555
 00       00    66                       //    22          22   00       00            //    00       00   55
00         00   66                      //                22   00         00          //    00         00  55
00         00   66                     //                 22   00         00         //     00         00  55
00         00   666666666666          //                22    00         00        //      00         00  555555555555
00         00   6666666666666        //              22       00         00       //       00         00  5555555555555
00         00   66         66       //             22         00         00      //        00         00             55
00         00   66         66      //            22           00         00     //         00         00             55
 00       00    66         66     //           22             00       00      //           00       00   55         55
  000000000     6666666666666   //            2222222222222    000000000     //             000000000    5555555555555
   0000000       66666666666   //             2222222222222     0000000     //               0000000      55555555555
```

```
   0000000       666666666666                          44      33333333333                     0000000       33333333333
  000000000     6666666666666                        444     3333333333333                    000000000     3333333333333
 00       00    66                  :::            4444     33         33        :::        00       00   33         33
00         00   66                  :::           44 44               33        :::       00         00              33
00         00   66                  :::          44  44               33        :::       00         00              33
00         00   666666666666                     44   44            333                   00         00            333
00         00   6666666666666                   44    44            333                   00         00            333
00         00   66         66       :::        444444444444           33        :::       00         00              33
00         00   66         66       :::       4444444444444           33        :::       00         00              33
 00       00    66         66       :::                44     33         33        :::        00       00   33         33
  000000000     6666666666666                         44     3333333333333                    000000000     3333333333333
   0000000       66666666666                          44      33333333333                     0000000       33333333333
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc         cc    aa         aa  ll              ee                              pp         pp    cc         cc
ss               cc               aa         aa  ll              ee                              pp         pp    cc
ss               cc               aa         aa  ll              ee                              pp         pp    cc
ssssssssssssss   cc               aaaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssssss  cc               aaaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppppp    cc
          ss     cc               aa         aa  ll              ee                              pp                cc
          ss     cc               aa         aa  ll              ee                              pp                cc
ss        ss     cc         cc    aa         aa  ll              ee                              pp                cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  llllllllllllll  eeeeeeeeeeeee                   pp                cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  llllllllllllll  eeeeeeeeeeeee                   pp                 ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                program verification information                                        *****
*****                                                                                                       *****
*****                             code system:  scale-pc version:  4.4a                                     *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o002                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/11/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  nitawl                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:43:03.18                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
      -1q array has      1 entries.

       0q array has      9 entries.

       1q array has     12 entries.

select 18 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

        2 resonance calculations have been requested
       -1 output option for ampx formatted cross section data
     2001 maximum number of resonance mesh intervals
        2 order of resonance level processing

the storage allocated for this case is   2000000 words

        2q array has     18 entries.

        3q array has     30 entries.

        4q array has     18 entries.

 general information concerning cross section library
   tape identification number                4321
   number of nuclides on tape                  18
   number of neutron energy groups            238
   first thermal neutron energy group         149
   number of gamma energy groups                0

   direct access unit number  9 requires 280 blocks of length  8172 words
 xsdrn tape   4321
                        scale - 238 neutron group library            based on endf-b version 5 data
                          generated with a chi-1/e-maxwellian weight spectrum
                            compiled for doe - 8/18/94           last updated - 5/16/2002
                              n.m.greene & l.m.petrie
                                nuclear applications & methods analysis - ns&td - ornl

 nuclides from xsdrn tape
    1     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  1004309
    2     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  2004309
    3     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91         4024304
    4     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91         4026304
    5     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91         4028304
    6    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               1006012
    7    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               2006012
    8    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               4006012
    9     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88              4014000
   10     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88              4025055
   11     8O 16 from version 6 evaluation                                             1008016
   12     8O 16 from version 6 evaluation                                             5008016
   13     hydrogen in water 1301/1002    mod1   11/23/92                              1001001
   14     hydrogen in water 1301/1002    mod1   11/23/92                              2001001
   15     hydrogen in water 1301/1002    mod1   11/23/92                              5001001
   16     15p 31 lll evaloct77 howerton                    mod1 12/20/88              4015031
   17     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89              6082000
   18     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89              1094239

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002              1004309     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002              2004309     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91     4024304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91     4026304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91     4028304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           1006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           2006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           4006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88           4014000     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88           4025055     temperature=   293.00

geometry has been set to homogeneous as lbar is  0.0000E+00

resonance data for this nuclide

mass number (a)          =    54.466              temperature(kelvin)       =   293.000

potential scatter sigma  =     3.801              lumped nuclear density    = 1.7407142E-03

spin factor (g)          =     0.000              lump dimension (a-bar)    = 0.0000000E+00

inner radius             = 0.0000000E+00          dancoff correction (c)    = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1    =    55.845              sigma(per absorber atom)= 3.4101929E+02
```

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 53.766 sigma(per absorber atom)= 1.2864024E+02

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
44	-2.573557E-05	0.000000E+00	-4.815655E-02
45	-1.291448E-04	0.000000E+00	-3.816337E-02
46	-1.606563E-04	0.000000E+00	-1.332381E-02
47	-1.056918E-04	0.000000E+00	-2.060706E-02
48	-4.179799E-05	0.000000E+00	-9.612578E-02
49	-1.779133E-04	0.000000E+00	-1.038285E-01
50	-2.606053E-04	0.000000E+00	-1.521462E-01
51	-6.117731E-05	0.000000E+00	-7.269186E-04
52	-2.276834E-04	0.000000E+00	-6.778821E-03
53	-4.136545E-04	0.000000E+00	-3.950535E-01
54	-9.016085E-04	0.000000E+00	-3.850810E-01
55	-1.889857E-03	0.000000E+00	-8.663202E-01
56	-1.682722E-04	0.000000E+00	-2.095040E-04
57	-8.006894E-04	0.000000E+00	-6.747544E-02
58	-5.832270E-03	0.000000E+00	-5.143185E+00
59	-6.111082E-03	0.000000E+00	-3.758587E+00
60	-3.959768E-03	0.000000E+00	-3.334263E-02
61	-1.836192E-06	0.000000E+00	-2.387732E-03
62	-4.381017E-04	0.000000E+00	-4.759451E-01
63	-9.039582E-03	0.000000E+00	-7.946639E+00
64	-1.435731E-02	0.000000E+00	-9.543545E+00
65	-4.290072E-03	0.000000E+00	-3.739039E+00
66	-1.355880E-02	0.000000E+00	-1.010358E+01
67	-2.306789E-04	0.000000E+00	-1.431424E-01
68	-3.245916E-06	0.000000E+00	-1.800902E-03
69	-3.050841E-03	0.000000E+00	-1.654186E-01
70	-2.155581E+00	0.000000E+00	-6.385146E+01
71	9.803476E-06	0.000000E+00	-9.597841E-04
72	-6.031858E-09	0.000000E+00	-1.791791E-06
73	-3.683254E-05	0.000000E+00	-4.341343E-03
74	-6.284016E+00	0.000000E+00	-3.027933E+02
75	-1.065459E-01	0.000000E+00	-4.692756E+00
76	-2.623990E-02	0.000000E+00	-1.060597E+00
77	-7.989248E-04	0.000000E+00	-2.867110E-02
78	-4.575271E-06	0.000000E+00	-1.544029E-04
79	-5.029187E-05	0.000000E+00	-1.677382E-03
80	-6.286984E-06	0.000000E+00	-2.025635E-04
81	-8.363011E-05	0.000000E+00	-2.566171E-03
82	-1.235011E-07	0.000000E+00	-2.377236E-06
83	-8.699079E-08	0.000000E+00	-1.242513E-06
84	6.870753E-08	0.000000E+00	3.754665E-06
85	7.176524E-07	0.000000E+00	1.973096E-06

excess resonance integrals

	resolved
absorption	3.13724E+00
fission	0.00000E+00

elapsed time 0.07 min.

process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 1008016 temperature= 293.00
process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 5008016 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 1001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 2001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 5001001 temperature= 293.00
process number 1007 is at temperature= 296.00

15p 31 111 evaloct77 howerton mod1 12/20/88 4015031 temperature= 293.00
process number 1007 is at temperature= 296.00

82pb ornl evaljul71 c.y.fu and f.g. mod2 01/04/89 6082000 temperature= 293.00
process number 1007 is at temperature= 296.00

94pu239 lanl jun83 e.arthur p.you mod2 02/28/89 1094239 temperature= 293.00

geometry has been set to homogeneous as lbar is 0.0000E+00

resonance data for this nuclide

mass number (a) = 237.000 temperature(kelvin) = 293.000

potential scatter sigma = 10.200 lumped nuclear density = 9.7961311E-05

spin factor (g) = 0.000 lump dimension (a-bar) = 0.0000000E+00

inner radius = 0.0000000E+00 dancoff correction (c) = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1 = 1.008 sigma(per absorber atom)= 1.6303029E+04

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 11.852 sigma(per absorber atom)= 1.9701793E+03

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
75	-3.278199E-02	-1.268487E-02	-5.417645E-03
76	-3.769820E-01	-1.295935E-01	-2.145695E-01
77	-1.186808E-01	-2.372789E-02	-2.229474E-02
78	-1.141490E-01	-1.692835E-02	-1.241954E-02
79	-3.899803E-01	-3.020253E-01	-5.818965E-02
80	-9.428344E-03	-3.255350E-03	-4.875140E-04
81	-2.668563E-01	-6.822097E-02	-1.080070E-01
82	-9.111283E-01	-4.460771E-01	-2.407054E-01
83	-1.909154E+00	-9.551582E-01	-4.721678E-01
84	-3.607188E-03	-1.334161E-03	-1.457223E-04
85	-7.376938E-01	-2.306573E-01	-1.104565E-01
86	-1.007394E+00	-1.995415E-01	-2.341246E-01
87	-7.671843E-01	-2.712779E-01	-9.657206E-02
88	-4.882243E-03	-4.667127E-03	-1.146307E-04
89	-2.755107E-03	-2.048857E-03	-1.149155E-03
90	-8.058477E+00	-5.547768E+00	-1.300786E+00
91	-4.285506E-04	-3.021945E-04	-6.727427E-05
92	-5.564181E+00	-2.676325E+00	-5.292637E-01
93	-2.219478E-02	-1.508607E-02	7.197936E-05
94	-1.303663E+00	-9.471200E-01	-3.529918E-02
95	-2.879335E-01	-2.033753E-01	-5.895120E-03
96	-1.280380E+01	-2.061764E+00	-2.383256E+00
97	-7.265707E-03	-3.077238E-03	-1.776939E-03
98	-1.618609E+00	-3.905415E-01	-9.248369E-02
99	-1.462671E-02	-1.256531E-02	-1.284129E-04
100	-1.781003E-01	-1.434610E-01	-3.414195E-03
101	-4.067100E-03	-2.337169E-03	-6.129850E-04
102	-9.251626E+00	-8.922214E-01	-1.287753E+00
103	-3.650260E-03	-6.154113E-04	-5.664823E-04
104	-4.788481E+00	-5.787504E-01	-3.507571E-01
105	-6.524116E-03	-9.051571E-04	4.265191E-04
106	-1.228725E-04	-2.685446E-05	6.904171E-05
107	-3.825592E-05	-9.795808E-06	2.667038E-05
108	-1.545601E-05	-3.536593E-06	5.242030E-06
109	-2.831352E-02	-2.743458E-03	4.777033E-04
110	-4.399139E-03	-4.291263E-04	-1.251357E-03
111	-8.733832E-05	-3.079840E-05	1.273983E-05
112	-2.393584E-04	-1.662229E-04	-2.139561E-05
113	-2.078506E-02	-1.475152E-02	-7.964402E-05
114	-1.140722E-03	-8.098001E-04	6.117208E-05
115	-7.098255E-05	-5.025215E-05	7.284550E-06
116	-1.555520E-03	-1.826282E-04	-1.060793E-04
117	-1.216964E+00	-6.163096E-01	-2.283719E-02
118	-7.278799E-02	-4.276369E-02	-4.376843E-03
119	-5.902959E+00	-3.532616E+00	-1.542892E-01
120	-3.841326E-04	-2.298361E-04	4.702829E-05
121	-1.700449E-04	-9.254598E-05	-2.089172E-05
122	-8.423217E-04	-4.091696E-04	-1.461751E-04
123	-5.857863E+00	-2.727374E+00	-1.360005E-01
124	-9.729549E-03	-8.498154E-03	1.502149E-05
125	-2.913056E-02	-2.400744E-02	-5.624897E-04
126	-1.629105E+01	-7.408995E+00	-4.115263E-01
127	-1.508167E+00	-9.655835E-01	-1.459944E-02
128	-2.109087E-03	-1.312315E-03	1.075052E-04
129	-4.050308E+00	-1.519129E+00	-8.063980E-02
130	-9.280965E+00	-3.485795E+00	-1.549486E-01
131	-8.380547E+00	-6.500924E+00	-8.866454E-02
132	-2.062808E-03	-1.572087E-03	9.982416E-05
133	-1.634800E-02	-8.756413E-03	-9.116957E-04
134	-1.056278E+01	-5.630844E+00	-1.142015E-01
135	-2.053192E-03	-1.098760E-03	1.034875E-04
136	-8.356670E-04	-4.490779E-04	5.581086E-05
137	-3.230917E-04	-1.751623E-04	2.791304E-05
138	-1.542604E-04	-8.465187E-05	1.619172E-05
139	-8.454472E-05	-4.698533E-05	1.035310E-05
140	-7.016868E-05	-3.873351E-05	1.346373E-05
141	-1.889010E-05	-1.097974E-05	3.384600E-06
142	-1.227906E-05	-7.292318E-06	2.304908E-06
143	-8.298939E-06	-5.010661E-06	1.808380E-06
144	-4.989349E-06	-3.111565E-06	1.060095E-06
145	-4.191979E-06	-2.640928E-06	9.011478E-07
146	-3.510932E-06	-2.234545E-06	7.638358E-07
147	-3.081207E-06	-1.976520E-06	6.681605E-07
148	-2.960812E-06	-1.903799E-06	6.415957E-07
149	-2.900134E-06	-1.867081E-06	6.281355E-07
150	-2.806839E-06	-1.810527E-06	6.074753E-07
151	-2.653887E-06	-1.719049E-06	5.728615E-07
152	-1.215321E-06	-9.429125E-07	2.136755E-07
153	-1.179826E-06	-9.153735E-07	2.061246E-07
154	-1.146862E-06	-8.897984E-07	1.989237E-07
155	-1.117802E-06	-8.672517E-07	1.923867E-07
156	-1.814734E-07	-1.407970E-07	3.123589E-08

excess resonance integrals

	resolved
absorption	3.10353E+02
fission	1.74837E+02

elapsed time 0.12 min.

process number 1007 is at temperature= 296.00

elapsed time 0.13 min.

```
this xsdrn working tape was created 06/20/05 at 06:43:03
the title of the parent case is as follows
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
    tape id                          4321          number of nuclides                    18
    number of neutron groups          238          number of gamma groups                 0
    first thermal group               149          logical unit                           4
                                 table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 111 evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    4.44 seconds
```

```
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooooo                  vv          vv
kk         kk   eeeeeeeeeeeee  nnn         nn  oooooooooooooo                 vv          vv
kk        kk    ee             nnnn        nn  oo        oo                   vv          vv
kk       kk     ee             nn nn       nn  oo        oo                   vv          vv
kk      kk      ee             nn   nn     nn  oo        oo                   vv          vv
kkkkkkkk        eeeeeeeee      nn    nn    nn  oo        oo   -------------   vv          vv
kkkkkkkk        eeeeeeeee      nn     nn   nn  oo        oo   -------------    vv        vv
kk      kk      ee             nn      nn  nn  oo        oo                     vv     vv
kk       kk     ee             nn       nn nn  oo        oo                      vv   vv
kk        kk    ee             nn        nnnn  oo        oo                       vv vv
kk         kk   eeeeeeeeeeeee  nn         nnn  oooooooooooooo                       vvv
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooooo                         v
```

```
 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                pppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                ppppppppppppp   cccccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                           pp         pp   cc         cc
ss              cc              aa         aa ll            ee                           pp         pp   cc
ss              cc              aa         aa ll            ee                           pp         pp   cc
ssssssssssss    cc              aaaaaaaaaaaaa ll            eeeeeeeee    -------------   ppppppppppppp   cc
 ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee    -------------   ppppppppppp     cc
          ss    cc              aa         aa ll            ee                           pp              cc
          ss    cc              aa         aa ll            ee                           pp              cc
ss         ss   cc         cc   aa         aa ll            ee                           pp              cc         cc
ssssssssssssss  cccccccccccccc   aa         aa llllllllllllll eeeeeeeeeeeeee              pp              cccccccccccccc
 ssssssssssss    cccccccccccc    aa         aa llllllllllllll eeeeeeeeeeeeee              pp               cccccccccccc
```

```
   0000000       666666666666              //   22222222222       0000000                //     0000000      5555555555555
  000000000     6666666666666              //   2222222222222     000000000              //     000000000    5555555555555
 00       00    66                        //    22          22    00       00            //     00       00  55
00         00   66                       //                 22   00         00           //     00         00 55
00         00   66                      //                  22   00         00          //      00         00 55
00         00   666666666666           //                  22    00         00         //       00         00 555555555555
00         00   6666666666666         //                 22      00         00        //        00         00 5555555555555
00         00   66         66        //               22        00         00       //         00         00          55
00         00   66         66       //              22          00         00      //          00         00          55
 00       00    66         66      //             22            00       00      //            00       00  55         55
  000000000     6666666666666    //              2222222222222     000000000     //              000000000    5555555555555
   0000000       66666666666    //               2222222222222      0000000     //                0000000      55555555555
```

```
   0000000       666666666666                            44      33333333333                          11      5555555555555
  000000000     6666666666666                           444     3333333333333                        111      5555555555555
 00       00    66                   :::              4444     33         33        :::            1111      55
00         00   66                   :::            44 44                33        :::              11      55
00         00   66                   :::           44  44                33        :::              11      55
00         00   666666666666                      44   44             333                          11      555555555555
00         00   6666666666666                    44    44            333                          11      5555555555555
00         00   66         66        :::       444444444444             33        :::              11                55
00         00   66         66        :::      4444444444444             33        :::              11                55
 00       00    66         66        :::               44      33         33        :::              11      55        55
  000000000     6666666666666                           44      3333333333333                    11111111     5555555555555
   0000000       66666666666                            44      33333333333                      11111111      55555555555
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll            eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll            eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss    cc         cc    aa         aa  ll            ee                             pp         pp    cc         cc
ss               cc               aa         aa  ll            ee                             pp         pp    cc
ss               cc               aa         aa  ll            ee                             pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------  pppppppppppppp    cc
           ss    cc               aa         aa  ll            ee                             pp               cc
           ss    cc               aa         aa  ll            ee                             pp               cc
ss         ss    cc         cc    aa         aa  ll            ee                             pp               cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  lllllllllllll eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  lllllllllllll eeeeeeeeeeeee                  pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o009                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  kenova                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:43:15.51                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
*****************************************************************************************************
***                                                                                                 ***
***                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800       ***
***                                                                                                 ***
*****************************************************************************************************
***                    ******      numeric parameters      ******                                   ***
***                                                                                                 ***
***                                                                                                 ***
***          tme       maximum problem time (min)                          120.00                   ***
***                                                                                                 ***
***          tba       time per generation (min)                             5.00                   ***
***                                                                                                 ***
***          gen       number of generations                                 1000                   ***
***                                                                                                 ***
***          npg       number per generation                                 1000                   ***
***                                                                                                 ***
***          nsk       number of generations to be skipped                     50                   ***
***                                                                                                 ***
***          beg       beginning generation number                              1                   ***
***                                                                                                 ***
***          res       generations between checkpoints                          0                   ***
***                                                                                                 ***
***          xld       number of extra 1-d cross sections                       1                   ***
***                                                                                                 ***
***          nbk       neutron bank size                                     1025                   ***
***                                                                                                 ***
***          xnb       extra positions in neutron bank                          0                   ***
***                                                                                                 ***
***          nfb       fission bank size                                     1000                   ***
***                                                                                                 ***
***          xfb       extra positions in fission bank                          0                   ***
***                                                                                                 ***
***          wta       default value of weight average                     0.5000                   ***
***                                                                                                 ***
***          wth       weight high for splitting                           3.0000                   ***
***                                                                                                 ***
***          wtl       weight low for russian roulette                     0.3333                   ***
***                                                                                                 ***
***          rnd       starting random number                         BB827100001                   ***
***                                                                                                 ***
***          nb8       number of d.a. blocks on unit  8                       200                   ***
***                                                                                                 ***
***          nl8       length of d.a. blocks on unit  8                       512                   ***
***                                                                                                 ***
***          adj       mode of calculation                                forward                   ***
***                                                                                                 ***
***                    input data written on restart unit                      no                   ***
***                                                                                                 ***
***                    binary data interface                                  yes                   ***
***                                                                                                 ***
***                                                                                                 ***
*****************************************************************************************************
*****************************************************************************************************
```

```
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be~refl;h/pu=800           ***
***                                                                                                           ***
*****************************************************************************************************************
***                          ******      logical parameters        ******                                   ***
***                                                                                                           ***
***  run  execute problem after checking data    yes          plt  plot picture map(s)                    yes ***
***                                                                                                           ***
***  flx  compute flux                            no          fdn  compute fission densities               no ***
***                                                                                                           ***
***  smu  compute avg unit self-multiplication    no          nub  compute nu-bar & avg fission group     yes ***
***                                                                                                           ***
***  mku  compute matrix k-eff by unit number     no          mkp  compute matrix k-eff by unit location   no ***
***                                                                                                           ***
***  cku  compute cofactor k-eff by unit number   no          ckp  compute cofactor k-eff by unit location  no ***
***                                                                                                           ***
***  fmu  print fiss prod matrix by unit number   no          fmp  print fiss prod matrix by unit location  no ***
***                                                                                                           ***
***  mkh  compute matrix k-eff by hole number     no          mka  compute matrix k-eff by array number    no ***
***                                                                                                           ***
***  ckh  compute cofactor k-eff by hole number   no          cka  compute cofactor k-eff by array number  no ***
***                                                                                                           ***
***  fmh  print fiss prod matrix by hole number   no          fma  print fiss prod matrix by array number  no ***
***                                                                                                           ***
***  hhl  collect matrix by highest hole level    no          hal  collect matrix by highest array level   no ***
***                                                                                                           ***
***  amx  print all mixed cross sections          no          far  print fis. and abs. by region           no ***
***                                                                                                           ***
***  xs1  print 1-d mixture x-sections            no          gas  print far by group                      no ***
***                                                                                                           ***
***  xs2  print 2-d mixture x-sections            no          pax  print xsec-albedo correlation tables    no ***
***                                                                                                           ***
***  xap  print mixture angles & probabilities    no          pwt  print weight average array              no ***
***                                                                                                           ***
***  pki  print fission spectrum                  no          pgm  print input geometry                    no ***
***                                                                                                           ***
***  p1d  print extra 1-d cross sections          no          bug  print debug information                 no ***
***                                                                                                           ***
***                                                           trk  print tracking information              no ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
                                    parameter input completed

                        ........    0 io's were used reading the parameter data    ........

                      ************** data reading completed **************
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                                case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800      ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***          unit                                                  volume                                      ***
***         number                 data set name                   name        unit function                ***
***         ------                 -------------                   ----        -------------                ***
***                                                                                                           ***
***      xsc  14     C:\scale4.4a\tmpdir\ft14f001                               mixed cross sections         ***
***                                                                                                           ***
***      alb  79     C:\scale4.4a\data\ft79f001                                 input albedos                ***
***                                                                                                           ***
***      wts  80     C:\scale4.4a\data\ft80f001                                 input weights                ***
***                                                                                                           ***
***      skt  16      unknown                                                   write scratch data           ***
***                                                                                                           ***
***      bin  95     C:\scale4.4a\tmpdir\ft95f001                               binary input data            ***
***                                                                                                           ***
***      rst  95     C:\scale4.4a\tmpdir\ft95f001                               read restart data            ***
***                                                                                                           ***
***      lib   4     C:\scale4.4a\tmpdir\ft04f001                               input ampx working library   ***
***                                                                                                           ***
***            8     C:\scale4.4a\tmpdir\ft08f001                               input data direct access     ***
***                                                                                                           ***
***            9      unknown                                                   super grouped direct access  ***
***                                                                                                           ***
***           10      unknown                                                   xsec mixing direct access    ***
***                                                                                                           ***
*****************************************************************************************************************

                        ........    0 io's were used preparing input data    ........


                         cross sections read from the ampx working library on unit    4
```

```
                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

                                mixing table

                        number of scattering angles =  2
                    cross section message threshold =3.0E-05


mixture =     1          density(g/cc) = 0.96929
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   1001001  7.83610E-02  1.35272E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   1004309  1.23375E-03  1.90487E-02   4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   1006012  3.91847E-02  8.05560E-01   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   1008016  0.00000E+00  0.00000E+00   8016    15.9904      8O 16 from version 6 evaluation
   1094239  9.79613E-05  4.01185E-02  94239   239.0526      94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

mixture =     2          density(g/cc) = 0.93226
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   2001001  7.85246E-02  1.40939E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   2004309  1.23621E-03  1.98448E-02   4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   2006012  3.92623E-02  8.39216E-01   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas

mixture =     4          density(g/cc) =  7.9400
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   4006012  3.18772E-04  8.00006E-04   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   4014000  1.70252E-03  9.99998E-03  14000    28.0853      14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
   4015031  6.94680E-05  4.50000E-04  15031    30.9741      15p 31 lll evaloct77 howerton                    mod1 12/20/88
   4024304  1.74726E-02  1.90000E-01  24000    51.9957      24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
   4025055  1.74071E-03  1.99999E-02  25055    54.9379      25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
   4026304  5.85446E-02  6.83750E-01  26000    55.8447      26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
   4028304  7.74020E-03  9.50001E-02  28000    58.6872      28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91

mixture =     5          density(g/cc) = 0.99817
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   5001001  6.67692E-02  1.11927E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   5008016  3.33846E-02  8.88074E-01   8016    15.9904      8O 16 from version 6 evaluation

mixture =     6          density(g/cc) =  11.344
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   6082000  3.29690E-02  1.00000E+00  82000   207.2100      82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89


                    1004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    2004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    4024304     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
                    4026304     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
                    4028304     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91
                    1006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    2006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4014000     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
                    4025055     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
                    1008016     8O 16 from version 6 evaluation
                    5008016     8O 16 from version 6 evaluation
                    1001001     hydrogen in water 1301/1002    mod1   11/23/92
                    2001001     hydrogen in water 1301/1002    mod1   11/23/92
                    5001001     hydrogen in water 1301/1002    mod1   11/23/92
                    4015031     15p 31 lll evaloct77 howerton                    mod1 12/20/88
                    6082000     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89
                    1094239     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   51 to group   87
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
     1.359785E-04   5.584433E-06  -6.764520E-05  -8.353045E-06
        the moments corresponding to this distribution are
     4.106851E-02   1.686755E-03   6.943620E-05
        the moments corresponding to the generated distribution are
     4.106851E-02   1.686755E-03   6.938630E-05
        the legendre expansion corresponding to these moments is
     1.359785E-04   5.584433E-06  -6.764520E-05  -8.353062E-06
        the weights/angles for this distribution are
     9.999998E-01   2.237458E-07
     4.106833E-02   8.127885E-01
        the moments corresponding to this distribution are
     4.106851E-02   1.686755E-03   6.938630E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   61 to group  114
            1 moments were accepted. the p0 coefficient is  1.16512E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  130
            1 moments were accepted. the p0 coefficient is  1.58735E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   68 to group  129
            2 moments were accepted. the p0 coefficient is  5.84422E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   72 to group  207
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
     3.294851E-05   7.359226E-07  -1.644960E-05  -1.102961E-06
        the moments corresponding to this distribution are
     2.233553E-02   4.989243E-04   1.120185E-05
        the moments corresponding to the generated distribution are
     2.233553E-02   4.989243E-04   1.118432E-05
        the legendre expansion corresponding to these moments is
     3.294851E-05   7.359226E-07  -1.644960E-05  -1.102963E-06
        the weights/angles for this distribution are
     9.999999E-01   7.617165E-08
     2.233547E-02   8.183465E-01
        the moments corresponding to this distribution are
     2.233553E-02   4.989243E-04   1.118432E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  201
            2 moments were accepted
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            the legendre expansion of the cross section (p0-pn) is
      1.512330E-04   6.679826E-06  -7.517394E-05  -9.987112E-06
            the moments corresponding to this distribution are
      4.416909E-02   1.950993E-03   8.629591E-05
            the moments corresponding to the generated distribution are
      4.416909E-02   1.950993E-03   8.622792E-05
            the legendre expansion corresponding to these moments is
      1.512330E-04   6.679826E-06  -7.517394E-05  -9.987138E-06
            the weights/angles for this distribution are
      9.999997E-01   2.756945E-07
      4.416894E-02   5.980905E-01
            the moments corresponding to this distribution are
      4.416909E-02   1.950993E-03   8.622792E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  204
                1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.512330E-04   5.742454E-06  -7.528946E-05  -8.592981E-06
            the moments corresponding to this distribution are
      3.797089E-02   1.441787E-03   5.474900E-05
            the moments corresponding to the generated distribution are
      3.797089E-02   1.441790E-03   5.474612E-05
            the legendre expansion corresponding to these moments is
      1.512330E-04   5.742454E-06  -7.528946E-05  -8.592982E-06
            the weights/angles for this distribution are
      9.999990E-01   9.870718E-07
      3.797093E-02  -3.753419E-08
            the moments corresponding to this distribution are
      3.797089E-02   1.441790E-03   5.474612E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  212
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      7.561652E-05   2.030262E-06  -3.772650E-05  -3.041736E-06
            the moments corresponding to this distribution are
      2.684945E-02   7.208937E-04   1.934780E-05
            the moments corresponding to the generated distribution are
      2.684945E-02   7.208937E-04   1.935562E-05
            the legendre expansion corresponding to these moments is
      7.561652E-05   2.030262E-06  -3.772650E-05  -3.041734E-06
            the weights/angles for this distribution are
      9.999992E-01   7.914491E-07
      2.684947E-02  -2.126534E-08
            the moments corresponding to this distribution are
      2.684945E-02   7.208937E-04   1.935562E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   76 to group  216
                1 moments were accepted. the p0 coefficient is  8.52992E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   77 to group  213
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      9.937686E-05   2.874093E-06  -4.956374E-05  -4.305127E-06
            the moments corresponding to this distribution are
      2.892115E-02   8.364419E-04   2.420332E-05
            the moments corresponding to the generated distribution are
      2.892115E-02   8.364419E-04   2.419645E-05
            the legendre expansion corresponding to these moments is
      9.937686E-05   2.874093E-06  -4.956374E-05  -4.305129E-06
            the weights/angles for this distribution are
      1.000000E+00   2.609287E-08
      2.892114E-02   6.086238E-01
            the moments corresponding to this distribution are
      2.892115E-02   8.364419E-04   2.419645E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   79 to group  200
                2 moments were accepted. the p0 coefficient is  1.11552E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   79 to group  216
                2 moments were accepted. the p0 coefficient is  1.11552E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   84 to group  183
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      8.004126E-05   7.826343E-06  -3.887275E-05  -1.155244E-05
            the moments corresponding to this distribution are
      9.777886E-02   9.560740E-03   9.349127E-04
            the moments corresponding to the generated distribution are
      9.777886E-02   9.560740E-03   9.348417E-04
            the legendre expansion corresponding to these moments is
      8.004126E-05   7.826343E-06  -3.887275E-05  -1.155245E-05
            the weights/angles for this distribution are
      9.999963E-01   3.703566E-06
      9.777922E-02  -3.656288E-07
            the moments corresponding to this distribution are
      9.777886E-02   9.560740E-03   9.348417E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   98 to group  189
                2 moments were accepted. the p0 coefficient is  1.78718E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  100 to group  148
                2 moments were accepted. the p0 coefficient is  9.36119E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  100 to group  190
                1 moments were accepted. the p0 coefficient is  4.68077E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  103 to group  206
                2 moments were accepted. the p0 coefficient is  5.16406E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  149
                2 moments were accepted. the p0 coefficient is  6.41320E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  205
                2 moments were accepted. the p0 coefficient is  5.34420E-04
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k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  123 to group  228
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       5.030150E-05   8.011616E-07  -2.513161E-05  -1.201229E-06
            the moments corresponding to this distribution are
       1.592719E-02   2.537107E-04   4.085372E-06
            the moments corresponding to the generated distribution are
       1.592719E-02   2.537107E-04   4.068114E-06
            the legendre expansion corresponding to these moments is
       5.030150E-05   8.011616E-07  -2.513161E-05  -1.201231E-06
            the weights/angles for this distribution are
       9.999999E-01   6.451809E-08
       1.592714E-02   7.554147E-01
            the moments corresponding to this distribution are
       1.592719E-02   2.537107E-04   4.068114E-06

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  130 to group  175
                2 moments were accepted. the p0 coefficient is  7.62405E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  143 to group  230
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       1.024485E-04   2.576329E-06  -5.112708E-05  -3.860411E-06
            the moments corresponding to this distribution are
       2.514754E-02   6.324149E-04   1.593658E-05
            the moments corresponding to the generated distribution are
       2.514754E-02   6.324149E-04   1.590408E-05
            the legendre expansion corresponding to these moments is
       1.024485E-04   2.576329E-06  -5.112708E-05  -3.860419E-06
            the weights/angles for this distribution are
       9.999745E-01   2.545996E-05
       2.514818E-02  -6.406933E-07
            the moments corresponding to this distribution are
       2.514754E-02   6.324149E-04   1.590408E-05

keno message number k5-222     124 transfers for mixture     1 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   17 to group   73
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
            the moments corresponding to this distribution are
       2.103383E-02   4.424545E-04   9.340116E-06
            the moments corresponding to the generated distribution are
       2.103383E-02   4.424545E-04   9.338884E-06
            the legendre expansion corresponding to these moments is
       6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
            the weights/angles for this distribution are
       1.000000E+00   3.506203E-08
       2.103380E-02   9.809266E-01
            the moments corresponding to this distribution are
       2.103383E-02   4.424545E-04   9.338884E-06

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   31 to group   67
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       3.020880E-04   1.552948E-05  -1.498463E-04  -2.319124E-05
            the moments corresponding to this distribution are
       5.140713E-02   2.643117E-03   1.363483E-04
            the moments corresponding to the generated distribution are
       5.140713E-02   2.643117E-03   1.362936E-04
            the legendre expansion corresponding to these moments is
       3.020880E-04   1.552948E-05  -1.498463E-04  -2.319128E-05
            the weights/angles for this distribution are
       9.999995E-01   5.426291E-07
       5.140665E-02   9.355055E-01
            the moments corresponding to this distribution are
       5.140713E-02   2.643117E-03   1.362936E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   36 to group   75
                1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       3.436553E-05   8.753364E-07  -1.714932E-05  -1.311583E-06
            the moments corresponding to this distribution are
       2.547135E-02   6.487885E-04   1.654347E-05
            the moments corresponding to the generated distribution are
       2.547135E-02   6.487908E-04   1.652561E-05
            the legendre expansion corresponding to these moments is
       3.436553E-05   8.753364E-07  -1.714932E-05  -1.311585E-06
            the weights/angles for this distribution are
       9.999982E-01   1.759111E-06
       2.547139E-02  -4.483616E-08
            the moments corresponding to this distribution are
       2.547135E-02   6.487908E-04   1.652561E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   86
                1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       1.550883E-04   6.403348E-06  -7.714756E-05  -9.577728E-06
            the moments corresponding to this distribution are
       4.128841E-02   1.704733E-03   7.039822E-05
            the moments corresponding to the generated distribution are
       4.128841E-02   1.704733E-03   7.038573E-05
            the legendre expansion corresponding to these moments is
       1.550883E-04   6.403348E-06  -7.714756E-05  -9.577732E-06
            the weights/angles for this distribution are
       9.999999E-01   1.260091E-07
       4.128842E-02  -5.211604E-09
            the moments corresponding to this distribution are
       4.128841E-02   1.704733E-03   7.038573E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   91
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
       6.978938E-05   2.469208E-06  -3.476364E-05  -3.696076E-06
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            the moments corresponding to this distribution are
      3.538085E-02   1.251836E-03   4.433614E-05
            the moments corresponding to the generated distribution are
      3.538085E-02   1.251836E-03   4.431055E-05
            the legendre expansion corresponding to these moments is
      6.978938E-05   2.469208E-06  -3.476364E-05  -3.696081E-06
            the weights/angles for this distribution are
      9.999999E-01   1.014716E-07
      3.538080E-02   5.900701E-01
            the moments corresponding to this distribution are
      3.538085E-02   1.251836E-03   4.431055E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   51 to group   87
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.360841E-04   5.588769E-06  -6.769771E-05  -8.359530E-06
            the moments corresponding to this distribution are
      4.106850E-02   1.686766E-03   6.943713E-05
            the moments corresponding to the generated distribution are
      4.106850E-02   1.686766E-03   6.940783E-05
            the legendre expansion corresponding to these moments is
      1.360841E-04   5.588769E-06  -6.769771E-05  -8.359540E-06
            the weights/angles for this distribution are
      9.999998E-01   1.956027E-07
      4.106834E-02   8.979992E-01
            the moments corresponding to this distribution are
      4.106850E-02   1.686766E-03   6.940783E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   65 to group  101
              1 moments were accepted. the p0 coefficient is  7.14843E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   68 to group  107
              2 moments were accepted. the p0 coefficient is  6.43298E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   75 to group  194
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.513644E-04   8.247675E-06  -7.500807E-05  -1.231030E-05
            the moments corresponding to this distribution are
      5.448889E-02   2.969040E-03   1.617684E-04
            the moments corresponding to the generated distribution are
      5.448889E-02   2.969040E-03   1.617797E-04
            the legendre expansion corresponding to these moments is
      1.513644E-04   8.247675E-06  -7.500807E-05  -1.231029E-05
            the weights/angles for this distribution are
      9.999997E-01   2.777653E-07
      5.448890E-02  -1.518020E-08
            the moments corresponding to this distribution are
      5.448889E-02   2.969040E-03   1.617797E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   77 to group  209
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      9.945100E-05   3.561977E-06  -4.953412E-05  -5.331510E-06
            the moments corresponding to this distribution are
      3.581641E-02   1.282931E-03   4.607786E-05
            the moments corresponding to the generated distribution are
      3.581641E-02   1.282931E-03   4.606247E-05
            the legendre expansion corresponding to these moments is
      9.945100E-05   3.561977E-06  -4.953412E-05  -5.331513E-06
            the weights/angles for this distribution are
      9.999999E-01   1.439254E-07
      3.581628E-02   9.337027E-01
            the moments corresponding to this distribution are
      3.581641E-02   1.282931E-03   4.606247E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   80 to group  172
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
            the moments corresponding to this distribution are
      8.005312E-02   6.408680E-03   5.132358E-04
            the moments corresponding to the generated distribution are
      8.005312E-02   6.408680E-03   5.132162E-04
            the legendre expansion corresponding to these moments is
      1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
            the weights/angles for this distribution are
      9.999998E-01   2.368696E-07
      8.005292E-02   9.445136E-01
            the moments corresponding to this distribution are
      8.005312E-02   6.408680E-03   5.132162E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   82 to group  162
              2 moments were accepted. the p0 coefficient is  6.66650E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   98 to group  214
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      4.471841E-04   2.551503E-05  -2.214081E-04  -3.806459E-05
            the moments corresponding to this distribution are
      5.705712E-02   3.255749E-03   1.860170E-04
            the moments corresponding to the generated distribution are
      5.705712E-02   3.255749E-03   1.860059E-04
            the legendre expansion corresponding to these moments is
      4.471841E-04   2.551503E-05  -2.214081E-04  -3.806460E-05
            the weights/angles for this distribution are
      9.999997E-01   2.774108E-07
      5.705686E-02   9.762922E-01
            the moments corresponding to this distribution are
      5.705712E-02   3.255749E-03   1.860059E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  100 to group  190
              2 moments were accepted. the p0 coefficient is  4.68299E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  104 to group  205
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            1 moments were accepted. the p0 coefficient is  5.35149E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  105 to group  210
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.537484E-04   4.469354E-05  -2.714633E-04  -6.631247E-05
          the moments corresponding to this distribution are
     8.071091E-02   6.514266E-03   5.257494E-04
          the moments corresponding to the generated distribution are
     8.071091E-02   6.514266E-03   5.257672E-04
          the legendre expansion corresponding to these moments is
     5.537484E-04   4.469354E-05  -2.714633E-04  -6.631245E-05
          the weights/angles for this distribution are
     9.999999E-01   6.184942E-08
     8.071094E-02  -4.163174E-01
          the moments corresponding to this distribution are
     8.071091E-02   6.514266E-03   5.257672E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  192
            2 moments were accepted. the p0 coefficient is  7.08334E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  207
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     7.083302E-04   7.331732E-05  -3.427817E-04  -1.080120E-04
          the moments corresponding to this distribution are
     1.035073E-01   1.071382E-02   1.109050E-03
          the moments corresponding to the generated distribution are
     1.035073E-01   1.071382E-02   1.109007E-03
          the legendre expansion corresponding to these moments is
     7.083302E-04   7.331732E-05  -3.427817E-04  -1.080121E-04
          the weights/angles for this distribution are
     9.999998E-01   2.029094E-07
     1.035072E-01   6.642933E-01
          the moments corresponding to this distribution are
     1.035073E-01   1.071382E-02   1.109007E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  122 to group  229
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     4.760356E-05   6.498871E-07  -2.378847E-05  -9.745249E-07
          the moments corresponding to this distribution are
     1.365207E-02   1.863943E-04   2.568987E-06
          the moments corresponding to the generated distribution are
     1.365207E-02   1.863943E-04   2.551278E-06
          the legendre expansion corresponding to these moments is
     4.760356E-05   6.498871E-07  -2.378847E-05  -9.745271E-07
          the weights/angles for this distribution are
     9.999999E-01   9.257298E-08
     1.365203E-02   4.196166E-01
          the moments corresponding to this distribution are
     1.365207E-02   1.863943E-04   2.551278E-06

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  130 to group  175
            2 moments were accepted. the p0 coefficient is  7.62811E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  144 to group  230
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
          the moments corresponding to this distribution are
     2.667994E-02   7.118417E-04   1.901619E-05
          the moments corresponding to the generated distribution are
     2.667994E-02   7.118417E-04   1.901414E-05
          the legendre expansion corresponding to these moments is
     1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
          the weights/angles for this distribution are
     1.000000E+00   2.632260E-08
     2.667991E-02   9.547741E-01
          the moments corresponding to this distribution are
     2.667994E-02   7.118417E-04   1.901414E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  147 to group  177
            2 moments were accepted. the p0 coefficient is  2.87948E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  149 to group  149
            1 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.392408E-02   3.268915E-02   3.028554E-02   2.745581E-02
          the moments corresponding to this distribution are
     9.635975E-01   9.284965E-01   9.018909E-01
          the moments corresponding to the generated distribution are
     9.635975E-01   9.285436E-01   8.947650E-01
          the legendre expansion corresponding to these moments is
     3.392408E-02   3.268915E-02   3.028794E-02   2.685146E-02
          the weights/angles for this distribution are
     9.999746E-01   2.536909E-05
     9.636219E-01  -3.422353E-04
          the moments corresponding to this distribution are
     9.635975E-01   9.285436E-01   8.947650E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  150 to group  150
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.160285E-02   4.909516E-02   4.461168E-02   3.940127E-02
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.762618E-01
          the moments corresponding to the generated distribution are
     9.514041E-01   9.096799E-01   8.714495E-01
          the legendre expansion corresponding to these moments is
     5.160285E-02   4.909516E-02   4.461168E-02   3.878044E-02
          the weights/angles for this distribution are
     9.870113E-01   1.298868E-02
     9.591081E-01   3.659778E-01
          the moments corresponding to this distribution are
```

```
          9.514041E-01   9.096799E-01   8.714495E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  151 to group  151
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.254969E-02   4.995038E-02   4.532984E-02   3.997005E-02
             the moments corresponding to this distribution are
          9.505360E-01   9.084061E-01   8.745673E-01
             the moments corresponding to the generated distribution are
          9.505360E-01   9.084061E-01   8.704781E-01
             the legendre expansion corresponding to these moments is
          5.254969E-02   4.995038E-02   4.532984E-02   3.943283E-02
             the weights/angles for this distribution are
          9.790505E-01   2.094948E-02
          9.607624E-01   4.726190E-01
             the moments corresponding to this distribution are
          9.505360E-01   9.084061E-01   8.704781E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  152 to group  152
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.445168E-02   5.164695E-02   4.673397E-02   4.110458E-02
             the moments corresponding to this distribution are
          9.484915E-01   9.055100E-01   8.710476E-01
             the moments corresponding to the generated distribution are
          9.484915E-01   9.055100E-01   8.682405E-01
             the legendre expansion corresponding to these moments is
          5.445168E-02   5.164695E-02   4.673397E-02   4.072245E-02
             the weights/angles for this distribution are
          9.456984E-01   5.430165E-02
          9.668567E-01   6.286492E-01
             the moments corresponding to this distribution are
          9.484915E-01   9.055100E-01   8.682405E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  153 to group  153
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.650781E-02   5.348388E-02   4.824280E-02   4.225094E-02
             the moments corresponding to this distribution are
          9.464864E-01   9.024911E-01   8.669722E-01
             the moments corresponding to the generated distribution are
          9.464864E-01   9.024911E-01   8.656703E-01
             the legendre expansion corresponding to these moments is
          5.650781E-02   5.348388E-02   4.824280E-02   4.206703E-02
             the weights/angles for this distribution are
          8.593679E-01   1.406321E-01
          9.794865E-01   7.448307E-01
             the moments corresponding to this distribution are
          9.464864E-01   9.024911E-01   8.656703E-01

keno message number k5-222     149 transfers for mixture     2 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   25 to group   63
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          3.523775E-04   1.975428E-05  -1.745275E-04  -2.947598E-05
             the moments corresponding to this distribution are
          5.606000E-02   3.142957E-03   1.764563E-04
             the moments corresponding to the generated distribution are
          5.606000E-02   3.142957E-03   1.764250E-04
             the legendre expansion corresponding to these moments is
          3.523775E-04   1.975428E-05  -1.745275E-04  -2.947601E-05
             the weights/angles for this distribution are
          9.999997E-01   3.036038E-07
          5.605973E-02   9.328158E-01
             the moments corresponding to this distribution are
          5.606000E-02   3.142957E-03   1.764250E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   46 to group   75
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          2.107464E-04   1.252698E-05  -1.042563E-04  -1.867983E-05
             the moments corresponding to this distribution are
          5.944100E-02   3.533259E-03   2.099896E-04
             the moments corresponding to the generated distribution are
          5.944100E-02   3.533259E-03   2.100019E-04
             the legendre expansion corresponding to these moments is
          2.107464E-04   1.252698E-05  -1.042563E-04  -1.867982E-05
             the weights/angles for this distribution are
          1.000000E+00   3.845905E-08
          5.944103E-02  -7.662296E-01
             the moments corresponding to this distribution are
          5.944100E-02   3.533259E-03   2.100019E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   50 to group   91
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          7.176521E-05   2.539114E-06  -3.574785E-05  -3.800717E-06
             the moments corresponding to this distribution are
          3.538085E-02   1.251842E-03   4.433718E-05
             the moments corresponding to the generated distribution are
          3.538085E-02   1.251842E-03   4.432188E-05
             the legendre expansion corresponding to these moments is
          7.176521E-05   2.539114E-06  -3.574785E-05  -3.800719E-06
             the weights/angles for this distribution are
          9.999999E-01   6.443804E-08
          3.538080E-02   7.931237E-01
             the moments corresponding to this distribution are
          3.538085E-02   1.251842E-03   4.432188E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   65 to group  101
                2 moments were accepted. the p0 coefficient is  7.31570E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  209
                2 moments were accepted
```

```
          the legendre expansion of the cross section (p0-pn) is
     1.017605E-04   3.644696E-06  -5.068443E-05  -5.455322E-06
          the moments corresponding to this distribution are
     3.581641E-02   1.282915E-03   4.607288E-05
          the moments corresponding to the generated distribution are
     3.581641E-02   1.282915E-03   4.603329E-05
          the legendre expansion corresponding to these moments is
     1.017605E-04   3.644696E-06  -5.068443E-05  -5.455332E-06
          the weights/angles for this distribution are
     9.999998E-01   1.703986E-07
     3.581627E-02   8.022606E-01
          the moments corresponding to this distribution are
     3.581641E-02   1.282915E-03   4.603329E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  213
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.017610E-04   2.943045E-06  -5.075281E-05  -4.408409E-06
          the moments corresponding to this distribution are
     2.892116E-02   8.364365E-04   2.420515E-05
          the moments corresponding to the generated distribution are
     2.892116E-02   8.364365E-04   2.419080E-05
          the legendre expansion corresponding to these moments is
     1.017610E-04   2.943045E-06  -5.075281E-05  -4.408413E-06
          the weights/angles for this distribution are
     9.999962E-01   3.840111E-06
     2.892127E-02  -1.111543E-07
          the moments corresponding to this distribution are
     2.892116E-02   8.364365E-04   2.419080E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  171
               2 moments were accepted. the p0 coefficient is  1.20653E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  206
               1 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.206511E-04   5.280875E-06  -5.997885E-05  -7.896021E-06
          the moments corresponding to this distribution are
     4.376979E-02   1.915793E-03   8.384988E-05
          the moments corresponding to the generated distribution are
     4.376979E-02   1.915796E-03   8.385408E-05
          the legendre expansion corresponding to these moments is
     1.206511E-04   5.280875E-06  -5.997885E-05  -7.896020E-06
          the weights/angles for this distribution are
     9.999992E-01   8.131593E-07
     4.376983E-02  -3.566019E-08
          the moments corresponding to this distribution are
     4.376979E-02   1.915796E-03   8.385408E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  222
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     4.826018E-05   7.438963E-07  -2.411289E-05  -1.115404E-06
          the moments corresponding to this distribution are
     1.541429E-02   2.376060E-04   3.652759E-06
          the moments corresponding to the generated distribution are
     1.541429E-02   2.376060E-04   3.660935E-06
          the legendre expansion corresponding to these moments is
     4.826018E-05   7.438963E-07  -2.411289E-05  -1.115403E-06
          the weights/angles for this distribution are
     9.999999E-01   6.128777E-08
     1.541431E-02  -2.913944E-01
          the moments corresponding to this distribution are
     1.541429E-02   2.376060E-04   3.660935E-06

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   83 to group  161
               2 moments were accepted. the p0 coefficient is  6.24506E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   84 to group  160
               2 moments were accepted. the p0 coefficient is  4.91713E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   89 to group  148
               2 moments were accepted. the p0 coefficient is  5.85610E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   90 to group  169
               2 moments were accepted. the p0 coefficient is  6.17329E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   93 to group  181
               2 moments were accepted. the p0 coefficient is  1.45037E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   94 to group  112
               2 moments were accepted. the p0 coefficient is  7.61129E-03

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   97 to group  189
               1 moments were accepted. the p0 coefficient is  1.78001E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   99 to group  176
               1 moments were accepted. the p0 coefficient is  1.87371E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  104 to group  205
               1 moments were accepted. the p0 coefficient is  5.47573E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  105 to group  210
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.666031E-04   4.573105E-05  -2.777650E-04  -6.785186E-05
          the moments corresponding to this distribution are
     8.071091E-02   6.514271E-03   5.257461E-04
          the moments corresponding to the generated distribution are
     8.071091E-02   6.514271E-03   5.257637E-04
          the legendre expansion corresponding to these moments is
     5.666031E-04   4.573105E-05  -2.777650E-04  -6.785183E-05
          the weights/angles for this distribution are
     1.000000E+00   4.936485E-08
     8.071094E-02  -5.467504E-01
```

```
            the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257637E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  106 to group  177
                2 moments were accepted. the p0 coefficient is  2.32080E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  114 to group  192
                2 moments were accepted. the p0 coefficient is  7.24779E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725976E-06
            the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.901552E-05
            the moments corresponding to the generated distribution are
        2.667994E-02   7.118348E-04   1.900025E-05
            the legendre expansion corresponding to these moments is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725981E-06
            the weights/angles for this distribution are
        9.999999E-01   6.598613E-08
        2.667990E-02   5.153067E-01
            the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.900025E-05

keno message number k5-222     129 transfers for mixture     5 were corrected for bad moments.

                               ........    0 io's were used mixing cross-sections       ........

                                1-d cross section array id numbers
                                   1  2002  1452    27    18  1018

*****************************************************************************************************************************

                              the number of direct access blocks for unit  8 has been increased to 1079.

*****************************************************************************************************************************

                               ........    0 io's were used preparing the cross sections    ........
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                              ****** additional information ******                 ***
***                                                                                   ***
***  number of energy groups              238       use lattice geometry          no  ***
***                                                                                   ***
***  no. of fission spectrum source group  1        global array number             0  ***
***                                                                                   ***
***  no. of scattering angles in xsecs     2        number of units in the global x dir.  0  ***
***                                                                                   ***
***  entries/neutron in the neutron bank  17        number of units in the global y dir.  0  ***
***                                                                                   ***
***  entries/neutron in the fission bank  10        number of units in the global z dir.  0  ***
***                                                                                   ***
***  number of mixtures used               5        use a global reflector       yes  ***
***                                                                                   ***
***  number of bias id's used              1        use nested holes              no  ***
***                                                                                   ***
***  number of differential albedos used   0        number of holes                1  ***
***                                                                                   ***
***  total input geometry regions          7        maximum hole nesting level     1  ***
***                                                                                   ***
***  number of geometry regions used       7        use nested arrays             no  ***
***                                                                                   ***
***  largest geometry unit number         10        number of arrays used          0  ***
***                                                                                   ***
***  largest array number                  1        maximum array nesting level    0  ***
***                                                                                   ***
***                                                                                   ***
***  +x boundary condition            mirror        -x boundary condition      mirror  ***
***                                                                                   ***
***  +y boundary condition            mirror        -y boundary condition      mirror  ***
***                                                                                   ***
***  +z boundary condition            mirror        -z boundary condition      mirror  ***
***                                                                                   ***
*****************************************************************************************
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    ****** space and supergroup information ******                 ***
***                                                                                   ***
***      2000000 words is the total space available.                                  ***
***                                                                                   ***
***        30661 words were used for non-supergroup storage.                          ***
***                                                                                   ***
***      1969339 words of storage are available for supergrouped data.                ***
***                                                                                   ***
***      1999416 words of storage are available for constructing the supergroups.     ***
***                                                                                   ***
***      1968857 words of storage are available to each supergroup.                   ***
***                                                                                   ***
***         5835 words are needed for the largest group.                              ***
***                                                                                   ***
***        38400 words of storage is sufficient to run this problem.                  ***
***                                                                                   ***
***       469323 words of storage will allow the problem to run with one supergroup.  ***
***                                                                                   ***
***       469632 words of storage will be used to run this problem.                   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    starting      ending       xsec       albedo      total        ***
***   supergroup         group        group      length      length      length       ***
***                                                                                   ***
***                                                                                   ***
***          1            1           238       105618           0      438180        ***
***                                                                                   ***
*****************************************************************************************

             ........    0 io's were used in supergrouping  ........

             ........    0 io's were used loading the data    ........
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

```
                    media bias      geometry description for those units utilized in this problem
region               num   id

                                                  -----   unit     1   -----

pu sphere

  1 sphere           1  1  radius =  11.458     the center is located at ( 0.00000    , 0.00000    , 0.00000    ).

                                   ******************   global   ******************
                                                  -----   unit    10   -----

ru-tru 72-b package w/ pu sphere

  1 cylinder         2  1  radius =  39.688     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

    hole number      1        at x = 0.00000     y =  28.230      z =  142.85     is unit number      1

  2 cylinder         4  1  radius =  43.180     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  3 cylinder         6  1  radius =  47.943     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  4 cylinder         4  1  radius =  52.070     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  5 cylinder         4  1  radius =  52.070     +z =  187.33     -z = -170.82     centerline is at  x = 0.00000      y = 0.00000

  6 cuboid           5  1       +x =  72.390     -x = -72.390     +y =  72.390     -y = -72.390     +z =  216.54     -z = -200.03
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	6.30026E+03 cm**3	6.30026E+03 cm**3
10	1	2	1.52085E+06 cm**3	1.52715E+06 cm**3
	2	3	2.80605E+05 cm**3	1.80775E+06 cm**3
	3	4	4.20760E+05 cm**3	2.22851E+06 cm**3
	4	5	4.00235E+05 cm**3	2.62875E+06 cm**3
	5	6	4.21884E+05 cm**3	3.05063E+06 cm**3
	6	7	5.68119E+06 cm**3	8.73183E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	6.30026E+03 cm**3
10	1	1	2	1.52085E+06 cm**3
		2	4	2.80605E+05 cm**3
		3	6	4.20760E+05 cm**3
		4	4	4.00235E+05 cm**3
		5	4	4.21884E+05 cm**3
		6	5	5.68119E+06 cm**3

total mixture volumes

mixture	total volume	mass(g)
1	6.30026E+03 cm**3	6.10676E+03
2	1.52085E+06 cm**3	1.41782E+06
4	1.10272E+06 cm**3	8.75563E+06
5	5.68119E+06 cm**3	5.67080E+06
6	4.20760E+05 cm**3	4.77310E+06

```
*****************************************************************************************************
***                                                                                               ***
***                                    biasing information                                        ***
***                                                                                               ***
***     a default weight of    0.500 will be used for all bias id's.                              ***
***                                                                                               ***
*****************************************************************************************************
```

..... 0 io's were used in keno-v before tracking .....

..... 0.09217 minutes were used processing data. .....

volume fraction of fissile material in the core= 7.21528E-04

start type 0 was used.

the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
the flag to start neutrons in the reflector was turned off

0.07750 minutes were required for starting. total elapsed time is 0.17350 minutes.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
keno message number k5-132		warning....only	963 independent fission points were generated			
1	9.03480E-01	1.80000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	995 independent fission points were generated			
2	9.31369E-01	1.95500E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	975 independent fission points were generated			
3	8.81173E-01	2.02667E-01	8.81173E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.39570E-01	2.11000E-01	9.10372E-01	2.91984E-02	0.00000E+00	0.00000E+00
5	9.22443E-01	2.16333E-01	9.14396E-01	1.73313E-02	0.00000E+00	0.00000E+00
6	9.31757E-01	2.24500E-01	9.18736E-01	1.30010E-02	0.00000E+00	0.00000E+00
7	9.46563E-01	2.29667E-01	9.24301E-01	1.15060E-02	0.00000E+00	0.00000E+00
8	9.68626E-01	2.35333E-01	9.31689E-01	1.19513E-02	0.00000E+00	0.00000E+00
9	9.06708E-01	2.43500E-01	9.28120E-01	1.07126E-02	0.00000E+00	0.00000E+00
10	9.01790E-01	2.48667E-01	9.24829E-01	9.84389E-03	0.00000E+00	0.00000E+00
11	9.56791E-01	2.56167E-01	9.28380E-01	9.37977E-03	0.00000E+00	0.00000E+00
12	9.22951E-01	2.61500E-01	9.27837E-01	8.40707E-03	0.00000E+00	0.00000E+00
13	8.86162E-01	2.66333E-01	9.24049E-01	8.49600E-03	0.00000E+00	0.00000E+00
14	9.15815E-01	2.73667E-01	9.23363E-01	7.78605E-03	0.00000E+00	0.00000E+00
15	9.31556E-01	2.79333E-01	9.23993E-01	7.18980E-03	0.00000E+00	0.00000E+00
16	9.65725E-01	2.86500E-01	9.26974E-01	7.29344E-03	0.00000E+00	0.00000E+00
17	9.21934E-01	2.94500E-01	9.26638E-01	6.79813E-03	0.00000E+00	0.00000E+00
18	9.44886E-01	3.02667E-01	9.27778E-01	6.46054E-03	0.00000E+00	0.00000E+00
19	9.04878E-01	3.10333E-01	9.26431E-01	6.21633E-03	0.00000E+00	0.00000E+00
20	9.31833E-01	3.17167E-01	9.26731E-01	5.86849E-03	0.00000E+00	0.00000E+00
21	9.25325E-01	3.25167E-01	9.26657E-01	5.55153E-03	0.00000E+00	0.00000E+00
22	9.76432E-01	3.30667E-01	9.29146E-01	5.82505E-03	0.00000E+00	0.00000E+00
23	9.68449E-01	3.36500E-01	9.31018E-01	5.84828E-03	0.00000E+00	0.00000E+00
24	9.32992E-01	3.43667E-01	9.31107E-01	5.57684E-03	0.00000E+00	0.00000E+00
25	9.35985E-01	3.49667E-01	9.31319E-01	5.33307E-03	0.00000E+00	0.00000E+00
26	9.13958E-01	3.56500E-01	9.30596E-01	5.15701E-03	0.00000E+00	0.00000E+00
27	8.99639E-01	3.63500E-01	9.29358E-01	5.09907E-03	0.00000E+00	0.00000E+00
28	9.96432E-01	3.71333E-01	9.31937E-01	5.53677E-03	0.00000E+00	0.00000E+00
29	9.76668E-01	3.77000E-01	9.33594E-01	5.57939E-03	0.00000E+00	0.00000E+00
30	9.53868E-01	3.83333E-01	9.34318E-01	5.42497E-03	0.00000E+00	0.00000E+00
31	9.44982E-01	3.89833E-01	9.34686E-01	5.24746E-03	0.00000E+00	0.00000E+00
32	8.91354E-01	3.95500E-01	9.33242E-01	5.27128E-03	0.00000E+00	0.00000E+00
33	9.79428E-01	4.01333E-01	9.34731E-01	5.31164E-03	0.00000E+00	0.00000E+00
34	9.43281E-01	4.07833E-01	9.34999E-01	5.14991E-03	0.00000E+00	0.00000E+00
35	9.34380E-01	4.13833E-01	9.34980E-01	4.99145E-03	0.00000E+00	0.00000E+00
36	9.22950E-01	4.19500E-01	9.34626E-01	4.85533E-03	0.00000E+00	0.00000E+00
37	9.74546E-01	4.25500E-01	9.35767E-01	4.85056E-03	0.00000E+00	0.00000E+00
38	9.41390E-01	4.31167E-01	9.35923E-01	4.71649E-03	0.00000E+00	0.00000E+00
39	9.11329E-01	4.37000E-01	9.35258E-01	4.63515E-03	0.00000E+00	0.00000E+00
40	9.14953E-01	4.42500E-01	9.34724E-01	4.54306E-03	0.00000E+00	0.00000E+00
41	9.61103E-01	4.47833E-01	9.35400E-01	4.47644E-03	0.00000E+00	0.00000E+00
42	8.83318E-01	4.53667E-01	9.34098E-01	4.55323E-03	0.00000E+00	0.00000E+00
43	9.13012E-01	4.59167E-01	9.33584E-01	4.47047E-03	0.00000E+00	0.00000E+00
44	8.77136E-01	4.64500E-01	9.32240E-01	4.56506E-03	0.00000E+00	0.00000E+00
45	9.66227E-01	4.71000E-01	9.33030E-01	4.52716E-03	0.00000E+00	0.00000E+00
46	9.34467E-01	4.78333E-01	9.33063E-01	4.42320E-03	0.00000E+00	0.00000E+00
47	9.55659E-01	4.84167E-01	9.33565E-01	4.35285E-03	0.00000E+00	0.00000E+00
48	9.41181E-01	4.89833E-01	9.33731E-01	4.26038E-03	0.00000E+00	0.00000E+00
49	9.54455E-01	4.95333E-01	9.34171E-01	4.19201E-03	0.00000E+00	0.00000E+00
50	9.31958E-01	5.06167E-01	9.34125E-01	4.10400E-03	0.00000E+00	0.00000E+00
51	9.40299E-01	5.16333E-01	9.34251E-01	4.02135E-03	0.00000E+00	0.00000E+00
52	9.14635E-01	5.22167E-01	9.33859E-01	3.95959E-03	0.00000E+00	0.00000E+00
53	9.30015E-01	5.28667E-01	9.33784E-01	3.88190E-03	0.00000E+00	0.00000E+00
54	9.27977E-01	5.35333E-01	9.33672E-01	3.80816E-03	0.00000E+00	0.00000E+00
55	8.60630E-01	5.42167E-01	9.32294E-01	3.98172E-03	0.00000E+00	0.00000E+00
56	8.98455E-01	5.48667E-01	9.31667E-01	3.95722E-03	0.00000E+00	0.00000E+00
57	9.40695E-01	5.55000E-01	9.31831E-01	3.88807E-03	0.00000E+00	0.00000E+00
58	9.85582E-01	5.61167E-01	9.32791E-01	3.93681E-03	0.00000E+00	0.00000E+00
59	9.42646E-01	5.66833E-01	9.32964E-01	3.87099E-03	0.00000E+00	0.00000E+00
60	9.32777E-01	5.72667E-01	9.32961E-01	3.80367E-03	0.00000E+00	0.00000E+00
61	9.22359E-01	5.78333E-01	9.32781E-01	3.74296E-03	0.00000E+00	0.00000E+00
62	1.00632E+00	5.83833E-01	9.34007E-01	3.87879E-03	0.00000E+00	0.00000E+00
63	8.92503E-01	5.89333E-01	9.33326E-01	3.87488E-03	0.00000E+00	0.00000E+00
64	9.66769E-01	5.95000E-01	9.33866E-01	3.84984E-03	0.00000E+00	0.00000E+00
65	8.88249E-01	6.02333E-01	9.33142E-01	3.85682E-03	0.00000E+00	0.00000E+00
66	9.38264E-01	6.07500E-01	9.33222E-01	3.79692E-03	0.00000E+00	0.00000E+00
67	9.17049E-01	6.13000E-01	9.32973E-01	3.74632E-03	0.00000E+00	0.00000E+00
68	9.37513E-01	6.18667E-01	9.33042E-01	3.68976E-03	0.00000E+00	0.00000E+00
69	9.07625E-01	6.24500E-01	9.32662E-01	3.65402E-03	0.00000E+00	0.00000E+00
70	9.64423E-01	6.29667E-01	9.33129E-01	3.63006E-03	0.00000E+00	0.00000E+00
71	9.33550E-01	6.35667E-01	9.33136E-01	3.57707E-03	0.00000E+00	0.00000E+00
72	9.64978E-01	6.41667E-01	9.33590E-01	3.55482E-03	0.00000E+00	0.00000E+00
73	9.72085E-01	6.47167E-01	9.34133E-01	3.54609E-03	0.00000E+00	0.00000E+00
74	9.83697E-01	6.52500E-01	9.34821E-01	3.56361E-03	0.00000E+00	0.00000E+00
75	9.72520E-01	6.59333E-01	9.35337E-01	3.55220E-03	0.00000E+00	0.00000E+00
76	9.40046E-01	6.65000E-01	9.35401E-01	3.50444E-03	0.00000E+00	0.00000E+00
77	9.44091E-01	6.70833E-01	9.35517E-01	3.45934E-03	0.00000E+00	0.00000E+00
78	9.10646E-01	6.76500E-01	9.35190E-01	3.42917E-03	0.00000E+00	0.00000E+00
79	9.33112E-01	6.82000E-01	9.35163E-01	3.38445E-03	0.00000E+00	0.00000E+00
80	9.13246E-01	6.87167E-01	9.34882E-01	3.35257E-03	0.00000E+00	0.00000E+00
81	9.46281E-01	6.92667E-01	9.35026E-01	3.31301E-03	0.00000E+00	0.00000E+00
82	9.27051E-01	6.98667E-01	9.34926E-01	3.27285E-03	0.00000E+00	0.00000E+00
83	9.03527E-01	7.04333E-01	9.34539E-01	3.25536E-03	0.00000E+00	0.00000E+00
84	9.41982E-01	7.09667E-01	9.34629E-01	3.21669E-03	0.00000E+00	0.00000E+00
85	9.69440E-01	7.14833E-01	9.35049E-01	3.20526E-03	0.00000E+00	0.00000E+00
86	9.45640E-01	7.20000E-01	9.35175E-01	3.16938E-03	0.00000E+00	0.00000E+00
87	9.05593E-01	7.26000E-01	9.34827E-01	3.15115E-03	0.00000E+00	0.00000E+00
88	9.15918E-01	7.31667E-01	9.34607E-01	3.12204E-03	0.00000E+00	0.00000E+00
89	9.09905E-01	7.37500E-01	9.34323E-01	3.09898E-03	0.00000E+00	0.00000E+00
90	9.10449E-01	7.43500E-01	9.34052E-01	3.07555E-03	0.00000E+00	0.00000E+00
91	9.36223E-01	7.49167E-01	9.34076E-01	3.04090E-03	0.00000E+00	0.00000E+00
92	9.47052E-01	7.54833E-01	9.34220E-01	3.01038E-03	0.00000E+00	0.00000E+00
93	9.45308E-01	7.60667E-01	9.34342E-01	2.97960E-03	0.00000E+00	0.00000E+00
94	9.61830E-01	7.66333E-01	9.34641E-01	2.96215E-03	0.00000E+00	0.00000E+00
95	8.82925E-01	7.72167E-01	9.34085E-01	2.98242E-03	0.00000E+00	0.00000E+00
96	9.18343E-01	7.77833E-01	9.33917E-01	2.95527E-03	0.00000E+00	0.00000E+00
97	9.52728E-01	7.83333E-01	9.34115E-01	2.93070E-03	0.00000E+00	0.00000E+00
98	9.28875E-01	7.89333E-01	9.34061E-01	2.90052E-03	0.00000E+00	0.00000E+00

99	9.33952E-01	7.94833E-01	9.34060E-01	2.87046E-03	0.00000E+00	0.00000E+00
100	8.86673E-01	8.00667E-01	9.33576E-01	2.88188E-03	0.00000E+00	0.00000E+00
101	9.21330E-01	8.06667E-01	9.33453E-01	2.85530E-03	0.00000E+00	0.00000E+00
102	9.56162E-01	8.12500E-01	9.33680E-01	2.83571E-03	0.00000E+00	0.00000E+00
103	9.85424E-01	8.17667E-01	9.34192E-01	2.85386E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	981 independent fission points were generated			
104	8.77442E-01	8.23667E-01	9.33636E-01	2.87999E-03	0.00000E+00	0.00000E+00
105	9.37680E-01	8.29167E-01	9.33675E-01	2.85216E-03	0.00000E+00	0.00000E+00
106	9.28672E-01	8.34333E-01	9.33627E-01	2.82501E-03	0.00000E+00	0.00000E+00
107	8.99861E-01	8.40333E-01	9.33305E-01	2.81640E-03	0.00000E+00	0.00000E+00
108	9.86228E-01	8.45500E-01	9.33804E-01	2.83403E-03	0.00000E+00	0.00000E+00
109	9.64201E-01	8.50667E-01	9.34088E-01	2.82175E-03	0.00000E+00	0.00000E+00
110	9.64065E-01	8.56500E-01	9.34366E-01	2.80925E-03	0.00000E+00	0.00000E+00
111	9.38010E-01	8.62500E-01	9.34399E-01	2.78356E-03	0.00000E+00	0.00000E+00
112	9.34111E-01	8.68167E-01	9.34397E-01	2.75814E-03	0.00000E+00	0.00000E+00
113	9.08764E-01	8.74000E-01	9.34166E-01	2.74292E-03	0.00000E+00	0.00000E+00
114	9.25363E-01	8.79833E-01	9.34087E-01	2.71945E-03	0.00000E+00	0.00000E+00
115	9.34490E-01	8.85667E-01	9.34091E-01	2.69528E-03	0.00000E+00	0.00000E+00
116	9.18239E-01	8.91167E-01	9.33952E-01	2.67515E-03	0.00000E+00	0.00000E+00
117	9.29960E-01	8.97667E-01	9.33917E-01	2.65201E-03	0.00000E+00	0.00000E+00
118	9.32852E-01	9.03833E-01	9.33908E-01	2.62907E-03	0.00000E+00	0.00000E+00
119	9.13358E-01	9.10167E-01	9.33732E-01	2.61241E-03	0.00000E+00	0.00000E+00
120	9.72533E-01	9.15833E-01	9.34061E-01	2.61096E-03	0.00000E+00	0.00000E+00
121	9.32263E-01	9.21500E-01	9.34046E-01	2.58897E-03	0.00000E+00	0.00000E+00
122	9.42256E-01	9.28167E-01	9.34114E-01	2.56822E-03	0.00000E+00	0.00000E+00
123	9.03820E-01	9.33833E-01	9.33864E-01	2.55918E-03	0.00000E+00	0.00000E+00
124	9.62084E-01	9.39833E-01	9.34095E-01	2.54864E-03	0.00000E+00	0.00000E+00
125	9.48161E-01	9.45500E-01	9.34210E-01	2.53042E-03	0.00000E+00	0.00000E+00
126	9.45839E-01	9.51333E-01	9.34304E-01	2.51168E-03	0.00000E+00	0.00000E+00
127	9.28460E-01	9.57333E-01	9.34257E-01	2.49194E-03	0.00000E+00	0.00000E+00
128	9.51640E-01	9.63000E-01	9.34395E-01	2.47593E-03	0.00000E+00	0.00000E+00
129	9.70396E-01	9.69000E-01	9.34678E-01	2.47266E-03	0.00000E+00	0.00000E+00
130	9.42814E-01	9.74500E-01	9.34742E-01	2.45409E-03	0.00000E+00	0.00000E+00
131	9.22042E-01	9.80500E-01	9.34643E-01	2.43698E-03	0.00000E+00	0.00000E+00
132	9.64080E-01	9.85833E-01	9.34870E-01	2.42874E-03	0.00000E+00	0.00000E+00
133	9.19368E-01	9.91833E-01	9.34751E-01	2.41304E-03	0.00000E+00	0.00000E+00
134	8.77328E-01	9.97667E-01	9.34316E-01	2.43388E-03	0.00000E+00	0.00000E+00
135	9.20102E-01	1.00317E+00	9.34210E-01	2.41787E-03	0.00000E+00	0.00000E+00
136	9.44550E-01	1.00900E+00	9.34287E-01	2.40100E-03	0.00000E+00	0.00000E+00
137	9.23171E-01	1.01450E+00	9.34204E-01	2.38457E-03	0.00000E+00	0.00000E+00
138	9.10380E-01	1.02033E+00	9.34029E-01	2.37345E-03	0.00000E+00	0.00000E+00
139	9.11085E-01	1.02567E+00	9.33862E-01	2.36200E-03	0.00000E+00	0.00000E+00
140	9.43404E-01	1.03100E+00	9.33931E-01	2.34584E-03	0.00000E+00	0.00000E+00
141	9.27612E-01	1.03617E+00	9.33885E-01	2.32935E-03	0.00000E+00	0.00000E+00
142	8.58556E-01	1.04233E+00	9.33347E-01	2.37442E-03	0.00000E+00	0.00000E+00
143	9.21453E-01	1.04783E+00	9.33263E-01	2.35903E-03	0.00000E+00	0.00000E+00
144	9.60972E-01	1.05317E+00	9.33458E-01	2.35047E-03	0.00000E+00	0.00000E+00
145	8.59284E-01	1.05850E+00	9.32939E-01	2.39092E-03	0.00000E+00	0.00000E+00
146	9.38437E-01	1.06383E+00	9.32978E-01	2.37457E-03	0.00000E+00	0.00000E+00
147	9.12011E-01	1.06900E+00	9.32833E-01	2.36256E-03	0.00000E+00	0.00000E+00
148	8.73903E-01	1.07467E+00	9.32429E-01	2.38079E-03	0.00000E+00	0.00000E+00
149	9.08103E-01	1.07983E+00	9.32264E-01	2.37032E-03	0.00000E+00	0.00000E+00
150	9.22579E-01	1.08567E+00	9.32198E-01	2.35516E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	976 independent fission points were generated			
151	8.89799E-01	1.09167E+00	9.31914E-01	2.35654E-03	0.00000E+00	0.00000E+00
152	9.22823E-01	1.09783E+00	9.31853E-01	2.34157E-03	0.00000E+00	0.00000E+00
153	9.55950E-01	1.10383E+00	9.32013E-01	2.33147E-03	0.00000E+00	0.00000E+00
154	9.38220E-01	1.10933E+00	9.32054E-01	2.31645E-03	0.00000E+00	0.00000E+00
155	9.13159E-01	1.11483E+00	9.31930E-01	2.30457E-03	0.00000E+00	0.00000E+00
156	9.72324E-01	1.12083E+00	9.32192E-01	2.30453E-03	0.00000E+00	0.00000E+00
157	8.83229E-01	1.12683E+00	9.31877E-01	2.31130E-03	0.00000E+00	0.00000E+00
158	8.78059E-01	1.13250E+00	9.31532E-01	2.32220E-03	0.00000E+00	0.00000E+00
159	9.66222E-01	1.13817E+00	9.31753E-01	2.31792E-03	0.00000E+00	0.00000E+00
160	9.87549E-01	1.14350E+00	9.32106E-01	2.33012E-03	0.00000E+00	0.00000E+00
161	9.03075E-01	1.14917E+00	9.31923E-01	2.32261E-03	0.00000E+00	0.00000E+00
162	9.19754E-01	1.15483E+00	9.31847E-01	2.30930E-03	0.00000E+00	0.00000E+00
163	9.09265E-01	1.16033E+00	9.31707E-01	2.29919E-03	0.00000E+00	0.00000E+00
164	9.49367E-01	1.16617E+00	9.31816E-01	2.28755E-03	0.00000E+00	0.00000E+00
165	9.44011E-01	1.17217E+00	9.31891E-01	2.27471E-03	0.00000E+00	0.00000E+00
166	9.31494E-01	1.17800E+00	9.31888E-01	2.26080E-03	0.00000E+00	0.00000E+00
167	9.28457E-01	1.18350E+00	9.31867E-01	2.24715E-03	0.00000E+00	0.00000E+00
168	9.08863E-01	1.18950E+00	9.31729E-01	2.23787E-03	0.00000E+00	0.00000E+00
169	9.32865E-01	1.19533E+00	9.31736E-01	2.22444E-03	0.00000E+00	0.00000E+00
170	9.20914E-01	1.20067E+00	9.31671E-01	2.21209E-03	0.00000E+00	0.00000E+00
171	9.30012E-01	1.20617E+00	9.31661E-01	2.19899E-03	0.00000E+00	0.00000E+00
172	9.39774E-01	1.21217E+00	9.31709E-01	2.18653E-03	0.00000E+00	0.00000E+00
173	9.38516E-01	1.21817E+00	9.31749E-01	2.17407E-03	0.00000E+00	0.00000E+00
174	9.55798E-01	1.22367E+00	9.31889E-01	2.16591E-03	0.00000E+00	0.00000E+00
175	9.20407E-01	1.22967E+00	9.31822E-01	2.15438E-03	0.00000E+00	0.00000E+00
176	8.78377E-01	1.23533E+00	9.31515E-01	2.16388E-03	0.00000E+00	0.00000E+00
177	9.13473E-01	1.24117E+00	9.31412E-01	2.15394E-03	0.00000E+00	0.00000E+00
178	9.19690E-01	1.24650E+00	9.31346E-01	2.14271E-03	0.00000E+00	0.00000E+00
179	9.07432E-01	1.25200E+00	9.31210E-01	2.13484E-03	0.00000E+00	0.00000E+00
180	9.69729E-01	1.25833E+00	9.31427E-01	2.13382E-03	0.00000E+00	0.00000E+00
181	9.24164E-01	1.26433E+00	9.31386E-01	2.12225E-03	0.00000E+00	0.00000E+00
182	9.17867E-01	1.26967E+00	9.31311E-01	2.11176E-03	0.00000E+00	0.00000E+00
183	9.35881E-01	1.27567E+00	9.31336E-01	2.10022E-03	0.00000E+00	0.00000E+00
184	9.51140E-01	1.28150E+00	9.31445E-01	2.09148E-03	0.00000E+00	0.00000E+00
185	9.31895E-01	1.28717E+00	9.31448E-01	2.08002E-03	0.00000E+00	0.00000E+00
186	9.59472E-01	1.29267E+00	9.31600E-01	2.07428E-03	0.00000E+00	0.00000E+00
187	9.73123E-01	1.29783E+00	9.31824E-01	2.07521E-03	0.00000E+00	0.00000E+00
188	8.99782E-01	1.30367E+00	9.31652E-01	2.07120E-03	0.00000E+00	0.00000E+00
189	9.25249E-01	1.30883E+00	9.31618E-01	2.06038E-03	0.00000E+00	0.00000E+00
190	9.00527E-01	1.31433E+00	9.31453E-01	2.05605E-03	0.00000E+00	0.00000E+00
191	9.45001E-01	1.32050E+00	9.31524E-01	2.04640E-03	0.00000E+00	0.00000E+00
192	9.16671E-01	1.32600E+00	9.31446E-01	2.03710E-03	0.00000E+00	0.00000E+00
193	9.24818E-01	1.33200E+00	9.31411E-01	2.02671E-03	0.00000E+00	0.00000E+00
194	8.98983E-01	1.33750E+00	9.31242E-01	2.02319E-03	0.00000E+00	0.00000E+00
195	9.14402E-01	1.34300E+00	9.31155E-01	2.01457E-03	0.00000E+00	0.00000E+00
196	9.30962E-01	1.34833E+00	9.31154E-01	2.00416E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	929 independent fission points were generated			
197	8.51825E-01	1.35417E+00	9.30747E-01	2.03493E-03	0.00000E+00	0.00000E+00
198	9.34923E-01	1.36017E+00	9.30769E-01	2.02463E-03	0.00000E+00	0.00000E+00
199	9.28481E-01	1.36550E+00	9.30757E-01	2.01436E-03	0.00000E+00	0.00000E+00
200	9.35441E-01	1.37100E+00	9.30781E-01	2.00430E-03	0.00000E+00	0.00000E+00

201	9.08241E-01	1.37650E+00	9.30667E-01	1.99742E-03	0.00000E+00	0.00000E+00
202	9.48625E-01	1.38250E+00	9.30757E-01	1.98944E-03	0.00000E+00	0.00000E+00
203	9.35436E-01	1.38817E+00	9.30781E-01	1.97965E-03	0.00000E+00	0.00000E+00
204	9.25558E-01	1.39350E+00	9.30755E-01	1.97000E-03	0.00000E+00	0.00000E+00
205	9.81880E-01	1.39883E+00	9.31007E-01	1.97638E-03	0.00000E+00	0.00000E+00
206	8.96938E-01	1.40483E+00	9.30840E-01	1.97375E-03	0.00000E+00	0.00000E+00
207	9.26446E-01	1.41117E+00	9.30818E-01	1.96421E-03	0.00000E+00	0.00000E+00
208	9.44488E-01	1.41633E+00	9.30884E-01	1.95578E-03	0.00000E+00	0.00000E+00
209	9.02875E-01	1.42183E+00	9.30749E-01	1.95101E-03	0.00000E+00	0.00000E+00
210	9.89418E-01	1.42700E+00	9.31031E-01	1.96198E-03	0.00000E+00	0.00000E+00
211	9.27497E-01	1.43250E+00	9.31014E-01	1.95265E-03	0.00000E+00	0.00000E+00
212	9.22819E-01	1.43817E+00	9.30975E-01	1.94372E-03	0.00000E+00	0.00000E+00
213	9.19877E-01	1.44350E+00	9.30923E-01	1.93520E-03	0.00000E+00	0.00000E+00
214	9.39481E-01	1.44883E+00	9.30963E-01	1.92647E-03	0.00000E+00	0.00000E+00
215	9.50554E-01	1.45467E+00	9.31055E-01	1.91961E-03	0.00000E+00	0.00000E+00
216	9.76549E-01	1.46017E+00	9.31268E-01	1.92241E-03	0.00000E+00	0.00000E+00
217	9.25981E-01	1.46550E+00	9.31243E-01	1.91361E-03	0.00000E+00	0.00000E+00
218	9.42054E-01	1.47133E+00	9.31293E-01	1.90538E-03	0.00000E+00	0.00000E+00
219	8.91744E-01	1.47683E+00	9.31111E-01	1.90532E-03	0.00000E+00	0.00000E+00
220	9.03464E-01	1.48250E+00	9.30984E-01	1.90079E-03	0.00000E+00	0.00000E+00
221	9.17498E-01	1.48867E+00	9.30922E-01	1.89310E-03	0.00000E+00	0.00000E+00
222	9.74729E-01	1.49417E+00	9.31122E-01	1.89496E-03	0.00000E+00	0.00000E+00
223	9.33519E-01	1.50000E+00	9.31132E-01	1.88640E-03	0.00000E+00	0.00000E+00
224	9.50518E-01	1.50533E+00	9.31220E-01	1.87991E-03	0.00000E+00	0.00000E+00
225	9.00603E-01	1.51117E+00	9.31082E-01	1.87649E-03	0.00000E+00	0.00000E+00
226	9.66022E-01	1.51633E+00	9.31238E-01	1.87460E-03	0.00000E+00	0.00000E+00
227	9.09415E-01	1.52183E+00	9.31141E-01	1.86877E-03	0.00000E+00	0.00000E+00
228	9.10279E-01	1.52733E+00	9.31049E-01	1.86277E-03	0.00000E+00	0.00000E+00
229	9.41043E-01	1.53300E+00	9.31093E-01	1.85507E-03	0.00000E+00	0.00000E+00
230	9.20855E-01	1.53817E+00	9.31048E-01	1.84746E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 976 independent fission points were generated

231	8.76119E-01	1.54400E+00	9.30808E-01	1.85495E-03	0.00000E+00	0.00000E+00
232	9.39672E-01	1.54917E+00	9.30847E-01	1.84727E-03	0.00000E+00	0.00000E+00
233	9.15853E-01	1.55467E+00	9.30782E-01	1.84040E-03	0.00000E+00	0.00000E+00
234	8.96840E-01	1.56033E+00	9.30636E-01	1.83828E-03	0.00000E+00	0.00000E+00
235	9.05629E-01	1.56617E+00	9.30528E-01	1.83352E-03	0.00000E+00	0.00000E+00
236	9.29291E-01	1.57150E+00	9.30523E-01	1.82567E-03	0.00000E+00	0.00000E+00
237	8.70362E-01	1.57733E+00	9.30267E-01	1.83582E-03	0.00000E+00	0.00000E+00
238	9.57886E-01	1.58283E+00	9.30384E-01	1.83177E-03	0.00000E+00	0.00000E+00
239	9.27425E-01	1.58817E+00	9.30372E-01	1.82407E-03	0.00000E+00	0.00000E+00
240	1.00677E+00	1.59317E+00	9.30693E-01	1.84453E-03	0.00000E+00	0.00000E+00
241	9.61834E-01	1.60183E+00	9.30823E-01	1.84141E-03	0.00000E+00	0.00000E+00
242	9.52322E-01	1.60750E+00	9.30912E-01	1.83591E-03	0.00000E+00	0.00000E+00
243	9.52314E-01	1.61350E+00	9.31001E-01	1.83043E-03	0.00000E+00	0.00000E+00
244	9.83573E-01	1.61950E+00	9.31218E-01	1.83575E-03	0.00000E+00	0.00000E+00
245	9.33565E-01	1.62517E+00	9.31228E-01	1.82821E-03	0.00000E+00	0.00000E+00
246	8.96669E-01	1.63067E+00	9.31087E-01	1.82620E-03	0.00000E+00	0.00000E+00
247	9.24853E-01	1.63633E+00	9.31061E-01	1.81891E-03	0.00000E+00	0.00000E+00
248	9.48836E-01	1.64167E+00	9.31133E-01	1.81294E-03	0.00000E+00	0.00000E+00
249	9.51795E-01	1.64683E+00	9.31217E-01	1.80752E-03	0.00000E+00	0.00000E+00
250	9.23539E-01	1.65200E+00	9.31186E-01	1.80049E-03	0.00000E+00	0.00000E+00
251	9.15863E-01	1.65750E+00	9.31124E-01	1.79430E-03	0.00000E+00	0.00000E+00
252	9.60916E-01	1.66267E+00	9.31244E-01	1.79107E-03	0.00000E+00	0.00000E+00
253	9.82224E-01	1.66850E+00	9.31447E-01	1.79545E-03	0.00000E+00	0.00000E+00
254	9.46863E-01	1.67417E+00	9.31508E-01	1.78936E-03	0.00000E+00	0.00000E+00
255	9.30819E-01	1.68033E+00	9.31505E-01	1.78227E-03	0.00000E+00	0.00000E+00
256	9.21048E-01	1.68567E+00	9.31464E-01	1.77572E-03	0.00000E+00	0.00000E+00
257	9.53138E-01	1.69133E+00	9.31549E-01	1.77078E-03	0.00000E+00	0.00000E+00
258	9.65945E-01	1.69733E+00	9.31683E-01	1.76896E-03	0.00000E+00	0.00000E+00
259	9.38252E-01	1.70367E+00	9.31709E-01	1.76225E-03	0.00000E+00	0.00000E+00
260	9.15865E-01	1.70950E+00	9.31648E-01	1.75648E-03	0.00000E+00	0.00000E+00
261	9.43069E-01	1.71500E+00	9.31692E-01	1.75024E-03	0.00000E+00	0.00000E+00
262	9.51757E-01	1.72050E+00	9.31769E-01	1.74520E-03	0.00000E+00	0.00000E+00
263	9.55756E-01	1.72567E+00	9.31861E-01	1.74093E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 986 independent fission points were generated

264	8.78548E-01	1.73200E+00	9.31657E-01	1.74617E-03	0.00000E+00	0.00000E+00
265	9.30385E-01	1.73767E+00	9.31652E-01	1.73952E-03	0.00000E+00	0.00000E+00
266	9.35181E-01	1.74283E+00	9.31666E-01	1.73297E-03	0.00000E+00	0.00000E+00
267	9.36717E-01	1.74817E+00	9.31685E-01	1.72653E-03	0.00000E+00	0.00000E+00
268	9.17441E-01	1.75350E+00	9.31631E-01	1.72086E-03	0.00000E+00	0.00000E+00
269	9.33106E-01	1.75900E+00	9.31637E-01	1.71441E-03	0.00000E+00	0.00000E+00
270	9.49349E-01	1.76450E+00	9.31703E-01	1.70928E-03	0.00000E+00	0.00000E+00
271	9.01022E-01	1.77017E+00	9.31589E-01	1.70673E-03	0.00000E+00	0.00000E+00
272	9.31431E-01	1.77567E+00	9.31588E-01	1.70040E-03	0.00000E+00	0.00000E+00
273	9.90546E-01	1.78117E+00	9.31806E-01	1.70802E-03	0.00000E+00	0.00000E+00
274	9.39190E-01	1.78667E+00	9.31833E-01	1.70195E-03	0.00000E+00	0.00000E+00
275	9.08909E-01	1.79233E+00	9.31749E-01	1.69778E-03	0.00000E+00	0.00000E+00
276	9.67501E-01	1.79833E+00	9.31879E-01	1.69660E-03	0.00000E+00	0.00000E+00
277	9.32232E-01	1.80417E+00	9.31881E-01	1.69042E-03	0.00000E+00	0.00000E+00
278	9.20118E-01	1.80950E+00	9.31838E-01	1.68482E-03	0.00000E+00	0.00000E+00
279	9.06818E-01	1.81550E+00	9.31748E-01	1.68115E-03	0.00000E+00	0.00000E+00
280	9.03034E-01	1.82133E+00	9.31645E-01	1.67828E-03	0.00000E+00	0.00000E+00
281	9.43182E-01	1.82650E+00	9.31686E-01	1.67276E-03	0.00000E+00	0.00000E+00
282	9.13040E-01	1.83217E+00	9.31619E-01	1.66811E-03	0.00000E+00	0.00000E+00
283	8.82330E-01	1.83817E+00	9.31444E-01	1.67139E-03	0.00000E+00	0.00000E+00
284	9.18980E-01	1.84400E+00	9.31400E-01	1.66604E-03	0.00000E+00	0.00000E+00
285	9.49816E-01	1.84933E+00	9.31465E-01	1.66142E-03	0.00000E+00	0.00000E+00
286	9.29129E-01	1.85517E+00	9.31457E-01	1.65558E-03	0.00000E+00	0.00000E+00
287	9.51394E-01	1.86067E+00	9.31526E-01	1.65124E-03	0.00000E+00	0.00000E+00
288	9.34429E-01	1.86600E+00	9.31537E-01	1.64549E-03	0.00000E+00	0.00000E+00
289	9.15486E-01	1.87183E+00	9.31481E-01	1.64070E-03	0.00000E+00	0.00000E+00
290	9.10653E-01	1.87783E+00	9.31408E-01	1.63659E-03	0.00000E+00	0.00000E+00
291	9.54220E-01	1.88333E+00	9.31487E-01	1.63283E-03	0.00000E+00	0.00000E+00
292	9.46638E-01	1.88867E+00	9.31540E-01	1.62802E-03	0.00000E+00	0.00000E+00
293	9.25349E-01	1.89417E+00	9.31518E-01	1.62256E-03	0.00000E+00	0.00000E+00
294	9.62807E-01	1.89967E+00	9.31625E-01	1.62054E-03	0.00000E+00	0.00000E+00
295	9.01613E-01	1.90533E+00	9.31523E-01	1.61824E-03	0.00000E+00	0.00000E+00
296	9.45632E-01	1.91083E+00	9.31571E-01	1.61344E-03	0.00000E+00	0.00000E+00
297	8.89265E-01	1.91633E+00	9.31428E-01	1.61435E-03	0.00000E+00	0.00000E+00
298	9.04235E-01	1.92233E+00	9.31336E-01	1.61151E-03	0.00000E+00	0.00000E+00
299	9.14885E-01	1.92800E+00	9.31280E-01	1.60703E-03	0.00000E+00	0.00000E+00
300	9.32139E-01	1.93383E+00	9.31283E-01	1.60163E-03	0.00000E+00	0.00000E+00
301	9.23220E-01	1.93933E+00	9.31256E-01	1.59649E-03	0.00000E+00	0.00000E+00
302	9.36224E-01	1.94517E+00	9.31273E-01	1.59124E-03	0.00000E+00	0.00000E+00
303	9.71280E-01	1.95067E+00	9.31406E-01	1.59151E-03	0.00000E+00	0.00000E+00

304	9.48663E-01	1.95600E+00	9.31463E-01	1.58726E-03	0.00000E+00	0.00000E+00
305	9.51887E-01	1.96167E+00	9.31530E-01	1.58345E-03	0.00000E+00	0.00000E+00
306	8.99875E-01	1.96733E+00	9.31426E-01	1.58166E-03	0.00000E+00	0.00000E+00
307	9.58764E-01	1.97283E+00	9.31516E-01	1.57901E-03	0.00000E+00	0.00000E+00
308	8.76444E-01	1.97883E+00	9.31336E-01	1.58410E-03	0.00000E+00	0.00000E+00
309	9.04298E-01	1.98483E+00	9.31248E-01	1.58139E-03	0.00000E+00	0.00000E+00
310	9.53148E-01	1.99050E+00	9.31319E-01	1.57785E-03	0.00000E+00	0.00000E+00
311	9.47576E-01	1.99683E+00	9.31371E-01	1.57361E-03	0.00000E+00	0.00000E+00
312	8.94693E-01	2.00183E+00	9.31253E-01	1.57298E-03	0.00000E+00	0.00000E+00
313	9.53972E-01	2.00717E+00	9.31326E-01	1.56962E-03	0.00000E+00	0.00000E+00
314	9.52752E-01	2.01250E+00	9.31395E-01	1.56609E-03	0.00000E+00	0.00000E+00
315	9.12773E-01	2.01817E+00	9.31335E-01	1.56221E-03	0.00000E+00	0.00000E+00
316	8.81870E-01	2.02417E+00	9.31178E-01	1.56517E-03	0.00000E+00	0.00000E+00
317	9.25521E-01	2.02983E+00	9.31160E-01	1.56030E-03	0.00000E+00	0.00000E+00
318	9.24317E-01	2.03567E+00	9.31138E-01	1.55550E-03	0.00000E+00	0.00000E+00
319	9.14025E-01	2.04167E+00	9.31084E-01	1.55153E-03	0.00000E+00	0.00000E+00
320	9.39371E-01	2.04683E+00	9.31110E-01	1.54686E-03	0.00000E+00	0.00000E+00
321	9.36609E-01	2.05250E+00	9.31128E-01	1.54210E-03	0.00000E+00	0.00000E+00
322	9.42033E-01	2.05767E+00	9.31162E-01	1.53765E-03	0.00000E+00	0.00000E+00
323	9.09408E-01	2.06350E+00	9.31094E-01	1.53435E-03	0.00000E+00	0.00000E+00
324	9.51354E-01	2.06950E+00	9.31157E-01	1.53087E-03	0.00000E+00	0.00000E+00
325	9.56568E-01	2.07550E+00	9.31235E-01	1.52815E-03	0.00000E+00	0.00000E+00
326	9.19904E-01	2.08150E+00	9.31200E-01	1.52383E-03	0.00000E+00	0.00000E+00
327	9.67665E-01	2.08667E+00	9.31313E-01	1.52327E-03	0.00000E+00	0.00000E+00
328	9.78657E-01	2.09183E+00	9.31458E-01	1.52552E-03	0.00000E+00	0.00000E+00
329	9.40575E-01	2.09733E+00	9.31486E-01	1.52110E-03	0.00000E+00	0.00000E+00
330	9.67646E-01	2.10233E+00	9.31596E-01	1.52046E-03	0.00000E+00	0.00000E+00
331	9.43901E-01	2.10767E+00	9.31633E-01	1.51629E-03	0.00000E+00	0.00000E+00
332	9.37871E-01	2.11300E+00	9.31652E-01	1.51181E-03	0.00000E+00	0.00000E+00
333	9.17728E-01	2.11817E+00	9.31610E-01	1.50782E-03	0.00000E+00	0.00000E+00
334	9.29264E-01	2.12367E+00	9.31603E-01	1.50329E-03	0.00000E+00	0.00000E+00
335	8.78529E-01	2.12917E+00	9.31444E-01	1.50722E-03	0.00000E+00	0.00000E+00
336	9.54826E-01	2.13450E+00	9.31514E-01	1.50433E-03	0.00000E+00	0.00000E+00
337	9.44020E-01	2.14000E+00	9.31551E-01	1.50030E-03	0.00000E+00	0.00000E+00
338	9.70504E-01	2.14583E+00	9.31667E-01	1.50031E-03	0.00000E+00	0.00000E+00
339	9.07424E-01	2.15167E+00	9.31595E-01	1.49758E-03	0.00000E+00	0.00000E+00
340	9.04000E-01	2.15750E+00	9.31513E-01	1.49538E-03	0.00000E+00	0.00000E+00
341	8.81915E-01	2.16300E+00	9.31367E-01	1.49812E-03	0.00000E+00	0.00000E+00
342	9.21006E-01	2.16817E+00	9.31337E-01	1.49402E-03	0.00000E+00	0.00000E+00
343	9.05908E-01	2.17433E+00	9.31262E-01	1.49150E-03	0.00000E+00	0.00000E+00
344	9.21531E-01	2.18017E+00	9.31234E-01	1.48740E-03	0.00000E+00	0.00000E+00
345	9.23653E-01	2.18583E+00	9.31212E-01	1.48322E-03	0.00000E+00	0.00000E+00
346	9.35091E-01	2.19167E+00	9.31223E-01	1.47895E-03	0.00000E+00	0.00000E+00
347	9.32340E-01	2.19733E+00	9.31226E-01	1.47466E-03	0.00000E+00	0.00000E+00
348	9.66111E-01	2.20300E+00	9.31327E-01	1.47384E-03	0.00000E+00	0.00000E+00
349	9.07322E-01	2.20883E+00	9.31258E-01	1.47122E-03	0.00000E+00	0.00000E+00
350	9.69386E-01	2.21417E+00	9.31367E-01	1.47107E-03	0.00000E+00	0.00000E+00
351	9.64474E-01	2.22000E+00	9.31462E-01	1.46991E-03	0.00000E+00	0.00000E+00
352	9.81107E-01	2.22600E+00	9.31604E-01	1.47255E-03	0.00000E+00	0.00000E+00
353	9.22014E-01	2.23167E+00	9.31577E-01	1.46861E-03	0.00000E+00	0.00000E+00
354	9.45069E-01	2.23800E+00	9.31615E-01	1.46493E-03	0.00000E+00	0.00000E+00
355	8.87204E-01	2.24467E+00	9.31489E-01	1.46618E-03	0.00000E+00	0.00000E+00
356	9.29721E-01	2.25050E+00	9.31484E-01	1.46204E-03	0.00000E+00	0.00000E+00
357	9.32240E-01	2.25567E+00	9.31486E-01	1.45792E-03	0.00000E+00	0.00000E+00
358	9.13972E-01	2.26167E+00	9.31437E-01	1.45465E-03	0.00000E+00	0.00000E+00
359	9.43910E-01	2.26733E+00	9.31472E-01	1.45099E-03	0.00000E+00	0.00000E+00
360	9.50885E-01	2.27317E+00	9.31526E-01	1.44795E-03	0.00000E+00	0.00000E+00
361	9.05098E-01	2.27850E+00	9.31453E-01	1.44578E-03	0.00000E+00	0.00000E+00
362	9.23393E-01	2.28433E+00	9.31430E-01	1.44194E-03	0.00000E+00	0.00000E+00
363	9.35538E-01	2.28983E+00	9.31442E-01	1.43798E-03	0.00000E+00	0.00000E+00
364	9.16037E-01	2.29550E+00	9.31399E-01	1.43464E-03	0.00000E+00	0.00000E+00
365	9.24557E-01	2.30100E+00	9.31380E-01	1.43080E-03	0.00000E+00	0.00000E+00
366	9.48954E-01	2.30700E+00	9.31429E-01	1.42768E-03	0.00000E+00	0.00000E+00
367	9.32637E-01	2.31217E+00	9.31432E-01	1.42377E-03	0.00000E+00	0.00000E+00
368	9.38339E-01	2.31767E+00	9.31451E-01	1.42000E-03	0.00000E+00	0.00000E+00
369	8.89967E-01	2.32317E+00	9.31338E-01	1.42063E-03	0.00000E+00	0.00000E+00
370	8.95338E-01	2.32883E+00	9.31240E-01	1.42014E-03	0.00000E+00	0.00000E+00
371	9.58793E-01	2.33433E+00	9.31315E-01	1.41825E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 996 independent fission points were generated

372	8.96225E-01	2.34000E+00	9.31220E-01	1.41759E-03	0.00000E+00	0.00000E+00
373	9.24347E-01	2.34517E+00	9.31201E-01	1.41388E-03	0.00000E+00	0.00000E+00
374	9.24522E-01	2.35050E+00	9.31183E-01	1.41019E-03	0.00000E+00	0.00000E+00
375	9.32667E-01	2.35567E+00	9.31187E-01	1.40641E-03	0.00000E+00	0.00000E+00
376	9.00971E-01	2.36133E+00	9.31106E-01	1.40497E-03	0.00000E+00	0.00000E+00
377	8.98848E-01	2.36683E+00	9.31020E-01	1.40386E-03	0.00000E+00	0.00000E+00
378	9.71146E-01	2.37183E+00	9.31127E-01	1.40418E-03	0.00000E+00	0.00000E+00
379	9.38351E-01	2.37733E+00	9.31146E-01	1.40058E-03	0.00000E+00	0.00000E+00
380	9.24077E-01	2.38250E+00	9.31128E-01	1.39700E-03	0.00000E+00	0.00000E+00
381	9.07155E-01	2.38800E+00	9.31064E-01	1.39474E-03	0.00000E+00	0.00000E+00
382	9.37301E-01	2.39317E+00	9.31081E-01	1.39116E-03	0.00000E+00	0.00000E+00
383	9.05686E-01	2.39867E+00	9.31014E-01	1.38910E-03	0.00000E+00	0.00000E+00
384	8.96090E-01	2.40383E+00	9.30923E-01	1.38848E-03	0.00000E+00	0.00000E+00
385	9.15659E-01	2.40933E+00	9.30883E-01	1.38542E-03	0.00000E+00	0.00000E+00
386	9.38473E-01	2.41550E+00	9.30903E-01	1.38195E-03	0.00000E+00	0.00000E+00
387	9.06350E-01	2.42150E+00	9.30839E-01	1.37983E-03	0.00000E+00	0.00000E+00
388	1.00056E+00	2.42700E+00	9.31019E-01	1.38805E-03	0.00000E+00	0.00000E+00
389	9.48893E-01	2.43217E+00	9.31066E-01	1.38523E-03	0.00000E+00	0.00000E+00
390	9.50606E-01	2.43817E+00	9.31116E-01	1.38257E-03	0.00000E+00	0.00000E+00
391	9.44443E-01	2.44367E+00	9.31150E-01	1.37944E-03	0.00000E+00	0.00000E+00
392	9.30463E-01	2.44933E+00	9.31148E-01	1.37590E-03	0.00000E+00	0.00000E+00
393	9.06869E-01	2.45517E+00	9.31086E-01	1.37378E-03	0.00000E+00	0.00000E+00
394	8.97954E-01	2.46033E+00	9.31002E-01	1.37287E-03	0.00000E+00	0.00000E+00
395	9.17160E-01	2.46583E+00	9.30967E-01	1.36983E-03	0.00000E+00	0.00000E+00
396	9.49020E-01	2.47133E+00	9.31012E-01	1.36712E-03	0.00000E+00	0.00000E+00
397	9.60313E-01	2.47667E+00	9.31087E-01	1.36567E-03	0.00000E+00	0.00000E+00
398	9.42929E-01	2.48217E+00	9.31117E-01	1.36254E-03	0.00000E+00	0.00000E+00
399	9.79652E-01	2.48733E+00	9.31239E-01	1.36459E-03	0.00000E+00	0.00000E+00
400	9.40272E-01	2.49283E+00	9.31261E-01	1.36135E-03	0.00000E+00	0.00000E+00
401	9.35699E-01	2.49833E+00	9.31273E-01	1.35798E-03	0.00000E+00	0.00000E+00
402	9.76670E-01	2.50350E+00	9.31386E-01	1.35933E-03	0.00000E+00	0.00000E+00
403	9.49736E-01	2.50933E+00	9.31432E-01	1.35670E-03	0.00000E+00	0.00000E+00
404	9.88066E-01	2.51483E+00	9.31573E-01	1.36064E-03	0.00000E+00	0.00000E+00
405	1.03308E+00	2.52000E+00	9.31825E-01	1.38043E-03	0.00000E+00	0.00000E+00
406	9.06907E-01	2.52550E+00	9.31763E-01	1.37839E-03	0.00000E+00	0.00000E+00
407	9.33048E-01	2.53167E+00	9.31766E-01	1.37499E-03	0.00000E+00	0.00000E+00

408	9.47966E-01	2.53717E+00	9.31806E-01	1.37218E-03	0.00000E+00	0.00000E+00
409	9.70144E-01	2.54283E+00	9.31900E-01	1.37204E-03	0.00000E+00	0.00000E+00
410	9.18859E-01	2.54867E+00	9.31868E-01	1.36904E-03	0.00000E+00	0.00000E+00
411	9.12072E-01	2.55400E+00	9.31820E-01	1.36655E-03	0.00000E+00	0.00000E+00
412	9.16320E-01	2.56033E+00	9.31782E-01	1.36374E-03	0.00000E+00	0.00000E+00
413	9.19655E-01	2.56633E+00	9.31753E-01	1.36073E-03	0.00000E+00	0.00000E+00
414	9.04495E-01	2.57200E+00	9.31686E-01	1.35904E-03	0.00000E+00	0.00000E+00
415	9.82582E-01	2.57750E+00	9.31810E-01	1.36133E-03	0.00000E+00	0.00000E+00
416	9.13053E-01	2.58317E+00	9.31764E-01	1.35880E-03	0.00000E+00	0.00000E+00
417	9.51699E-01	2.58917E+00	9.31812E-01	1.35637E-03	0.00000E+00	0.00000E+00
418	9.16422E-01	2.59500E+00	9.31775E-01	1.35361E-03	0.00000E+00	0.00000E+00
419	9.74113E-01	2.60050E+00	9.31877E-01	1.35417E-03	0.00000E+00	0.00000E+00
420	9.98452E-01	2.60617E+00	9.32036E-01	1.36028E-03	0.00000E+00	0.00000E+00
421	9.60622E-01	2.61233E+00	9.32104E-01	1.35875E-03	0.00000E+00	0.00000E+00
422	9.90480E-01	2.61783E+00	9.32243E-01	1.36262E-03	0.00000E+00	0.00000E+00
423	9.19593E-01	2.62367E+00	9.32213E-01	1.35971E-03	0.00000E+00	0.00000E+00
424	9.50767E-01	2.62933E+00	9.32257E-01	1.35719E-03	0.00000E+00	0.00000E+00
425	9.44676E-01	2.63533E+00	9.32287E-01	1.35430E-03	0.00000E+00	0.00000E+00
426	8.93749E-01	2.64100E+00	9.32196E-01	1.35416E-03	0.00000E+00	0.00000E+00
427	9.01328E-01	2.64683E+00	9.32123E-01	1.35292E-03	0.00000E+00	0.00000E+00
428	9.27233E-01	2.65283E+00	9.32112E-01	1.34979E-03	0.00000E+00	0.00000E+00
429	9.15960E-01	2.65883E+00	9.32074E-01	1.34715E-03	0.00000E+00	0.00000E+00
430	9.37240E-01	2.66417E+00	9.32086E-01	1.34406E-03	0.00000E+00	0.00000E+00
431	9.76301E-01	2.67000E+00	9.32189E-01	1.34487E-03	0.00000E+00	0.00000E+00
432	9.36507E-01	2.67567E+00	9.32199E-01	1.34178E-03	0.00000E+00	0.00000E+00
433	9.40936E-01	2.68117E+00	9.32219E-01	1.33882E-03	0.00000E+00	0.00000E+00
434	9.35178E-01	2.68667E+00	9.32226E-01	1.33573E-03	0.00000E+00	0.00000E+00
435	9.27181E-01	2.69283E+00	9.32214E-01	1.33269E-03	0.00000E+00	0.00000E+00
436	9.45762E-01	2.69833E+00	9.32246E-01	1.32999E-03	0.00000E+00	0.00000E+00
437	9.25681E-01	2.70467E+00	9.32231E-01	1.32701E-03	0.00000E+00	0.00000E+00
438	9.36661E-01	2.71000E+00	9.32241E-01	1.32400E-03	0.00000E+00	0.00000E+00
439	8.92351E-01	2.71600E+00	9.32149E-01	1.32412E-03	0.00000E+00	0.00000E+00
440	9.25617E-01	2.72233E+00	9.32135E-01	1.32118E-03	0.00000E+00	0.00000E+00
441	9.70392E-01	2.72783E+00	9.32222E-01	1.32104E-03	0.00000E+00	0.00000E+00
442	9.66611E-01	2.73317E+00	9.32300E-01	1.32035E-03	0.00000E+00	0.00000E+00
443	9.44655E-01	2.73867E+00	9.32328E-01	1.31765E-03	0.00000E+00	0.00000E+00
444	9.21968E-01	2.74450E+00	9.32304E-01	1.31488E-03	0.00000E+00	0.00000E+00
445	9.08850E-01	2.74983E+00	9.32251E-01	1.31297E-03	0.00000E+00	0.00000E+00
446	9.26015E-01	2.75517E+00	9.32237E-01	1.31009E-03	0.00000E+00	0.00000E+00
447	9.43159E-01	2.76050E+00	9.32262E-01	1.30737E-03	0.00000E+00	0.00000E+00
448	9.22433E-01	2.76600E+00	9.32240E-01	1.30462E-03	0.00000E+00	0.00000E+00
449	9.34540E-01	2.77133E+00	9.32245E-01	1.30171E-03	0.00000E+00	0.00000E+00
450	9.55016E-01	2.77650E+00	9.32296E-01	1.29980E-03	0.00000E+00	0.00000E+00
451	9.51582E-01	2.78200E+00	9.32339E-01	1.29761E-03	0.00000E+00	0.00000E+00
452	9.32436E-01	2.78717E+00	9.32339E-01	1.29472E-03	0.00000E+00	0.00000E+00
453	9.24480E-01	2.79233E+00	9.32322E-01	1.29197E-03	0.00000E+00	0.00000E+00
454	8.84062E-01	2.79800E+00	9.32215E-01	1.29352E-03	0.00000E+00	0.00000E+00
455	9.22430E-01	2.80333E+00	9.32193E-01	1.29084E-03	0.00000E+00	0.00000E+00
456	9.90336E-01	2.80850E+00	9.32321E-01	1.29435E-03	0.00000E+00	0.00000E+00
457	8.63051E-01	2.81400E+00	9.32169E-01	1.30044E-03	0.00000E+00	0.00000E+00
458	9.24088E-01	2.81950E+00	9.32151E-01	1.29771E-03	0.00000E+00	0.00000E+00
459	9.09794E-01	2.82550E+00	9.32102E-01	1.29579E-03	0.00000E+00	0.00000E+00
460	9.23608E-01	2.83083E+00	9.32084E-01	1.29309E-03	0.00000E+00	0.00000E+00
461	9.41383E-01	2.83667E+00	9.32104E-01	1.29043E-03	0.00000E+00	0.00000E+00
462	8.99570E-01	2.84267E+00	9.32033E-01	1.28956E-03	0.00000E+00	0.00000E+00
463	9.45074E-01	2.84867E+00	9.32062E-01	1.28707E-03	0.00000E+00	0.00000E+00
464	9.27238E-01	2.85433E+00	9.32051E-01	1.28432E-03	0.00000E+00	0.00000E+00
465	9.06825E-01	2.86033E+00	9.31997E-01	1.28270E-03	0.00000E+00	0.00000E+00
466	9.77698E-01	2.86550E+00	9.32095E-01	1.28372E-03	0.00000E+00	0.00000E+00
467	9.26683E-01	2.87133E+00	9.32084E-01	1.28101E-03	0.00000E+00	0.00000E+00
468	8.54023E-01	2.87717E+00	9.31916E-01	1.28919E-03	0.00000E+00	0.00000E+00
469	9.63529E-01	2.88250E+00	9.31984E-01	1.28820E-03	0.00000E+00	0.00000E+00
470	9.56926E-01	2.88800E+00	9.32037E-01	1.28655E-03	0.00000E+00	0.00000E+00
471	9.75182E-01	2.89317E+00	9.32129E-01	1.28710E-03	0.00000E+00	0.00000E+00
472	9.45290E-01	2.89833E+00	9.32157E-01	1.28466E-03	0.00000E+00	0.00000E+00
473	9.31477E-01	2.90383E+00	9.32156E-01	1.28193E-03	0.00000E+00	0.00000E+00
474	9.41027E-01	2.90933E+00	9.32174E-01	1.27935E-03	0.00000E+00	0.00000E+00
475	9.11186E-01	2.91500E+00	9.32130E-01	1.27741E-03	0.00000E+00	0.00000E+00
476	8.99446E-01	2.92050E+00	9.32061E-01	1.27658E-03	0.00000E+00	0.00000E+00
477	9.04417E-01	2.92600E+00	9.32003E-01	1.27522E-03	0.00000E+00	0.00000E+00
478	9.81218E-01	2.93117E+00	9.32106E-01	1.27673E-03	0.00000E+00	0.00000E+00
479	9.98199E-01	2.93667E+00	9.32245E-01	1.28156E-03	0.00000E+00	0.00000E+00
480	9.47746E-01	2.94217E+00	9.32277E-01	1.27929E-03	0.00000E+00	0.00000E+00
481	9.39642E-01	2.94733E+00	9.32293E-01	1.27671E-03	0.00000E+00	0.00000E+00
482	9.57754E-01	2.95283E+00	9.32346E-01	1.27515E-03	0.00000E+00	0.00000E+00
483	9.08993E-01	2.95817E+00	9.32297E-01	1.27342E-03	0.00000E+00	0.00000E+00
484	9.54041E-01	2.96417E+00	9.32342E-01	1.27158E-03	0.00000E+00	0.00000E+00
485	9.39880E-01	2.96967E+00	9.32358E-01	1.26904E-03	0.00000E+00	0.00000E+00
486	9.52109E-01	2.97517E+00	9.32399E-01	1.26707E-03	0.00000E+00	0.00000E+00
487	8.75417E-01	2.98083E+00	9.32281E-01	1.26990E-03	0.00000E+00	0.00000E+00
488	9.79704E-01	2.98633E+00	9.32379E-01	1.27104E-03	0.00000E+00	0.00000E+00
489	9.74869E-01	2.99217E+00	9.32466E-01	1.27142E-03	0.00000E+00	0.00000E+00
490	9.12536E-01	2.99783E+00	9.32425E-01	1.26947E-03	0.00000E+00	0.00000E+00
491	9.66474E-01	3.00333E+00	9.32495E-01	1.26879E-03	0.00000E+00	0.00000E+00
492	9.37260E-01	3.00900E+00	9.32505E-01	1.26623E-03	0.00000E+00	0.00000E+00
493	9.40377E-01	3.01450E+00	9.32521E-01	1.26375E-03	0.00000E+00	0.00000E+00
494	9.79873E-01	3.02000E+00	9.32617E-01	1.26485E-03	0.00000E+00	0.00000E+00
495	9.29986E-01	3.02567E+00	9.32612E-01	1.26229E-03	0.00000E+00	0.00000E+00
496	9.18163E-01	3.03117E+00	9.32582E-01	1.26007E-03	0.00000E+00	0.00000E+00
497	8.53835E-01	3.03717E+00	9.32423E-01	1.26755E-03	0.00000E+00	0.00000E+00
498	9.74896E-01	3.04283E+00	9.32509E-01	1.26788E-03	0.00000E+00	0.00000E+00
499	9.76300E-01	3.04800E+00	9.32597E-01	1.26839E-03	0.00000E+00	0.00000E+00
500	9.14959E-01	3.05350E+00	9.32562E-01	1.26634E-03	0.00000E+00	0.00000E+00
501	9.06870E-01	3.05983E+00	9.32510E-01	1.26485E-03	0.00000E+00	0.00000E+00
502	9.34695E-01	3.06583E+00	9.32514E-01	1.26232E-03	0.00000E+00	0.00000E+00
503	9.48632E-01	3.07150E+00	9.32547E-01	1.26021E-03	0.00000E+00	0.00000E+00
504	9.28198E-01	3.07717E+00	9.32538E-01	1.25773E-03	0.00000E+00	0.00000E+00
505	9.24107E-01	3.08317E+00	9.32521E-01	1.25534E-03	0.00000E+00	0.00000E+00

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506	9.11947E-01	3.08900E+00	9.32480E-01	1.25351E-03	0.00000E+00	0.00000E+00
507	9.66692E-01	3.09467E+00	9.32548E-01	1.25286E-03	0.00000E+00	0.00000E+00
508	9.24216E-01	3.10017E+00	9.32532E-01	1.25049E-03	0.00000E+00	0.00000E+00
509	9.06788E-01	3.10583E+00	9.32481E-01	1.24905E-03	0.00000E+00	0.00000E+00
510	8.98292E-01	3.11183E+00	9.32414E-01	1.24840E-03	0.00000E+00	0.00000E+00
511	9.50532E-01	3.11817E+00	9.32449E-01	1.24646E-03	0.00000E+00	0.00000E+00

512	9.13613E-01	3.12433E+00	9.32412E-01	1.24456E-03	0.00000E+00	0.00000E+00
513	9.64759E-01	3.13033E+00	9.32475E-01	1.24373E-03	0.00000E+00	0.00000E+00
514	9.22662E-01	3.13633E+00	9.32456E-01	1.24145E-03	0.00000E+00	0.00000E+00
515	9.36799E-01	3.14183E+00	9.32465E-01	1.23906E-03	0.00000E+00	0.00000E+00
516	9.68238E-01	3.14750E+00	9.32534E-01	1.23860E-03	0.00000E+00	0.00000E+00
517	9.40157E-01	3.15283E+00	9.32549E-01	1.23628E-03	0.00000E+00	0.00000E+00
518	9.31446E-01	3.15867E+00	9.32547E-01	1.23389E-03	0.00000E+00	0.00000E+00
519	9.38303E-01	3.16417E+00	9.32558E-01	1.23155E-03	0.00000E+00	0.00000E+00
520	9.67932E-01	3.17000E+00	9.32626E-01	1.23106E-03	0.00000E+00	0.00000E+00
521	9.10106E-01	3.17617E+00	9.32583E-01	1.22945E-03	0.00000E+00	0.00000E+00
522	9.28755E-01	3.18250E+00	9.32576E-01	1.22711E-03	0.00000E+00	0.00000E+00
523	9.34677E-01	3.18850E+00	9.32580E-01	1.22476E-03	0.00000E+00	0.00000E+00
524	9.12818E-01	3.19450E+00	9.32542E-01	1.22300E-03	0.00000E+00	0.00000E+00
525	9.41944E-01	3.20017E+00	9.32560E-01	1.22079E-03	0.00000E+00	0.00000E+00
526	9.82357E-01	3.20567E+00	9.32655E-01	1.22216E-03	0.00000E+00	0.00000E+00
527	9.79961E-01	3.21117E+00	9.32745E-01	1.22315E-03	0.00000E+00	0.00000E+00
528	9.33702E-01	3.21683E+00	9.32747E-01	1.22082E-03	0.00000E+00	0.00000E+00
529	9.41793E-01	3.22283E+00	9.32764E-01	1.21863E-03	0.00000E+00	0.00000E+00
530	9.37546E-01	3.22850E+00	9.32773E-01	1.21635E-03	0.00000E+00	0.00000E+00
531	9.24231E-01	3.23433E+00	9.32757E-01	1.21416E-03	0.00000E+00	0.00000E+00
532	8.80983E-01	3.24000E+00	9.32659E-01	1.21579E-03	0.00000E+00	0.00000E+00
533	9.48210E-01	3.24550E+00	9.32689E-01	1.21385E-03	0.00000E+00	0.00000E+00
534	9.94055E-01	3.25067E+00	9.32804E-01	1.21705E-03	0.00000E+00	0.00000E+00
535	9.52713E-01	3.25583E+00	9.32841E-01	1.21534E-03	0.00000E+00	0.00000E+00
536	9.30502E-01	3.26183E+00	9.32837E-01	1.21307E-03	0.00000E+00	0.00000E+00
537	9.50048E-01	3.26783E+00	9.32869E-01	1.21123E-03	0.00000E+00	0.00000E+00
538	9.33091E-01	3.27367E+00	9.32869E-01	1.20896E-03	0.00000E+00	0.00000E+00
539	9.54945E-01	3.27933E+00	9.32911E-01	1.20741E-03	0.00000E+00	0.00000E+00
540	9.53863E-01	3.28483E+00	9.32949E-01	1.20579E-03	0.00000E+00	0.00000E+00
541	9.17547E-01	3.29033E+00	9.32921E-01	1.20389E-03	0.00000E+00	0.00000E+00
542	9.63395E-01	3.29567E+00	9.32977E-01	1.20299E-03	0.00000E+00	0.00000E+00
543	9.31596E-01	3.30150E+00	9.32975E-01	1.20076E-03	0.00000E+00	0.00000E+00
544	9.52786E-01	3.30717E+00	9.33011E-01	1.19910E-03	0.00000E+00	0.00000E+00
545	9.49577E-01	3.31267E+00	9.33042E-01	1.19728E-03	0.00000E+00	0.00000E+00
546	9.34464E-01	3.31833E+00	9.33044E-01	1.19508E-03	0.00000E+00	0.00000E+00
547	8.90743E-01	3.32433E+00	9.32967E-01	1.19541E-03	0.00000E+00	0.00000E+00
548	8.98346E-01	3.33017E+00	9.32903E-01	1.19490E-03	0.00000E+00	0.00000E+00
549	9.34141E-01	3.33633E+00	9.32906E-01	1.19272E-03	0.00000E+00	0.00000E+00
550	9.28329E-01	3.34183E+00	9.32897E-01	1.19057E-03	0.00000E+00	0.00000E+00
551	9.49221E-01	3.34700E+00	9.32927E-01	1.18877E-03	0.00000E+00	0.00000E+00
552	9.44291E-01	3.35250E+00	9.32948E-01	1.18679E-03	0.00000E+00	0.00000E+00
553	9.49307E-01	3.35817E+00	9.32977E-01	1.18500E-03	0.00000E+00	0.00000E+00
554	9.26151E-01	3.36450E+00	9.32965E-01	1.18292E-03	0.00000E+00	0.00000E+00
555	9.32931E-01	3.37050E+00	9.32965E-01	1.18078E-03	0.00000E+00	0.00000E+00
556	9.92873E-01	3.37617E+00	9.33073E-01	1.18359E-03	0.00000E+00	0.00000E+00
557	9.39778E-01	3.38183E+00	9.33085E-01	1.18152E-03	0.00000E+00	0.00000E+00
558	9.85767E-01	3.38767E+00	9.33180E-01	1.18319E-03	0.00000E+00	0.00000E+00
559	9.32912E-01	3.39333E+00	9.33179E-01	1.18107E-03	0.00000E+00	0.00000E+00
560	9.38764E-01	3.39933E+00	9.33189E-01	1.17899E-03	0.00000E+00	0.00000E+00
561	9.03002E-01	3.40533E+00	9.33135E-01	1.17812E-03	0.00000E+00	0.00000E+00
562	9.62698E-01	3.41100E+00	9.33188E-01	1.17720E-03	0.00000E+00	0.00000E+00
563	9.19851E-01	3.41700E+00	9.33165E-01	1.17534E-03	0.00000E+00	0.00000E+00
564	8.98104E-01	3.42283E+00	9.33102E-01	1.17490E-03	0.00000E+00	0.00000E+00
565	9.52306E-01	3.42883E+00	9.33136E-01	1.17331E-03	0.00000E+00	0.00000E+00
566	9.58905E-01	3.43483E+00	9.33182E-01	1.17212E-03	0.00000E+00	0.00000E+00
567	9.76061E-01	3.44050E+00	9.33258E-01	1.17250E-03	0.00000E+00	0.00000E+00
568	9.66402E-01	3.44600E+00	9.33316E-01	1.17189E-03	0.00000E+00	0.00000E+00
569	8.97632E-01	3.45150E+00	9.33253E-01	1.17151E-03	0.00000E+00	0.00000E+00
570	9.16102E-01	3.45667E+00	9.33223E-01	1.16984E-03	0.00000E+00	0.00000E+00
571	9.02096E-01	3.46217E+00	9.33169E-01	1.16906E-03	0.00000E+00	0.00000E+00
572	9.14489E-01	3.46767E+00	9.33136E-01	1.16747E-03	0.00000E+00	0.00000E+00
573	9.56870E-01	3.47300E+00	9.33177E-01	1.16616E-03	0.00000E+00	0.00000E+00
574	9.14243E-01	3.47850E+00	9.33144E-01	1.16459E-03	0.00000E+00	0.00000E+00

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575	8.73277E-01	3.48400E+00	9.33040E-01	1.16725E-03	0.00000E+00	0.00000E+00
576	9.06806E-01	3.48967E+00	9.32994E-01	1.16611E-03	0.00000E+00	0.00000E+00
577	9.31892E-01	3.49550E+00	9.32992E-01	1.16408E-03	0.00000E+00	0.00000E+00
578	9.06036E-01	3.50150E+00	9.32945E-01	1.16300E-03	0.00000E+00	0.00000E+00
579	8.97123E-01	3.50750E+00	9.32883E-01	1.16264E-03	0.00000E+00	0.00000E+00
580	9.53441E-01	3.51317E+00	9.32919E-01	1.16117E-03	0.00000E+00	0.00000E+00
581	9.39717E-01	3.51867E+00	9.32931E-01	1.15922E-03	0.00000E+00	0.00000E+00
582	9.57690E-01	3.52417E+00	9.32973E-01	1.15801E-03	0.00000E+00	0.00000E+00
583	8.91152E-01	3.52983E+00	9.32901E-01	1.15825E-03	0.00000E+00	0.00000E+00
584	9.51870E-01	3.53533E+00	9.32934E-01	1.15672E-03	0.00000E+00	0.00000E+00
585	9.20845E-01	3.54050E+00	9.32913E-01	1.15492E-03	0.00000E+00	0.00000E+00
586	9.35198E-01	3.54600E+00	9.32917E-01	1.15295E-03	0.00000E+00	0.00000E+00
587	9.27981E-01	3.55150E+00	9.32909E-01	1.15101E-03	0.00000E+00	0.00000E+00
588	9.76955E-01	3.55717E+00	9.32984E-01	1.15150E-03	0.00000E+00	0.00000E+00
589	9.64192E-01	3.56233E+00	9.33037E-01	1.15076E-03	0.00000E+00	0.00000E+00
590	9.42728E-01	3.56767E+00	9.33053E-01	1.14892E-03	0.00000E+00	0.00000E+00
591	9.24485E-01	3.57300E+00	9.33039E-01	1.14706E-03	0.00000E+00	0.00000E+00
592	9.58387E-01	3.57883E+00	9.33082E-01	1.14592E-03	0.00000E+00	0.00000E+00
593	9.26296E-01	3.58483E+00	9.33070E-01	1.14404E-03	0.00000E+00	0.00000E+00
594	9.59596E-01	3.59017E+00	9.33115E-01	1.14298E-03	0.00000E+00	0.00000E+00
595	9.58845E-01	3.59600E+00	9.33159E-01	1.14188E-03	0.00000E+00	0.00000E+00
596	9.43976E-01	3.60117E+00	9.33177E-01	1.14010E-03	0.00000E+00	0.00000E+00
597	9.53531E-01	3.60667E+00	9.33211E-01	1.13870E-03	0.00000E+00	0.00000E+00
598	9.21961E-01	3.61217E+00	9.33192E-01	1.13694E-03	0.00000E+00	0.00000E+00
599	9.30052E-01	3.61767E+00	9.33187E-01	1.13505E-03	0.00000E+00	0.00000E+00
600	9.28199E-01	3.62333E+00	9.33178E-01	1.13318E-03	0.00000E+00	0.00000E+00
601	9.81180E-01	3.62850E+00	9.33259E-01	1.13412E-03	0.00000E+00	0.00000E+00
602	9.13570E-01	3.63450E+00	9.33226E-01	1.13270E-03	0.00000E+00	0.00000E+00
603	9.51840E-01	3.64000E+00	9.33257E-01	1.13124E-03	0.00000E+00	0.00000E+00
604	9.45690E-01	3.64517E+00	9.33277E-01	1.12955E-03	0.00000E+00	0.00000E+00
605	9.61510E-01	3.65067E+00	9.33324E-01	1.12865E-03	0.00000E+00	0.00000E+00
606	9.54787E-01	3.65633E+00	9.33360E-01	1.12734E-03	0.00000E+00	0.00000E+00
607	9.18916E-01	3.66217E+00	9.33336E-01	1.12572E-03	0.00000E+00	0.00000E+00
608	9.51416E-01	3.66783E+00	9.33366E-01	1.12426E-03	0.00000E+00	0.00000E+00
609	9.63243E-01	3.67300E+00	9.33415E-01	1.12349E-03	0.00000E+00	0.00000E+00
610	9.37962E-01	3.67950E+00	9.33422E-01	1.12166E-03	0.00000E+00	0.00000E+00
611	9.03418E-01	3.68583E+00	9.33373E-01	1.12090E-03	0.00000E+00	0.00000E+00
612	9.14384E-01	3.69200E+00	9.33342E-01	1.11950E-03	0.00000E+00	0.00000E+00
613	9.52349E-01	3.69800E+00	9.33373E-01	1.11809E-03	0.00000E+00	0.00000E+00
614	9.52294E-01	3.70383E+00	9.33404E-01	1.11669E-03	0.00000E+00	0.00000E+00
615	9.19505E-01	3.70983E+00	9.33381E-01	1.11510E-03	0.00000E+00	0.00000E+00

616	9.47805E-01	3.71583E+00	9.33405E-01	1.11353E-03	0.00000E+00	0.00000E+00
617	9.06395E-01	3.72150E+00	9.33361E-01	1.11259E-03	0.00000E+00	0.00000E+00
618	9.40822E-01	3.72767E+00	9.33373E-01	1.11084E-03	0.00000E+00	0.00000E+00
619	9.35430E-01	3.73400E+00	9.33376E-01	1.10905E-03	0.00000E+00	0.00000E+00
620	9.21607E-01	3.74000E+00	9.33357E-01	1.10742E-03	0.00000E+00	0.00000E+00
621	9.34245E-01	3.74550E+00	9.33359E-01	1.10563E-03	0.00000E+00	0.00000E+00
622	9.19025E-01	3.75117E+00	9.33336E-01	1.10408E-03	0.00000E+00	0.00000E+00
623	9.34131E-01	3.75667E+00	9.33337E-01	1.10231E-03	0.00000E+00	0.00000E+00
624	8.75262E-01	3.76283E+00	9.33244E-01	1.10448E-03	0.00000E+00	0.00000E+00
625	9.05821E-01	3.76867E+00	9.33200E-01	1.10359E-03	0.00000E+00	0.00000E+00
626	9.05648E-01	3.77433E+00	9.33155E-01	1.10270E-03	0.00000E+00	0.00000E+00
627	9.35890E-01	3.78067E+00	9.33160E-01	1.10095E-03	0.00000E+00	0.00000E+00
628	8.90614E-01	3.78633E+00	9.33092E-01	1.10129E-03	0.00000E+00	0.00000E+00
629	9.26428E-01	3.79200E+00	9.33081E-01	1.09958E-03	0.00000E+00	0.00000E+00
630	9.05488E-01	3.79783E+00	9.33037E-01	1.09871E-03	0.00000E+00	0.00000E+00
631	9.07548E-01	3.80350E+00	9.32997E-01	1.09771E-03	0.00000E+00	0.00000E+00
632	9.34109E-01	3.80867E+00	9.32999E-01	1.09596E-03	0.00000E+00	0.00000E+00
633	8.88275E-01	3.81467E+00	9.32928E-01	1.09652E-03	0.00000E+00	0.00000E+00
634	9.83189E-01	3.82067E+00	9.33007E-01	1.09767E-03	0.00000E+00	0.00000E+00
635	9.01581E-01	3.82650E+00	9.32958E-01	1.09705E-03	0.00000E+00	0.00000E+00
636	9.17048E-01	3.83217E+00	9.32932E-01	1.09561E-03	0.00000E+00	0.00000E+00
637	9.15192E-01	3.83783E+00	9.32904E-01	1.09424E-03	0.00000E+00	0.00000E+00
638	9.44619E-01	3.84383E+00	9.32923E-01	1.09267E-03	0.00000E+00	0.00000E+00
639	9.64674E-01	3.84967E+00	9.32973E-01	1.09210E-03	0.00000E+00	0.00000E+00
640	9.25040E-01	3.85583E+00	9.32960E-01	1.09045E-03	0.00000E+00	0.00000E+00
641	9.12348E-01	3.86167E+00	9.32928E-01	1.08922E-03	0.00000E+00	0.00000E+00
642	9.87519E-01	3.86683E+00	9.33013E-01	1.09086E-03	0.00000E+00	0.00000E+00
643	8.81631E-01	3.87233E+00	9.32933E-01	1.09210E-03	0.00000E+00	0.00000E+00

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644	9.12213E-01	3.87767E+00	9.32901E-01	1.09088E-03	0.00000E+00	0.00000E+00
645	9.95965E-01	3.88350E+00	9.32999E-01	1.09359E-03	0.00000E+00	0.00000E+00
646	9.65521E-01	3.88900E+00	9.33049E-01	1.09305E-03	0.00000E+00	0.00000E+00
647	9.39112E-01	3.89433E+00	9.33059E-01	1.09140E-03	0.00000E+00	0.00000E+00
648	9.96936E-01	3.89983E+00	9.33158E-01	1.09418E-03	0.00000E+00	0.00000E+00
649	9.71164E-01	3.90583E+00	9.33217E-01	1.09407E-03	0.00000E+00	0.00000E+00
650	9.16233E-01	3.91217E+00	9.33190E-01	1.09270E-03	0.00000E+00	0.00000E+00
651	8.95284E-01	3.91750E+00	9.33132E-01	1.09257E-03	0.00000E+00	0.00000E+00
652	9.55932E-01	3.92350E+00	9.33167E-01	1.09145E-03	0.00000E+00	0.00000E+00
653	9.06752E-01	3.92950E+00	9.33126E-01	1.09053E-03	0.00000E+00	0.00000E+00
654	9.44931E-01	3.93583E+00	9.33145E-01	1.08901E-03	0.00000E+00	0.00000E+00
655	9.06559E-01	3.94200E+00	9.33104E-01	1.08810E-03	0.00000E+00	0.00000E+00
656	9.28322E-01	3.94783E+00	9.33096E-01	1.08646E-03	0.00000E+00	0.00000E+00
657	9.21241E-01	3.95350E+00	9.33078E-01	1.08495E-03	0.00000E+00	0.00000E+00
658	9.35821E-01	3.95983E+00	9.33083E-01	1.08330E-03	0.00000E+00	0.00000E+00
659	9.68466E-01	3.96500E+00	9.33136E-01	1.08299E-03	0.00000E+00	0.00000E+00
660	9.21311E-01	3.97017E+00	9.33118E-01	1.08150E-03	0.00000E+00	0.00000E+00
661	9.11600E-01	3.97617E+00	9.33086E-01	1.08035E-03	0.00000E+00	0.00000E+00
662	9.38906E-01	3.98183E+00	9.33095E-01	1.07875E-03	0.00000E+00	0.00000E+00
663	9.91554E-01	3.98767E+00	9.33183E-01	1.08074E-03	0.00000E+00	0.00000E+00
664	9.26196E-01	3.99383E+00	9.33172E-01	1.07915E-03	0.00000E+00	0.00000E+00
665	9.34040E-01	3.99933E+00	9.33174E-01	1.07753E-03	0.00000E+00	0.00000E+00
666	9.04623E-01	4.00500E+00	9.33131E-01	1.07676E-03	0.00000E+00	0.00000E+00
667	9.30580E-01	4.01083E+00	9.33127E-01	1.07515E-03	0.00000E+00	0.00000E+00
668	9.27968E-01	4.01650E+00	9.33119E-01	1.07356E-03	0.00000E+00	0.00000E+00
669	8.78397E-01	4.02283E+00	9.33037E-01	1.07508E-03	0.00000E+00	0.00000E+00
670	9.15264E-01	4.02900E+00	9.33011E-01	1.07380E-03	0.00000E+00	0.00000E+00
671	9.35123E-01	4.03500E+00	9.33014E-01	1.07220E-03	0.00000E+00	0.00000E+00
672	9.63803E-01	4.04067E+00	9.33060E-01	1.07159E-03	0.00000E+00	0.00000E+00
673	9.50601E-01	4.04617E+00	9.33086E-01	1.07031E-03	0.00000E+00	0.00000E+00
674	8.82992E-01	4.05200E+00	9.33011E-01	1.07131E-03	0.00000E+00	0.00000E+00
675	9.16193E-01	4.05767E+00	9.32986E-01	1.07001E-03	0.00000E+00	0.00000E+00
676	9.27420E-01	4.06367E+00	9.32978E-01	1.06845E-03	0.00000E+00	0.00000E+00
677	9.73969E-01	4.06933E+00	9.33039E-01	1.06860E-03	0.00000E+00	0.00000E+00
678	9.88722E-01	4.07533E+00	9.33121E-01	1.07019E-03	0.00000E+00	0.00000E+00
679	9.51358E-01	4.08117E+00	9.33148E-01	1.06895E-03	0.00000E+00	0.00000E+00
680	9.31633E-01	4.08650E+00	9.33146E-01	1.06737E-03	0.00000E+00	0.00000E+00
681	9.16899E-01	4.09283E+00	9.33122E-01	1.06607E-03	0.00000E+00	0.00000E+00
682	9.23461E-01	4.09850E+00	9.33108E-01	1.06459E-03	0.00000E+00	0.00000E+00
683	9.54042E-01	4.10400E+00	9.33138E-01	1.06347E-03	0.00000E+00	0.00000E+00
684	9.35266E-01	4.10983E+00	9.33142E-01	1.06192E-03	0.00000E+00	0.00000E+00
685	9.35623E-01	4.11550E+00	9.33145E-01	1.06037E-03	0.00000E+00	0.00000E+00
686	9.27426E-01	4.12167E+00	9.33137E-01	1.05885E-03	0.00000E+00	0.00000E+00
687	8.88026E-01	4.12767E+00	9.33071E-01	1.05935E-03	0.00000E+00	0.00000E+00
688	9.43265E-01	4.13350E+00	9.33086E-01	1.05791E-03	0.00000E+00	0.00000E+00
689	9.15494E-01	4.13900E+00	9.33060E-01	1.05668E-03	0.00000E+00	0.00000E+00
690	9.62537E-01	4.14417E+00	9.33103E-01	1.05601E-03	0.00000E+00	0.00000E+00
691	8.90738E-01	4.14933E+00	9.33042E-01	1.05627E-03	0.00000E+00	0.00000E+00
692	9.94106E-01	4.15500E+00	9.33130E-01	1.05844E-03	0.00000E+00	0.00000E+00
693	9.26590E-01	4.16083E+00	9.33121E-01	1.05695E-03	0.00000E+00	0.00000E+00
694	9.74985E-01	4.16683E+00	9.33181E-01	1.05716E-03	0.00000E+00	0.00000E+00
695	9.75136E-01	4.17233E+00	9.33242E-01	1.05736E-03	0.00000E+00	0.00000E+00
696	8.95378E-01	4.17800E+00	9.33187E-01	1.05725E-03	0.00000E+00	0.00000E+00
697	8.99362E-01	4.18367E+00	9.33138E-01	1.05685E-03	0.00000E+00	0.00000E+00
698	9.08118E-01	4.18967E+00	9.33102E-01	1.05594E-03	0.00000E+00	0.00000E+00
699	9.35363E-01	4.19550E+00	9.33106E-01	1.05443E-03	0.00000E+00	0.00000E+00
700	8.96713E-01	4.20117E+00	9.33054E-01	1.05421E-03	0.00000E+00	0.00000E+00
701	8.94807E-01	4.20667E+00	9.32999E-01	1.05412E-03	0.00000E+00	0.00000E+00
702	9.41581E-01	4.21267E+00	9.33011E-01	1.05268E-03	0.00000E+00	0.00000E+00
703	9.48891E-01	4.21867E+00	9.33034E-01	1.05142E-03	0.00000E+00	0.00000E+00
704	9.41438E-01	4.22400E+00	9.33046E-01	1.04999E-03	0.00000E+00	0.00000E+00
705	9.19217E-01	4.22950E+00	9.33026E-01	1.04868E-03	0.00000E+00	0.00000E+00
706	9.04819E-01	4.23583E+00	9.32986E-01	1.04796E-03	0.00000E+00	0.00000E+00
707	9.47821E-01	4.24183E+00	9.33007E-01	1.04668E-03	0.00000E+00	0.00000E+00
708	8.99901E-01	4.24750E+00	9.32960E-01	1.04625E-03	0.00000E+00	0.00000E+00
709	9.69763E-01	4.25300E+00	9.33012E-01	1.04607E-03	0.00000E+00	0.00000E+00
710	1.00124E+00	4.25850E+00	9.33109E-01	1.04902E-03	0.00000E+00	0.00000E+00
711	9.45990E-01	4.26417E+00	9.33127E-01	1.04770E-03	0.00000E+00	0.00000E+00
712	9.34343E-01	4.26967E+00	9.33128E-01	1.04623E-03	0.00000E+00	0.00000E+00
713	9.45220E-01	4.27533E+00	9.33145E-01	1.04489E-03	0.00000E+00	0.00000E+00
714	8.97363E-01	4.28083E+00	9.33095E-01	1.04463E-03	0.00000E+00	0.00000E+00
715	8.96984E-01	4.28683E+00	9.33045E-01	1.04439E-03	0.00000E+00	0.00000E+00
716	9.38426E-01	4.29250E+00	9.33052E-01	1.04296E-03	0.00000E+00	0.00000E+00
717	9.40559E-01	4.29800E+00	9.33063E-01	1.04155E-03	0.00000E+00	0.00000E+00
718	9.51648E-01	4.30317E+00	9.33089E-01	1.04042E-03	0.00000E+00	0.00000E+00
719	9.50760E-01	4.30850E+00	9.33113E-01	1.03926E-03	0.00000E+00	0.00000E+00

720	9.44616E-01	4.31400E+00	9.33129E-01	1.03793E-03	0.00000E+00	0.00000E+00
721	9.38792E-01	4.31917E+00	9.33137E-01	1.03652E-03	0.00000E+00	0.00000E+00
722	9.29731E-01	4.32483E+00	9.33132E-01	1.03509E-03	0.00000E+00	0.00000E+00
723	9.72834E-01	4.33000E+00	9.33187E-01	1.03512E-03	0.00000E+00	0.00000E+00
724	9.26754E-01	4.33600E+00	9.33179E-01	1.03372E-03	0.00000E+00	0.00000E+00
725	9.50827E-01	4.34183E+00	9.33203E-01	1.03258E-03	0.00000E+00	0.00000E+00
726	9.00850E-01	4.34783E+00	9.33158E-01	1.03212E-03	0.00000E+00	0.00000E+00
727	9.35794E-01	4.35383E+00	9.33162E-01	1.03070E-03	0.00000E+00	0.00000E+00
728	9.32148E-01	4.35950E+00	9.33161E-01	1.02928E-03	0.00000E+00	0.00000E+00
729	9.16744E-01	4.36567E+00	9.33138E-01	1.02811E-03	0.00000E+00	0.00000E+00
730	9.43213E-01	4.37117E+00	9.33152E-01	1.02679E-03	0.00000E+00	0.00000E+00
731	9.26427E-01	4.37717E+00	9.33143E-01	1.02543E-03	0.00000E+00	0.00000E+00
732	9.10954E-01	4.38300E+00	9.33112E-01	1.02447E-03	0.00000E+00	0.00000E+00
733	8.66573E-01	4.38917E+00	9.33021E-01	1.02711E-03	0.00000E+00	0.00000E+00
734	9.33251E-01	4.39517E+00	9.33021E-01	1.02571E-03	0.00000E+00	0.00000E+00
735	9.31807E-01	4.40083E+00	9.33020E-01	1.02431E-03	0.00000E+00	0.00000E+00
736	9.15460E-01	4.40667E+00	9.32996E-01	1.02319E-03	0.00000E+00	0.00000E+00
737	9.55295E-01	4.41233E+00	9.33026E-01	1.02225E-03	0.00000E+00	0.00000E+00
738	9.13372E-01	4.41800E+00	9.32999E-01	1.02121E-03	0.00000E+00	0.00000E+00
739	9.70730E-01	4.42433E+00	9.33051E-01	1.02111E-03	0.00000E+00	0.00000E+00
740	9.19500E-01	4.43033E+00	9.33032E-01	1.01989E-03	0.00000E+00	0.00000E+00
741	9.15070E-01	4.43583E+00	9.33008E-01	1.01880E-03	0.00000E+00	0.00000E+00
742	9.44715E-01	4.44100E+00	9.33024E-01	1.01754E-03	0.00000E+00	0.00000E+00
743	9.62998E-01	4.44667E+00	9.33064E-01	1.01697E-03	0.00000E+00	0.00000E+00
744	9.36982E-01	4.45217E+00	9.33070E-01	1.01561E-03	0.00000E+00	0.00000E+00
745	9.81480E-01	4.45767E+00	9.33135E-01	1.01634E-03	0.00000E+00	0.00000E+00
746	9.61565E-01	4.46333E+00	9.33173E-01	1.01569E-03	0.00000E+00	0.00000E+00
747	9.74577E-01	4.46917E+00	9.33229E-01	1.01585E-03	0.00000E+00	0.00000E+00
748	9.60040E-01	4.47467E+00	9.33264E-01	1.01512E-03	0.00000E+00	0.00000E+00
749	9.65183E-01	4.48083E+00	9.33307E-01	1.01466E-03	0.00000E+00	0.00000E+00
750	9.80046E-01	4.48633E+00	9.33370E-01	1.01523E-03	0.00000E+00	0.00000E+00
751	9.19007E-01	4.49150E+00	9.33350E-01	1.01405E-03	0.00000E+00	0.00000E+00
752	9.52801E-01	4.49783E+00	9.33376E-01	1.01303E-03	0.00000E+00	0.00000E+00
753	9.23015E-01	4.50383E+00	9.33363E-01	1.01178E-03	0.00000E+00	0.00000E+00
754	9.46489E-01	4.50917E+00	9.33380E-01	1.01058E-03	0.00000E+00	0.00000E+00
755	9.33175E-01	4.51467E+00	9.33380E-01	1.00924E-03	0.00000E+00	0.00000E+00
756	9.27806E-01	4.52017E+00	9.33372E-01	1.00792E-03	0.00000E+00	0.00000E+00
757	9.27641E-01	4.52617E+00	9.33365E-01	1.00662E-03	0.00000E+00	0.00000E+00
758	9.53616E-01	4.53183E+00	9.33392E-01	1.00564E-03	0.00000E+00	0.00000E+00
759	9.72940E-01	4.53717E+00	9.33444E-01	1.00567E-03	0.00000E+00	0.00000E+00
760	9.22105E-01	4.54283E+00	9.33429E-01	1.00445E-03	0.00000E+00	0.00000E+00
761	9.27608E-01	4.54850E+00	9.33421E-01	1.00316E-03	0.00000E+00	0.00000E+00
762	9.55069E-01	4.55450E+00	9.33450E-01	1.00224E-03	0.00000E+00	0.00000E+00
763	9.60367E-01	4.56033E+00	9.33485E-01	1.00155E-03	0.00000E+00	0.00000E+00
764	9.49193E-01	4.56567E+00	9.33506E-01	1.00045E-03	0.00000E+00	0.00000E+00
765	9.02655E-01	4.57200E+00	9.33465E-01	9.99953E-04	0.00000E+00	0.00000E+00
766	9.66693E-01	4.57750E+00	9.33509E-01	9.99590E-04	0.00000E+00	0.00000E+00
767	9.48096E-01	4.58367E+00	9.33528E-01	9.98464E-04	0.00000E+00	0.00000E+00
768	9.11775E-01	4.59050E+00	9.33499E-01	9.97564E-04	0.00000E+00	0.00000E+00
769	9.40323E-01	4.59600E+00	9.33508E-01	9.96303E-04	0.00000E+00	0.00000E+00
770	9.11702E-01	4.60167E+00	9.33480E-01	9.95410E-04	0.00000E+00	0.00000E+00
771	8.91030E-01	4.60733E+00	9.33425E-01	9.95646E-04	0.00000E+00	0.00000E+00
772	9.06316E-01	4.61367E+00	9.33390E-01	9.94975E-04	0.00000E+00	0.00000E+00
773	9.46396E-01	4.61967E+00	9.33406E-01	9.93827E-04	0.00000E+00	0.00000E+00
774	9.49963E-01	4.62567E+00	9.33428E-01	9.92770E-04	0.00000E+00	0.00000E+00
775	9.77148E-01	4.63117E+00	9.33484E-01	9.93097E-04	0.00000E+00	0.00000E+00
776	9.29853E-01	4.63650E+00	9.33480E-01	9.91824E-04	0.00000E+00	0.00000E+00
777	9.36763E-01	4.64250E+00	9.33484E-01	9.90553E-04	0.00000E+00	0.00000E+00
778	9.41548E-01	4.64850E+00	9.33494E-01	9.89330E-04	0.00000E+00	0.00000E+00
779	9.52297E-01	4.65433E+00	9.33519E-01	9.88352E-04	0.00000E+00	0.00000E+00
780	9.51257E-01	4.66000E+00	9.33541E-01	9.87344E-04	0.00000E+00	0.00000E+00
781	9.39809E-01	4.66617E+00	9.33549E-01	9.86109E-04	0.00000E+00	0.00000E+00
782	9.24182E-01	4.67200E+00	9.33537E-01	9.84917E-04	0.00000E+00	0.00000E+00
783	9.52588E-01	4.67767E+00	9.33562E-01	9.83958E-04	0.00000E+00	0.00000E+00
784	9.12639E-01	4.68367E+00	9.33535E-01	9.83063E-04	0.00000E+00	0.00000E+00
785	9.46352E-01	4.68950E+00	9.33551E-01	9.81943E-04	0.00000E+00	0.00000E+00
786	9.36762E-01	4.69517E+00	9.33555E-01	9.80698E-04	0.00000E+00	0.00000E+00
787	9.29544E-01	4.70067E+00	9.33550E-01	9.79461E-04	0.00000E+00	0.00000E+00
788	9.14723E-01	4.70617E+00	9.33526E-01	9.78508E-04	0.00000E+00	0.00000E+00
789	9.23236E-01	4.71233E+00	9.33513E-01	9.77351E-04	0.00000E+00	0.00000E+00
790	9.67644E-01	4.71833E+00	9.33557E-01	9.77070E-04	0.00000E+00	0.00000E+00
791	9.11626E-01	4.72450E+00	9.33529E-01	9.76227E-04	0.00000E+00	0.00000E+00
792	9.43836E-01	4.73050E+00	9.33542E-01	9.75078E-04	0.00000E+00	0.00000E+00
793	9.51639E-01	4.73650E+00	9.33565E-01	9.74113E-04	0.00000E+00	0.00000E+00
794	9.06871E-01	4.74233E+00	9.33531E-01	9.73466E-04	0.00000E+00	0.00000E+00
795	9.54826E-01	4.74750E+00	9.33558E-01	9.72608E-04	0.00000E+00	0.00000E+00
796	9.14032E-01	4.75350E+00	9.33533E-01	9.71694E-04	0.00000E+00	0.00000E+00
797	9.41942E-01	4.75900E+00	9.33544E-01	9.70528E-04	0.00000E+00	0.00000E+00
798	9.34734E-01	4.76467E+00	9.33545E-01	9.69310E-04	0.00000E+00	0.00000E+00
799	9.07405E-01	4.77067E+00	9.33513E-01	9.68648E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 989 independent fission points were generated

800	8.99473E-01	4.77617E+00	9.33470E-01	9.68373E-04	0.00000E+00	0.00000E+00
801	9.06742E-01	4.78217E+00	9.33436E-01	9.67739E-04	0.00000E+00	0.00000E+00
802	9.25315E-01	4.78817E+00	9.33426E-01	9.66582E-04	0.00000E+00	0.00000E+00
803	9.28956E-01	4.79383E+00	9.33421E-01	9.65390E-04	0.00000E+00	0.00000E+00
804	9.17463E-01	4.79950E+00	9.33401E-01	9.64391E-04	0.00000E+00	0.00000E+00
805	8.96241E-01	4.80533E+00	9.33355E-01	9.64301E-04	0.00000E+00	0.00000E+00
806	9.80703E-01	4.81050E+00	9.33413E-01	9.64899E-04	0.00000E+00	0.00000E+00
807	9.09214E-01	4.81600E+00	9.33383E-01	9.64169E-04	0.00000E+00	0.00000E+00
808	9.93493E-01	4.82117E+00	9.33458E-01	9.65855E-04	0.00000E+00	0.00000E+00
809	9.34070E-01	4.82667E+00	9.33459E-01	9.64658E-04	0.00000E+00	0.00000E+00
810	9.45705E-01	4.83267E+00	9.33474E-01	9.63582E-04	0.00000E+00	0.00000E+00
811	9.19887E-01	4.83833E+00	9.33457E-01	9.62537E-04	0.00000E+00	0.00000E+00
812	9.29298E-01	4.84433E+00	9.33452E-01	9.61362E-04	0.00000E+00	0.00000E+00
813	9.53341E-01	4.85017E+00	9.33477E-01	9.60489E-04	0.00000E+00	0.00000E+00
814	9.97852E-01	4.85550E+00	9.33556E-01	9.62576E-04	0.00000E+00	0.00000E+00
815	9.99108E-01	4.86183E+00	9.33636E-01	9.64766E-04	0.00000E+00	0.00000E+00
816	9.61571E-01	4.86733E+00	9.33671E-01	9.64191E-04	0.00000E+00	0.00000E+00
817	9.45583E-01	4.87333E+00	9.33685E-01	9.63118E-04	0.00000E+00	0.00000E+00
818	9.01508E-01	4.87867E+00	9.33646E-01	9.62745E-04	0.00000E+00	0.00000E+00
819	9.01989E-01	4.88467E+00	9.33607E-01	9.62347E-04	0.00000E+00	0.00000E+00
820	9.44916E-01	4.89050E+00	9.33621E-01	9.61269E-04	0.00000E+00	0.00000E+00
821	9.33218E-01	4.89617E+00	9.33621E-01	9.60094E-04	0.00000E+00	0.00000E+00
822	9.09792E-01	4.90200E+00	9.33591E-01	9.59363E-04	0.00000E+00	0.00000E+00
823	8.78005E-01	4.90783E+00	9.33524E-01	9.60583E-04	0.00000E+00	0.00000E+00

824	9.24362E-01	4.91367E+00	9.33513E-01	9.59478E-04	0.00000E+00	0.00000E+00
825	9.28771E-01	4.91933E+00	9.33507E-01	9.58329E-04	0.00000E+00	0.00000E+00
826	9.27840E-01	4.92567E+00	9.33500E-01	9.57190E-04	0.00000E+00	0.00000E+00
827	9.71100E-01	4.93117E+00	9.33546E-01	9.57115E-04	0.00000E+00	0.00000E+00
828	9.16693E-01	4.93700E+00	9.33525E-01	9.56173E-04	0.00000E+00	0.00000E+00
829	9.77210E-01	4.94250E+00	9.33578E-01	9.56476E-04	0.00000E+00	0.00000E+00
830	9.65454E-01	4.94833E+00	9.33616E-01	9.56095E-04	0.00000E+00	0.00000E+00
831	9.47754E-01	4.95400E+00	9.33634E-01	9.55094E-04	0.00000E+00	0.00000E+00
832	9.46526E-01	4.95967E+00	9.33649E-01	9.54069E-04	0.00000E+00	0.00000E+00
833	9.52476E-01	4.96550E+00	9.33672E-01	9.53189E-04	0.00000E+00	0.00000E+00
834	9.37037E-01	4.97150E+00	9.33676E-01	9.52051E-04	0.00000E+00	0.00000E+00
835	9.80734E-01	4.97717E+00	9.33732E-01	9.52584E-04	0.00000E+00	0.00000E+00
836	9.07280E-01	4.98283E+00	9.33701E-01	9.51970E-04	0.00000E+00	0.00000E+00
837	9.12037E-01	4.98867E+00	9.33675E-01	9.51183E-04	0.00000E+00	0.00000E+00
838	9.27642E-01	4.99467E+00	9.33667E-01	9.50072E-04	0.00000E+00	0.00000E+00
839	9.46431E-01	5.00083E+00	9.33683E-01	9.49059E-04	0.00000E+00	0.00000E+00
840	9.89846E-01	5.00683E+00	9.33750E-01	9.50292E-04	0.00000E+00	0.00000E+00
841	9.73598E-01	5.01267E+00	9.33797E-01	9.50346E-04	0.00000E+00	0.00000E+00
842	9.50951E-01	5.01850E+00	9.33818E-01	9.49434E-04	0.00000E+00	0.00000E+00
843	9.26656E-01	5.02400E+00	9.33809E-01	9.48342E-04	0.00000E+00	0.00000E+00
844	9.00478E-01	5.02950E+00	9.33769E-01	9.48042E-04	0.00000E+00	0.00000E+00
845	9.22544E-01	5.03550E+00	9.33756E-01	9.47011E-04	0.00000E+00	0.00000E+00
846	9.45618E-01	5.04117E+00	9.33770E-01	9.45992E-04	0.00000E+00	0.00000E+00
847	9.59316E-01	5.04717E+00	9.33800E-01	9.45356E-04	0.00000E+00	0.00000E+00
848	8.79612E-01	5.05267E+00	9.33736E-01	9.46408E-04	0.00000E+00	0.00000E+00
849	9.12632E-01	5.05817E+00	9.33711E-01	9.45618E-04	0.00000E+00	0.00000E+00
850	9.64583E-01	5.06417E+00	9.33748E-01	9.45203E-04	0.00000E+00	0.00000E+00
851	9.37155E-01	5.06983E+00	9.33752E-01	9.44098E-04	0.00000E+00	0.00000E+00
852	9.31450E-01	5.07533E+00	9.33749E-01	9.42991E-04	0.00000E+00	0.00000E+00
853	9.76068E-01	5.08133E+00	9.33799E-01	9.43194E-04	0.00000E+00	0.00000E+00
854	9.71201E-01	5.08683E+00	9.33843E-01	9.43108E-04	0.00000E+00	0.00000E+00
855	9.66417E-01	5.09283E+00	9.33881E-01	9.42776E-04	0.00000E+00	0.00000E+00
856	9.27651E-01	5.09833E+00	9.33874E-01	9.41699E-04	0.00000E+00	0.00000E+00
857	9.27324E-01	5.10367E+00	9.33866E-01	9.40628E-04	0.00000E+00	0.00000E+00
858	9.26723E-01	5.10950E+00	9.33858E-01	9.39566E-04	0.00000E+00	0.00000E+00
859	9.48698E-01	5.11500E+00	9.33875E-01	9.38629E-04	0.00000E+00	0.00000E+00
860	9.48024E-01	5.12100E+00	9.33891E-01	9.37679E-04	0.00000E+00	0.00000E+00
861	9.37494E-01	5.12683E+00	9.33896E-01	9.36596E-04	0.00000E+00	0.00000E+00
862	9.06723E-01	5.13233E+00	9.33864E-01	9.36040E-04	0.00000E+00	0.00000E+00
863	9.32996E-01	5.13767E+00	9.33863E-01	9.34953E-04	0.00000E+00	0.00000E+00
864	9.71057E-01	5.14283E+00	9.33906E-01	9.34864E-04	0.00000E+00	0.00000E+00
865	9.39118E-01	5.14800E+00	9.33912E-01	9.33799E-04	0.00000E+00	0.00000E+00
866	9.48636E-01	5.15350E+00	9.33929E-01	9.32874E-04	0.00000E+00	0.00000E+00
867	9.05886E-01	5.15867E+00	9.33897E-01	9.32358E-04	0.00000E+00	0.00000E+00
868	9.07733E-01	5.16367E+00	9.33867E-01	9.31771E-04	0.00000E+00	0.00000E+00
869	9.23015E-01	5.16917E+00	9.33854E-01	9.30780E-04	0.00000E+00	0.00000E+00
870	9.18895E-01	5.17483E+00	9.33837E-01	9.29867E-04	0.00000E+00	0.00000E+00
871	9.39281E-01	5.18000E+00	9.33843E-01	9.28817E-04	0.00000E+00	0.00000E+00
872	9.12702E-01	5.18583E+00	9.33819E-01	9.28067E-04	0.00000E+00	0.00000E+00
873	9.12634E-01	5.19150E+00	9.33795E-01	9.27320E-04	0.00000E+00	0.00000E+00
874	9.06335E-01	5.19700E+00	9.33763E-01	9.26791E-04	0.00000E+00	0.00000E+00
875	9.16092E-01	5.20250E+00	9.33743E-01	9.25950E-04	0.00000E+00	0.00000E+00
876	9.10689E-01	5.20783E+00	9.33716E-01	9.25266E-04	0.00000E+00	0.00000E+00
877	9.07038E-01	5.21367E+00	9.33686E-01	9.24711E-04	0.00000E+00	0.00000E+00
878	9.11073E-01	5.21933E+00	9.33660E-01	9.24015E-04	0.00000E+00	0.00000E+00
879	8.90842E-01	5.22517E+00	9.33611E-01	9.24252E-04	0.00000E+00	0.00000E+00
880	9.52225E-01	5.23033E+00	9.33633E-01	9.23442E-04	0.00000E+00	0.00000E+00
881	9.26077E-01	5.23600E+00	9.33624E-01	9.22431E-04	0.00000E+00	0.00000E+00
882	9.11382E-01	5.24150E+00	9.33599E-01	9.21728E-04	0.00000E+00	0.00000E+00
883	9.30844E-01	5.24717E+00	9.33596E-01	9.20687E-04	0.00000E+00	0.00000E+00
884	9.15863E-01	5.25267E+00	9.33575E-01	9.19862E-04	0.00000E+00	0.00000E+00
885	9.30756E-01	5.25850E+00	9.33572E-01	9.18825E-04	0.00000E+00	0.00000E+00
886	9.40142E-01	5.26367E+00	9.33580E-01	9.17816E-04	0.00000E+00	0.00000E+00
887	9.31383E-01	5.26883E+00	9.33577E-01	9.16781E-04	0.00000E+00	0.00000E+00
888	9.19792E-01	5.27400E+00	9.33562E-01	9.15878E-04	0.00000E+00	0.00000E+00
889	8.91367E-01	5.27950E+00	9.33514E-01	9.16081E-04	0.00000E+00	0.00000E+00
890	9.60166E-01	5.28467E+00	9.33544E-01	9.15541E-04	0.00000E+00	0.00000E+00
891	8.76116E-01	5.29050E+00	9.33479E-01	9.16789E-04	0.00000E+00	0.00000E+00
892	9.09493E-01	5.29600E+00	9.33453E-01	9.16155E-04	0.00000E+00	0.00000E+00
893	9.07233E-01	5.30133E+00	9.33423E-01	9.15599E-04	0.00000E+00	0.00000E+00
894	9.44129E-01	5.30683E+00	9.33435E-01	9.14651E-04	0.00000E+00	0.00000E+00
895	9.69239E-01	5.31200E+00	9.33475E-01	9.14505E-04	0.00000E+00	0.00000E+00
896	9.30009E-01	5.31733E+00	9.33471E-01	9.13490E-04	0.00000E+00	0.00000E+00
897	9.05111E-01	5.32267E+00	9.33440E-01	9.13019E-04	0.00000E+00	0.00000E+00
898	9.56450E-01	5.32800E+00	9.33465E-01	9.12361E-04	0.00000E+00	0.00000E+00
899	9.51633E-01	5.33283E+00	9.33486E-01	9.11568E-04	0.00000E+00	0.00000E+00
900	9.49179E-01	5.33833E+00	9.33503E-01	9.10720E-04	0.00000E+00	0.00000E+00
901	9.43251E-01	5.34350E+00	9.33514E-01	9.09771E-04	0.00000E+00	0.00000E+00
902	9.49655E-01	5.34850E+00	9.33532E-01	9.08937E-04	0.00000E+00	0.00000E+00
903	9.08243E-01	5.35400E+00	9.33504E-01	9.08361E-04	0.00000E+00	0.00000E+00
904	9.54412E-01	5.35917E+00	9.33527E-01	9.07649E-04	0.00000E+00	0.00000E+00
905	9.37429E-01	5.36467E+00	9.33531E-01	9.06654E-04	0.00000E+00	0.00000E+00
906	9.81288E-01	5.36967E+00	9.33584E-01	9.07190E-04	0.00000E+00	0.00000E+00
907	9.72960E-01	5.37483E+00	9.33628E-01	9.07231E-04	0.00000E+00	0.00000E+00
908	9.28862E-01	5.38033E+00	9.33622E-01	9.06244E-04	0.00000E+00	0.00000E+00
909	9.84170E-01	5.38550E+00	9.33678E-01	9.06958E-04	0.00000E+00	0.00000E+00
910	9.16328E-01	5.39100E+00	9.33659E-01	9.06161E-04	0.00000E+00	0.00000E+00
911	8.91078E-01	5.39617E+00	9.33612E-01	9.06374E-04	0.00000E+00	0.00000E+00
912	9.17378E-01	5.40167E+00	9.33594E-01	9.05554E-04	0.00000E+00	0.00000E+00
913	9.52065E-01	5.40667E+00	9.33615E-01	9.04786E-04	0.00000E+00	0.00000E+00
914	9.81355E-01	5.41183E+00	9.33667E-01	9.05308E-04	0.00000E+00	0.00000E+00
915	8.99609E-01	5.41750E+00	9.33630E-01	9.05085E-04	0.00000E+00	0.00000E+00
916	9.16994E-01	5.42350E+00	9.33611E-01	9.04278E-04	0.00000E+00	0.00000E+00
917	9.48695E-01	5.42867E+00	9.33628E-01	9.03439E-04	0.00000E+00	0.00000E+00
918	9.51467E-01	5.43400E+00	9.33647E-01	9.02662E-04	0.00000E+00	0.00000E+00
919	9.66440E-01	5.43917E+00	9.33683E-01	9.02386E-04	0.00000E+00	0.00000E+00
920	8.82707E-01	5.44467E+00	9.33628E-01	9.03112E-04	0.00000E+00	0.00000E+00
921	9.10417E-01	5.45000E+00	9.33602E-01	9.02482E-04	0.00000E+00	0.00000E+00
922	9.28056E-01	5.45533E+00	9.33596E-01	9.01521E-04	0.00000E+00	0.00000E+00
923	9.44934E-01	5.46083E+00	9.33609E-01	9.00625E-04	0.00000E+00	0.00000E+00
924	9.27623E-01	5.46600E+00	9.33602E-01	8.99671E-04	0.00000E+00	0.00000E+00
925	9.64074E-01	5.47150E+00	9.33635E-01	8.99302E-04	0.00000E+00	0.00000E+00
926	9.31906E-01	5.47683E+00	9.33633E-01	8.98330E-04	0.00000E+00	0.00000E+00
927	9.55802E-01	5.48217E+00	9.33657E-01	8.97679E-04	0.00000E+00	0.00000E+00
928	9.04150E-01	5.48750E+00	9.33625E-01	8.97275E-04	0.00000E+00	0.00000E+00

929	8.98813E-01	5.49300E+00	9.33588E-01	8.97093E-04	0.00000E+00	0.00000E+00
930	8.82902E-01	5.49850E+00	9.33533E-01	8.97788E-04	0.00000E+00	0.00000E+00
931	9.17280E-01	5.50367E+00	9.33516E-01	8.96992E-04	0.00000E+00	0.00000E+00
932	9.15606E-01	5.50917E+00	9.33496E-01	8.96234E-04	0.00000E+00	0.00000E+00
933	9.33497E-01	5.51500E+00	9.33496E-01	8.95271E-04	0.00000E+00	0.00000E+00
934	9.43043E-01	5.52033E+00	9.33507E-01	8.94368E-04	0.00000E+00	0.00000E+00
935	9.70452E-01	5.52567E+00	9.33546E-01	8.94286E-04	0.00000E+00	0.00000E+00
936	9.66679E-01	5.53083E+00	9.33582E-01	8.94032E-04	0.00000E+00	0.00000E+00
937	8.73254E-01	5.53633E+00	9.33517E-01	8.95404E-04	0.00000E+00	0.00000E+00
938	9.46740E-01	5.54150E+00	9.33531E-01	8.94558E-04	0.00000E+00	0.00000E+00
939	9.29740E-01	5.54667E+00	9.33527E-01	8.93612E-04	0.00000E+00	0.00000E+00
940	9.44398E-01	5.55217E+00	9.33539E-01	8.92734E-04	0.00000E+00	0.00000E+00
941	9.49539E-01	5.55783E+00	9.33556E-01	8.91945E-04	0.00000E+00	0.00000E+00
942	1.01461E+00	5.56283E+00	9.33642E-01	8.95158E-04	0.00000E+00	0.00000E+00
943	9.77635E-01	5.56783E+00	9.33689E-01	8.95428E-04	0.00000E+00	0.00000E+00
944	9.23105E-01	5.57333E+00	9.33678E-01	8.94547E-04	0.00000E+00	0.00000E+00
945	8.87799E-01	5.57867E+00	9.33629E-01	8.94922E-04	0.00000E+00	0.00000E+00
946	9.07136E-01	5.58400E+00	9.33601E-01	8.94414E-04	0.00000E+00	0.00000E+00
947	9.33574E-01	5.58933E+00	9.33601E-01	8.93467E-04	0.00000E+00	0.00000E+00
948	9.24883E-01	5.59483E+00	9.33592E-01	8.92569E-04	0.00000E+00	0.00000E+00
949	9.09157E-01	5.60033E+00	9.33566E-01	8.92000E-04	0.00000E+00	0.00000E+00
950	9.14088E-01	5.60583E+00	9.33545E-01	8.91295E-04	0.00000E+00	0.00000E+00
951	9.28750E-01	5.61150E+00	9.33540E-01	8.90370E-04	0.00000E+00	0.00000E+00
952	9.27343E-01	5.61733E+00	9.33534E-01	8.89456E-04	0.00000E+00	0.00000E+00
953	9.48781E-01	5.62317E+00	9.33550E-01	8.88665E-04	0.00000E+00	0.00000E+00
954	9.35412E-01	5.62867E+00	9.33552E-01	8.87733E-04	0.00000E+00	0.00000E+00
955	9.33213E-01	5.63450E+00	9.33551E-01	8.86801E-04	0.00000E+00	0.00000E+00
956	9.45945E-01	5.64017E+00	9.33564E-01	8.85966E-04	0.00000E+00	0.00000E+00
957	9.25218E-01	5.64567E+00	9.33556E-01	8.85081E-04	0.00000E+00	0.00000E+00
958	9.09571E-01	5.65133E+00	9.33531E-01	8.84511E-04	0.00000E+00	0.00000E+00
959	9.18764E-01	5.65717E+00	9.33515E-01	8.83721E-04	0.00000E+00	0.00000E+00
960	9.40796E-01	5.66250E+00	9.33523E-01	8.82830E-04	0.00000E+00	0.00000E+00
961	9.10195E-01	5.66833E+00	9.33498E-01	8.82245E-04	0.00000E+00	0.00000E+00
962	9.87080E-01	5.67350E+00	9.33554E-01	8.83091E-04	0.00000E+00	0.00000E+00
963	9.27152E-01	5.67900E+00	9.33548E-01	8.82197E-04	0.00000E+00	0.00000E+00
964	9.79425E-01	5.68417E+00	9.33595E-01	8.82568E-04	0.00000E+00	0.00000E+00
965	9.47900E-01	5.68967E+00	9.33610E-01	8.81777E-04	0.00000E+00	0.00000E+00
966	9.35292E-01	5.69483E+00	9.33612E-01	8.80863E-04	0.00000E+00	0.00000E+00
967	9.22749E-01	5.70000E+00	9.33601E-01	8.80022E-04	0.00000E+00	0.00000E+00
968	9.68323E-01	5.70583E+00	9.33637E-01	8.79845E-04	0.00000E+00	0.00000E+00
969	9.60302E-01	5.71150E+00	9.33664E-01	8.79367E-04	0.00000E+00	0.00000E+00
970	9.65218E-01	5.71700E+00	9.33697E-01	8.79063E-04	0.00000E+00	0.00000E+00
971	9.31480E-01	5.72267E+00	9.33694E-01	8.78158E-04	0.00000E+00	0.00000E+00
972	9.46603E-01	5.72767E+00	9.33708E-01	8.77353E-04	0.00000E+00	0.00000E+00
973	9.22174E-01	5.73333E+00	9.33696E-01	8.76530E-04	0.00000E+00	0.00000E+00
974	9.08467E-01	5.73883E+00	9.33670E-01	8.76012E-04	0.00000E+00	0.00000E+00
975	9.61248E-01	5.74400E+00	9.33698E-01	8.75570E-04	0.00000E+00	0.00000E+00
976	9.34133E-01	5.74983E+00	9.33699E-01	8.74671E-04	0.00000E+00	0.00000E+00
977	9.53453E-01	5.75583E+00	9.33719E-01	8.74008E-04	0.00000E+00	0.00000E+00
978	9.23161E-01	5.76150E+00	9.33708E-01	8.73179E-04	0.00000E+00	0.00000E+00
979	9.13224E-01	5.76750E+00	9.33687E-01	8.72537E-04	0.00000E+00	0.00000E+00
980	9.20075E-01	5.77383E+00	9.33673E-01	8.71755E-04	0.00000E+00	0.00000E+00
981	9.32343E-01	5.77917E+00	9.33672E-01	8.70866E-04	0.00000E+00	0.00000E+00
982	9.39744E-01	5.78467E+00	9.33678E-01	8.69999E-04	0.00000E+00	0.00000E+00
983	9.34744E-01	5.78983E+00	9.33679E-01	8.69112E-04	0.00000E+00	0.00000E+00
984	9.36118E-01	5.79533E+00	9.33682E-01	8.68230E-04	0.00000E+00	0.00000E+00
985	9.40447E-01	5.80083E+00	9.33689E-01	8.67374E-04	0.00000E+00	0.00000E+00
986	9.19169E-01	5.80650E+00	9.33674E-01	8.66617E-04	0.00000E+00	0.00000E+00
987	9.42029E-01	5.81250E+00	9.33682E-01	8.65779E-04	0.00000E+00	0.00000E+00
988	9.27549E-01	5.81800E+00	9.33676E-01	8.64923E-04	0.00000E+00	0.00000E+00
989	9.63688E-01	5.82350E+00	9.33706E-01	8.64581E-04	0.00000E+00	0.00000E+00
990	9.22456E-01	5.82867E+00	9.33695E-01	8.63780E-04	0.00000E+00	0.00000E+00
991	9.54265E-01	5.83417E+00	9.33716E-01	8.63157E-04	0.00000E+00	0.00000E+00
992	9.57943E-01	5.83967E+00	9.33740E-01	8.62632E-04	0.00000E+00	0.00000E+00
993	9.48045E-01	5.84517E+00	9.33755E-01	8.61882E-04	0.00000E+00	0.00000E+00
994	9.35132E-01	5.85083E+00	9.33756E-01	8.61014E-04	0.00000E+00	0.00000E+00
995	9.58324E-01	5.85633E+00	9.33781E-01	8.60502E-04	0.00000E+00	0.00000E+00
996	8.94537E-01	5.86200E+00	9.33741E-01	8.60542E-04	0.00000E+00	0.00000E+00
997	9.41676E-01	5.86783E+00	9.33749E-01	8.59714E-04	0.00000E+00	0.00000E+00
998	9.27816E-01	5.87350E+00	9.33743E-01	8.58871E-04	0.00000E+00	0.00000E+00
999	9.51253E-01	5.87900E+00	9.33761E-01	8.58188E-04	0.00000E+00	0.00000E+00
1000	9.21878E-01	5.88467E+00	9.33749E-01	8.57411E-04	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

lifetime = 7.53048E-05 + or - 1.08743E-07 generation time = 3.83875E-05 + or - 5.33486E-08
nu bar = 2.89133E+00 + or - 3.51348E-06 average fission group = 2.16974E+02 + or - 4.66695E-03
energy(ev) of the average lethargy causing fission = 5.57779E-02 + or - 3.80857E-05

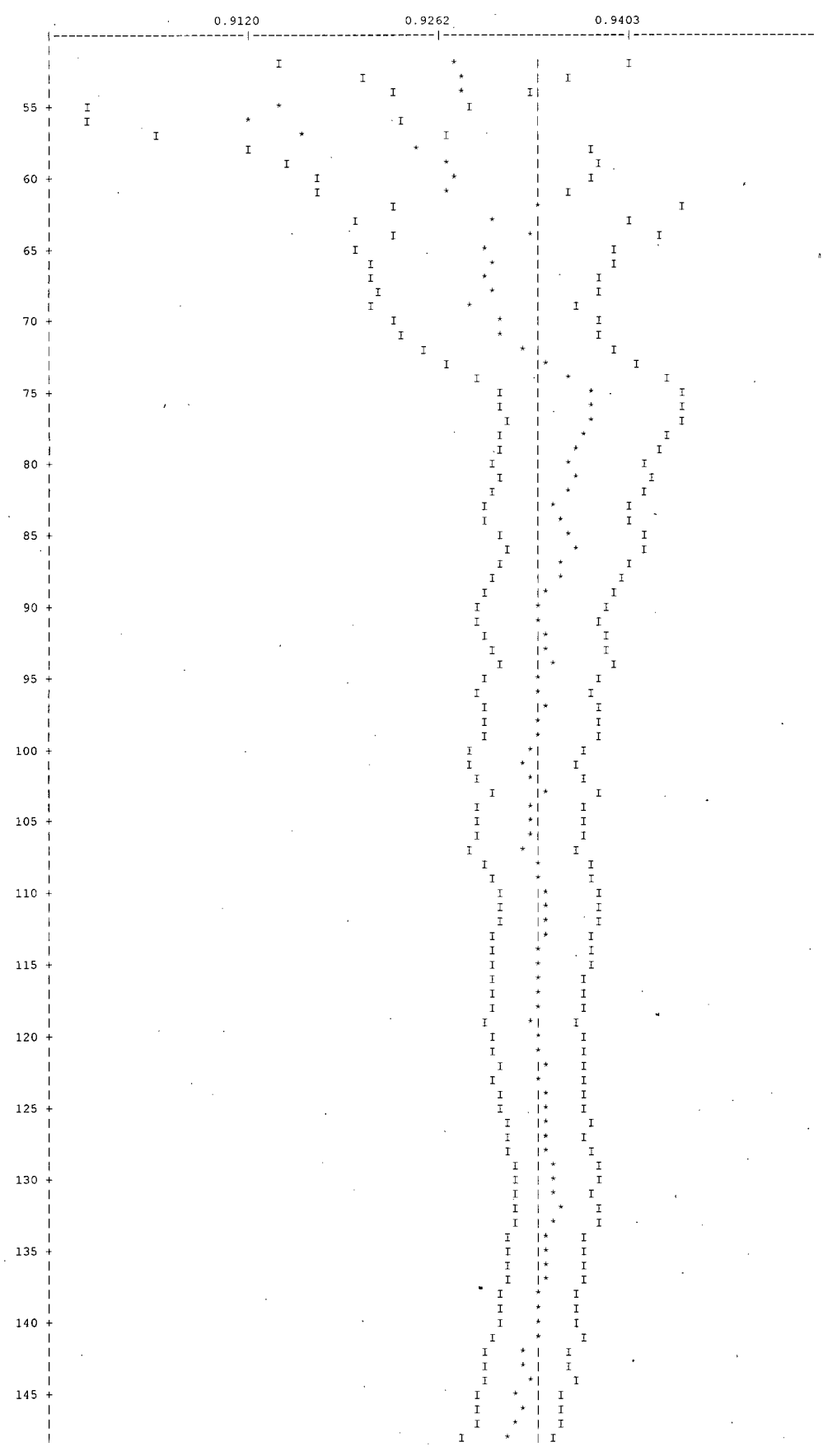
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
50	0.93373	+ or - 0.00101	0.93272 to 0.93474	0.93170 to 0.93576	0.93069 to 0.93677	950000
51	0.93372	+ or - 0.00104	0.93268 to 0.93477	0.93164 to 0.93581	0.93060 to 0.93685	949000
52	0.93374	+ or - 0.00103	0.93272 to 0.93477	0.93169 to 0.93580	0.93066 to 0.93682	948000
53	0.93375	+ or - 0.00102	0.93273 to 0.93477	0.93171 to 0.93578	0.93069 to 0.93680	947000
54	0.93375	+ or - 0.00100	0.93276 to 0.93475	0.93176 to 0.93575	0.93076 to 0.93674	946000
55	0.93383	+ or - 0.00105	0.93279 to 0.93488	0.93174 to 0.93592	0.93069 to 0.93697	945000
56	0.93387	+ or - 0.00105	0.93282 to 0.93492	0.93176 to 0.93597	0.93071 to 0.93703	944000
57	0.93386	+ or - 0.00109	0.93277 to 0.93495	0.93169 to 0.93604	0.93060 to 0.93712	943000
58	0.93381	+ or - 0.00108	0.93272 to 0.93489	0.93164 to 0.93597	0.93056 to 0.93705	942000
59	0.93380	+ or - 0.00105	0.93275 to 0.93485	0.93170 to 0.93589	0.93065 to 0.93694	941000
81	0.93364	+ or - 0.00110	0.93254 to 0.93474	0.93145 to 0.93583	0.93035 to 0.93693	919000
103	0.93370	+ or - 0.00108	0.93262 to 0.93478	0.93154 to 0.93586	0.93046 to 0.93694	897000
125	0.93368	+ or - 0.00114	0.93254 to 0.93483	0.93140 to 0.93597	0.93026 to 0.93711	875000
147	0.93390	+ or - 0.00112	0.93279 to 0.93502	0.93167 to 0.93614	0.93055 to 0.93726	853000
169	0.93415	+ or - 0.00111	0.93305 to 0.93526	0.93194 to 0.93637	0.93083 to 0.93748	831000
191	0.93427	+ or - 0.00119	0.93308 to 0.93546	0.93189 to 0.93665	0.93070 to 0.93784	809000
213	0.93451	+ or - 0.00118	0.93333 to 0.93569	0.93215 to 0.93686	0.93097 to 0.93804	787000
235	0.93473	+ or - 0.00114	0.93359 to 0.93587	0.93244 to 0.93702	0.93130 to 0.93816	765000
257	0.93450	+ or - 0.00117	0.93334 to 0.93567	0.93217 to 0.93684	0.93100 to 0.93801	743000
279	0.93452	+ or - 0.00124	0.93328 to 0.93576	0.93204 to 0.93700	0.93080 to 0.93824	721000
301	0.93482	+ or - 0.00122	0.93359 to 0.93604	0.93237 to 0.93726	0.93115 to 0.93848	699000
323	0.93501	+ or - 0.00125	0.93376 to 0.93626	0.93250 to 0.93751	0.93125 to 0.93877	677000
345	0.93508	+ or - 0.00129	0.93379 to 0.93636	0.93251 to 0.93765	0.93122 to 0.93893	655000
367	0.93509	+ or - 0.00132	0.93377 to 0.93640	0.93245 to 0.93772	0.93114 to 0.93903	633000
389	0.93545	+ or - 0.00131	0.93414 to 0.93676	0.93283 to 0.93806	0.93153 to 0.93937	611000
411	0.93509	+ or - 0.00132	0.93377 to 0.93641	0.93245 to 0.93772	0.93113 to 0.93904	589000

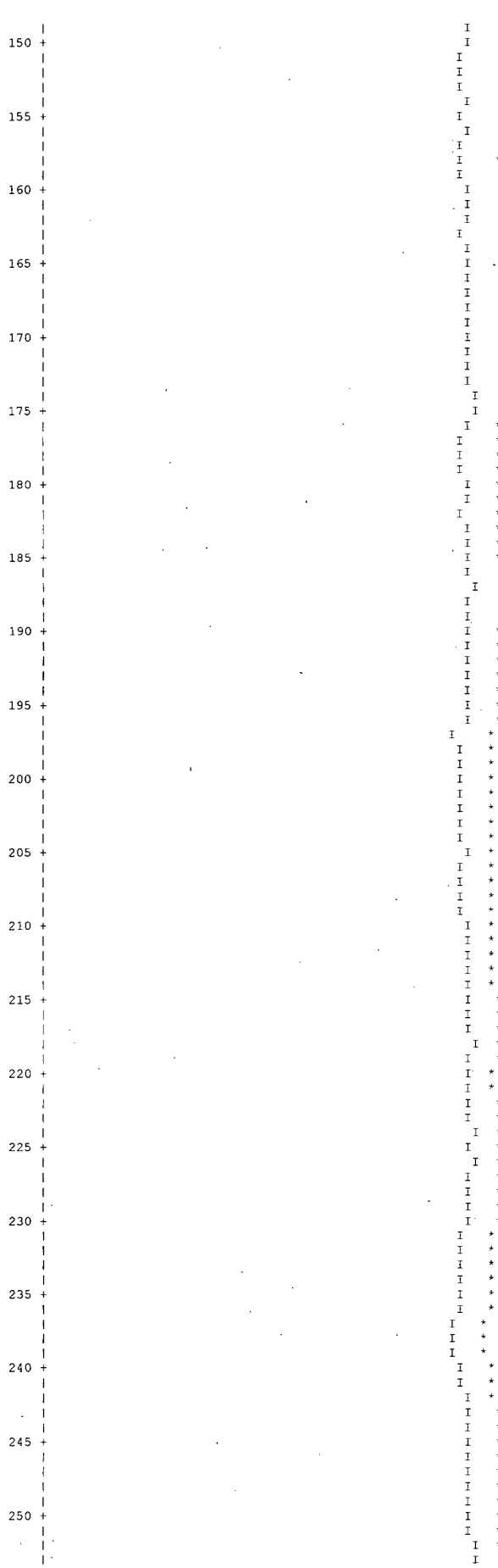
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

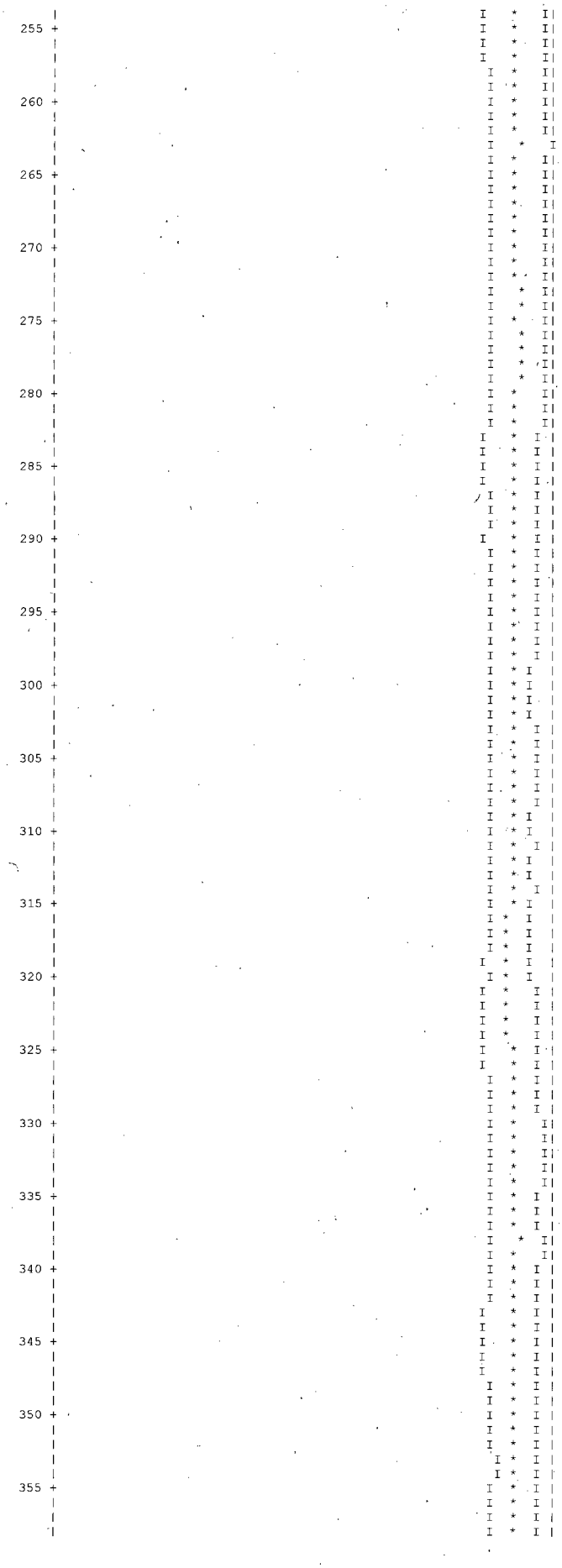
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
433	0.93491	+ or - 0.00140	0.93351 to 0.93631	0.93212 to 0.93771	0.93072 to 0.93910	567000
455	0.93504	+ or - 0.00139	0.93365 to 0.93643	0.93226 to 0.93782	0.93087 to 0.93921	545000
477	0.93533	+ or - 0.00153	0.93380 to 0.93687	0.93227 to 0.93840	0.93074 to 0.93993	523000
499	0.93489	+ or - 0.00150	0.93340 to 0.93639	0.93190 to 0.93788	0.93040 to 0.93938	501000
521	0.93501	+ or - 0.00150	0.93351 to 0.93651	0.93201 to 0.93801	0.93051 to 0.93951	479000
543	0.93467	+ or - 0.00161	0.93306 to 0.93627	0.93145 to 0.93788	0.92985 to 0.93949	457000
565	0.93454	+ or - 0.00161	0.93293 to 0.93616	0.93132 to 0.93777	0.92970 to 0.93938	435000
587	0.93494	+ or - 0.00177	0.93317 to 0.93671	0.93140 to 0.93848	0.92963 to 0.94025	413000
609	0.93427	+ or - 0.00169	0.93258 to 0.93596	0.93089 to 0.93765	0.92920 to 0.93934	391000
631	0.93503	+ or - 0.00166	0.93337 to 0.93669	0.93171 to 0.93835	0.93005 to 0.94001	369000
653	0.93492	+ or - 0.00179	0.93313 to 0.93671	0.93134 to 0.93850	0.92955 to 0.94029	347000
675	0.93533	+ or - 0.00183	0.93350 to 0.93716	0.93167 to 0.93899	0.92984 to 0.94082	325000
697	0.93515	+ or - 0.00197	0.93318 to 0.93712	0.93122 to 0.93908	0.92925 to 0.94105	303000
719	0.93537	+ or - 0.00200	0.93337 to 0.93737	0.93137 to 0.93937	0.92937 to 0.94138	281000
741	0.93586	+ or - 0.00211	0.93375 to 0.93797	0.93164 to 0.94008	0.92953 to 0.94219	259000
763	0.93460	+ or - 0.00235	0.93224 to 0.93695	0.92989 to 0.93931	0.92753 to 0.94166	237000
785	0.93447	+ or - 0.00245	0.93202 to 0.93692	0.92958 to 0.93936	0.92713 to 0.94181	215000
807	0.93527	+ or - 0.00268	0.93260 to 0.93795	0.92992 to 0.94063	0.92725 to 0.94330	193000
829	0.93458	+ or - 0.00281	0.93177 to 0.93738	0.92897 to 0.94019	0.92616 to 0.94299	171000
851	0.93373	+ or - 0.00301	0.93073 to 0.93674	0.92772 to 0.93975	0.92471 to 0.94275	149000
873	0.93344	+ or - 0.00358	0.92986 to 0.93702	0.92628 to 0.94059	0.92270 to 0.94417	127000
895	0.93608	+ or - 0.00307	0.93300 to 0.93915	0.92993 to 0.94223	0.92686 to 0.94530	105000
917	0.93509	+ or - 0.00341	0.93167 to 0.93850	0.92826 to 0.94191	0.92485 to 0.94532	83000
939	0.93716	+ or - 0.00378	0.93337 to 0.94094	0.92959 to 0.94472	0.92581 to 0.94850	61000
961	0.93991	+ or - 0.00528	0.93463 to 0.94519	0.92936 to 0.95047	0.92408 to 0.95575	39000
983	0.93778	+ or - 0.01591	0.92188 to 0.95369	0.90597 to 0.96960	0.89007 to 0.98550	17000

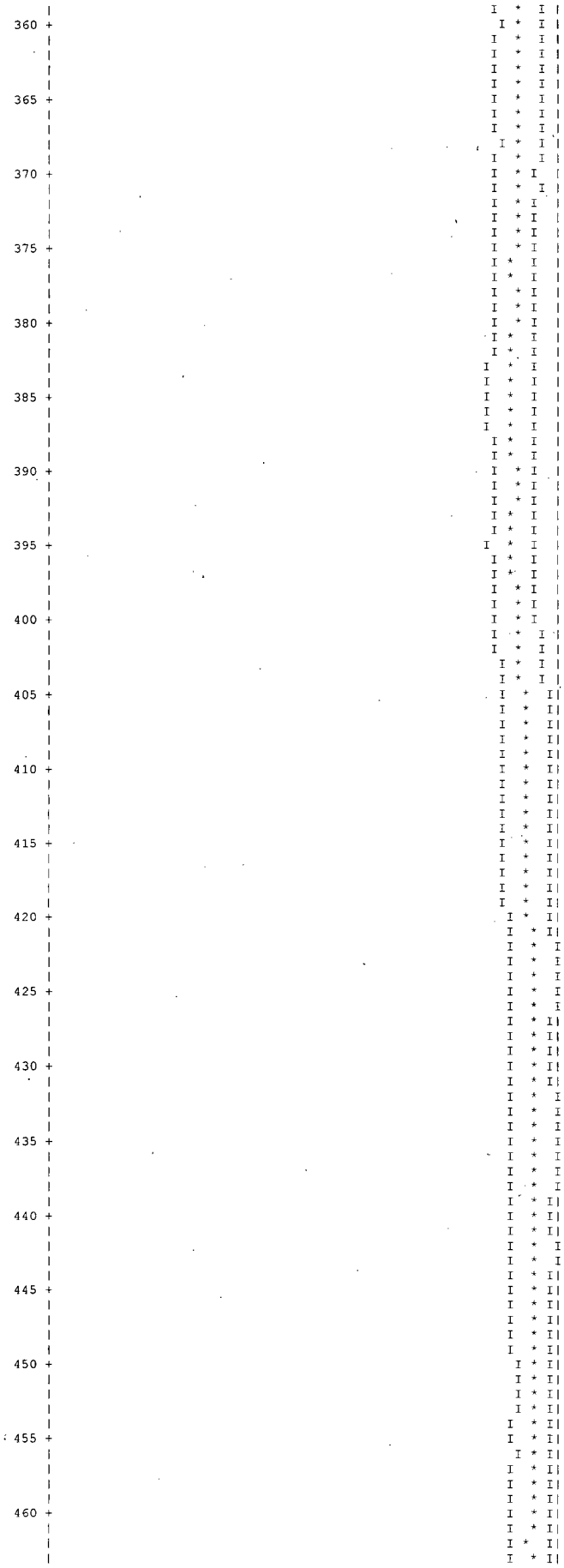
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

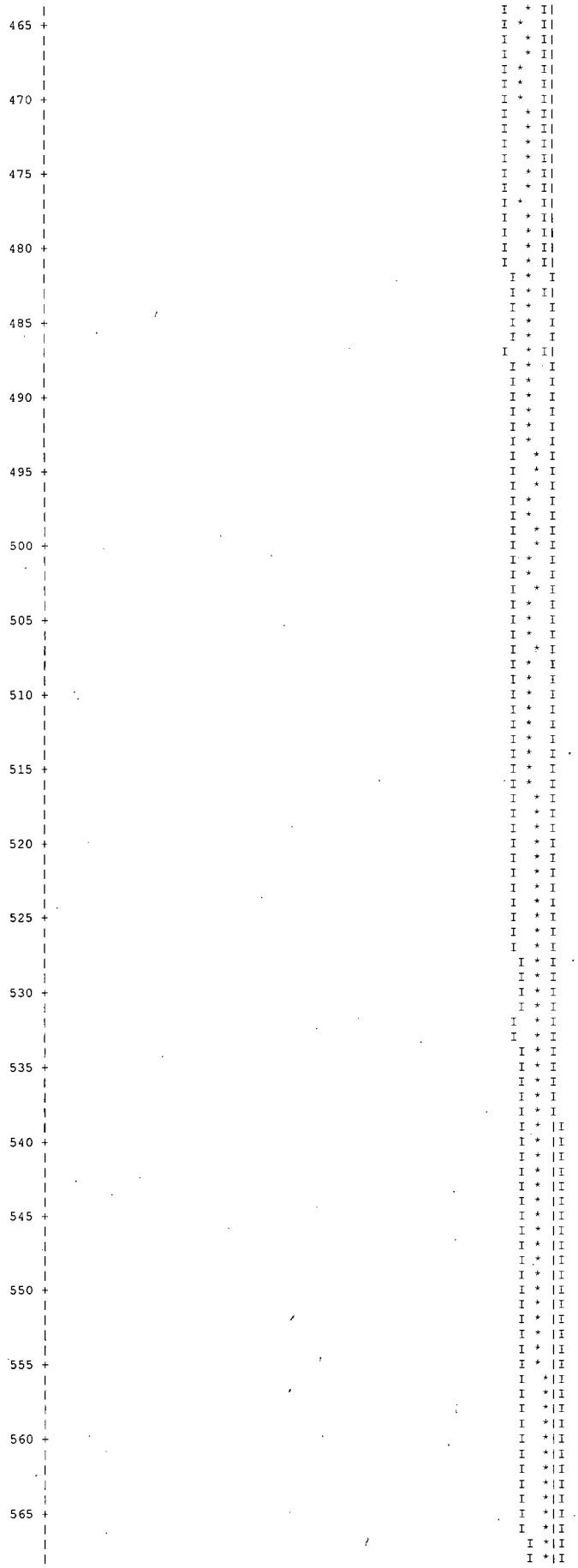
plot of average k-effective by generation run.
the line represents k-eff = 0.9337 + or - 0.0010 which occurs for 1000 generations run.

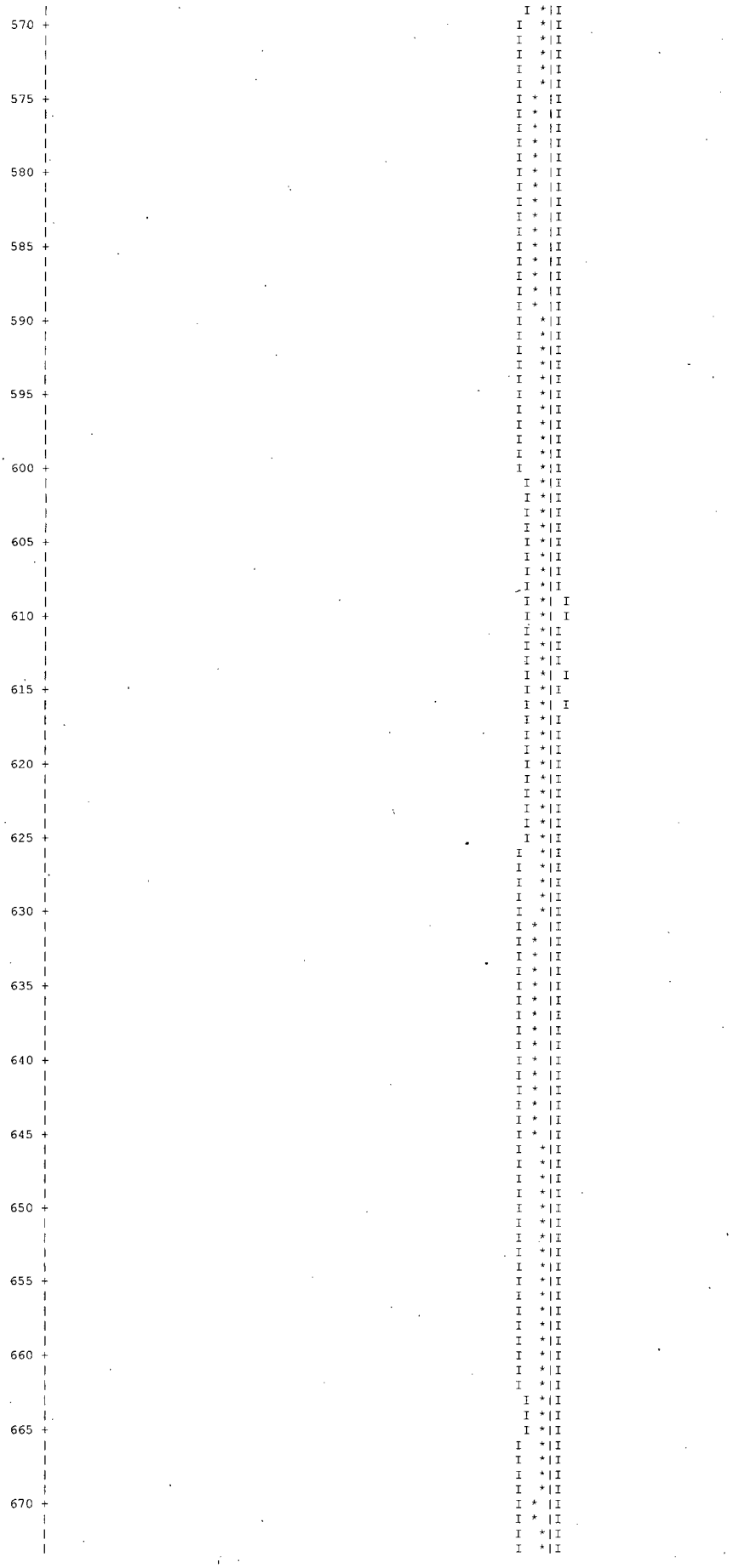








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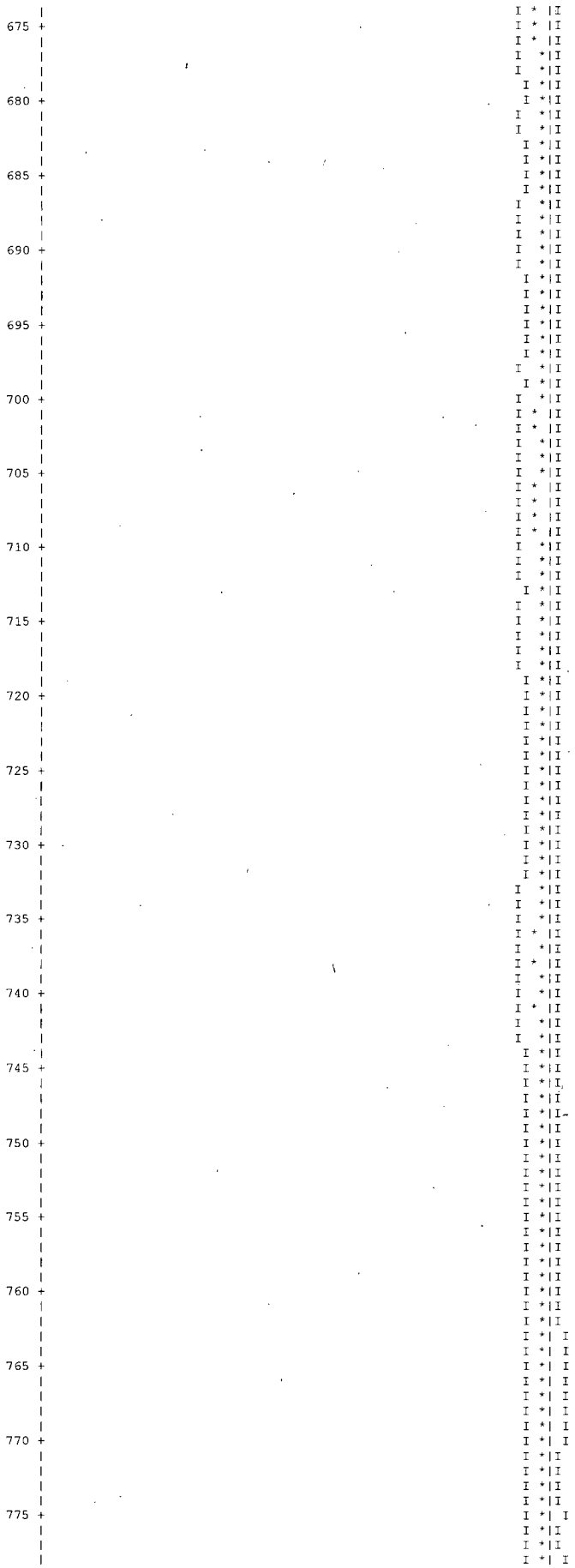

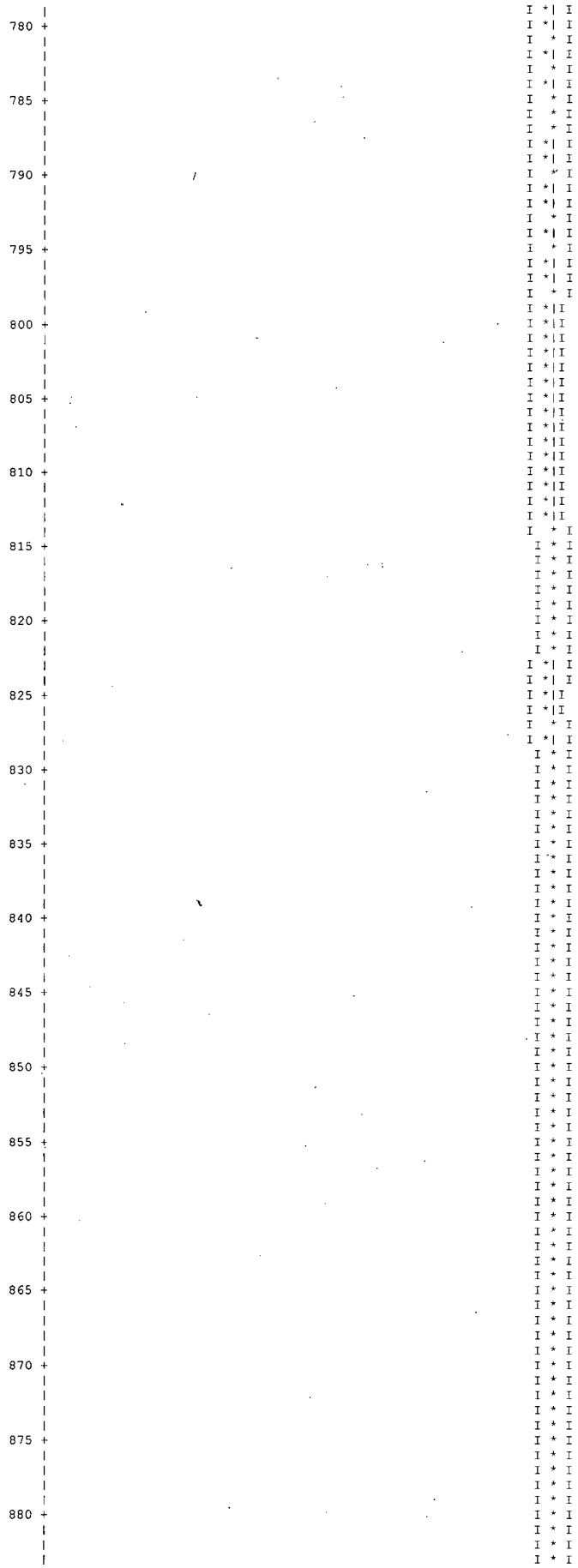
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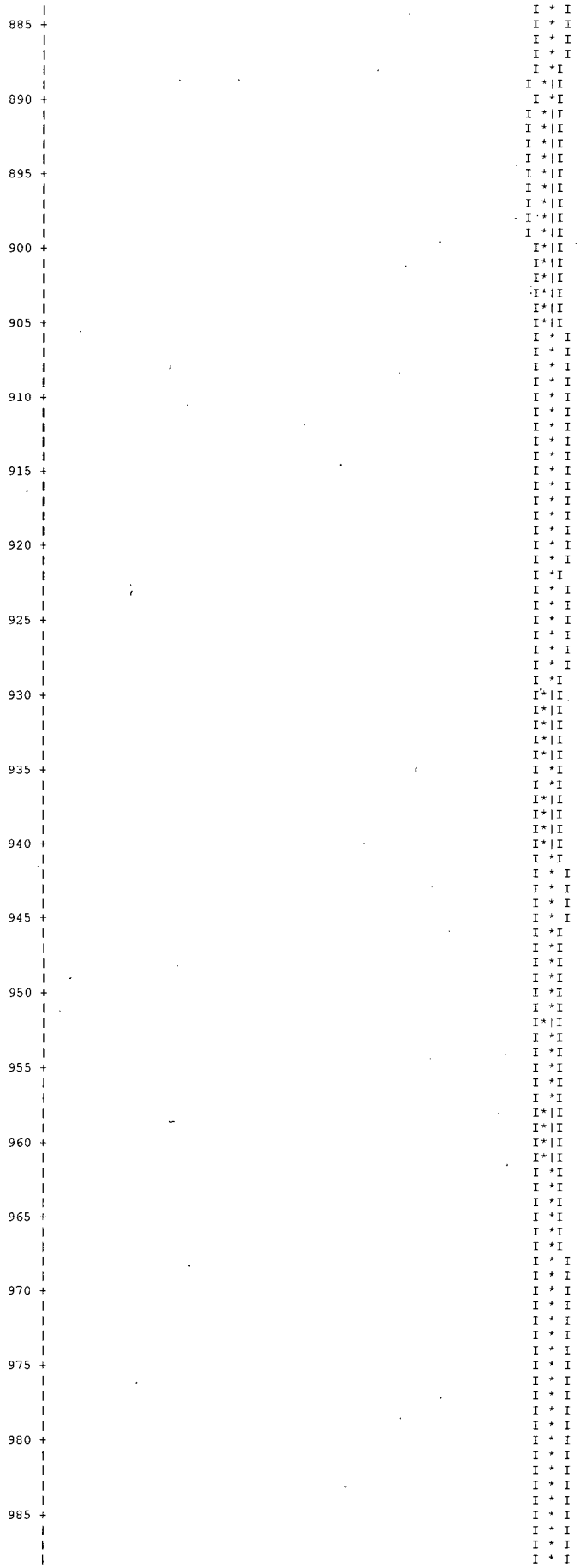
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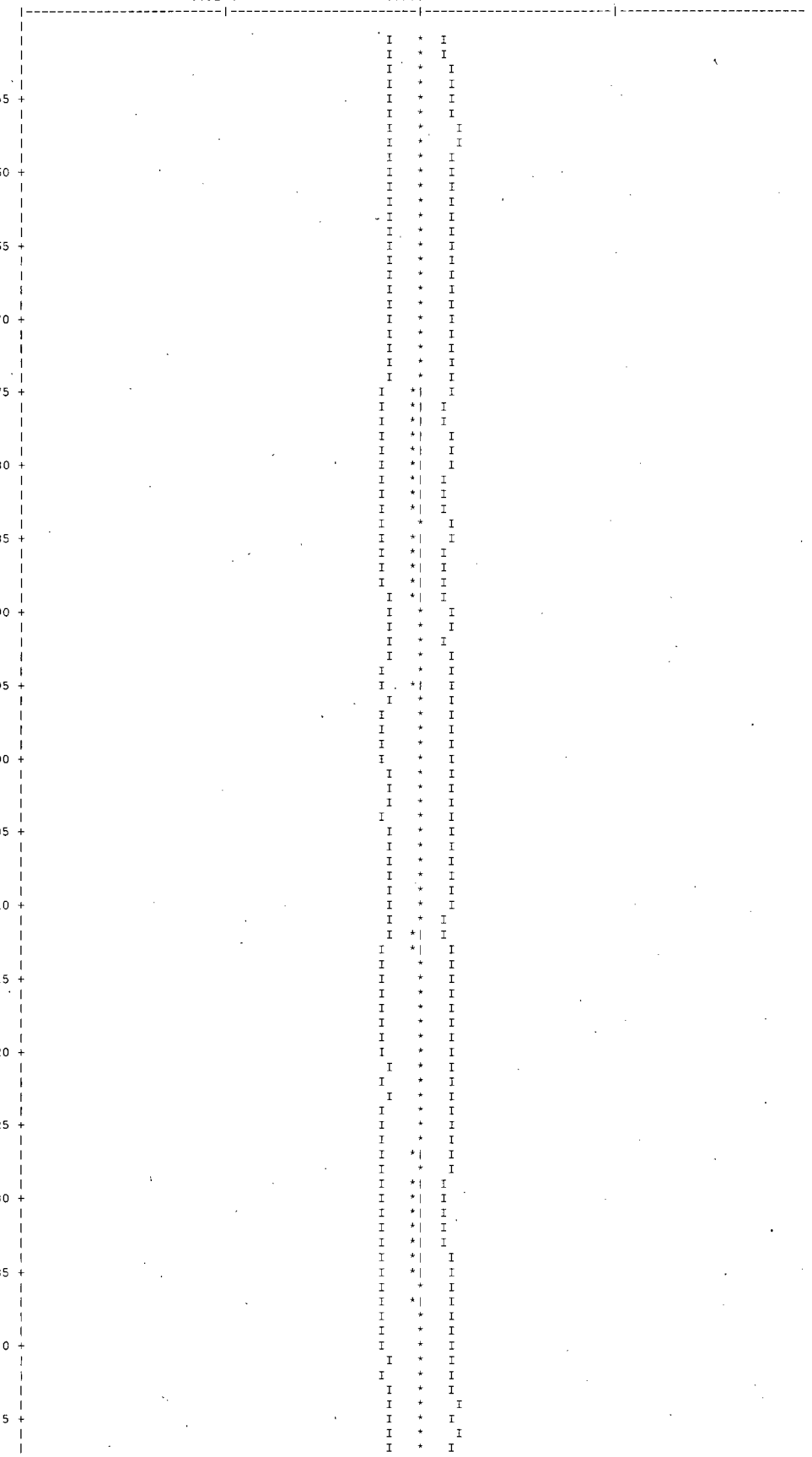
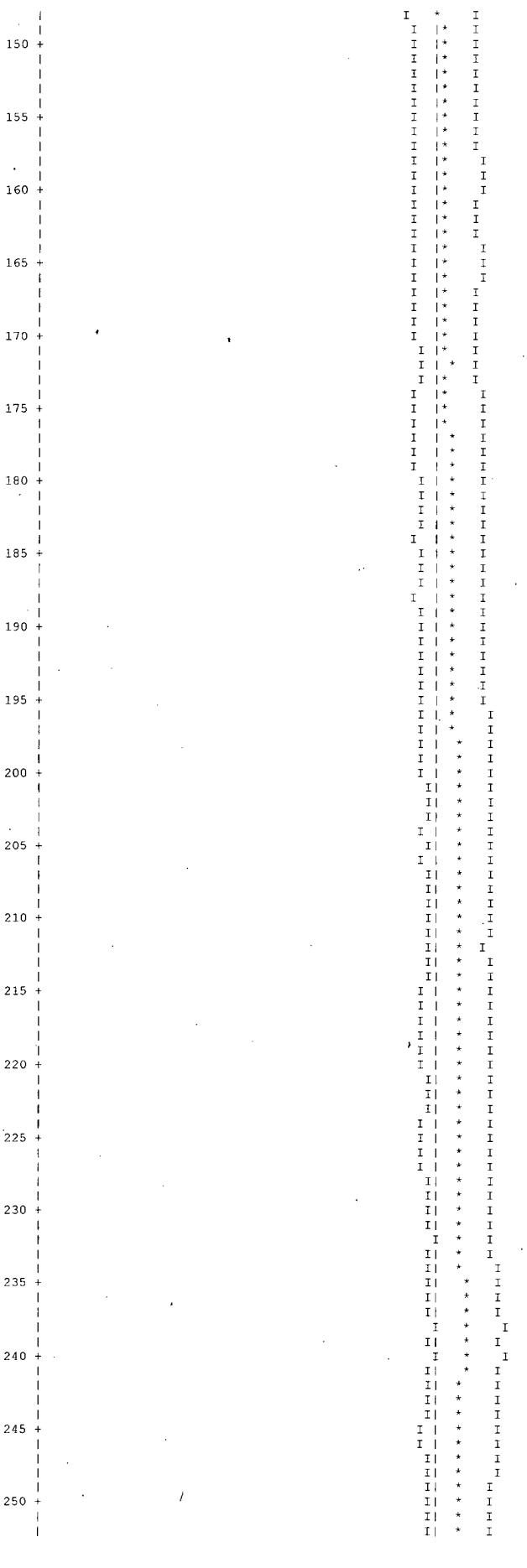
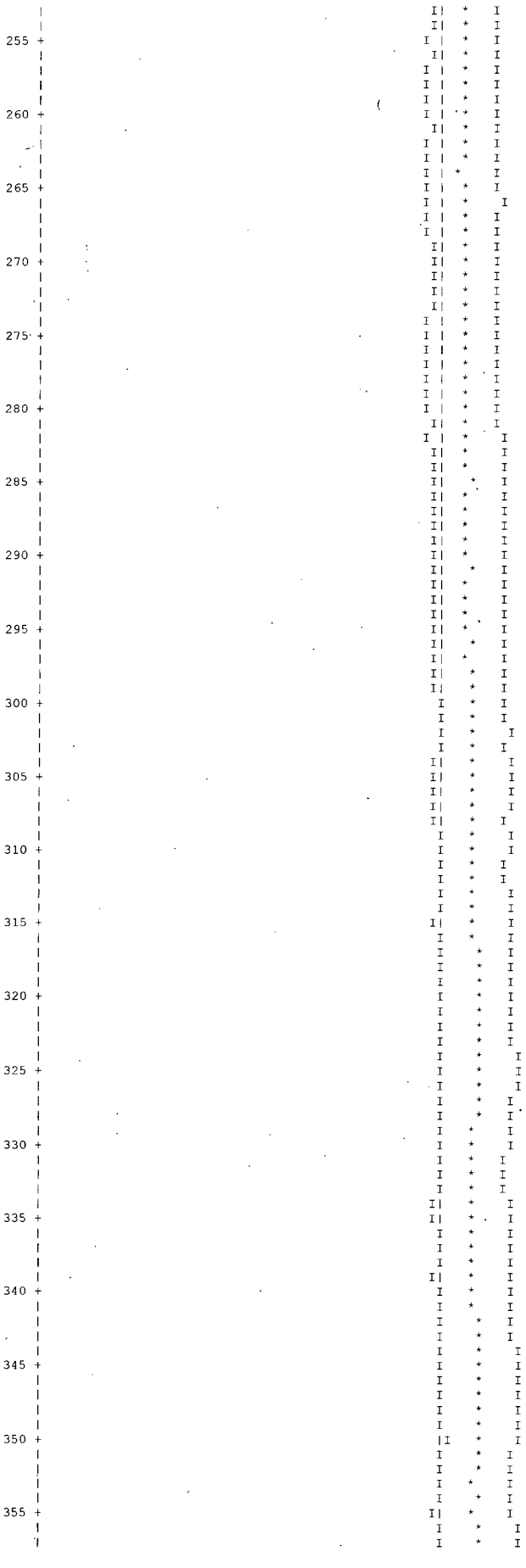
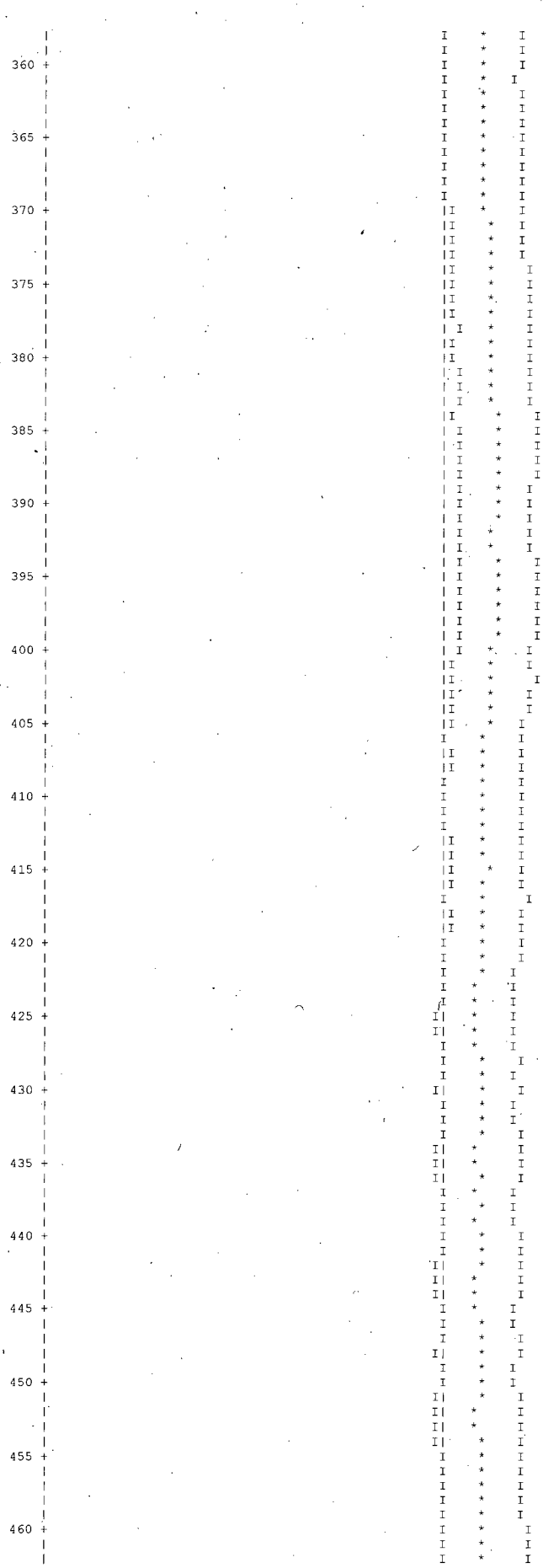
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

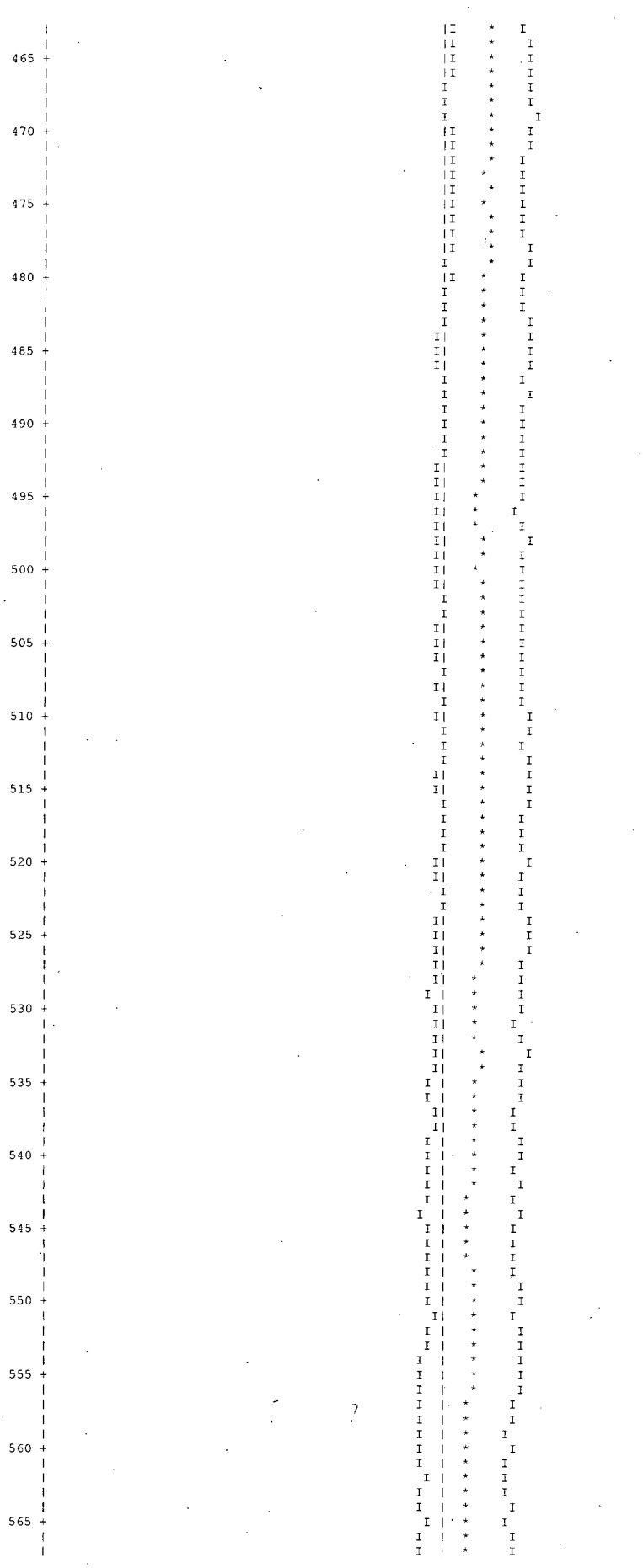
plot of average k-effective by generation skipped.
the line represents k-eff = 0.9338 + or - 0.0010 which occurs for 54 generations skipped.

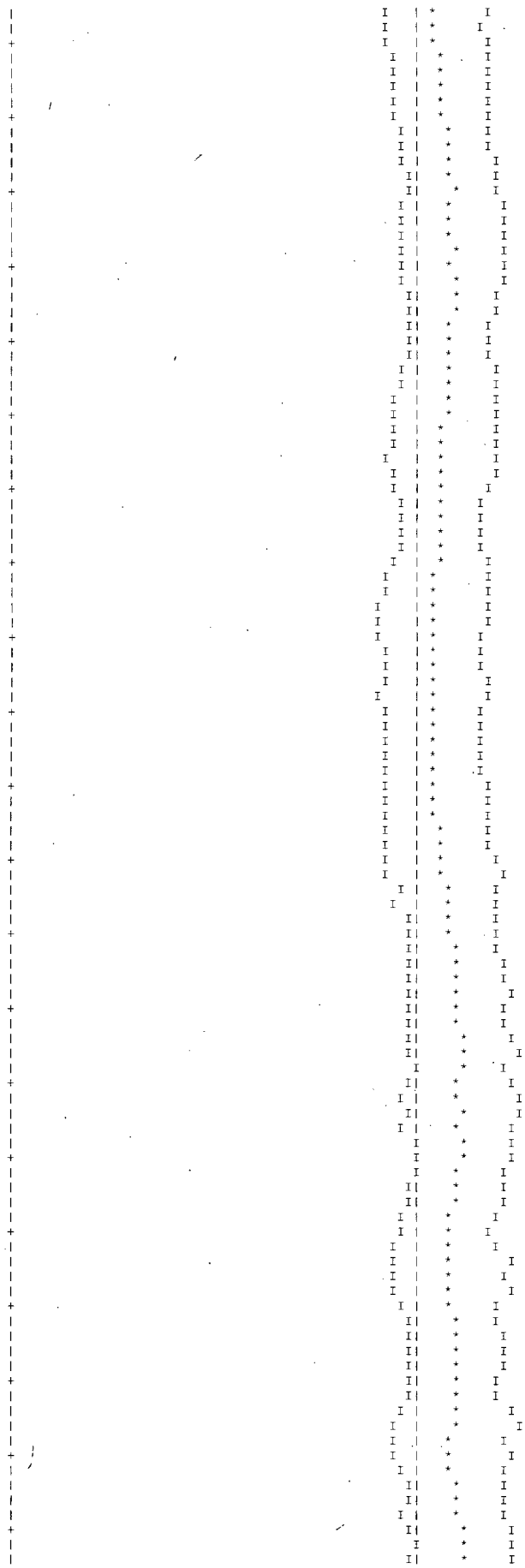


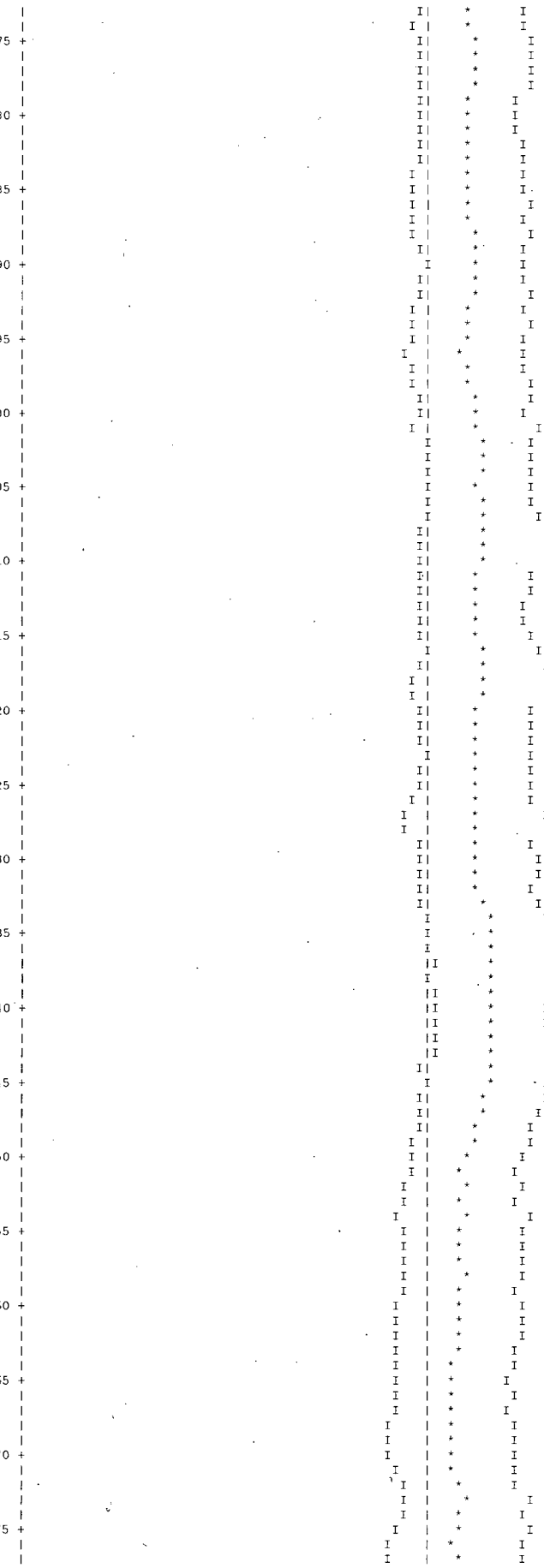








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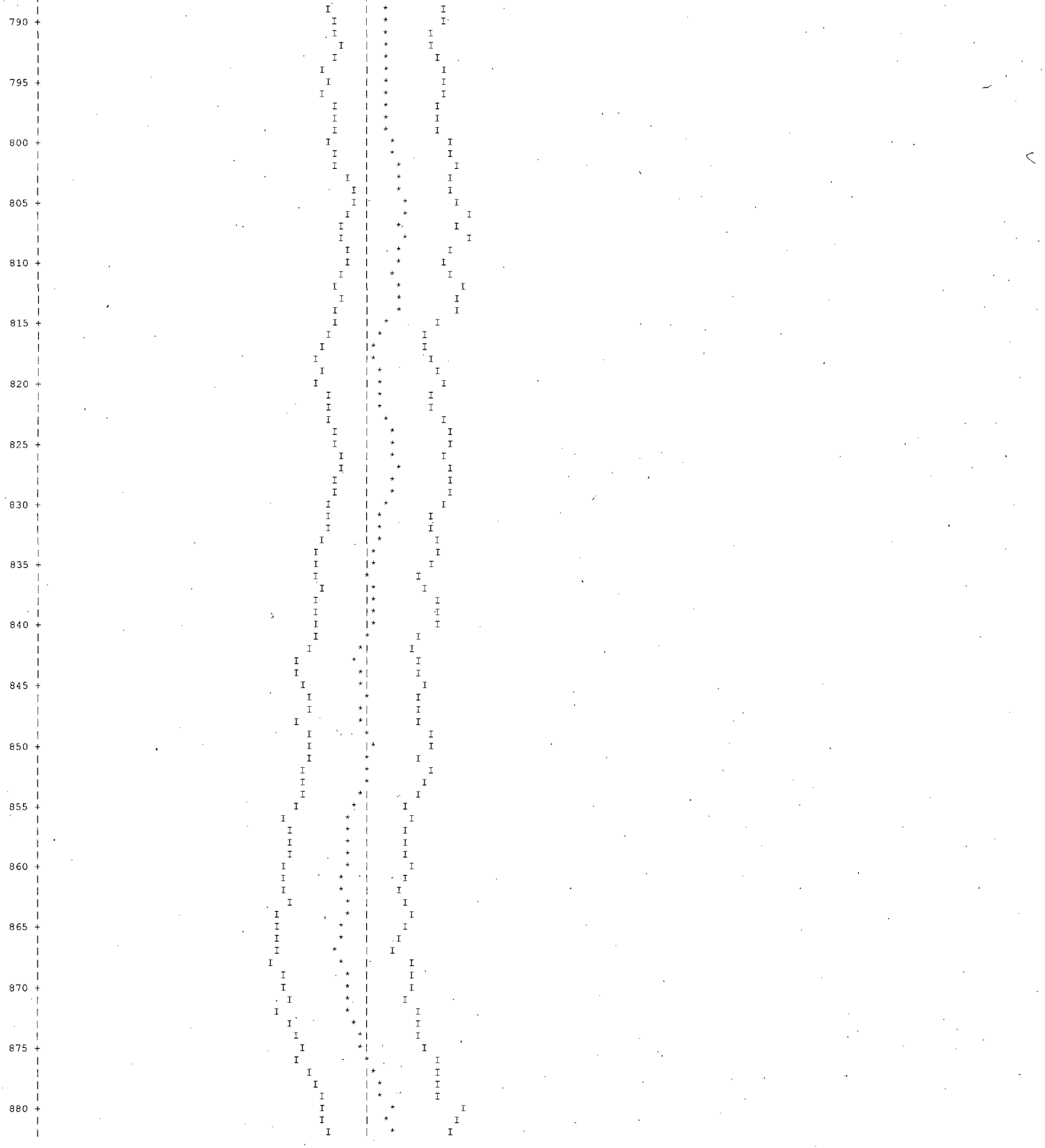
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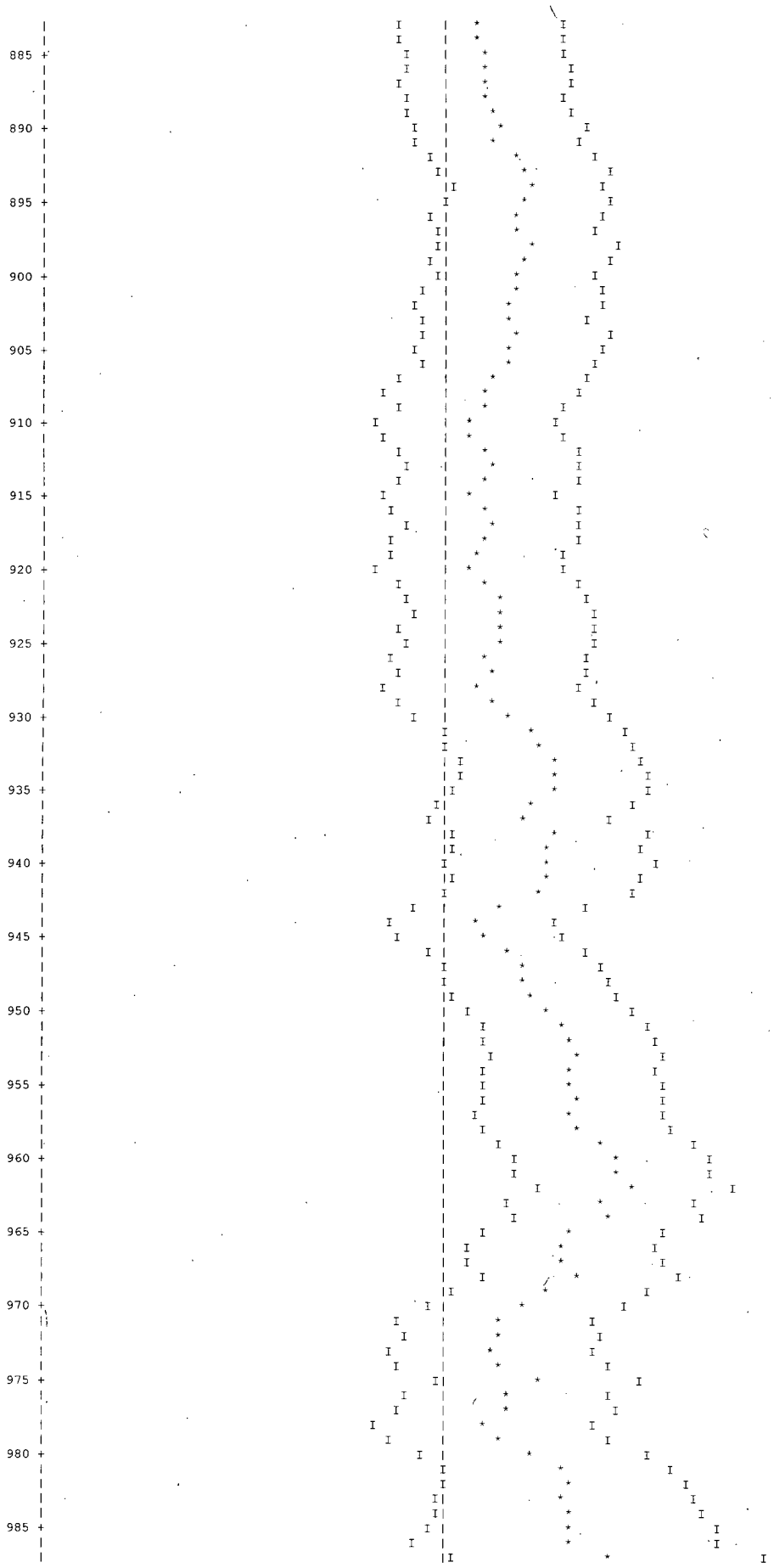
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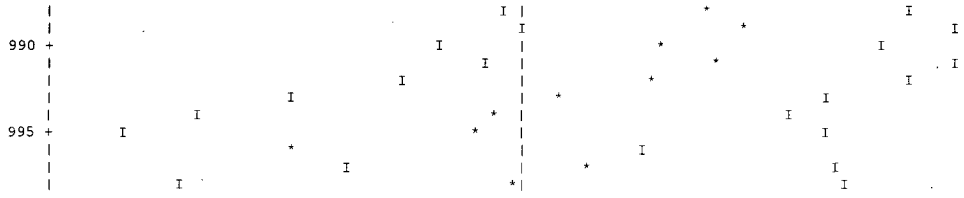

k-effective satisfies the chi**2 test for normality at the 95 % level

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			2.79836E-08	70.6734	2.08096E-07	60.5520	0.00000E+00	0.0000
2	0.0000			9.12973E-08	42.7029	7.69056E-07	36.7261	0.00000E+00	0.0000
3	0.0000			3.37204E-07	21.0038	1.84056E-06	19.5005	0.00000E+00	0.0000
4	0.0000			2.17404E-07	28.0239	2.05097E-06	31.8187	0.00000E+00	0.0000
5	0.0000			5.55185E-07	16.8553	5.50113E-06	14.5761	0.00000E+00	0.0000
6	0.0000			8.30672E-06	3.6538	9.10393E-05	3.5277	0.00000E+00	0.0000
7	0.0000			2.29190E-05	1.9644	3.09012E-04	1.6538	0.00000E+00	0.0000
8	0.0001			6.71474E-05	0.9916	3.54570E-04	1.2380	0.00000E+00	0.0000
9	0.0002			1.48198E-04	0.5377	3.13066E-04	1.1624	0.00000E+00	0.0000
10	0.0001	c		8.14694E-05	0.6922	1.32270E-04	1.4541	0.00000E+00	0.0000
11	0.0004			3.63267E-04	0.3190	4.74423E-04	0.6174	0.00000E+00	0.0000
12	0.0003			2.55648E-04	0.3213	2.58341E-04	0.5218	0.00000E+00	0.0000
13	0.0001			7.56297E-05	0.5694	6.45079E-05	0.6902	0.00000E+00	0.0000
14	0.0004			3.59306E-04	0.2653	2.49757E-04	0.3361	0.00000E+00	0.0000
15	0.0003			2.94180E-04	0.2698	1.74114E-04	0.3449	0.00000E+00	0.0000
16	0.0001			9.13384E-05	0.4402	5.36112E-05	0.5556	0.00000E+00	0.0000
17	0.0000			4.07420E-05	0.6062	2.62421E-05	0.7573	0.00000E+00	0.0000
18	0.0000			3.65522E-05	0.6740	2.27432E-05	0.7804	0.00000E+00	0.0000
19	0.0001			6.32393E-05	0.5117	4.29518E-05	0.6920	0.00000E+00	0.0000
20	0.0001			4.73103E-05	0.5472	3.60920E-05	0.7750	0.00000E+00	0.0000
21	0.0001			9.40575E-05	0.3838	8.88988E-05	0.7389	0.00000E+00	0.0000
22	0.0001			8.63227E-05	0.3851	8.37212E-05	0.7451	0.00000E+00	0.0000
23	0.0001			8.86767E-05	0.3813	1.06467E-04	0.8099	0.00000E+00	0.0000
24	0.0000			2.00202E-05	0.7654	2.68628E-05	1.2187	0.00000E+00	0.0000
25	0.0000			2.53792E-05	0.6734	3.88044E-05	1.1469	0.00000E+00	0.0000
26	0.0000			1.43151E-05	0.8495	1.89547E-05	1.2615	0.00000E+00	0.0000
27	0.0000			4.32456E-05	0.4935	7.74818E-05	0.9782	0.00000E+00	0.0000
28	0.0001			7.52073E-05	0.3855	1.41893E-04	0.8989	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
29	0.0001			7.67401E-05	0.3723	1.81936E-04	0.8514	0.00000E+00	0.0000
30	0.0000			9.66237E-06	0.9950	2.10935E-05	1.2526	0.00000E+00	0.0000
31	0.0001			7.77124E-05	0.3531	1.57993E-04	0.8224	0.00000E+00	0.0000
32	0.0000			3.03821E-05	0.5385	5.08698E-05	0.8761	0.00000E+00	0.0000
33	0.0000			2.66925E-05	0.5705	3.95018E-05	0.8308	0.00000E+00	0.0000
34	0.0001			5.94960E-05	0.3801	8.53574E-05	0.7871	0.00000E+00	0.0000
35	0.0000			3.59240E-05	0.4707	4.58705E-05	0.7197	0.00000E+00	0.0000
36	0.0000			3.72232E-05	0.4526	6.20911E-05	0.7533	0.00000E+00	0.0000
37	0.0000			2.52157E-05	0.5342	3.59742E-05	0.7572	0.00000E+00	0.0000
38	0.0000			2.56462E-05	0.5048	3.11154E-05	0.7164	0.00000E+00	0.0000
39	0.0001			9.41663E-05	0.2856	2.36537E-04	0.8673	0.00000E+00	0.0000
40	0.0001			8.70411E-05	0.2839	1.53163E-04	0.7958	0.00000E+00	0.0000
41	0.0001			1.12155E-04	0.2415	2.47261E-04	0.7945	0.00000E+00	0.0000
42	0.0001			9.17375E-05	0.2456	3.04172E-04	0.9128	0.00000E+00	0.0000
43	0.0000			4.58426E-05	0.3254	1.02744E-04	0.8549	0.00000E+00	0.0000
44	0.0001			6.99548E-05	0.2622	2.87141E-04	0.9283	0.00000E+00	0.0000
45	0.0000			4.02929E-05	0.3176	5.56920E-05	0.7711	0.00000E+00	0.0000
46	0.0000			8.42514E-06	0.6526	2.13570E-05	0.9973	0.00000E+00	0.0000
47	0.0000			2.13690E-05	0.4356	1.42131E-04	1.0588	0.00000E+00	0.0000
48	0.0000			6.77618E-06	0.7788	1.56809E-05	1.0912	0.00000E+00	0.0000
49	0.0000			4.64793E-05	0.3021	1.45538E-04	0.9787	0.00000E+00	0.0000
50	0.0000			3.32779E-05	0.3445	1.68124E-04	1.0750	0.00000E+00	0.0000
51	0.0000			8.77004E-06	0.6245	1.39058E-05	0.8885	0.00000E+00	0.0000
52	0.0000			2.18488E-05	0.4061	6.98474E-05	0.9727	0.00000E+00	0.0000
53	0.0001			8.16200E-05	0.2146	2.37968E-04	0.9430	0.00000E+00	0.0000
54	0.0000			3.57143E-05	0.3042	2.74355E-04	1.1668	0.00000E+00	0.0000
55	0.0001			7.57900E-05	0.2321	3.25959E-04	0.9820	0.00000E+00	0.0000
56	0.0001			5.29816E-05	0.2738	2.70871E-04	1.1092	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0001			6.40265E-05	0.2568	2.95610E-04	1.0624	0.00000E+00	0.0000
58	0.0000			3.84305E-05	0.3241	1.18452E-04	1.0515	0.00000E+00	0.0000
59	0.0001			6.39894E-05	0.2560	2.76921E-04	1.0652	0.00000E+00	0.0000
60	0.0001			1.04583E-04	0.2235	2.99038E-04	0.8469	0.00000E+00	0.0000
61	0.0000			1.16865E-05	0.6396	2.99902E-05	0.8537	0.00000E+00	0.0000
62	0.0001			7.11547E-05	0.2982	1.27251E-04	0.7356	0.00000E+00	0.0000
63	0.0001			5.55642E-05	0.3339	8.23480E-05	0.5816	0.00000E+00	0.0000
64	0.0000			4.18471E-05	0.3919	7.67216E-05	0.6424	0.00000E+00	0.0000
65	0.0000			1.16685E-05	0.6320	4.89614E-05	0.9250	0.00000E+00	0.0000
66	0.0001			6.16214E-05	0.3059	1.34470E-04	0.6742	0.00000E+00	0.0000
67	0.0001			4.77676E-05	0.3530	2.58428E-04	0.9621	0.00000E+00	0.0000
68	0.0000			9.42672E-06	0.7127	2.06330E-05	0.7151	0.00000E+00	0.0000
69	0.0002			1.42440E-04	0.2698	4.87223E-04	0.9311	0.00000E+00	0.0000
70	0.0001			1.34249E-04	0.3124	2.04066E-03	1.0972	0.00000E+00	0.0000
71	0.0002			1.69942E-04	0.2624	2.59407E-04	0.5500	0.00000E+00	0.0000
72	0.0000			7.74703E-06	0.9381	1.57737E-05	0.8345	0.00000E+00	0.0000
73	0.0002			1.53303E-04	0.3182	2.21491E-04	0.5092	0.00000E+00	0.0000
74	0.0006			5.92630E-04	0.2023	1.41702E-03	0.7606	0.00000E+00	0.0000
75	0.0001			6.74128E-05	0.5148	2.06751E-04	0.8571	0.00000E+00	0.0000
76	0.0004			3.70280E-04	0.3364	5.08709E-04	0.5699	0.00000E+00	0.0000
77	0.0001			1.25758E-04	0.3703	3.06477E-04	0.6452	0.00000E+00	0.0000
78	0.0000			2.91801E-06	1.1660	1.84196E-05	1.2426	0.00000E+00	0.0000
79	0.0003			2.89145E-04	0.4928	2.26388E-04	0.5029	0.00000E+00	0.0000
80	0.0000			1.47046E-05	0.7047	5.05754E-05	0.8397	0.00000E+00	0.0000
81	0.0006			5.94808E-04	0.2393	9.05184E-04	0.5279	0.00000E+00	0.0000
82	0.0001			6.89129E-05	0.8347	7.91702E-05	0.7094	0.00000E+00	0.0000
83	0.0002			1.79868E-04	0.7336	1.49898E-04	0.6231	0.00000E+00	0.0000
84	0.0000			2.09808E-05	0.5106	9.38903E-05	0.8228	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
85	0.0002			1.68481E-04	0.4987	2.57489E-04	0.5003	0.00000E+00	0.0000
86	0.0003			2.99410E-04	0.4249	3.67591E-04	0.4692	0.00000E+00	0.0000
87	0.0007			6.55505E-04	0.4396	4.42936E-04	0.4376	0.00000E+00	0.0000
88	0.0001			6.78760E-05	0.8514	6.21474E-05	0.7875	0.00000E+00	0.0000
89	0.0000			3.48710E-05	0.5896	9.40886E-05	0.7836	0.00000E+00	0.0000
90	0.0007			6.89103E-04	0.5795	4.42264E-04	0.5172	0.00000E+00	0.0000
91	0.0001			6.68256E-05	0.5283	1.26621E-04	0.7816	0.00000E+00	0.0000
92	0.0005			4.26273E-04	0.6760	3.29246E-04	0.5871	0.00000E+00	0.0000
93	0.0002			2.09923E-04	0.5312	1.87253E-04	0.5695	0.00000E+00	0.0000
94	0.0004			3.72875E-04	0.7199	2.18293E-04	0.6018	0.00000E+00	0.0000
95	0.0007			6.49681E-04	0.4400	4.52704E-04	0.4627	0.00000E+00	0.0000
96	0.0001			1.38949E-04	0.7866	3.28739E-04	0.7015	0.00000E+00	0.0000
97	0.0000			1.95875E-05	0.8309	6.21863E-05	0.8991	0.00000E+00	0.0000
98	0.0002			1.61453E-04	0.8040	1.92997E-04	0.6792	0.00000E+00	0.0000
99	0.0000			2.89265E-05	0.9954	4.72717E-05	0.9859	0.00000E+00	0.0000
100	0.0002			1.54327E-04	0.8435	1.18788E-04	0.6857	0.00000E+00	0.0000
101	0.0000			2.41864E-05	0.6998	8.69048E-05	0.8406	0.00000E+00	0.0000
102	0.0001			7.43886E-05	0.8176	2.98393E-04	0.7207	0.00000E+00	0.0000
103	0.0000			6.87033E-06	0.6859	8.03534E-05	0.9120	0.00000E+00	0.0000
104	0.0002			1.44411E-04	0.7203	3.35708E-04	0.6284	0.00000E+00	0.0000
105	0.0000			5.40367E-06	0.7090	7.72270E-05	0.9527	0.00000E+00	0.0000
106	0.0000			1.81143E-06	1.1136	2.70343E-05	1.4083	0.00000E+00	0.0000
107	0.0000			4.10218E-06	0.7882	6.06980E-05	1.0276	0.00000E+00	0.0000
108	0.0000			3.63748E-06	0.8055	5.71851E-05	1.0565	0.00000E+00	0.0000
109	0.0000			7.33336E-06	0.6576	9.70051E-05	0.8925	0.00000E+00	0.0000
110	0.0000			6.91575E-06	0.8472	6.83060E-05	0.9299	0.00000E+00	0.0000
111	0.0000			3.69998E-06	0.8409	5.53217E-05	1.0585	0.00000E+00	0.0000
112	0.0000			2.51045E-06	1.0701	3.34194E-05	1.3576	0.00000E+00	0.0000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0001			5.45845E-05	0.6374	1.26671E-04	0.8016	0.00000E+00	0.0000
114	0.0000			3.22867E-06	1.0490	3.63910E-05	1.3168	0.00000E+00	0.0000
115	0.0000			5.13102E-06	0.6687	9.53340E-05	0.9638	0.00000E+00	0.0000
116	0.0000			1.55519E-05	0.4738	2.10618E-04	0.8723	0.00000E+00	0.0000
117	0.0004			3.27460E-04	0.4453	4.63216E-04	0.5222	0.00000E+00	0.0000
118	0.0001			1.08923E-04	0.4205	3.31964E-04	0.7458	0.00000E+00	0.0000
119	0.0008			7.74005E-04	0.5440	6.27158E-04	0.4772	0.00000E+00	0.0000
120	0.0000			1.74554E-05	0.6062	1.39342E-04	0.9078	0.00000E+00	0.0000
121	0.0000			2.21399E-05	0.5670	1.48935E-04	0.8584	0.00000E+00	0.0000
122	0.0000			1.78890E-05	0.8550	8.13389E-05	1.0067	0.00000E+00	0.0000
123	0.0008			7.29055E-04	0.4772	7.57811E-04	0.4488	0.00000E+00	0.0000
124	0.0001			1.34872E-04	0.5419	2.35608E-04	0.7339	0.00000E+00	0.0000
125	0.0005			4.94371E-04	0.5672	3.70951E-04	0.5358	0.00000E+00	0.0000
126	0.0012			1.15010E-03	0.6379	9.59747E-04	0.5749	0.00000E+00	0.0000
127	0.0005			4.87383E-04	0.6123	4.10525E-04	0.5371	0.00000E+00	0.0000
128	0.0001			8.14952E-05	0.5410	2.45270E-04	0.7943	0.00000E+00	0.0000
129	0.0004			4.13930E-04	0.4920	5.95870E-04	0.5018	0.00000E+00	0.0000
130	0.0005			4.65097E-04	0.7169	4.99404E-04	0.6139	0.00000E+00	0.0000
131	0.0033			3.03844E-03	0.3588	1.83088E-03	0.3773	0.00000E+00	0.0000
132	0.0001			8.21893E-05	0.4351	3.81054E-04	0.8422	0.00000E+00	0.0000
133	0.0001			1.02708E-04	0.3998	4.97338E-04	0.8187	0.00000E+00	0.0000
134	0.0019			1.79392E-03	0.4032	1.64512E-03	0.4219	0.00000E+00	0.0000
135	0.0000			2.00274E-05	0.9202	9.65583E-05	1.1159	0.00000E+00	0.0000
136	0.0000			2.93066E-05	0.7287	1.60035E-04	0.9308	0.00000E+00	0.0000
137	0.0000			2.85081E-05	0.6998	1.65447E-04	0.9557	0.00000E+00	0.0000
138	0.0000			2.93649E-05	0.6979	1.72586E-04	0.9338	0.00000E+00	0.0000
139	0.0000			2.98823E-05	0.6729	1.81562E-04	0.9397	0.00000E+00	0.0000
140	0.0001			7.55864E-05	0.4308	4.73909E-04	0.9134	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
141	0.0001			5.58893E-05	0.4891	3.55034E-04	0.9188	0.00000E+00	0.0000
142	0.0000			3.76045E-05	0.6095	2.42555E-04	0.9156	0.00000E+00	0.0000
143	0.0001			1.31152E-04	0.3373	8.34101E-04	0.9159	0.00000E+00	0.0000
144	0.0001			5.59406E-05	0.5139	3.56856E-04	0.9066	0.00000E+00	0.0000
145	0.0001			5.36857E-05	0.5372	3.30021E-04	0.9519	0.00000E+00	0.0000
146	0.0001			9.60320E-05	0.4358	5.66070E-04	0.9111	0.00000E+00	0.0000
147	0.0000			3.11602E-05	0.7822	1.80007E-04	0.9875	0.00000E+00	0.0000
148	0.0000			1.63096E-05	1.0715	9.37804E-05	1.3077	0.00000E+00	0.0000
149	0.0000			1.04667E-05	1.3621	6.60565E-05	1.6360	0.00000E+00	0.0000
150	0.0000			3.65535E-05	0.7564	2.15345E-04	1.0702	0.00000E+00	0.0000
151	0.0000			3.90883E-05	0.7269	2.05541E-04	1.0573	0.00000E+00	0.0000
152	0.0000			4.21284E-05	0.6871	2.15370E-04	1.0274	0.00000E+00	0.0000
153	0.0000			4.61847E-05	0.7118	2.30321E-04	1.0196	0.00000E+00	0.0000
154	0.0001			4.95015E-05	0.6842	2.44390E-04	1.1068	0.00000E+00	0.0000
155	0.0001			4.78407E-05	0.7229	2.33273E-04	1.0639	0.00000E+00	0.0000
156	0.0000			4.53027E-05	0.7738	2.14639E-04	1.1083	0.00000E+00	0.0000
157	0.0001			5.50300E-05	0.6758	2.53539E-04	1.0286	0.00000E+00	0.0000
158	0.0001			5.95680E-05	0.6828	2.70851E-04	1.0579	0.00000E+00	0.0000
159	0.0001			8.79677E-05	0.5832	3.85779E-04	0.9590	0.00000E+00	0.0000
160	0.0001			4.82854E-05	0.7766	2.06636E-04	1.0995	0.00000E+00	0.0000
161	0.0001			6.94072E-05	0.6731	2.84870E-04	1.0193	0.00000E+00	0.0000
162	0.0001			8.66273E-05	0.6350	3.50242E-04	0.9628	0.00000E+00	0.0000
163	0.0001			9.75666E-05	0.5868	3.83191E-04	0.9606	0.00000E+00	0.0000
164	0.0001			1.10641E-04	0.5743	4.13821E-04	0.9389	0.00000E+00	0.0000
165	0.0001			1.23200E-04	0.5744	4.43453E-04	0.8955	0.00000E+00	0.0000
166	0.0001			7.55766E-05	0.7602	2.59340E-04	1.0609	0.00000E+00	0.0000
167	0.0001			8.14382E-05	0.7244	2.75672E-04	0.9807	0.00000E+00	0.0000
168	0.0001			8.91634E-05	0.7353	2.94014E-04	1.0254	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			9.58647E-05	0.6759	3.08968E-04	0.9415	0.00000E+00	0.0000
170	0.0001			1.03136E-04	0.6953	3.32874E-04	1.0117	0.00000E+00	0.0000
171	0.0001			5.58996E-05	0.9296	1.73871E-04	1.2022	0.00000E+00	0.0000
172	0.0001			5.69203E-05	0.9553	1.75739E-04	1.2155	0.00000E+00	0.0000
173	0.0001			6.06611E-05	0.9099	1.85391E-04	1.1403	0.00000E+00	0.0000
174	0.0001			6.33759E-05	0.9122	1.90232E-04	1.1656	0.00000E+00	0.0000
175	0.0000			2.59846E-05	1.4037	7.44924E-05	1.5991	0.00000E+00	0.0000
176	0.0000			2.71874E-05	1.3807	7.91957E-05	1.5974	0.00000E+00	0.0000
177	0.0000			2.73000E-05	1.3781	7.91173E-05	1.6577	0.00000E+00	0.0000
178	0.0000			2.81066E-05	1.4051	7.87101E-05	1.6082	0.00000E+00	0.0000
179	0.0000			2.76871E-05	1.3607	8.02989E-05	1.6267	0.00000E+00	0.0000
180	0.0000			2.93205E-05	1.3989	8.21726E-05	1.5969	0.00000E+00	0.0000
181	0.0000			3.00231E-05	1.2904	8.46515E-05	1.4931	0.00000E+00	0.0000
182	0.0000			3.06102E-05	1.3424	8.64674E-05	1.5657	0.00000E+00	0.0000
183	0.0000			3.09371E-05	1.3324	8.51998E-05	1.6158	0.00000E+00	0.0000
184	0.0000			3.20895E-05	1.3524	8.69132E-05	1.5556	0.00000E+00	0.0000
185	0.0000			3.23970E-05	1.2674	8.86871E-05	1.5402	0.00000E+00	0.0000
186	0.0000			3.31556E-05	1.3360	8.81898E-05	1.5867	0.00000E+00	0.0000
187	0.0000			3.46281E-05	1.3274	9.22895E-05	1.5692	0.00000E+00	0.0000
188	0.0000			3.50351E-05	1.3607	9.09804E-05	1.5562	0.00000E+00	0.0000
189	0.0000			3.58204E-05	1.2872	9.46640E-05	1.5550	0.00000E+00	0.0000
190	0.0001			9.42019E-05	0.8234	2.41629E-04	1.1344	0.00000E+00	0.0000
191	0.0001			1.00899E-04	0.8280	2.52045E-04	1.0232	0.00000E+00	0.0000
192	0.0001			1.08825E-04	0.7993	2.64125E-04	1.0515	0.00000E+00	0.0000
193	0.0001			1.17566E-04	0.8082	2.70659E-04	0.9790	0.00000E+00	0.0000
194	0.0003			2.65202E-04	0.5958	5.89251E-04	0.8381	0.00000E+00	0.0000
195	0.0003			3.17954E-04	0.5800	6.62638E-04	0.8317	0.00000E+00	0.0000
196	0.0004			3.78634E-04	0.5411	7.33016E-04	0.7898	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
197	0.0005			4.71265E-04	0.5114	8.27398E-04	0.7413	0.00000E+00	0.0000
198	0.0006			6.05492E-04	0.5165	9.72418E-04	0.7093	0.00000E+00	0.0000
199	0.0004			3.67151E-04	0.6609	5.41414E-04	0.8314	0.00000E+00	0.0000
200	0.0005			4.32409E-04	0.6137	5.94507E-04	0.7481	0.00000E+00	0.0000
201	0.0012			1.15215E-03	0.4387	1.39958E-03	0.5766	0.00000E+00	0.0000
202	0.0019			1.72996E-03	0.4299	1.82672E-03	0.5267	0.00000E+00	0.0000
203	0.0031			2.91184E-03	0.4217	2.61247E-03	0.4795	0.00000E+00	0.0000
204	0.0061			5.69549E-03	0.3774	4.31636E-03	0.3816	0.00000E+00	0.0000
205	0.0056			5.19877E-03	0.5043	3.60458E-03	0.4734	0.00000E+00	0.0000
206	0.0088			8.21328E-03	0.4636	5.53087E-03	0.4336	0.00000E+00	0.0000
207	0.0143			1.33959E-02	0.4433	8.67930E-03	0.4217	0.00000E+00	0.0000
208	0.0212			1.98399E-02	0.4321	1.25477E-02	0.4119	0.00000E+00	0.0000
209	0.0241			2.24869E-02	0.3986	1.42198E-02	0.3776	0.00000E+00	0.0000
210	0.0223			2.07852E-02	0.3867	1.34295E-02	0.3641	0.00000E+00	0.0000
211	0.0181			1.69328E-02	0.3495	1.14531E-02	0.3240	0.00000E+00	0.0000
212	0.0157			1.46255E-02	0.3104	1.06077E-02	0.2844	0.00000E+00	0.0000
213	0.0155			1.45142E-02	0.2749	1.15172E-02	0.2452	0.00000E+00	0.0000
214	0.0181			1.69200E-02	0.2250	1.48388E-02	0.2096	0.00000E+00	0.0000
215	0.0252			2.35546E-02	0.1876	2.25636E-02	0.1617	0.00000E+00	0.0000
216	0.0408			3.81358E-02	0.1576	3.94213E-02	0.1214	0.00000E+00	0.0000
217	0.0240			2.24549E-02	0.1677	2.40918E-02	0.1251	0.00000E+00	0.0000
218	0.0305			2.84355E-02	0.1586	3.12105E-02	0.1137	0.00000E+00	0.0000
219	0.0389			3.63450E-02	0.1463	4.05213E-02	0.0991	0.00000E+00	0.0000
220	0.0497			4.63953E-02	0.1360	5.24486E-02	0.0902	0.00000E+00	0.0000
221	0.0632			5.90308E-02	0.1275	6.75289E-02	0.0830	0.00000E+00	0.0000
222	0.0795			7.42480E-02	0.1208	8.54579E-02	0.0750	0.00000E+00	0.0000
223	0.0982			9.16969E-02	0.1190	1.05747E-01	0.0695	0.00000E+00	0.0000
224	0.0525			4.89876E-02	0.1293	5.64145E-02	0.0826	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
225	0.1948			1.81915E-01	0.1179	2.08865E-01	0.0668	0.00000E+00	0.0000
226	0.0309			2.88980E-02	0.1623	3.27969E-02	0.1042	0.00000E+00	0.0000
227	0.0282			2.63689E-02	0.1743	2.97779E-02	0.1164	0.00000E+00	0.0000
228	0.0102			9.47857E-03	0.2379	1.06035E-02	0.1697	0.00000E+00	0.0000
229	0.0092			8.61284E-03	0.2593	9.60308E-03	0.1772	0.00000E+00	0.0000
230	0.0042			3.91215E-03	0.3557	4.31845E-03	0.2463	0.00000E+00	0.0000
231	0.0038			3.55676E-03	0.3882	3.93699E-03	0.2686	0.00000E+00	0.0000
232	0.0035			3.26852E-03	0.4037	3.56068E-03	0.2688	0.00000E+00	0.0000
233	0.0019			1.75615E-03	0.5455	1.89802E-03	0.3714	0.00000E+00	0.0000
234	0.0011			1.03931E-03	0.6803	1.13236E-03	0.4650	0.00000E+00	0.0000
235	0.0012			1.13638E-03	0.6957	1.24097E-03	0.4858	0.00000E+00	0.0000
236	0.0010			9.25246E-04	0.7482	1.00137E-03	0.5030	0.00000E+00	0.0000
237	0.0010			9.68678E-04	0.8299	9.75369E-04	0.5498	0.00000E+00	0.0000
238	0.0001			5.07204E-05	3.4780	5.53197E-05	2.1554	0.00000E+00	0.0000
system total =				9.33730E-01	0.0939	1.00143E+00	0.0281	0.00000E+00	0.0000

elapsed time 5.88817 minutes

random number= 8402AA56FD

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

frequency for generations 51 to 1000

```
0.8497 to 0.8533     *
0.8533 to 0.8569     **
0.8569 to 0.8604     **
0.8604 to 0.8640     **
0.8640 to 0.8676     *
0.8676 to 0.8712     *
0.8712 to 0.8747     ***
0.8747 to 0.8783     *********
0.8783 to 0.8819     ********
0.8819 to 0.8855     ********
0.8855 to 0.8890     ******
0.8890 to 0.8926     **************
0.8926 to 0.8962     ********
0.8962 to 0.8998     ***********************
0.8998 to 0.9034     *********************
0.9034 to 0.9069     ****************************************
0.9069 to 0.9105     ****************************************
0.9105 to 0.9141     ****************************************
0.9141 to 0.9177     ***********************************************
0.9177 to 0.9212     ************************************
0.9212 to 0.9248     ***************************************************
0.9248 to 0.9284     *********************************************************
0.9284 to 0.9320     ***************************************************
0.9320 to 0.9355     ******************************************************************
0.9355 to 0.9391     ***********************************************
0.9391 to 0.9427     *********************************************
0.9427 to 0.9463     ************************************************
0.9463 to 0.9498     ***********************************************
0.9498 to 0.9534     ****************************************************
0.9534 to 0.9570     ****************************
0.9570 to 0.9606     ******************
0.9606 to 0.9642     *********************
0.9642 to 0.9677     ****************************
0.9677 to 0.9713     ********************
0.9713 to 0.9749     **************
0.9749 to 0.9785     ***************
0.9785 to 0.9820     ****************
0.9820 to 0.9856     *********
0.9856 to 0.9892     *******
0.9892 to 0.9928     ******
0.9928 to 0.9963     *****
0.9963 to 0.9999     *****
0.9999 to 1.0035     **
1.0035 to 1.0071     **
1.0071 to 1.0107
1.0107 to 1.0142
1.0142 to 1.0178     *
1.0178 to 1.0214
1.0214 to 1.0250
1.0250 to 1.0285
1.0285 to 1.0321
1.0321 to 1.0357     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

frequency for generations 289 to 1000

```
0.8497 to 0.8533
0.8533 to 0.8569     **
0.8569 to 0.8604
0.8604 to 0.8640     *
0.8640 to 0.8676     *
0.8676 to 0.8712
0.8712 to 0.8747     **
0.8747 to 0.8783     *****
0.8783 to 0.8819     ******
0.8819 to 0.8855     *****
0.8855 to 0.8890     ****
0.8890 to 0.8926     ***********
0.8926 to 0.8962     ********
0.8962 to 0.8998     ******************
0.8998 to 0.9034     *************
0.9034 to 0.9069     *********************************
0.9069 to 0.9105     ************************
0.9105 to 0.9141     ******************************
0.9141 to 0.9177     ************************************
0.9177 to 0.9212     *********************
0.9212 to 0.9248     ****************************************
0.9248 to 0.9284     **********************************************
0.9284 to 0.9320     ******************************
0.9320 to 0.9355     ************************************************
0.9355 to 0.9391     **********************************
0.9391 to 0.9427     ******************************
0.9427 to 0.9463     *************************************
0.9463 to 0.9498     ************************************
0.9498 to 0.9534     ****************************************
0.9534 to 0.9570     ************************
0.9570 to 0.9606     ****************
0.9606 to 0.9642     ***************
0.9642 to 0.9677     *********************
0.9677 to 0.9713     ******************
0.9713 to 0.9749     ********
0.9749 to 0.9785     **************
0.9785 to 0.9820     ***************
0.9820 to 0.9856     ****
0.9856 to 0.9892     *****
0.9892 to 0.9928     ****
0.9928 to 0.9963     *****
0.9963 to 0.9999     *****
0.9999 to 1.0035     **
1.0035 to 1.0071
1.0071 to 1.0107
1.0107 to 1.0142
1.0142 to 1.0178     *
1.0178 to 1.0214
1.0214 to 1.0250
1.0250 to 1.0285
1.0285 to 1.0321
1.0321 to 1.0357     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

frequency for generations 526 to 1000

```
0.8497 to 0.8533
0.8533 to 0.8569
0.8569 to 0.8604
0.8604 to 0.8640
0.8640 to 0.8676     *
0.8676 to 0.8712
0.8712 to 0.8747     **
0.8747 to 0.8783     ***
0.8783 to 0.8819     ****
0.8819 to 0.8855     ***
0.8855 to 0.8890     ***
0.8890 to 0.8926     ********
0.8926 to 0.8962     ****
0.8962 to 0.8998     ************
0.8998 to 0.9034     *********
0.9034 to 0.9069     ********************
0.9069 to 0.9105     *****************
0.9105 to 0.9141     ********************
0.9141 to 0.9177     ***************************
0.9177 to 0.9212     **************
0.9212 to 0.9248     ********************
0.9248 to 0.9284     ************************************
0.9284 to 0.9320     ************************
0.9320 to 0.9355     ***********************************
0.9355 to 0.9391     ********************
0.9391 to 0.9427     ******************
0.9427 to 0.9463     ************************
0.9463 to 0.9498     ****************************
0.9498 to 0.9534     ******************************
0.9534 to 0.9570     *****************
0.9570 to 0.9606     ************
0.9606 to 0.9642     ************
0.9642 to 0.9677     **************
0.9677 to 0.9713     **********
0.9713 to 0.9749     ******
0.9749 to 0.9785     ********
0.9785 to 0.9820     *********
0.9820 to 0.9856     ***
0.9856 to 0.9892     ****
0.9892 to 0.9928     **
0.9928 to 0.9963     *****
0.9963 to 0.9999     ***
0.9999 to 1.0035     *
1.0035 to 1.0071
1.0071 to 1.0107
1.0107 to 1.0142
1.0142 to 1.0178     *
1.0178 to 1.0214
1.0214 to 1.0250
1.0250 to 1.0285
1.0285 to 1.0321
1.0321 to 1.0357
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=800

frequency for generations 763 to 1000

```
0.8497 to 0.8533
0.8533 to 0.8569
0.8569 to 0.8604
0.8604 to 0.8640
0.8640 to 0.8676
0.8676 to 0.8712
0.8712 to 0.8747     *
0.8747 to 0.8783     **
0.8783 to 0.8819     *
0.8819 to 0.8855     **
0.8855 to 0.8890     *
0.8890 to 0.8926     ****
0.8926 to 0.8962     *
0.8962 to 0.8998     ****
0.8998 to 0.9034     ****
0.9034 to 0.9069     ********
0.9069 to 0.9105     ***************
0.9105 to 0.9141     *************
0.9141 to 0.9177     ***********
0.9177 to 0.9212     ******
0.9212 to 0.9248     ***********
0.9248 to 0.9284     ****************
0.9284 to 0.9320     ***************
0.9320 to 0.9355     *************
0.9355 to 0.9391     ********
0.9391 to 0.9427     ***********
0.9427 to 0.9463     ***********
0.9463 to 0.9498     ******************
0.9498 to 0.9534     *************
0.9534 to 0.9570     ******
0.9570 to 0.9606     ******
0.9606 to 0.9642     ****
0.9642 to 0.9677     ********
0.9677 to 0.9713     ******
0.9713 to 0.9749     **
0.9749 to 0.9785     ****
0.9785 to 0.9820     *****
0.9820 to 0.9856     *
0.9856 to 0.9892     *
0.9892 to 0.9928     *
0.9928 to 0.9963     *
0.9963 to 0.9999     **
0.9999 to 1.0035
1.0035 to 1.0071
1.0071 to 1.0107
1.0107 to 1.0142
1.0142 to 1.0178     *
1.0178 to 1.0214
1.0214 to 1.0250
1.0250 to 1.0285
1.0285 to 1.0321
1.0321 to 1.0357
```

****

congratulations! you have successfully traversed the perilous path through keno v in 5.88817 minutes

****

```
bbbbbbbbbbbb     oooooooooooo    nn          nn                    aaaaaaaaa     mm           mm  iiiiiiiiiiii     22222222222
bbbbbbbbbbbbb    oooooooooooooo  nnn         nn                   aaaaaaaaaaa    mmm          mmm  iiiiiiiiiiii    2222222222222
bb         bb    oo         oo   nnnn        nn                  aa         aa   mmmm       mmmm       ii         22          22
bb         bb    oo         oo   nn nn       nn                  aa         aa   mm mm     mm mm       ii                     22
bb         bb    oo         oo   nn   nn     nn                  aa         aa   mm   mm mm   mm       ii                     22
bbbbbbbbbbbb     oo         oo   nn    nn     nn  -------------   aaaaaaaaaaaaa  mm    mmm    mm       ii                 22
bbbbbbbbbbbb     oo         oo   nn     nn    nn  -------------   aaaaaaaaaaaaa  mm     m     mm       ii              22
bb         bb    oo         oo   nn      nn   nn                  aa         aa   mm           mm       ii            22
bb         bb    oo         oo   nn       nn nn                   aa         aa   mm           mm       ii          22
bb         bb    oo         oo   nn        nnnn                   aa         aa   mm           mm       ii        22
bbbbbbbbbbbb     oooooooooooo    nn         nnn                   aa         aa   mm           mm  iiiiiiiiiiii    2222222222222
bbbbbbbbbbbb      oooooooooooo   nn          nn                   aa         aa   mm           mm  iiiiiiiiiiii    2222222222222


 sssssssssss     ccccccccccc     aaaaaaaaa    ll                  eeeeeeeeeeeee                   pppppppppppp     cccccccccccc
sssssssssssss    ccccccccccccc    aaaaaaaaaaa  ll                  eeeeeeeeeeeee                   pppppppppppppp   ccccccccccccc
ss         ss    cc         cc   aa         aa ll                  ee                              pp         pp    cc         cc
ss               cc              aa         aa ll                  ee                              pp         pp    cc
ss               cc              aa         aa ll                  ee                              pp         pp    cc
sssssssssssss    cc              aaaaaaaaaaaaa ll                  eeeeeeeee       -------------   pppppppppppppp   cc
sssssssssssss    cc              aaaaaaaaaaaaa ll                  eeeeeeeee       -------------   pppppppppppp     cc
           ss    cc              aa         aa ll                  ee                              pp               cc
           ss    cc              aa         aa ll                  ee                              pp               cc
ss         ss    cc         cc   aa         aa ll                  ee                              pp               cc         cc
sssssssssssss    ccccccccccccc   aa         aa llllllllllll        eeeeeeeeeeeee                   pp               ccccccccccccc
 sssssssssss     ccccccccccc     aa         aa llllllllllll        eeeeeeeeeeeee                   pp                cccccccccccc


   0000000       666666666666              //  22222222222      0000000                  //    0000000      5555555555555
  000000000      6666666666666             //  2222222222222    000000000                //   000000000     5555555555555
 00       00     66                       //  22         22    00       00              //   00       00   55
00         00    66                      //                22  00         00           //   00         00  55
00         00    66                     //                 22  00         00          //   00         00  55
00         00    666666666666          //                22    00         00         //   00         00  555555555555
00         00    6666666666666        //              22      00         00        //   00         00  5555555555555
00         00    66         66       //            22        00         00       //   00         00              55
00         00    66         66      //           22          00         00      //   00         00              55
 00       00     66         66     //           22            00       00     //    00       00   55         55
  000000000      6666666666666    //           2222222222222    000000000     //     000000000    5555555555555
   0000000       66666666666     //            2222222222222     0000000     //       0000000      55555555555


   0000000       666666666666                        44     99999999999                        11        33333333333
  000000000      6666666666666                      444     9999999999999                     111       3333333333333
 00       00     66                  :::           4444     99         99         :::       1111       33         33
00         00    66                  :::         44 44     99         99         :::         11                   33
00         00    66                  :::        44  44     99         99         :::         11                   33
00         00    666666666666                  44   44     9999999999999                   11                333
00         00    6666666666666                44    44      999999999999                   11                333
00         00    66         66       :::     444444444444              99         :::       11                   33
00         00    66         66       :::    4444444444444              99         :::       11                   33
 00       00     66         66       :::            44                 99         :::       11         33        33
  000000000      6666666666666                     44     9999999999999                  11111111    3333333333333
   0000000       66666666666                       44     999999999999                   11111111     33333333333
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                    pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa   ll              eeeeeeeeeeeee                    ppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa  ll              ee                               pp         pp   cc         cc
ss               cc               aa         aa  ll              ee                               pp         pp   cc
ss               cc               aa         aa  ll              ee                               pp         pp   cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------    ppppppppppppp   cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------    ppppppppppppp   cc
          ss     cc               aa         aa  ll              ee                               pp              cc
          ss     cc               aa         aa  ll              ee                               pp              cc
ss        ss     cc          cc   aa         aa  ll              ee                               pp              cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  lllllllllllll   eeeeeeeeeeeee                    pp              cccccccccccccc
 ssssssssssss     ccccccccccc      aa         aa  lllllllllllll   eeeeeeeeeeeee                    pp               ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o008                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/11/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  bonami                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:49:13.36                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
-1q array has      1 entries.
 0q array has      4 entries.
 1q array has      6 entries.
 2q array has      2 entries.
```

logical assignments

master library 11
working library 0
scratch file 18
new library 1

p r o b l e m d e s c r i p t i o n

igr--geometry (0/1/2/3--inf med/slab/cyl/sphere 1

izm--number of zones or material regions 6

ms--mixing table length 18

ibl--shielded cross section edit option (0/1--no/yes) 0

ibr--bondarenko factor edit option (0/1--no/yes) 0

issopt--dancoff factor option 0

convergence criterion 1.00000E-03

geometry correction factor for wigner rational approximation 1.000E+00

3q array has 18 entries.

4q array has 18 entries.

5q array has 18 entries.

6q array has 6 entries.

7q array has 6 entries.

8q array has 6 entries.

9q array has 6 entries.

10q array has 18 entries.

11q array has 6 entries.

m i x i n g t a b l e

entry	mixture	isotope	number density	new identifier	explicit temperature
1	1	1001	7.83791E-02	1001001	293.0
2	2	1001	7.85246E-02	2001001	293.0
3	5	1001	6.67692E-02	5001001	293.0
4	1	4309	1.23401E-03	1004309	293.0
5	2	4309	1.23621E-03	2004309	293.0
6	1	6012	3.91937E-02	1006012	293.0
7	2	6012	3.92623E-02	2006012	293.0
8	4	6012	3.18772E-04	4006012	293.0
9	1	8016	0.00000E+00	1008016	293.0
10	5	8016	3.33846E-02	5008016	293.0
11	1	94239	8.70964E-05	1094239	293.0
12	4	14000	1.70252E-03	4014000	293.0
13	4	15031	6.94680E-05	4015031	293.0
14	4	24304	1.74726E-02	4024304	293.0
15	4	25055	1.74071E-03	4025055	293.0
16	4	26304	5.85446E-02	4026304	293.0
17	4	28304	7.74020E-03	4028304	293.0
18	6	82000	3.29690E-02	6082000	293.0

geometry and material description

zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0
3	3	1.10000E+01	-2.93000E+02	0.00000E+00	0
4	4	1.60000E+01	2.93000E+02	0.00000E+00	0
5	5	2.10000E+01	2.93000E+02	0.00000E+00	0
6	6	2.60000E+01	2.93000E+02	0.00000E+00	0

this calculation requires 36777 locations of 2000000 available to this module

power fitting for: 14000-- processes: 3-- sig0's: 8-- temperatures: 3-- max groups: 238

warning-nuclide: 14000 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
temperature 3.00000E+02 will be substituted.

power fitting for: 94239-- processes: 5-- sig0's: 7-- temperatures: 3-- max groups: 21

warning-nuclide: 94239 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
temperature 3.00000E+02 will be substituted.

zone	volume	outer radius
1	1.000E+00	1.000E+00
2	5.000E+00	6.000E+00
3	5.000E+00	1.100E+01
4	5.000E+00	1.600E+01
5	5.000E+00	2.100E+01
6	5.000E+00	2.600E+01

fuel region volume 2.60E+01
moderator region volume 0.00E+00
fuel region radius 2.60E+01
moderator region radius 2.60E+01

elapsed time 0.00 min.

infinite dilution macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.002E-01	1.062E-01	1.089E-01	1.073E-01	1.123E-01	1.202E-01	1.310E-01	1.484E-01	1.712E-01	2.056E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.766E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.811E-01	4.985E-01	5.222E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.250E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.870E-01	6.063E-01	6.291E-01	6.481E-01	6.653E-01	6.802E-01	7.180E-01	7.836E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.702E-01	2.774E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.689E-01	9.764E-01	1.062E+00	1.134E+00	1.210E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.471E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.279E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.688E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

infinite dilution macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.797E+00	1.802E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.804E+00	1.807E+00	1.798E+00	1.803E+00	1.804E+00	1.807E+00	1.800E+00	1.798E+00	1.818E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.819E+00	1.801E+00	1.811E+00	1.805E+00	1.833E+00	1.798E+00	1.812E+00	1.799E+00	1.804E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.827E+00	1.798E+00	1.821E+00	1.798E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.816E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.815E+00	1.800E+00	1.808E+00	1.849E+00	1.814E+00	1.800E+00	1.810E+00	1.830E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.826E+00	1.799E+00	1.800E+00	1.826E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

infinite dilution macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.853E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.861E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.874E+00	1.873E+00	1.881E+00	1.892E+00	1.901E+00	1.912E+00	1.931E+00	1.937E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.958E+00	1.991E+00	2.036E+00	2.114E+00	2.202E+00	2.297E+00	2.435E+00	2.605E+00	2.671E+00	2.617E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

infinite dilution macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.544E+00	2.526E+00	2.552E+00	2.616E+00	2.709E+00	2.848E+00	2.963E+00	3.051E+00	3.159E+00	3.297E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.482E+00	3.732E+00	4.073E+00	4.396E+00	5.027E+00	5.911E+00	6.350E+00	6.820E+00	7.222E+00	7.678E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.654E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.100E+00	8.688E+00	9.451E+00	1.014E+01	1.104E+01	1.260E+01	1.737E+01	3.647E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.335E+00	2.534E+00	2.878E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

bondarenko iteration statistics

iteration	mt	max change	group	zone	new value	nuclide	sig0	first	last
1	1	-5.749E-02	50	4	6.492E+00	4014000	2.44454E+02	1	238
1	1	-2.464E-02	56	1	1.370E+01	1094239	1.89885E+04	55	75
2	all groups for nuclide		4014000 are converged to less than eps= 1.00E-03						
2	all groups for nuclide		1094239 are converged to less than eps= 1.00E-03						

elapsed time 0.00 min.

shielded macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.002E-01	1.062E-01	1.089E-01	1.073E-01	1.123E-01	1.202E-01	1.310E-01	1.484E-01	1.712E-01	2.056E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.495E-01	2.719E-01	2.705E-01	2.958E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.765E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.811E-01	4.985E-01	5.222E-01	5.373E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.249E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.870E-01	6.063E-01	6.291E-01	6.481E-01	6.653E-01	6.802E-01	7.180E-01	7.836E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.701E-01	2.773E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.689E-01	9.764E-01	1.062E+00	1.134E+00	1.210E+00	1.245E+00	1.266E+00	1.286E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.469E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.272E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.402E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.688E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

shielded macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.790E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.797E+00	1.802E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.800E+00	1.804E+00	1.807E+00	1.798E+00	1.803E+00	1.804E+00	1.807E+00	1.800E+00	1.798E+00	1.818E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.819E+00	1.801E+00	1.811E+00	1.805E+00	1.833E+00	1.798E+00	1.812E+00	1.799E+00	1.804E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.827E+00	1.798E+00	1.821E+00	1.798E+00	1.797E+00	1.797E+00	1.797E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.816E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.815E+00	1.800E+00	1.808E+00	1.849E+00	1.814E+00	1.800E+00	1.810E+00	1.830E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.826E+00	1.799E+00	1.800E+00	1.826E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

shielded macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.853E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.861E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.874E+00	1.873E+00	1.881E+00	1.892E+00	1.901E+00	1.912E+00	1.931E+00	1.937E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.958E+00	1.991E+00	2.036E+00	2.114E+00	2.202E+00	2.297E+00	2.435E+00	2.605E+00	2.671E+00	2.617E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

shielded macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.544E+00	2.526E+00	2.552E+00	2.616E+00	2.709E+00	2.848E+00	2.963E+00	3.051E+00	3.159E+00	3.297E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.482E+00	3.732E+00	4.073E+00	4.396E+00	5.027E+00	5.911E+00	6.350E+00	6.820E+00	7.222E+00	7.678E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.655E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.100E+00	8.688E+00	9.451E+00	1.014E+01	1.104E+01	1.260E+01	1.737E+01	3.647E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.336E+00	2.534E+00	2.879E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

number of separate processes to treat: 8
number treated (including multi-zone): 8
maximum number of sigma-0's: 8
maximum number of temperatures: 3
offset of origen for interpolation: 2.0E+01

macroscopic escape cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

36777 locations of 36992 available are required to make a new master containing the self-shielded values

```
copy      4309   Be-metal (1304/ from log 11 to log 18    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy     24304   24CR BNL EVALDE from log 11 to log  1    bondarenko trigger 0

copy     26304   26FE 0 ORNL EVA from log 11 to log  1    bondarenko trigger 0

copy     28304   28NI 0 BNL NNDC from log 11 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 11 to log 18    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy     14000   14si 0 ornl eva from log 11 to log  1    bondarenko trigger 1

copy     25055   25mn 55 bnl eva from log 11 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 11 to log 18    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 11 to log 18    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy     15031   15p 31 111 eval from log 11 to log  1    bondarenko trigger 0

copy     82000   82pb ornl evalj from log 11 to log  1    bondarenko trigger 0

copy     94239   94pu239 lanl ju from log 11 to log  1    bondarenko trigger 1
```

```
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
      n.m.greene & l.m.petrie
        nuclear applications & methods analysis - ns&td - ornl
   tape id                              4321          number of nuclides                    18
   number of neutron groups              238          number of gamma groups                 0
   first thermal group                   149          logical unit                           1
                                 table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 lll evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took   12.80 seconds
```

```
nn          nn  iiiiiiiiiiii    tttttttttttt      aaaaaaaaa     ww          ww  ll
nnn         nn  iiiiiiiiiiii    tttttttttttt     aaaaaaaaaaa    ww          ww  ll
nnnn        nn      ii              tt         aa         aa   ww          ww  ll
nn nn       nn      ii              tt         aa         aa   ww          ww  ll
nn   nn     nn      ii              tt         aa         aa   ww          ww  ll
nn    nn    nn      ii              tt         aaaaaaaaaaaaa   ww     w    ww  ll
nn     nn   nn      ii              tt         aaaaaaaaaaaaa   ww    www   ww  ll
nn      nn  nn      ii              tt         aa         aa   ww   ww ww  ww  ll
nn       nn nn      ii              tt         aa         aa   ww ww    ww ww  ll
nn        nnnn      ii              tt         aa         aa   wwww      wwww  ll
nn         nnn  iiiiiiiiiiii        tt         aa         aa   www        www  llllllllllll
nn          nn  iiiiiiiiiiii        tt         aa         aa   ww          ww  llllllllllll
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                    ppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa    ll              eeeeeeeeeeeee                    pppppppppppppp  cccccccccccccc
ss         ss   cc          cc   aa         aa  ll              ee                               pp         pp   cc          cc
ss              cc              aa         aa  ll              ee                               pp         pp   cc
ss              cc              aa         aa  ll              ee                               pp         pp   cc
ssssssssssss    cc              aaaaaaaaaaaaa  ll              eeeeeeeee       -------------    pppppppppppppp   cc
 ssssssssssss   cc              aaaaaaaaaaaaa  ll              eeeeeeeee       -------------    pppppppppppppp   cc
         ss     cc              aa         aa  ll              ee                               pp               cc
          ss    cc              aa         aa  ll              ee                               pp               cc
ss         ss   cc          cc  aa         aa  ll              ee                               pp               cc          cc
ssssssssssssss  cccccccccccccc  aa         aa  llllllllllll    eeeeeeeeeeeee                    pp               cccccccccccccc
 ssssssssssss    cccccccccccc   aa         aa  llllllllllll    eeeeeeeeeeeee                    pp                cccccccccccc
```

```
   0000000      666666666666            //  22222222222      0000000                //     0000000      5555555555555
  000000000    6666666666666           //  2222222222222    000000000              //    000000000     5555555555555
 00       00   66                     //   22         22   00       00            //    00       00   55
00         00  66                    //                22  00         00          //    00         00  55
00         00  66                   //                 22  00         00         //    00         00  55
00         00  666666666666        //                22   00         00        //     00         00  555555555555
00         00  6666666666666      //               22     00         00       //      00         00  5555555555555
00         00  66         66     //              22       00         00      //       00         00             55
00         00  66         66    //             22         00         00     //        00         00             55
 00       00   66         66   //            22           00       00      //          00       00   55         55
  000000000    6666666666666  //            2222222222222   000000000     //            000000000    5555555555555
   0000000      66666666666  //             2222222222222    0000000      //              0000000      55555555555
```

```
   0000000      666666666666                        44     99999999999                    22222222222    7777777777777
  000000000    6666666666666                       444    9999999999999                  2222222222222   777777777777
 00       00   66                  :::           4444    99         99        :::       22         22   77         77
00         00  66                  :::          44 44    99         99        :::                  22            77
00         00  66                  :::         44  44    99         99        :::                  22           77
00         00  666666666666                   44   44    9999999999999                        22           77
00         00  6666666666666                 44    44     999999999999                      22            77
00         00  66         66       :::      444444444444             99        :::           22            77
00         00  66         66       :::     4444444444444             99        :::          22            77
 00       00   66         66       :::                44             99        :::         22            77
  000000000    6666666666666                       44    9999999999999                  2222222222222   77
   0000000      66666666666                        44    999999999999                   2222222222222   77
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa ll              ee                              pp         pp    cc          cc
ss               cc               aa         aa ll              ee                              pp         pp    cc
ss               cc               aa         aa ll              ee                              pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa ll              eeeeeeeee       -------------   pppppppppppp      cc
           ss    cc               aa         aa ll              ee                              pp                cc
           ss    cc               aa         aa ll              ee                              pp                cc
ss         ss    cc          cc   aa         aa ll              ee                              pp                cc          cc
ssssssssssssss   cccccccccccccc   aa         aa llllllllllll    eeeeeeeeeeeee                   pp                cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa llllllllllll    eeeeeeeeeeeee                   pp                 ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:          o0o002
creation date:    11/11/1999
library:          c:\scale4.4a\bin
production code:  nitawl
version:          4.4.0
jobname:          scale-pc
machine name:     NFA10385
date of execution:  20_jun_2005
time of execution:  06:49:27.09
```

```
      -1q array has      1 entries.

       0q array has      9 entries.

       1q array has     12 entries.

select 18 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

       2 resonance calculations have been requested
      -1 output option for ampx formatted cross section data
    2001 maximum number of resonance mesh intervals
       2 order of resonance level processing

the storage allocated for this case is   2000000 words

       2q array has     18 entries.

       3q array has     30 entries.

       4q array has     18 entries.

 general information concerning cross section library
   tape identification number                4321
   number of nuclides on tape                  18
   number of neutron energy groups            238
   first thermal neutron energy group         149
   number of gamma energy groups                0

   direct access unit number  9 requires 280 blocks of length  8172 words
 xsdrn tape   4321
                        scale - 238 neutron group library            based on endf-b version 5 data
                          generated with a chi-1/e-maxwellian weight spectrum
                            compiled for doe - 8/18/94           last updated - 5/16/2002
                              n.m.greene & l.m.petrie
                                nuclear applications & methods analysis - ns&td - ornl

 nuclides from xsdrn tape
    1     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  1004309
    2     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  2004309
    3     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91         4024304
    4     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91         4026304
    5     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91         4028304
    6    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               1006012
    7    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               2006012
    8    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               4006012
    9     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88              4014000
   10     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88              4025055
   11     8O 16 from version 6 evaluation                                             1008016
   12     8O 16 from version 6 evaluation                                             5008016
   13     hydrogen in water 1301/1002    mod1   11/23/92                              1001001
   14     hydrogen in water 1301/1002    mod1   11/23/92                              2001001
   15     hydrogen in water 1301/1002    mod1   11/23/92                              5001001
   16     15p 31 lll evaloct77 howerton                   mod1 12/20/88              4015031
   17     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89              6082000
   18     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89              1094239

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002.              1004309     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002               2004309     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91      4024304     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91      4026304     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91      4028304     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           1006012     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           2006012     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas           4006012     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88           4014000     temperature=   293.00
                                                        process number 1007 is at temperature=   296.00

 25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88           4025055     temperature=   293.00

geometry has been set to homogeneous as lbar is  0.0000E+00

resonance data for this nuclide

mass number (a)          =    54.466              temperature(kelvin)       =   293.000

potential scatter sigma  =     3.801              lumped nuclear density    = 1.7407142E-03

spin factor (g)          =     0.000              lump dimension (a-bar)    = 0.0000000E+00

inner radius             = 0.0000000E+00          dancoff correction (c)    = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1    =    55.845              sigma(per absorber atom)= 3.4101929E+02
```

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 53.766 sigma(per absorber atom)= 1.2864024E+02

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
44	-2.573557E-05	0.000000E+00	-4.815655E-02
45	-1.291448E-04	0.000000E+00	-3.816337E-02
46	-1.606563E-04	0.000000E+00	-1.332381E-02
47	-1.056918E-04	0.000000E+00	-2.060706E-02
48	-4.179799E-05	0.000000E+00	-9.612578E-02
49	-1.779133E-04	0.000000E+00	-1.038285E-01
50	-2.606053E-04	0.000000E+00	-1.521462E-01
51	-6.117731E-05	0.000000E+00	-7.269186E-04
52	-2.276834E-04	0.000000E+00	-6.778821E-03
53	-4.136545E-04	0.000000E+00	-3.950535E-01
54	-9.016085E-04	0.000000E+00	-3.850810E-01
55	-1.889857E-03	0.000000E+00	-8.663202E-01
56	-1.682722E-04	0.000000E+00	-2.095040E-04
57	-8.006894E-04	0.000000E+00	-6.747544E-02
58	-5.832270E-03	0.000000E+00	-5.143185E+00
59	-6.111082E-03	0.000000E+00	-3.758587E+00
60	-3.959768E-03	0.000000E+00	-3.334263E-02
61	-1.836192E-06	0.000000E+00	-2.387732E-03
62	-4.381017E-04	0.000000E+00	-4.759451E-01
63	-9.039582E-03	0.000000E+00	-7.946639E+00
64	-1.435731E-02	0.000000E+00	-9.543545E+00
65	-4.290072E-03	0.000000E+00	-3.739039E+00
66	-1.355880E-02	0.000000E+00	-1.010358E+01
67	-2.306789E-04	0.000000E+00	-1.431424E-01
68	-3.245916E-06	0.000000E+00	-1.800902E-03
69	-3.050841E-03	0.000000E+00	-1.654186E-01
70	-2.155581E+00	0.000000E+00	-6.385146E+01
71	9.803476E-06	0.000000E+00	-9.597841E-04
72	-6.031858E-09	0.000000E+00	-1.791791E-06
73	-3.683254E-05	0.000000E+00	-4.341343E-03
74	-6.284016E+00	0.000000E+00	-3.027933E+02
75	-1.065459E-01	0.000000E+00	-4.692756E+00
76	-2.623990E-02	0.000000E+00	-1.060597E+00
77	-7.989248E-04	0.000000E+00	-2.867110E-02
78	-4.575271E-06	0.000000E+00	-1.544029E-04
79	-5.029187E-05	0.000000E+00	-1.677382E-03
80	-6.286984E-06	0.000000E+00	-2.025635E-04
81	-8.363011E-05	0.000000E+00	-2.566171E-03
82	-1.235011E-07	0.000000E+00	-2.377236E-06
83	-8.699079E-08	0.000000E+00	-1.242513E-06
84	6.870753E-08	0.000000E+00	3.754665E-06
85	7.176524E-07	0.000000E+00	1.973096E-06

excess resonance integrals

	resolved
absorption	3.13724E+00
fission	0.00000E+00

elapsed time 0.05 min.

process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 1008016 temperature= 293.00
process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 5008016 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 1001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 2001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 5001001 temperature= 293.00
process number 1007 is at temperature= 296.00

15p 31 lll evaloct77 howerton mod1 12/20/88 4015031 temperature= 293.00
process number 1007 is at temperature= 296.00

82pb ornl evaljul71 c.y.fu and f.g. mod2 01/04/89 6082000 temperature= 293.00
process number 1007 is at temperature= 296.00

94pu239 lanl jun83 e.arthur p.you mod2 02/28/89 1094239 temperature= 293.00

geometry has been set to homogeneous as lbar is 0.0000E+00

resonance data for this nuclide

mass number (a) = 237.000 temperature(kelvin) = 293.000

potential scatter sigma = 10.200 lumped nuclear density = 8.7096363E-05

spin factor (g) = 0.000 lump dimension (a-bar) = 0.0000000E+00

inner radius = 0.0000000E+00 dancoff correction (c) = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1 = 1.008 sigma(per absorber atom)= 1.8340998E+04

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 11.852 sigma(per absorber atom)= 2.2164578E+03

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
75	-2.914783E-02	-1.127066E-02	-4.823067E-03
76	-3.358686E-01	-1.154199E-01	-1.912855E-01
77	-1.055778E-01	-2.109903E-02	-1.983661E-02
78	-1.098407E-01	-1.631847E-02	-1.161903E-02
79	-3.458327E-01	-2.686821E-01	-5.171614E-02
80	-8.701786E-03	-3.037793E-03	-4.340213E-04
81	-2.379066E-01	-6.075778E-02	-9.641022E-02
82	-8.362771E-01	-4.093809E-01	-2.195397E-01
83	-1.685808E+00	-8.434252E-01	-4.178943E-01
84	-3.380849E-03	-1.259675E-03	-1.381043E-04
85	-6.573199E-01	-2.055636E-01	-9.842328E-02
86	-8.990545E-01	-1.780458E-01	-2.090029E-01
87	-6.838769E-01	-2.416728E-01	-8.609655E-02
88	-4.203327E-03	-4.014671E-03	-1.052923E-04
89	-2.657321E-03	-1.976137E-03	-1.094858E-03
90	-7.212191E+00	-4.965546E+00	-1.164311E+00
91	-4.114847E-04	-2.878820E-04	-6.495827E-05
92	-4.969082E+00	-2.390050E+00	-4.727889E-01
93	-2.003945E-02	-1.358523E-02	8.831297E-05
94	-1.151614E+00	-8.367099E-01	-3.128184E-02
95	-2.594634E-01	-1.832612E-01	-5.336012E-03
96	-1.145324E+01	-1.844306E+00	-2.131963E+00
97	-7.596393E-03	-3.101895E-03	-1.643928E-03
98	-1.440697E+00	-3.470578E-01	-8.230739E-02
99	-1.440403E-02	-1.236443E-02	-1.284260E-04
100	-1.577920E-01	-1.271050E-01	-3.023733E-03
101	-4.020116E-03	-2.309636E-03	-6.039426E-04
102	-8.265870E+00	-7.971612E-01	-1.150663E+00
103	-3.857620E-03	-6.338625E-04	-4.916530E-04
104	-4.270449E+00	-5.157074E-01	-3.130068E-01
105	-6.609437E-03	-9.104293E-04	4.508069E-04
106	-1.228104E-04	-2.684267E-05	6.897765E-05
107	-3.820276E-05	-9.780509E-06	2.661259E-05
108	-1.544510E-05	-3.530873E-06	5.227004E-06
109	-2.720393E-02	-2.635986E-03	4.998604E-04
110	-6.355346E-04	-6.461568E-05	-1.235677E-03
111	-8.729689E-05	-3.078104E-05	1.273309E-05
112	-2.392406E-04	-1.661394E-04	-2.137786E-05
113	-1.842079E-02	-1.307355E-02	-7.278257E-05
114	-1.139477E-03	-8.089164E-04	6.105641E-05
115	-7.089867E-05	-5.018671E-05	7.204920E-06
116	-1.553640E-03	-1.821607E-04	-1.055587E-04
117	-1.084417E+00	-5.492541E-01	-2.034782E-02
118	-6.891095E-02	-4.053276E-02	-4.074546E-03
119	-5.265294E+00	-3.151006E+00	-1.375137E-01
120	-3.795844E-04	-2.271102E-04	4.600480E-05
121	-1.689017E-04	-9.193126E-05	-2.073723E-05
122	-8.380041E-04	-4.071097E-04	-1.450567E-04
123	-5.233232E+00	-2.436560E+00	-1.215161E-01
124	-9.222341E-03	-8.029619E-03	1.981437E-05
125	-2.518457E-02	-2.036890E-02	-5.600806E-04
126	-1.458681E+01	-6.637779E+00	-3.681766E-01
127	-1.325906E+00	-8.483023E-01	-1.288924E-02
128	-2.080222E-03	-1.293755E-03	1.050594E-04
129	-3.629112E+00	-1.361193E+00	-7.148595E-02
130	-8.270271E+00	-3.106668E+00	-1.399158E-01
131	-7.489716E+00	-5.809808E+00	-7.920616E-02
132	-1.966638E-03	-1.497889E-03	9.318987E-05
133	-1.547647E-02	-8.290407E-03	-8.488829E-04
134	-9.446073E+00	-5.035548E+00	-1.020897E-01
135	-2.046712E-03	-1.095302E-03	1.029594E-04
136	-8.310943E-04	-4.466338E-04	5.532708E-05
137	-3.218749E-04	-1.745090E-04	2.774567E-05
138	-1.538058E-04	-8.440608E-05	1.611487E-05
139	-8.432109E-05	-4.686272E-05	1.030829E-05
140	-6.675017E-05	-3.690170E-05	1.261735E-05
141	-1.877581E-05	-1.091760E-05	3.349913E-06
142	-1.226061E-05	-7.282173E-06	2.298576E-06
143	-8.218302E-06	-4.966223E-06	1.776080E-06
144	-4.986678E-06	-3.110053E-06	1.058833E-06
145	-4.190951E-06	-2.640336E-06	9.006192E-07
146	-3.509507E-06	-2.233719E-06	7.630216E-07
147	-3.081132E-06	-1.976476E-06	6.681131E-07
148	-2.960796E-06	-1.903789E-06	6.415852E-07
149	-2.900129E-06	-1.867078E-06	6.281319E-07
150	-2.806789E-06	-1.810498E-06	6.074404E-07
151	-2.653733E-06	-1.718965E-06	5.727449E-07
152	-1.215315E-06	-9.429080E-07	2.136692E-07
153	-1.179822E-06	-9.153703E-07	2.061195E-07
154	-1.146860E-06	-8.897965E-07	1.989196E-07
155	-1.117801E-06	-8.672508E-07	1.923842E-07
156	-1.814272E-07	-1.407611E-07	3.121172E-08

excess resonance integrals

	resolved
absorption	3.11439E+02
fission	1.75390E+02

elapsed time 0.08 min.

process number 1007 is at temperature= 296.00

elapsed time 0.09 min.

```
this xsdrn working tape was created 06/20/05 at 06:49:27
the title of the parent case is as follows
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94           last updated - 5/16/2002
    tape id                             4321          number of nuclides                    18
    number of neutron groups             238          number of gamma groups                 0
    first thermal group                  149          logical unit                           4
                                  table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 111 evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    6.05 seconds
```

```
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooooo                  vv          vv
kk         kk   eeeeeeeeeeeee  nnn         nn   oooooooooooooo                vv          vv
kk        kk    ee             nnnn        nn   oo         oo                 vv          vv
kk       kk     ee             nn nn       nn   oo         oo                 vv          vv
kk      kk      ee             nn   nn     nn   oo         oo                 vv          vv
kkkkkkkk        eeeeeeeee      nn    nn    nn   oo         oo   -------------  vv          vv
kkkkkkkk        eeeeeeeee      nn     nn   nn   oo         oo   -------------   vv        vv
kk      kk      ee             nn      nn  nn   oo         oo                    vv    vv
kk       kk     ee             nn       nn nn   oo         oo                     vv  vv
kk        kk    ee             nn        nnnn   oo         oo                      vvv vv
kk         kk   eeeeeeeeeeeee  nn         nnn   oooooooooooooo                      vvv
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooooo                        v
```

```
 sssssssssss    ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa   ll              eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss   cc         cc    aa         aa ll              ee                             pp         pp    cc         cc
ss              cc               aa         aa ll              ee                             pp         pp    cc
ss              cc               aa         aa ll              ee                             pp         pp    cc
ssssssssssss    cc               aaaaaaaaaaaaa ll              eeeeeeeee      -------------   pppppppppppppp   cc
 ssssssssssss   cc               aaaaaaaaaaaaa ll              eeeeeeeee      -------------   pppppppppppp     cc
          ss    cc               aa         aa ll              ee                             pp               cc
          ss    cc               aa         aa ll              ee                             pp               cc
ss        ss    cc         cc    aa         aa ll              ee                             pp               cc         cc
ssssssssssss    cccccccccccccc   aa         aa lllllllllllll   eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc     aa         aa lllllllllllll   eeeeeeeeeeeee                  pp                ccccccccccc
```

```
   0000000       666666666666              //  22222222222      0000000                //    0000000      5555555555555
  000000000     6666666666666             //   2222222222222    000000000              //    000000000    5555555555555
 00       00    66                       //    22          22   00       00            //    00       00  55
00         00  66                      //                 22   00         00          //    00         00 55
00         00  66                     //                  22   00         00         //     00         00 55
00         00  666666666666          //                 22    00         00        //      00         00 555555555555
00         00  6666666666666        //               22       00         00       //       00         00 5555555555555
00         00  66         66       //              22         00         00      //        00         00            55
00         00  66         66      //             22           00         00     //         00         00            55
 00       00   66         66     //             22            00       00      //           00       00  55         55
  000000000    6666666666666    //             2222222222222     000000000    //             000000000   5555555555555
   0000000      66666666666    //             2222222222222      0000000     //               0000000     55555555555
```

```
   0000000       666666666666                          44      99999999999                    33333333333     99999999999
  000000000     6666666666666                         444     9999999999999                  3333333333333   9999999999999
 00       00    66                  :::             4444     99         99        :::       33         33   99         99
00         00  66                  :::            44 44     99         99        :::                  33   99         99
00         00  66                  :::           44  44     99         99        :::                  33   99         99
00         00  666666666666                     44   44     9999999999999                      333   9999999999999
00         00  6666666666666                   44    44      999999999999                      333    999999999999
00         00  66         66       :::        444444444444            99        :::                  33             99
00         00  66         66       :::       4444444444444            99        :::                  33             99
 00       00   66         66       :::                44            99        :::       33         33             99
  000000000    6666666666666                         44     9999999999999                  3333333333333   9999999999999
   0000000      66666666666                          44     999999999999                    33333333333    999999999999
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp  cccccccccccccc
ss         ss   cc          cc   aa         aa  ll              ee                              pp         pp   cc         cc
ss              cc               aa         aa  ll              ee                              pp         pp   cc
ss              cc               aa         aa  ll              ee                              pp         pp   cc
ssssssssssss    cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppppp   cc
 ssssssssssss   cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppp     cc
          ss    cc               aa         aa  ll              ee                              pp               cc
          ss    cc               aa         aa  ll              ee                              pp               cc
ss        ss    cc          cc   aa         aa  ll              ee                              pp               cc         cc
ssssssssssss    cccccccccccccc   aa         aa  lllllllllllll   eeeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc     aa         aa  lllllllllllll   eeeeeeeeeeeeee                  pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                                 code system:  scale-pc version:  4.4a                                 *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o009                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  kenova                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:49:39.08                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
*****************************************************************************************************
***                                                                                                 ***
***                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900       ***
***                                                                                                 ***
*****************************************************************************************************
***                        ******      numeric parameters      ******                               ***
***                                                                                                 ***
***                                                                                                 ***
***          tme     maximum problem time (min)                                  120.00             ***
***                                                                                                 ***
***          tba     time per generation (min)                                     5.00             ***
***                                                                                                 ***
***          gen     number of generations                                        1000              ***
***                                                                                                 ***
***          npg     number per generation                                        1000              ***
***                                                                                                 ***
***          nsk     number of generations to be skipped                            50              ***
***                                                                                                 ***
***          beg     beginning generation number                                     1              ***
***                                                                                                 ***
***          res     generations between checkpoints                                 0              ***
***                                                                                                 ***
***          x1d     number of extra 1-d cross sections                              1              ***
***                                                                                                 ***
***          nbk     neutron bank size                                            1025              ***
***                                                                                                 ***
***          xnb     extra positions in neutron bank                                 0              ***
***                                                                                                 ***
***          nfb     fission bank size                                            1000              ***
***                                                                                                 ***
***          xfb     extra positions in fission bank                                 0              ***
***                                                                                                 ***
***          wta     default value of weight average                            0.5000              ***
***                                                                                                 ***
***          wth     weight high for splitting                                  3.0000              ***
***                                                                                                 ***
***          wtl     weight low for russian roulette                            0.3333              ***
***                                                                                                 ***
***          rnd     starting random number                                BB827100001              ***
***                                                                                                 ***
***          nb8     number of d.a. blocks on unit  8                             200              ***
***                                                                                                 ***
***          nl8     length of d.a. blocks on unit  8                             512              ***
***                                                                                                 ***
***          adj     mode of calculation                                     forward               ***
***                                                                                                 ***
***                  input data written on restart unit                           no               ***
***                                                                                                 ***
***                  binary data interface                                       yes               ***
***                                                                                                 ***
***                                                                                                 ***
*****************************************************************************************************
*****************************************************************************************************
```

```
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900           ***
***                                                                                                           ***
*****************************************************************************************************************
***                                  ******      logical parameters        ******                             ***
***                                                                                                           ***
***  run  execute problem after checking data    yes          plt  plot picture map(s)                    yes ***
***                                                                                                           ***
***  flx  compute flux                            no          fdn  compute fission densities               no ***
***                                                                                                           ***
***  smu  compute avg unit self-multiplication    no          nub  compute nu-bar & avg fission group     yes ***
***                                                                                                           ***
***  mku  compute matrix k-eff by unit number     no          mkp  compute matrix k-eff by unit location   no ***
***                                                                                                           ***
***  cku  compute cofactor k-eff by unit number   no          ckp  compute cofactor k-eff by unit location  no ***
***                                                                                                           ***
***  fmu  print fiss prod matrix by unit number   no          fmp  print fiss prod matrix by unit location  no ***
***                                                                                                           ***
***  mkh  compute matrix k-eff by hole number     no          mka  compute matrix k-eff by array number    no ***
***                                                                                                           ***
***  ckh  compute cofactor k-eff by hole number   no          cka  compute cofactor k-eff by array number  no ***
***                                                                                                           ***
***  fmh  print fiss prod matrix by hole number   no          fma  print fiss prod matrix by array number  no ***
***                                                                                                           ***
***  hhl  collect matrix by highest hole level    no          hal  collect matrix by highest array level   no ***
***                                                                                                           ***
***  amx  print all mixed cross sections          no          far  print fis. and abs. by region           no ***
***                                                                                                           ***
***  xs1  print 1-d mixture x-sections            no          gas  print far by group                      no ***
***                                                                                                           ***
***  xs2  print 2-d mixture x-sections            no          pax  print xsec-albedo correlation tables    no ***
***                                                                                                           ***
***  xap  print mixture angles & probabilities    no          pwt  print weight average array              no ***
***                                                                                                           ***
***  pki  print fission spectrum                  no          pgm  print input geometry                    no ***
***                                                                                                           ***
***  pld  print extra 1-d cross sections          no          bug  print debug information                 no ***
***                                                                                                           ***
***                                                           trk  print tracking information              no ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
                                   parameter input completed

                        ........    0 io's were used reading the parameter data      ........

                       *************** data reading completed ***************
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                                case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900       ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***          unit                                                    volume                                   ***
***         number              data set name                         name        unit function              ***
***         ------              -------------                         ----        -------------              ***
***                                                                                                           ***
***      xsc  14     C:\scale4.4a\tmpdir\ft14f001                                mixed cross sections       ***
***                                                                                                           ***
***      alb  79     C:\scale4.4a\data\ft79f001                                  input albedos              ***
***                                                                                                           ***
***      wts  80     C:\scale4.4a\data\ft80f001                                  input weights              ***
***                                                                                                           ***
***      skt  16      unknown                                                    write scratch data         ***
***                                                                                                           ***
***      bin  95     C:\scale4.4a\tmpdir\ft95f001                                binary input data          ***
***                                                                                                           ***
***      rst  95     C:\scale4.4a\tmpdir\ft95f001                                read restart data          ***
***                                                                                                           ***
***      lib   4     C:\scale4.4a\tmpdir\ft04f001                                input ampx working library ***
***                                                                                                           ***
***            8     C:\scale4.4a\tmpdir\ft08f001                                input data direct access   ***
***                                                                                                           ***
***            9      unknown                                                    super grouped direct access ***
***                                                                                                           ***
***           10      unknown                                                    xsec mixing direct access  ***
***                                                                                                           ***
*****************************************************************************************************************

                        ........    0 io's were used preparing input data    ........


                         cross sections read from the ampx working library on unit    4
```

```
                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

                                mixing table

                        number of scattering angles =  2
                    cross section message threshold =3.0E-05


mixture =     1          density(g/cc) = 0.96519
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   1001001  7.83791E-02  1.35878E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   1004309  1.23401E-03  1.91337E-02   4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   1006012  3.91937E-02  8.09167E-01   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   1008016  0.00000E+00  0.00000E+00   8016    15.9904      8O 16 from version 6 evaluation
   1094239  8.70964E-05  3.58205E-02  94239   239.0526      94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

mixture =     2          density(g/cc) = 0.93226
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   2001001  7.85246E-02  1.40939E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   2004309  1.23621E-03  1.98448E-02   4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   2006012  3.92623E-02  8.39216E-01   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas

mixture =     4          density(g/cc) =  7.9400
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   4006012  3.18772E-04  8.00006E-04   6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   4014000  1.70252E-03  9.99998E-03  14000    28.0853      14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
   4015031  6.94680E-05  4.50000E-04  15031    30.9741      15p 31 lll evaloct77 howerton                    mod1 12/20/88
   4024304  1.74726E-02  1.90000E-01  24000    51.9957      24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
   4025055  1.74071E-03  1.99999E-02  25055    54.9379      25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
   4026304  5.85446E-02  6.83750E-01  26000    55.8447      26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
   4028304  7.74020E-03  9.50001E-02  28000    58.6872      28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91

mixture =     5          density(g/cc) = 0.99817
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   5001001  6.67692E-02  1.11927E-01   1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   5008016  3.33846E-02  8.88074E-01   8016    15.9904      8O 16 from version 6 evaluation

mixture =     6          density(g/cc) =  11.344
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   6082000  3.29690E-02  1.00000E+00  82000   207.2100      82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89


                1004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                2004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                4024304     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
                4026304     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
                4028304     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91
                1006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                2006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                4006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                4014000     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
                4025055     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
                1008016     8O 16 from version 6 evaluation
                5008016     8O 16 from version 6 evaluation
                1001001     hydrogen in water 1301/1002    mod1   11/23/92
                2001001     hydrogen in water 1301/1002    mod1   11/23/92
                5001001     hydrogen in water 1301/1002    mod1   11/23/92
                4015031     15p 31 lll evaloct77 howerton                    mod1 12/20/88
                6082000     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89
                1094239     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  193
               2 moments were accepted. the p0 coefficient is  7.56237E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   77 to group  209
               2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        9.938458E-05   3.559599E-06  -4.950104E-05  -5.327950E-06
            the moments corresponding to this distribution are
        3.581641E-02   1.282934E-03   4.607479E-05
            the moments corresponding to the generated distribution are
        3.581641E-02   1.282934E-03   4.607249E-05
            the legendre expansion corresponding to these moments is
        9.938458E-05   3.559599E-06  -4.950104E-05  -5.327950E-06
            the weights/angles for this distribution are
        9.999999E-01   1.309082E-07
        3.581628E-02   9.903566E-01
            the moments corresponding to this distribution are
        3.581641E-02   1.282934E-03   4.607249E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   79 to group  216
               1 moments were accepted. the p0 coefficient is  1.11564E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   80 to group  206
               2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.178557E-04   5.158520E-06  -5.858916E-05  -7.713074E-06
            the moments corresponding to this distribution are
        4.376980E-02   1.915796E-03   8.384928E-05
            the moments corresponding to the generated distribution are
        4.376980E-02   1.915796E-03   8.385408E-05
            the legendre expansion corresponding to these moments is
        1.178557E-04   5.158520E-06  -5.858916E-05  -7.713073E-06
            the weights/angles for this distribution are
        9.999993E-01   6.601954E-07
        4.376983E-02  -2.895212E-08
            the moments corresponding to this distribution are
        4.376980E-02   1.915796E-03   8.385408E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   82 to group  162
               1 moments were accepted. the p0 coefficient is  6.65788E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   84 to group  160
               1 moments were accepted. the p0 coefficient is  4.80306E-04
```

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k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   88 to group  218
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      1.101443E-04   3.567781E-06  -5.489877E-05  -5.342294E-06
          the moments corresponding to this distribution are
      3.239189E-02   1.049294E-03   3.405271E-05
          the moments corresponding to the generated distribution are
      3.239189E-02   1.049294E-03   3.404786E-05
          the legendre expansion corresponding to these moments is
      1.101443E-04   3.567781E-06  -5.489877E-05  -5.342295E-06
          the weights/angles for this distribution are
      9.999999E-01   6.950965E-08
      3.239183E-02   9.593363E-01
          the moments corresponding to this distribution are
      3.239189E-02   1.049294E-03   3.404786E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   99 to group  176
            2 moments were accepted. the p0 coefficient is  1.83060E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  100 to group  207
            2 moments were accepted. the p0 coefficient is  4.68097E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  205
            2 moments were accepted. the p0 coefficient is  5.34499E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  106 to group  172
            2 moments were accepted. the p0 coefficient is  5.66870E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  114 to group  192
            2 moments were accepted. the p0 coefficient is  7.08055E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  114 to group  207
            2 moments were accepted. the p0 coefficient is  7.08051E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  142 to group  226
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      4.576761E-04   1.937928E-05  -2.276070E-04  -2.898167E-05
          the moments corresponding to this distribution are
      4.234279E-02   1.793208E-03   7.625608E-05
          the moments corresponding to the generated distribution are
      4.234279E-02   1.793208E-03   7.622058E-05
          the legendre expansion corresponding to these moments is
      4.576761E-04   1.937928E-05  -2.276070E-04  -2.898171E-05
          the weights/angles for this distribution are
      9.999996E-01   3.676722E-07
      4.234246E-02   9.401043E-01
          the moments corresponding to this distribution are
      4.234279E-02   1.793208E-03   7.622058E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  143 to group  230
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      1.024540E-04   2.576466E-06  -5.112980E-05  -3.860616E-06
          the moments corresponding to this distribution are
      2.514754E-02   6.324286E-04   1.593795E-05
          the moments corresponding to the generated distribution are
      2.514754E-02   6.324286E-04   1.593115E-05
          the legendre expansion corresponding to these moments is
      1.024540E-04   2.576466E-06  -5.112980E-05  -3.860618E-06
          the weights/angles for this distribution are
      1.000000E+00   4.020699E-08
      2.514751E-02   8.857394E-01
          the moments corresponding to this distribution are
      2.514754E-02   6.324286E-04   1.593115E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  149 to group  149
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      3.410973E-02   3.271683E-02   3.028305E-02   2.744737E-02
          the moments corresponding to this distribution are
      9.591641E-01   9.252085E-01   8.973699E-01
          the moments corresponding to the generated distribution are
      9.591641E-01   9.252085E-01   8.965778E-01
          the legendre expansion corresponding to these moments is
      3.410973E-02   3.271683E-02   3.028305E-02   2.737982E-02
          the weights/angles for this distribution are
      8.740576E-01   1.259424E-01
      9.865702E-01   7.689623E-01
          the moments corresponding to this distribution are
      9.591641E-01   9.252085E-01   8.965778E-01

keno message number k5-222     121 transfers for mixture     1 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   17 to group   73
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
          the moments corresponding to this distribution are
      2.103383E-02   4.424545E-04   9.340116E-06
          the moments corresponding to the generated distribution are
      2.103383E-02   4.424545E-04   9.338884E-06
          the legendre expansion corresponding to these moments is
      6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
          the weights/angles for this distribution are
      1.000000E+00   3.506203E-08
      2.103380E-02   9.809266E-01
          the moments corresponding to this distribution are
      2.103383E-02   4.424545E-04   9.338884E-06

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   31 to group   67
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
      3.020880E-04   1.552948E-05  -1.498463E-04  -2.319124E-05
```

```
        the moments corresponding to this distribution are
5.140713E-02   2.643117E-03   1.363483E-04
        the moments corresponding to the generated distribution are
5.140713E-02   2.643117E-03   1.362936E-04
        the legendre expansion corresponding to these moments is
3.020880E-04   1.552948E-05  -1.498463E-04  -2.319128E-05
        the weights/angles for this distribution are
9.999995E-01   5.426291E-07
5.140665E-02   9.355055E-01
        the moments corresponding to this distribution are
5.140713E-02   2.643117E-03   1.362936E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   36 to group   75
            1 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
3.436553E-05   8.753364E-07  -1.714932E-05  -1.311583E-06
        the moments corresponding to this distribution are
2.547135E-02   6.487885E-04   1.654347E-05
        the moments corresponding to the generated distribution are
2.547135E-02   6.487908E-04   1.652561E-05
        the legendre expansion corresponding to these moments is
3.436553E-05   8.753364E-07  -1.714932E-05  -1.311585E-06
        the weights/angles for this distribution are
9.999982E-01   1.759111E-06
2.547139E-02  -4.483616E-08
        the moments corresponding to this distribution are
2.547135E-02   6.487908E-04   1.652561E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   86
            1 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
1.550883E-04   6.403348E-06  -7.714756E-05  -9.577728E-06
        the moments corresponding to this distribution are
4.128841E-02   1.704733E-03   7.039822E-05
        the moments corresponding to the generated distribution are
4.128841E-02   1.704733E-03   7.038573E-05
        the legendre expansion corresponding to these moments is
1.550883E-04   6.403348E-06  -7.714756E-05  -9.577732E-06
        the weights/angles for this distribution are
9.999999E-01   1.260091E-07
4.128842E-02  -5.211604E-09
        the moments corresponding to this distribution are
4.128841E-02   1.704733E-03   7.038573E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
6.978938E-05   2.469208E-06  -3.476364E-05  -3.696076E-06
        the moments corresponding to this distribution are
3.538085E-02   1.251836E-03   4.433614E-05
        the moments corresponding to the generated distribution are
3.538085E-02   1.251836E-03   4.431055E-05
        the legendre expansion corresponding to these moments is
6.978938E-05   2.469208E-06  -3.476364E-05  -3.696081E-06
        the weights/angles for this distribution are
9.999999E-01   1.014716E-07
3.538080E-02   5.900701E-01
        the moments corresponding to this distribution are
3.538085E-02   1.251836E-03   4.431055E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   51 to group   87
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
1.360841E-04   5.588769E-06  -6.769771E-05  -8.359530E-06
        the moments corresponding to this distribution are
4.106850E-02   1.686766E-03   6.943713E-05
        the moments corresponding to the generated distribution are
4.106850E-02   1.686766E-03   6.940783E-05
        the legendre expansion corresponding to these moments is
1.360841E-04   5.588769E-06  -6.769771E-05  -8.359540E-06
        the weights/angles for this distribution are
9.999998E-01   1.956027E-07
4.106834E-02   8.979992E-01
        the moments corresponding to this distribution are
4.106850E-02   1.686766E-03   6.940783E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   65 to group  101
            1 moments were accepted. the p0 coefficient is  7.14843E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   68 to group  107
            2 moments were accepted. the p0 coefficient is  6.43298E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   75 to group  194
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
1.513644E-04   8.247675E-06  -7.500807E-05  -1.231030E-05
        the moments corresponding to this distribution are
5.448889E-02   2.969040E-03   1.617684E-04
        the moments corresponding to the generated distribution are
5.448889E-02   2.969040E-03   1.617797E-04
        the legendre expansion corresponding to these moments is
1.513644E-04   8.247675E-06  -7.500807E-05  -1.231029E-05
        the weights/angles for this distribution are
9.999997E-01   2.777653E-07
5.448890E-02  -1.518020E-08
        the moments corresponding to this distribution are
5.448889E-02   2.969040E-03   1.617797E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   77 to group  209
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
9.945100E-05   3.561977E-06  -4.953412E-05  -5.331510E-06
        the moments corresponding to this distribution are
3.581641E-02   1.282931E-03   4.607786E-05
        the moments corresponding to the generated distribution are
```

```
3.581641E-02   1.282931E-03   4.606247E-05
     the legendre expansion corresponding to these moments is
9.945100E-05   3.561977E-06  -4.953412E-05  -5.331513E-06
     the weights/angles for this distribution are
9.999999E-01   1.439254E-07
3.581628E-02   9.337027E-01
     the moments corresponding to this distribution are
3.581641E-02   1.282931E-03   4.606247E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   80 to group  172
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
     the moments corresponding to this distribution are
8.005312E-02   6.408680E-03   5.132358E-04
     the moments corresponding to the generated distribution are
8.005312E-02   6.408680E-03   5.132162E-04
     the legendre expansion corresponding to these moments is
1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
     the weights/angles for this distribution are
9.999998E-01   2.368696E-07
8.005292E-02   9.445136E-01
     the moments corresponding to this distribution are
8.005312E-02   6.408680E-03   5.132162E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   82 to group  162
          2 moments were accepted. the p0 coefficient is  6.66650E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   98 to group  214
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
4.471841E-04   2.551503E-05  -2.214081E-04  -3.806459E-05
     the moments corresponding to this distribution are
5.705712E-02   3.255749E-03   1.860170E-04
     the moments corresponding to the generated distribution are
5.705712E-02   3.255749E-03   1.860059E-04
     the legendre expansion corresponding to these moments is
4.471841E-04   2.551503E-05  -2.214081E-04  -3.806460E-05
     the weights/angles for this distribution are
9.999997E-01   2.774108E-07
5.705686E-02   9.762922E-01
     the moments corresponding to this distribution are
5.705712E-02   3.255749E-03   1.860059E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  100 to group  190
          2 moments were accepted. the p0 coefficient is  4.68299E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  104 to group  205
          1 moments were accepted. the p0 coefficient is  5.35149E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  105 to group  210
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
5.537484E-04   4.469354E-05  -2.714633E-04  -6.631247E-05
     the moments corresponding to this distribution are
8.071091E-02   6.514266E-03   5.257494E-04
     the moments corresponding to the generated distribution are
8.071091E-02   6.514266E-03   5.257672E-04
     the legendre expansion corresponding to these moments is
5.537484E-04   4.469354E-05  -2.714633E-04  -6.631245E-05
     the weights/angles for this distribution are
9.999999E-01   6.184942E-08
8.071094E-02  -4.163174E-01
     the moments corresponding to this distribution are
8.071091E-02   6.514266E-03   5.257672E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  192
          2 moments were accepted. the p0 coefficient is  7.08334E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  207
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
7.083302E-04   7.331732E-05  -3.427817E-04  -1.080120E-04
     the moments corresponding to this distribution are
1.035073E-01   1.071382E-02   1.109050E-03
     the moments corresponding to the generated distribution are
1.035073E-01   1.071382E-02   1.109007E-03
     the legendre expansion corresponding to these moments is
7.083302E-04   7.331732E-05  -3.427817E-04  -1.080121E-04
     the weights/angles for this distribution are
9.999998E-01   2.029094E-07
1.035072E-01   6.642933E-01
     the moments corresponding to this distribution are
1.035073E-01   1.071382E-02   1.109007E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  122 to group  229
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
4.760356E-05   6.498871E-07  -2.378847E-05  -9.745249E-07
     the moments corresponding to this distribution are
1.365207E-02   1.863943E-04   2.568987E-06
     the moments corresponding to the generated distribution are
1.365207E-02   1.863943E-04   2.551278E-06
     the legendre expansion corresponding to these moments is
4.760356E-05   6.498871E-07  -2.378847E-05  -9.745271E-07
     the weights/angles for this distribution are
9.999999E-01   9.257298E-08
1.365203E-02   4.196166E-01
     the moments corresponding to this distribution are
1.365207E-02   1.863943E-04   2.551278E-06

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  130 to group  175
          2 moments were accepted. the p0 coefficient is  7.62811E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  144 to group  230
```

```
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
          the moments corresponding to this distribution are
     2.667994E-02   7.118417E-04   1.901619E-05
          the moments corresponding to the generated distribution are
     2.667994E-02   7.118417E-04   1.901414E-05
          the legendre expansion corresponding to these moments is
     1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
          the weights/angles for this distribution are
     1.000000E+00   2.632260E-08
     2.667991E-02   9.547741E-01
          the moments corresponding to this distribution are
     2.667994E-02   7.118417E-04   1.901414E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  147 to group  177
            2 moments were accepted. the p0 coefficient is  2.87948E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  149 to group  149
            1 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.392408E-02   3.268915E-02   3.028554E-02   2.745581E-02
          the moments corresponding to this distribution are
     9.635975E-01   9.284965E-01   9.018909E-01
          the moments corresponding to the generated distribution are
     9.635975E-01   9.285436E-01   8.947650E-01
          the legendre expansion corresponding to these moments is
     3.392408E-02   3.268915E-02   3.028794E-02   2.685146E-02
          the weights/angles for this distribution are
     9.999746E-01   2.536909E-05
     9.636219E-01  -3.422353E-04
          the moments corresponding to this distribution are
     9.635975E-01   9.285436E-01   8.947650E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  150 to group  150
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.160285E-02   4.909516E-02   4.461168E-02   3.940127E-02
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.762618E-01
          the moments corresponding to the generated distribution are
     9.514041E-01   9.096799E-01   8.714495E-01
          the legendre expansion corresponding to these moments is
     5.160285E-02   4.909516E-02   4.461168E-02   3.878044E-02
          the weights/angles for this distribution are
     9.870113E-01   1.298868E-02
     9.591081E-01   3.659778E-01
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.714495E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  151 to group  151
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.254969E-02   4.995038E-02   4.532984E-02   3.997005E-02
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.745673E-01
          the moments corresponding to the generated distribution are
     9.505360E-01   9.084061E-01   8.704781E-01
          the legendre expansion corresponding to these moments is
     5.254969E-02   4.995038E-02   4.532984E-02   3.943283E-02
          the weights/angles for this distribution are
     9.790505E-01   2.094948E-02
     9.607624E-01   4.726190E-01
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.704781E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  152 to group  152
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.445168E-02   5.164695E-02   4.673397E-02   4.110458E-02
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.710476E-01
          the moments corresponding to the generated distribution are
     9.484915E-01   9.055100E-01   8.682405E-01
          the legendre expansion corresponding to these moments is
     5.445168E-02   5.164695E-02   4.673397E-02   4.072245E-02
          the weights/angles for this distribution are
     9.456984E-01   5.430165E-02
     9.668567E-01   6.286492E-01
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.682405E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  153 to group  153
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.650781E-02   5.348388E-02   4.824280E-02   4.225094E-02
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.669722E-01
          the moments corresponding to the generated distribution are
     9.464864E-01   9.024911E-01   8.656703E-01
          the legendre expansion corresponding to these moments is
     5.650781E-02   5.348388E-02   4.824280E-02   4.206703E-02
          the weights/angles for this distribution are
     8.593679E-01   1.406321E-01
     9.794865E-01   7.448307E-01
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.656703E-01

keno message number k5-222     149 transfers for mixture     2 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   25 to group   63
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947598E-05
          the moments corresponding to this distribution are
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5.606000E-02   3.142957E-03   1.764563E-04
     the moments corresponding to the generated distribution are
5.606000E-02   3.142957E-03   1.764250E-04
     the legendre expansion corresponding to these moments is
3.523775E-04   1.975428E-05  -1.745275E-04  -2.947601E-05
     the weights/angles for this distribution are
9.999997E-01   3.036038E-07
5.605973E-02   9.328158E-01
     the moments corresponding to this distribution are
5.606000E-02   3.142957E-03   1.764250E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   46 to group   75
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
2.107464E-04   1.252698E-05  -1.042563E-04  -1.867983E-05
     the moments corresponding to this distribution are
5.944100E-02   3.533259E-03   2.099896E-04
     the moments corresponding to the generated distribution are
5.944100E-02   3.533259E-03   2.100019E-04
     the legendre expansion corresponding to these moments is
2.107464E-04   1.252698E-05  -1.042563E-04  -1.867982E-05
     the weights/angles for this distribution are
1.000000E+00   3.845905E-08
5.944103E-02  -7.662296E-01
     the moments corresponding to this distribution are
5.944100E-02   3.533259E-03   2.100019E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   50 to group   91
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
7.176521E-05   2.539114E-06  -3.574785E-05  -3.800717E-06
     the moments corresponding to this distribution are
3.538085E-02   1.251842E-03   4.433718E-05
     the moments corresponding to the generated distribution are
3.538085E-02   1.251842E-03   4.432188E-05
     the legendre expansion corresponding to these moments is
7.176521E-05   2.539114E-06  -3.574785E-05  -3.800719E-06
     the weights/angles for this distribution are
9.999999E-01   6.443804E-08
3.538080E-02   7.931237E-01
     the moments corresponding to this distribution are
3.538085E-02   1.251842E-03   4.432188E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   65 to group  101
          2 moments were accepted. the p0 coefficient is  7.31570E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  209
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.017605E-04   3.644696E-06  -5.068443E-05  -5.455322E-06
     the moments corresponding to this distribution are
3.581641E-02   1.282915E-03   4.607288E-05
     the moments corresponding to the generated distribution are
3.581641E-02   1.282915E-03   4.603329E-05
     the legendre expansion corresponding to these moments is
1.017605E-04   3.644696E-06  -5.068443E-05  -5.455332E-06
     the weights/angles for this distribution are
9.999998E-01   1.703986E-07
3.581627E-02   8.022606E-01
     the moments corresponding to this distribution are
3.581641E-02   1.282915E-03   4.603329E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  213
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.017610E-04   2.943045E-06  -5.075281E-05  -4.408409E-06
     the moments corresponding to this distribution are
2.892116E-02   8.364365E-04   2.420515E-05
     the moments corresponding to the generated distribution are
2.892116E-02   8.364365E-04   2.419080E-05
     the legendre expansion corresponding to these moments is
1.017610E-04   2.943045E-06  -5.075281E-05  -4.408413E-06
     the weights/angles for this distribution are
9.999962E-01   3.840111E-06
2.892127E-02  -1.111543E-07
     the moments corresponding to this distribution are
2.892116E-02   8.364365E-04   2.419080E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  171
          2 moments were accepted. the p0 coefficient is  1.20653E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  206
          1 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.206511E-04   5.280875E-06  -5.997885E-05  -7.896021E-06
     the moments corresponding to this distribution are
4.376979E-02   1.915793E-03   8.384988E-05
     the moments corresponding to the generated distribution are
4.376979E-02   1.915796E-03   8.385408E-05
     the legendre expansion corresponding to these moments is
1.206511E-04   5.280875E-06  -5.997885E-05  -7.896020E-06
     the weights/angles for this distribution are
9.999992E-01   8.131593E-07
4.376983E-02  -3.566019E-08
     the moments corresponding to this distribution are
4.376979E-02   1.915796E-03   8.385408E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  222
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
4.826018E-05   7.438963E-07  -2.411289E-05  -1.115404E-06
     the moments corresponding to this distribution are
1.541429E-02   2.376060E-04   3.652759E-06
     the moments corresponding to the generated distribution are
1.541429E-02   2.376060E-04   3.660935E-06
```

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            the legendre expansion corresponding to these moments is
        4.826018E-05   7.438963E-07  -2.411289E-05  -1.115403E-06
            the weights/angles for this distribution are
        9.999999E-01   6.128777E-08
        1.541431E-02  -2.913944E-01
            the moments corresponding to this distribution are
        1.541429E-02   2.376060E-04   3.660935E-06

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   83 to group  161
                2 moments were accepted. the p0 coefficient is  6.24506E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   84 to group  160
                2 moments were accepted. the p0 coefficient is  4.91713E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   89 to group  148
                2 moments were accepted. the p0 coefficient is  5.85610E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   90 to group  169
                2 moments were accepted. the p0 coefficient is  6.17329E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   93 to group  181
                2 moments were accepted. the p0 coefficient is  1.45037E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   94 to group  112
                2 moments were accepted. the p0 coefficient is  7.61129E-03

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   97 to group  189
                1 moments were accepted. the p0 coefficient is  1.78001E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   99 to group  176
                1 moments were accepted. the p0 coefficient is  1.87371E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  104 to group  205
                1 moments were accepted. the p0 coefficient is  5.47573E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  105 to group  210
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785186E-05
            the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257461E-04
            the moments corresponding to the generated distribution are
        8.071091E-02   6.514271E-03   5.257637E-04
            the legendre expansion corresponding to these moments is
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785183E-05
            the weights/angles for this distribution are
        1.000000E+00   4.936485E-08
        8.071094E-02  -5.467504E-01
            the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257637E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  106 to group  177
                2 moments were accepted. the p0 coefficient is  2.32080E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  114 to group  192
                2 moments were accepted. the p0 coefficient is  7.24779E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725976E-06
            the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.901552E-05
            the moments corresponding to the generated distribution are
        2.667994E-02   7.118348E-04   1.900025E-05
            the legendre expansion corresponding to these moments is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725981E-06
            the weights/angles for this distribution are
        9.999999E-01   6.598613E-08
        2.667990E-02   5.153067E-01
            the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.900025E-05

keno message number k5-222     129 transfers for mixture     5 were corrected for bad moments.

                               ........    0 io's were used mixing cross-sections       ........

                                1-d cross section array id numbers
                                   1  2002  1452    27    18  1018

*****************************************************************************************************************************

                           the number of direct access blocks for unit  8 has been increased to 1079.

*****************************************************************************************************************************

                               ........    0 io's were used preparing the cross sections    ........
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900    ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                              ****** additional information ******                 ***
***                                                                                   ***
***  number of energy groups              238       use lattice geometry                no  ***
***                                                                                   ***
***  no. of fission spectrum source group  1        global array number                  0  ***
***                                                                                   ***
***  no. of scattering angles in xsecs     2        number of units in the global x dir.  0  ***
***                                                                                   ***
***  entries/neutron in the neutron bank  17        number of units in the global y dir.  0  ***
***                                                                                   ***
***  entries/neutron in the fission bank  10        number of units in the global z dir.  0  ***
***                                                                                   ***
***  number of mixtures used               5        use a global reflector            yes  ***
***                                                                                   ***
***  number of bias id's used              1        use nested holes                   no  ***
***                                                                                   ***
***  number of differential albedos used   0        number of holes                     1  ***
***                                                                                   ***
***  total input geometry regions          7        maximum hole nesting level          1  ***
***                                                                                   ***
***  number of geometry regions used       7        use nested arrays                  no  ***
***                                                                                   ***
***  largest geometry unit number         10        number of arrays used               0  ***
***                                                                                   ***
***  largest array number                  1        maximum array nesting level         0  ***
***                                                                                   ***
***                                                                                   ***
***  +x boundary condition            mirror        -x boundary condition          mirror  ***
***                                                                                   ***
***  +y boundary condition            mirror        -y boundary condition          mirror  ***
***                                                                                   ***
***  +z boundary condition            mirror        -z boundary condition          mirror  ***
***                                                                                   ***
*****************************************************************************************
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    ****** space and supergroup information ******                 ***
***                                                                                   ***
***      2000000 words is the total space available.                                  ***
***                                                                                   ***
***        30661 words were used for non-supergroup storage.                          ***
***                                                                                   ***
***      1969339 words of storage are available for supergrouped data.                ***
***                                                                                   ***
***      1999416 words of storage are available for constructing the supergroups.     ***
***                                                                                   ***
***      1968857 words of storage are available to each supergroup.                   ***
***                                                                                   ***
***         5835 words are needed for the largest group.                              ***
***                                                                                   ***
***        38400 words of storage is sufficient to run this problem.                  ***
***                                                                                   ***
***       469323 words of storage will allow the problem to run with one supergroup.  ***
***                                                                                   ***
***       469632 words of storage will be used to run this problem.                   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    starting      ending       xsec      albedo      total         ***
***   supergroup         group        group      length     length      length        ***
***                                                                                   ***
***                                                                                   ***
***          1            1           238       105618          0      438180         ***
***                                                                                   ***
*****************************************************************************************

            ........    0 io's were used in supergrouping    ........

            ........    0 io's were used loading the data    ........
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

```
                    media bias      geometry description for those units utilized in this problem
region               num   id

                                                  -----   unit     1   -----

pu sphere

  1 sphere           1  1  radius =  11.915     the center is located at ( 0.00000    , 0.00000    , 0.00000    ).

                                        ******************   global   ******************
                                                  -----   unit    10   -----

ru-tru 72-b package w/ pu sphere

  1 cylinder         2  1  radius =  39.688     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

    hole number      1        at x = 0.00000      y =  27.770      z =  142.39     is unit number      1

  2 cylinder         4  1  radius =  43.180     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  3 cylinder         6  1  radius =  47.943     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  4 cylinder         4  1  radius =  52.070     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  5 cylinder         4  1  radius =  52.070     +z =  187.33     -z = -170.82     centerline is at  x = 0.00000      y = 0.00000

  6 cuboid           5  1      +x =  72.390     -x = -72.390     +y =  72.390     -y = -72.390     +z =  216.54     -z = -200.03
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	7.08622E+03 cm**3	7.08622E+03 cm**3
10	1	2	1.52006E+06 cm**3	1.52715E+06 cm**3
	2	3	2.80605E+05 cm**3	1.80775E+06 cm**3
	3	4	4.20760E+05 cm**3	2.22851E+06 cm**3
	4	5	4.00235E+05 cm**3	2.62875E+06 cm**3
	5	6	4.21884E+05 cm**3	3.05063E+06 cm**3
	6	7	5.68119E+06 cm**3	8.73183E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	7.08622E+03 cm**3
10	1	1	2	1.52006E+06 cm**3
		2	4	2.80605E+05 cm**3
		3	6	4.20760E+05 cm**3
		4	4	4.00235E+05 cm**3
		5	4	4.21884E+05 cm**3
		6	5	5.68119E+06 cm**3

total mixture volumes

mixture	total volume	mass(g)
1	7.08622E+03 cm**3	6.83953E+03
2	1.52006E+06 cm**3	1.41709E+06
4	1.10272E+06 cm**3	8.75563E+06
5	5.68119E+06 cm**3	5.67080E+06
6	4.20760E+05 cm**3	4.77310E+06

```
*****************************************************************************************************
***                                                                                               ***
***                                    biasing information                                        ***
***                                                                                               ***
***     a default weight of    0.500 will be used for all bias id's.                              ***
***                                                                                               ***
*****************************************************************************************************
```

..... 0 io's were used in keno-v before tracking .....

..... 0.07550 minutes were used processing data. .....

volume fraction of fissile material in the core= 8.11539E-04

start type 0 was used.

the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
the flag to start neutrons in the reflector was turned off

0.06617 minutes were required for starting. total elapsed time is 0.14083 minutes.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
keno message number k5-132		warning....only	998 independent fission points were generated			
1	8.98382E-01	1.46833E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.32954E-01	1.53000E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	959 independent fission points were generated			
3	8.69728E-01	1.58833E-01	8.69728E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.30068E-01	1.64167E-01	8.99898E-01	3.01700E-02	0.00000E+00	0.00000E+00
5	9.38486E-01	1.73333E-01	9.12761E-01	2.16531E-02	0.00000E+00	0.00000E+00
6	9.00094E-01	1.79333E-01	9.09594E-01	1.56351E-02	0.00000E+00	0.00000E+00
7	9.60328E-01	1.88500E-01	9.19741E-01	1.57997E-02	0.00000E+00	0.00000E+00
8	8.97830E-01	1.94000E-01	9.16089E-01	1.34073E-02	0.00000E+00	0.00000E+00
9	9.15762E-01	1.99333E-01	9.16042E-01	1.13313E-02	0.00000E+00	0.00000E+00
10	9.38654E-01	2.07500E-01	9.18869E-01	1.02122E-02	0.00000E+00	0.00000E+00
11	9.42173E-01	2.13667E-01	9.21458E-01	9.37111E-03	0.00000E+00	0.00000E+00
12	9.26318E-01	2.21833E-01	9.21944E-01	8.39585E-03	0.00000E+00	0.00000E+00
13	9.71196E-01	2.27833E-01	9.26422E-01	8.81595E-03	0.00000E+00	0.00000E+00
14	9.19147E-01	2.35833E-01	9.25815E-01	8.07063E-03	0.00000E+00	0.00000E+00
15	9.47565E-01	2.41833E-01	9.27488E-01	7.61008E-03	0.00000E+00	0.00000E+00
16	8.99554E-01	2.47333E-01	9.25493E-01	7.32266E-03	0.00000E+00	0.00000E+00
17	9.49261E-01	2.54667E-01	9.27078E-01	6.99876E-03	0.00000E+00	0.00000E+00
18	9.14614E-01	2.60000E-01	9.26299E-01	6.59292E-03	0.00000E+00	0.00000E+00
19	9.18155E-01	2.65500E-01	9.25820E-01	6.21147E-03	0.00000E+00	0.00000E+00
20	9.40764E-01	2.73167E-01	9.26650E-01	5.91479E-03	0.00000E+00	0.00000E+00
21	9.10210E-01	2.78833E-01	9.25785E-01	5.66134E-03	0.00000E+00	0.00000E+00
22	9.50776E-01	2.86167E-01	9.27034E-01	5.51427E-03	0.00000E+00	0.00000E+00
23	9.45354E-01	2.91833E-01	9.27906E-01	5.31717E-03	0.00000E+00	0.00000E+00
24	9.39594E-01	2.97333E-01	9.28438E-01	5.09748E-03	0.00000E+00	0.00000E+00
25	9.24669E-01	3.03833E-01	9.28274E-01	4.87357E-03	0.00000E+00	0.00000E+00
26	8.90570E-01	3.09500E-01	9.26703E-01	4.92345E-03	0.00000E+00	0.00000E+00
27	8.97900E-01	3.15333E-01	9.25551E-01	4.86091E-03	0.00000E+00	0.00000E+00
28	9.39859E-01	3.22333E-01	9.26101E-01	4.70253E-03	0.00000E+00	0.00000E+00
29	9.67699E-01	3.27833E-01	9.27642E-01	4.78009E-03	0.00000E+00	0.00000E+00
30	9.16398E-01	3.34333E-01	9.27240E-01	4.62369E-03	0.00000E+00	0.00000E+00
31	9.22570E-01	3.39833E-01	9.27079E-01	4.46431E-03	0.00000E+00	0.00000E+00
32	9.87281E-01	3.45167E-01	9.29086E-01	4.75693E-03	0.00000E+00	0.00000E+00
33	9.41084E-01	3.51500E-01	9.29473E-01	4.61717E-03	0.00000E+00	0.00000E+00
34	9.59371E-01	3.56667E-01	9.30407E-01	4.56714E-03	0.00000E+00	0.00000E+00
35	9.27022E-01	3.62167E-01	9.30305E-01	4.42777E-03	0.00000E+00	0.00000E+00
36	9.20214E-01	3.67833E-01	9.30008E-01	4.30581E-03	0.00000E+00	0.00000E+00
37	9.21509E-01	3.73667E-01	9.29765E-01	4.18802E-03	0.00000E+00	0.00000E+00
38	9.15135E-01	3.79000E-01	9.29359E-01	4.09026E-03	0.00000E+00	0.00000E+00
39	9.33130E-01	3.84833E-01	9.29461E-01	3.97949E-03	0.00000E+00	0.00000E+00
40	9.28280E-01	3.90333E-01	9.29430E-01	3.87347E-03	0.00000E+00	0.00000E+00
41	9.35158E-01	3.95667E-01	9.29576E-01	3.77570E-03	0.00000E+00	0.00000E+00
42	9.09810E-01	4.01167E-01	9.29082E-01	3.71313E-03	0.00000E+00	0.00000E+00
43	9.06339E-01	4.07000E-01	9.28528E-01	3.66367E-03	0.00000E+00	0.00000E+00
44	9.44835E-01	4.12333E-01	9.28916E-01	3.59640E-03	0.00000E+00	0.00000E+00
45	9.40222E-01	4.18167E-01	9.29179E-01	3.52159E-03	0.00000E+00	0.00000E+00
46	9.47918E-01	4.23833E-01	9.29605E-01	3.46688E-03	0.00000E+00	0.00000E+00
47	9.00054E-01	4.29333E-01	9.28948E-01	3.45201E-03	0.00000E+00	0.00000E+00
48	9.13322E-01	4.35333E-01	9.28608E-01	3.39317E-03	0.00000E+00	0.00000E+00
49	9.42226E-01	4.41333E-01	9.28898E-01	3.33281E-03	0.00000E+00	0.00000E+00
50	9.61962E-01	4.46833E-01	9.29587E-01	3.33456E-03	0.00000E+00	0.00000E+00
51	9.36265E-01	4.52333E-01	9.29723E-01	3.26865E-03	0.00000E+00	0.00000E+00
52	9.71928E-01	4.57667E-01	9.30567E-01	3.31198E-03	0.00000E+00	0.00000E+00
53	9.54215E-01	4.63000E-01	9.31031E-01	3.27933E-03	0.00000E+00	0.00000E+00
54	9.87973E-01	4.68333E-01	9.32126E-01	3.39699E-03	0.00000E+00	0.00000E+00
55	9.08347E-01	4.74167E-01	9.31677E-01	3.36234E-03	0.00000E+00	0.00000E+00
56	9.68219E-01	4.80333E-01	9.32354E-01	3.36817E-03	0.00000E+00	0.00000E+00
57	9.53398E-01	4.85833E-01	9.32737E-01	3.32843E-03	0.00000E+00	0.00000E+00
58	9.24899E-01	4.91500E-01	9.32597E-01	3.27145E-03	0.00000E+00	0.00000E+00
59	9.00843E-01	4.97500E-01	9.32040E-01	3.26147E-03	0.00000E+00	0.00000E+00
60	9.24078E-01	5.02833E-01	9.31902E-01	3.20768E-03	0.00000E+00	0.00000E+00
61	9.18281E-01	5.08500E-01	9.31671E-01	3.16129E-03	0.00000E+00	0.00000E+00
62	9.00938E-01	5.14000E-01	9.31159E-01	3.15008E-03	0.00000E+00	0.00000E+00
63	9.70249E-01	5.19167E-01	9.31800E-01	3.16359E-03	0.00000E+00	0.00000E+00
64	9.54774E-01	5.24333E-01	9.32171E-01	3.13413E-03	0.00000E+00	0.00000E+00
65	9.37827E-01	5.30167E-01	9.32260E-01	3.08528E-03	0.00000E+00	0.00000E+00
66	9.23678E-01	5.35833E-01	9.32126E-01	3.03965E-03	0.00000E+00	0.00000E+00
67	9.53307E-01	5.42167E-01	9.32452E-01	3.01021E-03	0.00000E+00	0.00000E+00
68	9.33819E-01	5.48000E-01	9.32473E-01	2.96432E-03	0.00000E+00	0.00000E+00
69	9.18732E-01	5.54000E-01	9.32268E-01	2.92694E-03	0.00000E+00	0.00000E+00
70	9.26777E-01	5.59833E-01	9.32187E-01	2.88471E-03	0.00000E+00	0.00000E+00
71	9.07016E-01	5.65833E-01	9.31822E-01	2.86590E-03	0.00000E+00	0.00000E+00
72	1.01147E+00	5.71000E-01	9.32960E-01	3.04524E-03	0.00000E+00	0.00000E+00
73	9.21220E-01	5.76500E-01	9.32795E-01	3.00660E-03	0.00000E+00	0.00000E+00
74	9.42794E-01	5.82000E-01	9.32934E-01	2.96780E-03	0.00000E+00	0.00000E+00
75	9.49812E-01	5.87333E-01	9.33165E-01	2.93598E-03	0.00000E+00	0.00000E+00
76	9.31555E-01	5.93333E-01	9.33143E-01	2.89611E-03	0.00000E+00	0.00000E+00
77	9.65531E-01	5.98833E-01	9.33575E-01	2.88969E-03	0.00000E+00	0.00000E+00
78	9.55397E-01	6.04333E-01	9.33862E-01	2.86583E-03	0.00000E+00	0.00000E+00
79	9.40266E-01	6.10333E-01	9.33945E-01	2.82959E-03	0.00000E+00	0.00000E+00
80	8.93690E-01	6.18333E-01	9.33429E-01	2.84036E-03	0.00000E+00	0.00000E+00
81	9.48819E-01	6.24333E-01	9.33624E-01	2.81093E-03	0.00000E+00	0.00000E+00
82	9.53888E-01	6.30333E-01	9.33877E-01	2.78711E-03	0.00000E+00	0.00000E+00
83	9.33150E-01	6.36167E-01	9.33868E-01	2.75250E-03	0.00000E+00	0.00000E+00
84	9.93398E-01	6.42167E-01	9.34594E-01	2.81398E-03	0.00000E+00	0.00000E+00
85	9.54876E-01	6.47833E-01	9.34839E-01	2.79059E-03	0.00000E+00	0.00000E+00
86	9.36294E-01	6.53500E-01	9.34856E-01	2.75722E-03	0.00000E+00	0.00000E+00
87	8.82736E-01	6.59833E-01	9.34243E-01	2.79274E-03	0.00000E+00	0.00000E+00
88	9.21828E-01	6.65500E-01	9.34098E-01	2.76385E-03	0.00000E+00	0.00000E+00
89	9.42707E-01	6.72833E-01	9.34197E-01	2.73369E-03	0.00000E+00	0.00000E+00
90	9.69796E-01	6.78833E-01	9.34602E-01	2.73255E-03	0.00000E+00	0.00000E+00
91	9.26584E-01	6.84333E-01	9.34512E-01	2.70318E-03	0.00000E+00	0.00000E+00
92	9.40860E-01	6.90000E-01	9.34582E-01	2.67390E-03	0.00000E+00	0.00000E+00
93	8.88997E-01	6.95667E-01	9.34081E-01	2.69139E-03	0.00000E+00	0.00000E+00
94	9.19329E-01	7.01667E-01	9.33921E-01	2.66680E-03	0.00000E+00	0.00000E+00
95	9.06349E-01	7.07667E-01	9.33625E-01	2.65457E-03	0.00000E+00	0.00000E+00
96	9.14627E-01	7.13667E-01	9.33422E-01	2.63395E-03	0.00000E+00	0.00000E+00
97	9.21327E-01	7.19500E-01	9.33295E-01	2.60918E-03	0.00000E+00	0.00000E+00
98	9.09693E-01	7.25167E-01	9.33049E-01	2.59354E-03	0.00000E+00	0.00000E+00
99	9.42837E-01	7.30667E-01	9.33150E-01	2.56864E-03	0.00000E+00	0.00000E+00

100	9.54322E-01	7.36167E-01	9.33366E-01	2.55146E-03	0.00000E+00	0.00000E+00
101	9.49465E-01	7.41833E-01	9.33529E-01	2.53079E-03	0.00000E+00	0.00000E+00
102	9.34559E-01	7.47333E-01	9.33539E-01	2.50537E-03	0.00000E+00	0.00000E+00
103	9.19262E-01	7.52833E-01	9.33398E-01	2.48447E-03	0.00000E+00	0.00000E+00
104	9.53336E-01	7.58500E-01	9.33593E-01	2.46774E-03	0.00000E+00	0.00000E+00
105	9.39566E-01	7.64667E-01	9.33651E-01	2.44435E-03	0.00000E+00	0.00000E+00
106	9.30053E-01	7.70167E-01	9.33617E-01	2.42098E-03	0.00000E+00	0.00000E+00
107	9.82159E-01	7.75500E-01	9.34079E-01	2.44198E-03	0.00000E+00	0.00000E+00
108	9.39902E-01	7.81167E-01	9.34134E-01	2.41945E-03	0.00000E+00	0.00000E+00
109	9.25343E-01	7.87167E-01	9.34052E-01	2.39814E-03	0.00000E+00	0.00000E+00
110	9.26637E-01	7.93167E-01	9.33983E-01	2.37683E-03	0.00000E+00	0.00000E+00
111	9.30604E-01	7.99167E-01	9.33952E-01	2.35512E-03	0.00000E+00	0.00000E+00
112	9.29520E-01	8.05167E-01	9.33912E-01	2.33396E-03	0.00000E+00	0.00000E+00
113	8.85963E-01	8.10500E-01	9.33480E-01	2.35284E-03	0.00000E+00	0.00000E+00
114	9.52118E-01	8.15833E-01	9.33646E-01	2.33766E-03	0.00000E+00	0.00000E+00
115	9.29912E-01	8.21500E-01	9.33613E-01	2.31712E-03	0.00000E+00	0.00000E+00
116	9.27903E-01	8.27000E-01	9.33563E-01	2.29725E-03	0.00000E+00	0.00000E+00
117	9.32456E-01	8.32667E-01	9.33553E-01	2.27721E-03	0.00000E+00	0.00000E+00
118	9.62412E-01	8.38667E-01	9.33802E-01	2.27116E-03	0.00000E+00	0.00000E+00
119	9.23323E-01	8.44500E-01	9.33713E-01	2.25344E-03	0.00000E+00	0.00000E+00
120	9.25757E-01	8.49667E-01	9.33645E-01	2.23528E-03	0.00000E+00	0.00000E+00
121	9.56876E-01	8.54833E-01	9.33840E-01	2.22500E-03	0.00000E+00	0.00000E+00
122	9.40356E-01	8.60833E-01	9.33895E-01	2.20705E-03	0.00000E+00	0.00000E+00
123	8.85490E-01	8.66833E-01	9.33495E-01	2.22499E-03	0.00000E+00	0.00000E+00
124	9.32837E-01	8.72333E-01	9.33489E-01	2.20668E-03	0.00000E+00	0.00000E+00
125	9.72777E-01	8.78333E-01	9.33809E-01	2.21185E-03	0.00000E+00	0.00000E+00
126	9.25252E-01	8.83500E-01	9.33740E-01	2.19503E-03	0.00000E+00	0.00000E+00
127	9.59407E-01	8.88667E-01	9.33945E-01	2.18706E-03	0.00000E+00	0.00000E+00
128	9.45475E-01	8.94167E-01	9.34037E-01	2.17156E-03	0.00000E+00	0.00000E+00
129	9.60414E-01	8.99333E-01	9.34244E-01	2.16438E-03	0.00000E+00	0.00000E+00
130	9.50706E-01	9.04833E-01	9.34373E-01	2.15125E-03	0.00000E+00	0.00000E+00
131	9.24139E-01	9.10500E-01	9.34294E-01	2.13598E-03	0.00000E+00	0.00000E+00
132	9.47378E-01	9.15500E-01	9.34394E-01	2.12188E-03	0.00000E+00	0.00000E+00
133	9.54254E-01	9.21000E-01	9.34546E-01	2.11107E-03	0.00000E+00	0.00000E+00
134	9.29606E-01	9.26167E-01	9.34508E-01	2.09535E-03	0.00000E+00	0.00000E+00
135	9.68910E-01	9.31667E-01	9.34767E-01	2.09556E-03	0.00000E+00	0.00000E+00
136	9.27580E-01	9.37667E-01	9.34713E-01	2.08055E-03	0.00000E+00	0.00000E+00
137	9.26253E-01	9.43167E-01	9.34651E-01	2.06604E-03	0.00000E+00	0.00000E+00
138	9.55012E-01	9.49167E-01	9.34800E-01	2.05625E-03	0.00000E+00	0.00000E+00
139	9.52271E-01	9.54500E-01	9.34928E-01	2.04516E-03	0.00000E+00	0.00000E+00
140	9.15998E-01	9.60000E-01	9.34791E-01	2.03492E-03	0.00000E+00	0.00000E+00
141	9.22163E-01	9.65833E-01	9.34700E-01	2.02226E-03	0.00000E+00	0.00000E+00
142	9.25037E-01	9.72000E-01	9.34631E-01	2.00895E-03	0.00000E+00	0.00000E+00
143	9.24344E-01	9.78000E-01	9.34558E-01	1.99599E-03	0.00000E+00	0.00000E+00
144	9.15511E-01	9.83667E-01	9.34424E-01	1.98642E-03	0.00000E+00	0.00000E+00
145	9.44893E-01	9.89167E-01	9.34497E-01	1.97384E-03	0.00000E+00	0.00000E+00
146	9.56388E-01	9.95000E-01	9.34649E-01	1.96597E-03	0.00000E+00	0.00000E+00
147	8.86089E-01	1.00033E+00	9.34314E-01	1.98088E-03	0.00000E+00	0.00000E+00
148	9.65391E-01	1.00567E+00	9.34527E-01	1.97874E-03	0.00000E+00	0.00000E+00
149	9.40360E-01	1.01133E+00	9.34567E-01	1.96564E-03	0.00000E+00	0.00000E+00
150	9.31760E-01	1.01700E+00	9.34548E-01	1.95240E-03	0.00000E+00	0.00000E+00
151	8.82415E-01	1.02250E+00	9.34198E-01	1.97056E-03	0.00000E+00	0.00000E+00
152	9.44409E-01	1.02850E+00	9.34266E-01	1.95857E-03	0.00000E+00	0.00000E+00
153	9.61776E-01	1.03450E+00	9.34448E-01	1.95406E-03	0.00000E+00	0.00000E+00
154	9.68436E-01	1.04033E+00	9.34672E-01	1.95400E-03	0.00000E+00	0.00000E+00
155	9.28603E-01	1.04567E+00	9.34632E-01	1.94159E-03	0.00000E+00	0.00000E+00
156	9.27350E-01	1.05167E+00	9.34585E-01	1.92952E-03	0.00000E+00	0.00000E+00
157	9.17202E-01	1.05750E+00	9.34473E-01	1.92031E-03	0.00000E+00	0.00000E+00
158	9.49228E-01	1.06283E+00	9.34567E-01	1.91031E-03	0.00000E+00	0.00000E+00
159	9.01960E-01	1.06867E+00	9.34359E-01	1.90943E-03	0.00000E+00	0.00000E+00
160	8.89750E-01	1.07433E+00	9.34077E-01	1.91820E-03	0.00000E+00	0.00000E+00
161	8.97085E-01	1.08017E+00	9.33845E-01	1.92024E-03	0.00000E+00	0.00000E+00
162	9.35244E-01	1.08617E+00	9.33853E-01	1.90822E-03	0.00000E+00	0.00000E+00
163	9.56308E-01	1.09200E+00	9.33993E-01	1.90146E-03	0.00000E+00	0.00000E+00
164	9.12875E-01	1.09800E+00	9.33862E-01	1.89417E-03	0.00000E+00	0.00000E+00
165	9.02950E-01	1.10383E+00	9.33673E-01	1.89204E-03	0.00000E+00	0.00000E+00
166	9.30465E-01	1.10950E+00	9.33653E-01	1.88057E-03	0.00000E+00	0.00000E+00
167	9.49301E-01	1.11533E+00	9.33748E-01	1.87155E-03	0.00000E+00	0.00000E+00
168	9.29197E-01	1.12100E+00	9.33721E-01	1.86044E-03	0.00000E+00	0.00000E+00
169	9.25982E-01	1.12700E+00	9.33674E-01	1.84985E-03	0.00000E+00	0.00000E+00
170	9.36494E-01	1.13300E+00	9.33691E-01	1.83888E-03	0.00000E+00	0.00000E+00
171	9.47390E-01	1.13867E+00	9.33772E-01	1.82976E-03	0.00000E+00	0.00000E+00
172	9.19593E-01	1.14450E+00	9.33689E-01	1.82088E-03	0.00000E+00	0.00000E+00
173	9.22516E-01	1.15017E+00	9.33623E-01	1.81138E-03	0.00000E+00	0.00000E+00
174	9.64513E-01	1.15583E+00	9.33803E-01	1.80975E-03	0.00000E+00	0.00000E+00
175	9.30675E-01	1.16183E+00	9.33785E-01	1.79935E-03	0.00000E+00	0.00000E+00
176	9.41448E-01	1.16733E+00	9.33829E-01	1.78952E-03	0.00000E+00	0.00000E+00
177	9.90051E-01	1.17250E+00	9.34150E-01	1.80804E-03	0.00000E+00	0.00000E+00
178	9.35049E-01	1.17833E+00	9.34155E-01	1.79774E-03	0.00000E+00	0.00000E+00
179	9.06341E-01	1.18450E+00	9.33998E-01	1.79445E-03	0.00000E+00	0.00000E+00
180	9.21468E-01	1.19017E+00	9.33928E-01	1.78573E-03	0.00000E+00	0.00000E+00
181	8.98746E-01	1.19567E+00	9.33731E-01	1.78657E-03	0.00000E+00	0.00000E+00
182	8.73579E-01	1.20150E+00	9.33397E-01	1.80777E-03	0.00000E+00	0.00000E+00
183	8.74698E-01	1.20717E+00	9.33073E-01	1.82677E-03	0.00000E+00	0.00000E+00
184	9.51157E-01	1.21233E+00	9.33172E-01	1.81942E-03	0.00000E+00	0.00000E+00
185	8.98223E-01	1.21783E+00	9.32981E-01	1.81950E-03	0.00000E+00	0.00000E+00
186	9.52365E-01	1.22350E+00	9.33086E-01	1.81265E-03	0.00000E+00	0.00000E+00
187	9.24754E-01	1.22900E+00	9.33041E-01	1.80339E-03	0.00000E+00	0.00000E+00
188	9.32532E-01	1.23433E+00	9.33039E-01	1.79367E-03	0.00000E+00	0.00000E+00
189	9.11119E-01	1.24000E+00	9.32921E-01	1.78790E-03	0.00000E+00	0.00000E+00
190	9.42927E-01	1.24550E+00	9.32975E-01	1.77916E-03	0.00000E+00	0.00000E+00
191	9.05791E-01	1.25117E+00	9.32831E-01	1.77555E-03	0.00000E+00	0.00000E+00
192	9.17297E-01	1.25683E+00	9.32749E-01	1.76808E-03	0.00000E+00	0.00000E+00
193	9.53492E-01	1.26217E+00	9.32858E-01	1.76214E-03	0.00000E+00	0.00000E+00
194	9.34595E-01	1.26783E+00	9.32867E-01	1.75297E-03	0.00000E+00	0.00000E+00
195	9.37820E-01	1.27417E+00	9.32892E-01	1.74405E-03	0.00000E+00	0.00000E+00
196	9.57275E-01	1.27983E+00	9.33018E-01	1.73958E-03	0.00000E+00	0.00000E+00
197	9.16365E-01	1.28583E+00	9.32933E-01	1.73274E-03	0.00000E+00	0.00000E+00
198	9.27529E-01	1.29150E+00	9.32905E-01	1.72410E-03	0.00000E+00	0.00000E+00
199	9.33278E-01	1.29733E+00	9.32907E-01	1.71533E-03	0.00000E+00	0.00000E+00
200	9.28496E-01	1.30267E+00	9.32885E-01	1.70679E-03	0.00000E+00	0.00000E+00
201	9.08779E-01	1.30850E+00	9.32764E-01	1.70250E-03	0.00000E+00	0.00000E+00
202	9.43585E-01	1.31417E+00	9.32818E-01	1.69483E-03	0.00000E+00	0.00000E+00
203	9.50282E-01	1.32000E+00	9.32905E-01	1.68862E-03	0.00000E+00	0.00000E+00
204	9.12524E-01	1.32567E+00	9.32804E-01	1.68326E-03	0.00000E+00	0.00000E+00

205	9.24289E-01	1.33117E+00	9.32762E-01	1.67548E-03	0.00000E+00	0.00000E+00
206	9.72641E-01	1.33633E+00	9.32957E-01	1.67867E-03	0.00000E+00	0.00000E+00
207	9.26405E-01	1.34183E+00	9.32925E-01	1.67076E-03	0.00000E+00	0.00000E+00
208	9.30861E-01	1.34733E+00	9.32915E-01	1.66266E-03	0.00000E+00	0.00000E+00
209	9.21346E-01	1.35333E+00	9.32859E-01	1.65555E-03	0.00000E+00	0.00000E+00
210	9.39679E-01	1.35867E+00	9.32892E-01	1.64790E-03	0.00000E+00	0.00000E+00
211	9.14689E-01	1.36450E+00	9.32805E-01	1.64231E-03	0.00000E+00	0.00000E+00
212	9.16859E-01	1.37000E+00	9.32729E-01	1.63623E-03	0.00000E+00	0.00000E+00
213	9.19372E-01	1.37567E+00	9.32666E-01	1.62969E-03	0.00000E+00	0.00000E+00
214	8.94814E-01	1.38167E+00	9.32487E-01	1.63178E-03	0.00000E+00	0.00000E+00
215	9.12208E-01	1.38733E+00	9.32392E-01	1.62689E-03	0.00000E+00	0.00000E+00
216	9.28399E-01	1.39333E+00	9.32373E-01	1.61938E-03	0.00000E+00	0.00000E+00
217	9.69805E-01	1.39917E+00	9.32547E-01	1.62120E-03	0.00000E+00	0.00000E+00
218	8.72250E-01	1.40450E+00	9.32268E-01	1.63765E-03	0.00000E+00	0.00000E+00
219	9.11044E-01	1.41000E+00	9.32171E-01	1.63302E-03	0.00000E+00	0.00000E+00
220	9.51716E-01	1.41517E+00	9.32260E-01	1.62798E-03	0.00000E+00	0.00000E+00
221	9.57044E-01	1.42050E+00	9.32373E-01	1.62447E-03	0.00000E+00	0.00000E+00
222	9.07751E-01	1.42600E+00	9.32261E-01	1.62094E-03	0.00000E+00	0.00000E+00
223	9.05202E-01	1.43217E+00	9.32139E-01	1.61823E-03	0.00000E+00	0.00000E+00
224	9.25330E-01	1.43767E+00	9.32108E-01	1.61122E-03	0.00000E+00	0.00000E+00
225	8.88344E-01	1.44367E+00	9.31912E-01	1.61594E-03	0.00000E+00	0.00000E+00
226	9.37650E-01	1.44933E+00	9.31938E-01	1.60891E-03	0.00000E+00	0.00000E+00
227	9.41594E-01	1.45483E+00	9.31981E-01	1.60232E-03	0.00000E+00	0.00000E+00
228	9.52571E-01	1.46100E+00	9.32072E-01	1.59781E-03	0.00000E+00	0.00000E+00
229	9.63084E-01	1.46683E+00	9.32208E-01	1.59661E-03	0.00000E+00	0.00000E+00
230	9.48630E-01	1.47233E+00	9.32280E-01	1.59123E-03	0.00000E+00	0.00000E+00
231	8.98066E-01	1.47850E+00	9.32131E-01	1.59129E-03	0.00000E+00	0.00000E+00
232	9.27355E-01	1.48433E+00	9.32110E-01	1.58449E-03	0.00000E+00	0.00000E+00
233	9.77288E-01	1.48967E+00	9.32306E-01	1.58970E-03	0.00000E+00	0.00000E+00
234	9.48159E-01	1.49550E+00	9.32374E-01	1.58430E-03	0.00000E+00	0.00000E+00
235	9.93658E-01	1.50117E+00	9.32637E-01	1.59927E-03	0.00000E+00	0.00000E+00
236	9.28889E-01	1.50717E+00	9.32621E-01	1.59250E-03	0.00000E+00	0.00000E+00
237	9.22087E-01	1.51283E+00	9.32576E-01	1.58634E-03	0.00000E+00	0.00000E+00
238	9.37992E-01	1.51867E+00	9.32599E-01	1.57977E-03	0.00000E+00	0.00000E+00
239	9.41673E-01	1.52467E+00	9.32638E-01	1.57356E-03	0.00000E+00	0.00000E+00
240	9.21111E-01	1.53067E+00	9.32589E-01	1.56768E-03	0.00000E+00	0.00000E+00
241	9.11171E-01	1.53683E+00	9.32499E-01	1.56368E-03	0.00000E+00	0.00000E+00
242	9.26368E-01	1.54250E+00	9.32474E-01	1.55736E-03	0.00000E+00	0.00000E+00
243	9.47720E-01	1.54833E+00	9.32537E-01	1.55217E-03	0.00000E+00	0.00000E+00
244	9.35057E-01	1.55433E+00	9.32548E-01	1.54578E-03	0.00000E+00	0.00000E+00
245	9.54743E-01	1.56133E+00	9.32639E-01	1.54211E-03	0.00000E+00	0.00000E+00
246	9.21751E-01	1.56733E+00	9.32594E-01	1.53643E-03	0.00000E+00	0.00000E+00
247	9.29903E-01	1.57350E+00	9.32583E-01	1.53018E-03	0.00000E+00	0.00000E+00
248	9.56344E-01	1.57933E+00	9.32680E-01	1.52701E-03	0.00000E+00	0.00000E+00
249	9.18393E-01	1.58533E+00	9.32622E-01	1.52191E-03	0.00000E+00	0.00000E+00
250	9.71065E-01	1.59100E+00	9.32777E-01	1.52367E-03	0.00000E+00	0.00000E+00
251	9.01806E-01	1.59650E+00	9.32653E-01	1.52263E-03	0.00000E+00	0.00000E+00
252	9.30108E-01	1.60217E+00	9.32643E-01	1.51656E-03	0.00000E+00	0.00000E+00
253	8.86493E-01	1.60800E+00	9.32459E-01	1.52165E-03	0.00000E+00	0.00000E+00
254	9.40306E-01	1.61333E+00	9.32490E-01	1.51592E-03	0.00000E+00	0.00000E+00
255	9.22673E-01	1.62000E+00	9.32451E-01	1.51042E-03	0.00000E+00	0.00000E+00
256	8.95365E-01	1.62667E+00	9.32305E-01	1.51153E-03	0.00000E+00	0.00000E+00
257	9.59414E-01	1.63317E+00	9.32411E-01	1.50934E-03	0.00000E+00	0.00000E+00
258	9.35891E-01	1.63900E+00	9.32425E-01	1.50349E-03	0.00000E+00	0.00000E+00
259	9.14501E-01	1.64433E+00	9.32355E-01	1.49925E-03	0.00000E+00	0.00000E+00
260	9.68182E-01	1.65017E+00	9.32494E-01	1.49987E-03	0.00000E+00	0.00000E+00
261	9.51180E-01	1.65617E+00	9.32566E-01	1.49581E-03	0.00000E+00	0.00000E+00
262	9.60532E-01	1.66183E+00	9.32674E-01	1.49392E-03	0.00000E+00	0.00000E+00
263	9.27706E-01	1.66700E+00	9.32655E-01	1.48831E-03	0.00000E+00	0.00000E+00
264	9.11931E-01	1.67283E+00	9.32576E-01	1.48473E-03	0.00000E+00	0.00000E+00
265	9.38445E-01	1.67983E+00	9.32598E-01	1.47924E-03	0.00000E+00	0.00000E+00
266	9.00844E-01	1.68550E+00	9.32478E-01	1.47853E-03	0.00000E+00	0.00000E+00
267	9.26236E-01	1.69133E+00	9.32454E-01	1.47312E-03	0.00000E+00	0.00000E+00
268	9.17925E-01	1.69700E+00	9.32399E-01	1.46859E-03	0.00000E+00	0.00000E+00
269	9.33301E-01	1.70400E+00	9.32403E-01	1.46309E-03	0.00000E+00	0.00000E+00
270	8.94516E-01	1.71000E+00	9.32261E-01	1.46446E-03	0.00000E+00	0.00000E+00
271	9.85208E-01	1.71583E+00	9.32458E-01	1.47222E-03	0.00000E+00	0.00000E+00
272	9.15294E-01	1.72150E+00	9.32395E-01	1.46813E-03	0.00000E+00	0.00000E+00
273	9.20907E-01	1.72700E+00	9.32352E-01	1.46332E-03	0.00000E+00	0.00000E+00
274	8.98397E-01	1.73317E+00	9.32227E-01	1.46326E-03	0.00000E+00	0.00000E+00
275	8.94304E-01	1.73917E+00	9.32089E-01	1.46450E-03	0.00000E+00	0.00000E+00
276	9.55914E-01	1.74500E+00	9.32176E-01	1.46173E-03	0.00000E+00	0.00000E+00
277	9.34610E-01	1.75033E+00	9.32184E-01	1.45643E-03	0.00000E+00	0.00000E+00
278	9.37094E-01	1.75583E+00	9.32202E-01	1.45126E-03	0.00000E+00	0.00000E+00
279	9.15991E-01	1.76133E+00	9.32144E-01	1.44719E-03	0.00000E+00	0.00000E+00
280	9.43179E-01	1.76733E+00	9.32183E-01	1.44252E-03	0.00000E+00	0.00000E+00
281	9.39576E-01	1.77283E+00	9.32210E-01	1.43759E-03	0.00000E+00	0.00000E+00
282	9.17318E-01	1.77850E+00	9.32157E-01	1.43343E-03	0.00000E+00	0.00000E+00
283	9.52647E-01	1.78417E+00	9.32230E-01	1.43018E-03	0.00000E+00	0.00000E+00
284	9.23920E-01	1.79050E+00	9.32200E-01	1.42540E-03	0.00000E+00	0.00000E+00
285	9.52328E-01	1.79650E+00	9.32271E-01	1.42214E-03	0.00000E+00	0.00000E+00
286	9.56117E-01	1.80167E+00	9.32355E-01	1.41961E-03	0.00000E+00	0.00000E+00
287	9.75747E-01	1.80717E+00	9.32507E-01	1.42279E-03	0.00000E+00	0.00000E+00
288	9.01418E-01	1.81267E+00	9.32399E-01	1.42196E-03	0.00000E+00	0.00000E+00
289	9.28078E-01	1.81817E+00	9.32384E-01	1.41708E-03	0.00000E+00	0.00000E+00
290	9.13150E-01	1.82333E+00	9.32317E-01	1.41373E-03	0.00000E+00	0.00000E+00
291	9.29817E-01	1.82900E+00	9.32308E-01	1.40886E-03	0.00000E+00	0.00000E+00
292	9.15227E-01	1.83417E+00	9.32249E-01	1.40522E-03	0.00000E+00	0.00000E+00
293	9.85492E-01	1.83967E+00	9.32432E-01	1.41229E-03	0.00000E+00	0.00000E+00
294	8.89747E-01	1.84483E+00	9.32286E-01	1.41502E-03	0.00000E+00	0.00000E+00
295	8.91645E-01	1.85067E+00	9.32147E-01	1.41698E-03	0.00000E+00	0.00000E+00
296	9.61131E-01	1.85583E+00	9.32246E-01	1.41559E-03	0.00000E+00	0.00000E+00
297	9.20738E-01	1.86233E+00	9.32207E-01	1.41132E-03	0.00000E+00	0.00000E+00
298	8.79847E-01	1.86867E+00	9.32030E-01	1.41763E-03	0.00000E+00	0.00000E+00
299	9.43013E-01	1.87383E+00	9.32067E-01	1.41333E-03	0.00000E+00	0.00000E+00
300	9.51581E-01	1.87950E+00	9.32133E-01	1.41010E-03	0.00000E+00	0.00000E+00
301	9.13421E-01	1.88550E+00	9.32070E-01	1.40677E-03	0.00000E+00	0.00000E+00
302	9.06866E-01	1.89133E+00	9.31986E-01	1.40459E-03	0.00000E+00	0.00000E+00
303	9.22414E-01	1.89667E+00	9.31954E-01	1.40028E-03	0.00000E+00	0.00000E+00
304	9.53510E-01	1.90200E+00	9.32026E-01	1.39745E-03	0.00000E+00	0.00000E+00
305	9.20523E-01	1.90733E+00	9.31988E-01	1.39335E-03	0.00000E+00	0.00000E+00
306	9.17490E-01	1.91317E+00	9.31940E-01	1.38958E-03	0.00000E+00	0.00000E+00
307	9.42448E-01	1.91883E+00	9.31974E-01	1.38544E-03	0.00000E+00	0.00000E+00
308	9.02691E-01	1.92467E+00	9.31879E-01	1.38422E-03	0.00000E+00	0.00000E+00
309	9.03697E-01	1.93000E+00	9.31787E-01	1.38276E-03	0.00000E+00	0.00000E+00

310	8.78536E-01	1.93633E+00	9.31614E-01	1.38906E-03	0.00000E+00	0.00000E+00
311	9.14106E-01	1.94200E+00	9.31557E-01	1.38572E-03	0.00000E+00	0.00000E+00
312	9.74113E-01	1.94750E+00	9.31695E-01	1.38804E-03	0.00000E+00	0.00000E+00
313	9.23894E-01	1.95317E+00	9.31669E-01	1.38380E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	985 independent fission points were generated			
314	8.97905E-01	1.95917E+00	9.31561E-01	1.38360E-03	0.00000E+00	0.00000E+00
315	9.27759E-01	1.96517E+00	9.31549E-01	1.37922E-03	0.00000E+00	0.00000E+00
316	9.48203E-01	1.97100E+00	9.31602E-01	1.37585E-03	0.00000E+00	0.00000E+00
317	9.27048E-01	1.97617E+00	9.31588E-01	1.37155E-03	0.00000E+00	0.00000E+00
318	9.62913E-01	1.98133E+00	9.31687E-01	1.37079E-03	0.00000E+00	0.00000E+00
319	9.51334E-01	1.98717E+00	9.31749E-01	1.36786E-03	0.00000E+00	0.00000E+00
320	9.49603E-01	1.99250E+00	9.31805E-01	1.36471E-03	0.00000E+00	0.00000E+00
321	9.17623E-01	1.99850E+00	9.31761E-01	1.36115E-03	0.00000E+00	0.00000E+00
322	9.45022E-01	2.00483E+00	9.31802E-01	1.35753E-03	0.00000E+00	0.00000E+00
323	9.63472E-01	2.01083E+00	9.31901E-01	1.35688E-03	0.00000E+00	0.00000E+00
324	9.31908E-01	2.01783E+00	9.31901E-01	1.35266E-03	0.00000E+00	0.00000E+00
325	9.43406E-01	2.02383E+00	9.31936E-01	1.34894E-03	0.00000E+00	0.00000E+00
326	9.48691E-01	2.02950E+00	9.31988E-01	1.34576E-03	0.00000E+00	0.00000E+00
327	9.34293E-01	2.03600E+00	9.31995E-01	1.34163E-03	0.00000E+00	0.00000E+00
328	9.11576E-01	2.04233E+00	9.31932E-01	1.33898E-03	0.00000E+00	0.00000E+00
329	9.00973E-01	2.04850E+00	9.31838E-01	1.33823E-03	0.00000E+00	0.00000E+00
330	9.36700E-01	2.05433E+00	9.31853E-01	1.33422E-03	0.00000E+00	0.00000E+00
331	9.77392E-01	2.06050E+00	9.31991E-01	1.33735E-03	0.00000E+00	0.00000E+00
332	9.43163E-01	2.06650E+00	9.32025E-01	1.33372E-03	0.00000E+00	0.00000E+00
333	9.00158E-01	2.07233E+00	9.31929E-01	1.33316E-03	0.00000E+00	0.00000E+00
334	9.06281E-01	2.07800E+00	9.31851E-01	1.33138E-03	0.00000E+00	0.00000E+00
335	9.15060E-01	2.08400E+00	9.31801E-01	1.32834E-03	0.00000E+00	0.00000E+00
336	9.65546E-01	2.09000E+00	9.31902E-01	1.32820E-03	0.00000E+00	0.00000E+00
337	9.39920E-01	2.09567E+00	9.31926E-01	1.32445E-03	0.00000E+00	0.00000E+00
338	9.26339E-01	2.10167E+00	9.31909E-01	1.32060E-03	0.00000E+00	0.00000E+00
339	9.29933E-01	2.10767E+00	9.31903E-01	1.31669E-03	0.00000E+00	0.00000E+00
340	9.28918E-01	2.11367E+00	9.31895E-01	1.31282E-03	0.00000E+00	0.00000E+00
341	9.30821E-01	2.11967E+00	9.31891E-01	1.30895E-03	0.00000E+00	0.00000E+00
342	9.42067E-01	2.12483E+00	9.31921E-01	1.30543E-03	0.00000E+00	0.00000E+00
343	9.54494E-01	2.13083E+00	9.31987E-01	1.30328E-03	0.00000E+00	0.00000E+00
344	9.40156E-01	2.13733E+00	9.32011E-01	1.29969E-03	0.00000E+00	0.00000E+00
345	9.46196E-01	2.14417E+00	9.32053E-01	1.29655E-03	0.00000E+00	0.00000E+00
346	9.84332E-01	2.14967E+00	9.32205E-01	1.30168E-03	0.00000E+00	0.00000E+00
347	8.84780E-01	2.15567E+00	9.32067E-01	1.30516E-03	0.00000E+00	0.00000E+00
348	9.24206E-01	2.16150E+00	9.32045E-01	1.30158E-03	0.00000E+00	0.00000E+00
349	9.43224E-01	2.16750E+00	9.32077E-01	1.29822E-03	0.00000E+00	0.00000E+00
350	9.51028E-01	2.17333E+00	9.32131E-01	1.29563E-03	0.00000E+00	0.00000E+00
351	9.09661E-01	2.17933E+00	9.32067E-01	1.29352E-03	0.00000E+00	0.00000E+00
352	9.41718E-01	2.18500E+00	9.32094E-01	1.29011E-03	0.00000E+00	0.00000E+00
353	9.35102E-01	2.19133E+00	9.32103E-01	1.28646E-03	0.00000E+00	0.00000E+00
354	9.23746E-01	2.19750E+00	9.32079E-01	1.28302E-03	0.00000E+00	0.00000E+00
355	9.49806E-01	2.20483E+00	9.32129E-01	1.28037E-03	0.00000E+00	0.00000E+00
356	9.46869E-01	2.21183E+00	9.32171E-01	1.27742E-03	0.00000E+00	0.00000E+00
357	9.42126E-01	2.21933E+00	9.32199E-01	1.27413E-03	0.00000E+00	0.00000E+00
358	9.54440E-01	2.22567E+00	9.32262E-01	1.27208E-03	0.00000E+00	0.00000E+00
359	9.50979E-01	2.23183E+00	9.32314E-01	1.26959E-03	0.00000E+00	0.00000E+00
360	9.10242E-01	2.23783E+00	9.32252E-01	1.26754E-03	0.00000E+00	0.00000E+00
361	9.15217E-01	2.24367E+00	9.32205E-01	1.26490E-03	0.00000E+00	0.00000E+00
362	9.19498E-01	2.24900E+00	9.32170E-01	1.26187E-03	0.00000E+00	0.00000E+00
363	9.48120E-01	2.25550E+00	9.32214E-01	1.25915E-03	0.00000E+00	0.00000E+00
364	9.28848E-01	2.26133E+00	9.32204E-01	1.25570E-03	0.00000E+00	0.00000E+00
365	9.28523E-01	2.26750E+00	9.32194E-01	1.25228E-03	0.00000E+00	0.00000E+00
366	9.43134E-01	2.27333E+00	9.32224E-01	1.24919E-03	0.00000E+00	0.00000E+00
367	9.04396E-01	2.27933E+00	9.32148E-01	1.24810E-03	0.00000E+00	0.00000E+00
368	8.99211E-01	2.28533E+00	9.32058E-01	1.24793E-03	0.00000E+00	0.00000E+00
369	9.02061E-01	2.29133E+00	9.31976E-01	1.24721E-03	0.00000E+00	0.00000E+00
370	8.71290E-01	2.29667E+00	9.31812E-01	1.25470E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	985 independent fission points were generated			
371	8.65520E-01	2.30317E+00	9.31632E-01	1.26412E-03	0.00000E+00	0.00000E+00
372	9.33558E-01	2.30867E+00	9.31637E-01	1.26071E-03	0.00000E+00	0.00000E+00
373	9.07448E-01	2.31517E+00	9.31572E-01	1.25900E-03	0.00000E+00	0.00000E+00
374	9.41442E-01	2.32100E+00	9.31598E-01	1.25589E-03	0.00000E+00	0.00000E+00
375	9.03121E-01	2.32717E+00	9.31522E-01	1.25484E-03	0.00000E+00	0.00000E+00
376	9.22185E-01	2.33300E+00	9.31497E-01	1.25173E-03	0.00000E+00	0.00000E+00
377	9.82461E-01	2.33867E+00	9.31633E-01	1.25577E-03	0.00000E+00	0.00000E+00
378	9.51565E-01	2.34433E+00	9.31686E-01	1.25354E-03	0.00000E+00	0.00000E+00
379	9.50407E-01	2.34983E+00	9.31736E-01	1.25120E-03	0.00000E+00	0.00000E+00
380	9.46615E-01	2.35550E+00	9.31775E-01	1.24851E-03	0.00000E+00	0.00000E+00
381	9.71440E-01	2.36100E+00	9.31880E-01	1.24960E-03	0.00000E+00	0.00000E+00
382	9.41106E-01	2.36683E+00	9.31904E-01	1.24654E-03	0.00000E+00	0.00000E+00
383	9.55199E-01	2.37217E+00	9.31965E-01	1.24477E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	966 independent fission points were generated			
384	8.70501E-01	2.37767E+00	9.31804E-01	1.25189E-03	0.00000E+00	0.00000E+00
385	9.35596E-01	2.38367E+00	9.31814E-01	1.24865E-03	0.00000E+00	0.00000E+00
386	8.79853E-01	2.38950E+00	9.31679E-01	1.25273E-03	0.00000E+00	0.00000E+00
387	9.19974E-01	2.39483E+00	9.31648E-01	1.24984E-03	0.00000E+00	0.00000E+00
388	8.91577E-01	2.40067E+00	9.31545E-01	1.25091E-03	0.00000E+00	0.00000E+00
389	9.39862E-01	2.40617E+00	9.31566E-01	1.24786E-03	0.00000E+00	0.00000E+00
390	9.10613E-01	2.41150E+00	9.31512E-01	1.24581E-03	0.00000E+00	0.00000E+00
391	9.44174E-01	2.41683E+00	9.31545E-01	1.24303E-03	0.00000E+00	0.00000E+00
392	8.85387E-01	2.42217E+00	9.31426E-01	1.24548E-03	0.00000E+00	0.00000E+00
393	9.49287E-01	2.42750E+00	9.31472E-01	1.24313E-03	0.00000E+00	0.00000E+00
394	8.86436E-01	2.43300E+00	9.31357E-01	1.24526E-03	0.00000E+00	0.00000E+00
395	8.94518E-01	2.43833E+00	9.31263E-01	1.24562E-03	0.00000E+00	0.00000E+00
396	9.12067E-01	2.44433E+00	9.31215E-01	1.24341E-03	0.00000E+00	0.00000E+00
397	9.23816E-01	2.45017E+00	9.31196E-01	1.24040E-03	0.00000E+00	0.00000E+00
398	8.98989E-01	2.45617E+00	9.31115E-01	1.23993E-03	0.00000E+00	0.00000E+00
399	9.62136E-01	2.46150E+00	9.31193E-01	1.23927E-03	0.00000E+00	0.00000E+00
400	9.31429E-01	2.46750E+00	9.31193E-01	1.23615E-03	0.00000E+00	0.00000E+00
401	9.19513E-01	2.47350E+00	9.31164E-01	1.23340E-03	0.00000E+00	0.00000E+00
402	9.25429E-01	2.47900E+00	9.31150E-01	1.23040E-03	0.00000E+00	0.00000E+00
403	9.98126E-01	2.48450E+00	9.31317E-01	1.23864E-03	0.00000E+00	0.00000E+00
404	9.71141E-01	2.49000E+00	9.31416E-01	1.23952E-03	0.00000E+00	0.00000E+00
405	9.59525E-01	2.49567E+00	9.31486E-01	1.23840E-03	0.00000E+00	0.00000E+00
406	9.19861E-01	2.50200E+00	9.31457E-01	1.23567E-03	0.00000E+00	0.00000E+00
407	9.16864E-01	2.50733E+00	9.31421E-01	1.23314E-03	0.00000E+00	0.00000E+00
408	9.39356E-01	2.51283E+00	9.31440E-01	1.23026E-03	0.00000E+00	0.00000E+00
409	9.96786E-01	2.51833E+00	9.31601E-01	1.23769E-03	0.00000E+00	0.00000E+00
410	9.88563E-01	2.52350E+00	9.31740E-01	1.24252E-03	0.00000E+00	0.00000E+00
411	9.29803E-01	2.52900E+00	9.31736E-01	1.23949E-03	0.00000E+00	0.00000E+00

412	9.38911E-01	2.53467E+00	9.31753E-01	1.23658E-03	0.00000E+00	0.00000E+00
413	9.79522E-01	2.53967E+00	9.31869E-01	1.23903E-03	0.00000E+00	0.00000E+00
414	9.58730E-01	2.54567E+00	9.31935E-01	1.23774E-03	0.00000E+00	0.00000E+00
415	9.28415E-01	2.55167E+00	9.31926E-01	1.23477E-03	0.00000E+00	0.00000E+00
416	9.04223E-01	2.55733E+00	9.31859E-01	1.23360E-03	0.00000E+00	0.00000E+00
417	9.04001E-01	2.56317E+00	9.31792E-01	1.23245E-03	0.00000E+00	0.00000E+00
418	9.59752E-01	2.56883E+00	9.31859E-01	1.23132E-03	0.00000E+00	0.00000E+00
419	9.05810E-01	2.57483E+00	9.31797E-01	1.22995E-03	0.00000E+00	0.00000E+00
420	9.52359E-01	2.58050E+00	9.31846E-01	1.22799E-03	0.00000E+00	0.00000E+00
421	9.12767E-01	2.58600E+00	9.31800E-01	1.22590E-03	0.00000E+00	0.00000E+00
422	9.23066E-01	2.59150E+00	9.31780E-01	1.22316E-03	0.00000E+00	0.00000E+00
423	9.10184E-01	2.59717E+00	9.31728E-01	1.22133E-03	0.00000E+00	0.00000E+00
424	9.38073E-01	2.60300E+00	9.31743E-01	1.21852E-03	0.00000E+00	0.00000E+00
425	9.62310E-01	2.60817E+00	9.31816E-01	1.21778E-03	0.00000E+00	0.00000E+00
426	9.18292E-01	2.61367E+00	9.31784E-01	1.21533E-03	0.00000E+00	0.00000E+00
427	9.52712E-01	2.61917E+00	9.31833E-01	1.21346E-03	0.00000E+00	0.00000E+00
428	9.53395E-01	2.62450E+00	9.31884E-01	1.21167E-03	0.00000E+00	0.00000E+00
429	9.33752E-01	2.63000E+00	9.31888E-01	1.20884E-03	0.00000E+00	0.00000E+00
430	9.48943E-01	2.63550E+00	9.31928E-01	1.20667E-03	0.00000E+00	0.00000E+00
431	9.51819E-01	2.64067E+00	9.31974E-01	1.20474E-03	0.00000E+00	0.00000E+00
432	8.99743E-01	2.64617E+00	9.31899E-01	1.20427E-03	0.00000E+00	0.00000E+00
433	9.64304E-01	2.65167E+00	9.31974E-01	1.20383E-03	0.00000E+00	0.00000E+00
434	9.30564E-01	2.65717E+00	9.31971E-01	1.20104E-03	0.00000E+00	0.00000E+00
435	9.27539E-01	2.66233E+00	9.31961E-01	1.19831E-03	0.00000E+00	0.00000E+00
436	9.65575E-01	2.66750E+00	9.32038E-01	1.19805E-03	0.00000E+00	0.00000E+00
437	9.45432E-01	2.67300E+00	9.32069E-01	1.19569E-03	0.00000E+00	0.00000E+00
438	8.92902E-01	2.67850E+00	9.31979E-01	1.19632E-03	0.00000E+00	0.00000E+00

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439	8.68080E-01	2.68417E+00	9.31833E-01	1.20250E-03	0.00000E+00	0.00000E+00
440	8.87055E-01	2.68967E+00	9.31731E-01	1.20410E-03	0.00000E+00	0.00000E+00
441	9.26483E-01	2.69517E+00	9.31719E-01	1.20142E-03	0.00000E+00	0.00000E+00
442	9.32100E-01	2.70067E+00	9.31720E-01	1.19868E-03	0.00000E+00	0.00000E+00
443	9.78460E-01	2.70583E+00	9.31826E-01	1.20065E-03	0.00000E+00	0.00000E+00
444	9.43938E-01	2.71133E+00	9.31853E-01	1.19824E-03	0.00000E+00	0.00000E+00
445	9.22540E-01	2.71683E+00	9.31832E-01	1.19572E-03	0.00000E+00	0.00000E+00
446	9.56522E-01	2.72250E+00	9.31888E-01	1.19432E-03	0.00000E+00	0.00000E+00
447	9.48820E-01	2.72800E+00	9.31926E-01	1.19224E-03	0.00000E+00	0.00000E+00
448	9.35624E-01	2.73350E+00	9.31934E-01	1.18959E-03	0.00000E+00	0.00000E+00
449	9.36815E-01	2.73867E+00	9.31945E-01	1.18698E-03	0.00000E+00	0.00000E+00
450	9.01031E-01	2.74417E+00	9.31876E-01	1.18633E-03	0.00000E+00	0.00000E+00
451	9.17804E-01	2.74950E+00	9.31845E-01	1.18410E-03	0.00000E+00	0.00000E+00
452	9.48701E-01	2.75483E+00	9.31882E-01	1.18206E-03	0.00000E+00	0.00000E+00
453	9.33626E-01	2.76050E+00	9.31886E-01	1.17945E-03	0.00000E+00	0.00000E+00
454	9.51347E-01	2.76600E+00	9.31929E-01	1.17762E-03	0.00000E+00	0.00000E+00
455	9.88488E-01	2.77200E+00	9.32054E-01	1.18163E-03	0.00000E+00	0.00000E+00
456	9.52357E-01	2.77767E+00	9.32099E-01	1.17988E-03	0.00000E+00	0.00000E+00
457	8.68516E-01	2.78417E+00	9.31959E-01	1.18554E-03	0.00000E+00	0.00000E+00
458	8.87277E-01	2.79050E+00	9.31861E-01	1.18699E-03	0.00000E+00	0.00000E+00
459	9.22009E-01	2.79650E+00	9.31839E-01	1.18459E-03	0.00000E+00	0.00000E+00
460	9.15657E-01	2.80217E+00	9.31804E-01	1.18253E-03	0.00000E+00	0.00000E+00
461	9.73656E-01	2.80850E+00	9.31895E-01	1.18347E-03	0.00000E+00	0.00000E+00
462	9.15812E-01	2.81417E+00	9.31860E-01	1.18141E-03	0.00000E+00	0.00000E+00
463	9.28912E-01	2.81983E+00	9.31854E-01	1.17886E-03	0.00000E+00	0.00000E+00
464	9.39372E-01	2.82583E+00	9.31870E-01	1.17642E-03	0.00000E+00	0.00000E+00
465	9.17209E-01	2.83183E+00	9.31838E-01	1.17430E-03	0.00000E+00	0.00000E+00
466	9.68533E-01	2.83817E+00	9.31918E-01	1.17443E-03	0.00000E+00	0.00000E+00
467	9.05366E-01	2.84383E+00	9.31860E-01	1.17330E-03	0.00000E+00	0.00000E+00
468	9.58918E-01	2.85017E+00	9.31918E-01	1.17221E-03	0.00000E+00	0.00000E+00
469	9.60380E-01	2.85583E+00	9.31979E-01	1.17129E-03	0.00000E+00	0.00000E+00
470	9.68116E-01	2.86100E+00	9.32057E-01	1.17133E-03	0.00000E+00	0.00000E+00
471	9.95611E-01	2.86650E+00	9.32192E-01	1.17666E-03	0.00000E+00	0.00000E+00
472	8.92287E-01	2.87200E+00	9.32107E-01	1.17722E-03	0.00000E+00	0.00000E+00
473	9.17530E-01	2.87800E+00	9.32076E-01	1.17512E-03	0.00000E+00	0.00000E+00
474	9.65642E-01	2.88367E+00	9.32147E-01	1.17479E-03	0.00000E+00	0.00000E+00
475	9.02155E-01	2.88933E+00	9.32084E-01	1.17401E-03	0.00000E+00	0.00000E+00
476	9.36390E-01	2.89483E+00	9.32093E-01	1.17157E-03	0.00000E+00	0.00000E+00
477	9.51721E-01	2.90067E+00	9.32134E-01	1.16983E-03	0.00000E+00	0.00000E+00
478	9.40692E-01	2.90633E+00	9.32152E-01	1.16751E-03	0.00000E+00	0.00000E+00
479	9.64665E-01	2.91183E+00	9.32221E-01	1.16705E-03	0.00000E+00	0.00000E+00
480	9.20304E-01	2.91733E+00	9.32196E-01	1.16487E-03	0.00000E+00	0.00000E+00
481	8.99266E-01	2.92300E+00	9.32127E-01	1.16447E-03	0.00000E+00	0.00000E+00
482	9.30303E-01	2.92850E+00	9.32123E-01	1.16205E-03	0.00000E+00	0.00000E+00
483	9.59431E-01	2.93417E+00	9.32180E-01	1.16102E-03	0.00000E+00	0.00000E+00
484	9.52861E-01	2.93933E+00	9.32223E-01	1.15940E-03	0.00000E+00	0.00000E+00
485	9.62692E-01	2.94467E+00	9.32286E-01	1.15872E-03	0.00000E+00	0.00000E+00
486	9.47695E-01	2.95017E+00	9.32318E-01	1.15676E-03	0.00000E+00	0.00000E+00
487	9.21090E-01	2.95533E+00	9.32295E-01	1.15460E-03	0.00000E+00	0.00000E+00
488	9.24061E-01	2.96083E+00	9.32278E-01	1.15235E-03	0.00000E+00	0.00000E+00
489	9.69570E-01	2.96600E+00	9.32354E-01	1.15253E-03	0.00000E+00	0.00000E+00
490	9.74765E-01	2.97150E+00	9.32441E-01	1.15344E-03	0.00000E+00	0.00000E+00
491	9.18702E-01	2.97667E+00	9.32413E-01	1.15142E-03	0.00000E+00	0.00000E+00
492	9.69576E-01	2.98217E+00	9.32489E-01	1.15157E-03	0.00000E+00	0.00000E+00
493	9.76700E-01	2.98767E+00	9.32579E-01	1.15275E-03	0.00000E+00	0.00000E+00
494	9.63526E-01	2.99283E+00	9.32642E-01	1.15212E-03	0.00000E+00	0.00000E+00
495	9.22464E-01	2.99883E+00	9.32621E-01	1.14996E-03	0.00000E+00	0.00000E+00
496	9.33692E-01	3.00450E+00	9.32623E-01	1.14764E-03	0.00000E+00	0.00000E+00
497	9.63348E-01	3.01000E+00	9.32685E-01	1.14700E-03	0.00000E+00	0.00000E+00
498	9.16104E-01	3.01917E+00	9.32652E-01	1.14517E-03	0.00000E+00	0.00000E+00
499	9.37585E-01	3.02517E+00	9.32662E-01	1.14291E-03	0.00000E+00	0.00000E+00
500	9.46800E-01	3.03083E+00	9.32690E-01	1.14096E-03	0.00000E+00	0.00000E+00
501	9.00431E-01	3.03650E+00	9.32626E-01	1.14051E-03	0.00000E+00	0.00000E+00
502	9.06630E-01	3.04233E+00	9.32574E-01	1.13941E-03	0.00000E+00	0.00000E+00
503	9.12658E-01	3.04800E+00	9.32534E-01	1.13783E-03	0.00000E+00	0.00000E+00
504	9.68319E-01	3.05500E+00	9.32605E-01	1.13780E-03	0.00000E+00	0.00000E+00
505	9.99695E-01	3.06083E+00	9.32739E-01	1.14334E-03	0.00000E+00	0.00000E+00
506	9.30387E-01	3.06650E+00	9.32734E-01	1.14108E-03	0.00000E+00	0.00000E+00
507	9.62466E-01	3.07250E+00	9.32793E-01	1.14034E-03	0.00000E+00	0.00000E+00
508	9.68411E-01	3.07800E+00	9.32863E-01	1.14025E-03	0.00000E+00	0.00000E+00
509	9.47507E-01	3.08317E+00	9.32892E-01	1.13837E-03	0.00000E+00	0.00000E+00
510	9.08708E-01	3.08917E+00	9.32844E-01	1.13712E-03	0.00000E+00	0.00000E+00
511	9.80810E-01	3.09483E+00	9.32939E-01	1.13879E-03	0.00000E+00	0.00000E+00
512	9.67461E-01	3.10033E+00	9.33006E-01	1.13857E-03	0.00000E+00	0.00000E+00
513	9.67232E-01	3.10583E+00	9.33073E-01	1.13831E-03	0.00000E+00	0.00000E+00
514	9.39638E-01	3.11133E+00	9.33086E-01	1.13616E-03	0.00000E+00	0.00000E+00
515	1.00346E+00	3.11650E+00	9.33223E-01	1.14221E-03	0.00000E+00	0.00000E+00

516	9.58683E-01	3.12167E+00	9.33273E-01	1.14106E-03	0.00000E+00	0.00000E+00
517	9.40378E-01	3.12717E+00	9.33287E-01	1.13893E-03	0.00000E+00	0.00000E+00
518	9.26555E-01	3.13267E+00	9.33274E-01	1.13679E-03	0.00000E+00	0.00000E+00
519	9.03923E-01	3.13783E+00	9.33217E-01	1.13601E-03	0.00000E+00	0.00000E+00
520	9.23866E-01	3.14333E+00	9.33199E-01	1.13396E-03	0.00000E+00	0.00000E+00
521	9.38501E-01	3.14850E+00	9.33209E-01	1.13182E-03	0.00000E+00	0.00000E+00
522	9.12079E-01	3.15417E+00	9.33168E-01	1.13037E-03	0.00000E+00	0.00000E+00
523	8.97024E-01	3.15967E+00	9.33099E-01	1.13033E-03	0.00000E+00	0.00000E+00
524	9.13454E-01	3.16550E+00	9.33061E-01	1.12879E-03	0.00000E+00	0.00000E+00
525	9.59496E-01	3.17117E+00	9.33112E-01	1.12776E-03	0.00000E+00	0.00000E+00
526	9.28528E-01	3.17750E+00	9.33103E-01	1.12564E-03	0.00000E+00	0.00000E+00
527	9.11628E-01	3.18317E+00	9.33062E-01	1.12424E-03	0.00000E+00	0.00000E+00
528	9.20606E-01	3.18883E+00	9.33039E-01	1.12235E-03	0.00000E+00	0.00000E+00
529	9.26245E-01	3.19433E+00	9.33026E-01	1.12029E-03	0.00000E+00	0.00000E+00
530	9.05870E-01	3.19983E+00	9.32974E-01	1.11935E-03	0.00000E+00	0.00000E+00
531	8.96649E-01	3.20533E+00	9.32906E-01	1.11934E-03	0.00000E+00	0.00000E+00
532	9.49512E-01	3.21100E+00	9.32937E-01	1.11767E-03	0.00000E+00	0.00000E+00
533	9.12710E-01	3.21667E+00	9.32899E-01	1.11621E-03	0.00000E+00	0.00000E+00
534	9.00116E-01	3.22217E+00	9.32837E-01	1.11582E-03	0.00000E+00	0.00000E+00
535	8.97458E-01	3.22800E+00	9.32771E-01	1.11570E-03	0.00000E+00	0.00000E+00
536	9.51305E-01	3.23317E+00	9.32805E-01	1.11415E-03	0.00000E+00	0.00000E+00
537	8.96863E-01	3.23883E+00	9.32738E-01	1.11409E-03	0.00000E+00	0.00000E+00
538	9.41641E-01	3.24433E+00	9.32755E-01	1.11213E-03	0.00000E+00	0.00000E+00
539	9.45698E-01	3.24983E+00	9.32779E-01	1.11032E-03	0.00000E+00	0.00000E+00
540	9.55403E-01	3.25533E+00	9.32821E-01	1.10905E-03	0.00000E+00	0.00000E+00
541	9.17087E-01	3.26150E+00	9.32792E-01	1.10738E-03	0.00000E+00	0.00000E+00
542	9.20669E-01	3.26750E+00	9.32769E-01	1.10555E-03	0.00000E+00	0.00000E+00
543	9.78659E-01	3.27333E+00	9.32854E-01	1.10676E-03	0.00000E+00	0.00000E+00
544	9.44611E-01	3.27867E+00	9.32876E-01	1.10493E-03	0.00000E+00	0.00000E+00
545	9.37353E-01	3.28467E+00	9.32884E-01	1.10293E-03	0.00000E+00	0.00000E+00
546	9.76249E-01	3.29050E+00	9.32964E-01	1.10378E-03	0.00000E+00	0.00000E+00
547	9.05721E-01	3.29583E+00	9.32914E-01	1.10289E-03	0.00000E+00	0.00000E+00
548	9.11791E-01	3.30183E+00	9.32875E-01	1.10154E-03	0.00000E+00	0.00000E+00
549	9.24973E-01	3.30717E+00	9.32861E-01	1.09962E-03	0.00000E+00	0.00000E+00
550	9.36093E-01	3.31250E+00	9.32867E-01	1.09763E-03	0.00000E+00	0.00000E+00
551	9.26028E-01	3.31833E+00	9.32854E-01	1.09570E-03	0.00000E+00	0.00000E+00
552	1.01344E+00	3.32350E+00	9.33001E-01	1.10348E-03	0.00000E+00	0.00000E+00
553	9.66571E-01	3.32850E+00	9.33062E-01	1.10316E-03	0.00000E+00	0.00000E+00
554	9.51431E-01	3.33367E+00	9.33095E-01	1.10166E-03	0.00000E+00	0.00000E+00
555	9.42994E-01	3.33883E+00	9.33113E-01	1.09981E-03	0.00000E+00	0.00000E+00
556	9.21977E-01	3.34433E+00	9.33093E-01	1.09801E-03	0.00000E+00	0.00000E+00
557	9.20551E-01	3.35000E+00	9.33070E-01	1.09626E-03	0.00000E+00	0.00000E+00
558	9.26040E-01	3.35583E+00	9.33058E-01	1.09436E-03	0.00000E+00	0.00000E+00
559	9.65253E-01	3.36133E+00	9.33115E-01	1.09392E-03	0.00000E+00	0.00000E+00
560	9.13848E-01	3.36650E+00	9.33081E-01	1.09250E-03	0.00000E+00	0.00000E+00
561	9.45870E-01	3.37200E+00	9.33104E-01	1.09079E-03	0.00000E+00	0.00000E+00
562	9.83970E-01	3.37717E+00	9.33194E-01	1.09262E-03	0.00000E+00	0.00000E+00
563	9.54344E-01	3.38233E+00	9.33232E-01	1.09132E-03	0.00000E+00	0.00000E+00
564	9.75252E-01	3.38783E+00	9.33307E-01	1.09194E-03	0.00000E+00	0.00000E+00
565	9.56726E-01	3.39300E+00	9.33349E-01	1.09079E-03	0.00000E+00	0.00000E+00
566	9.67444E-01	3.39833E+00	9.33409E-01	1.09054E-03	0.00000E+00	0.00000E+00
567	9.19750E-01	3.40450E+00	9.33385E-01	1.08887E-03	0.00000E+00	0.00000E+00
568	9.85412E-01	3.41000E+00	9.33477E-01	1.09083E-03	0.00000E+00	0.00000E+00
569	9.64837E-01	3.41517E+00	9.33532E-01	1.09030E-03	0.00000E+00	0.00000E+00
570	9.24270E-01	3.42033E+00	9.33516E-01	1.08851E-03	0.00000E+00	0.00000E+00
571	9.68877E-01	3.42583E+00	9.33578E-01	1.08837E-03	0.00000E+00	0.00000E+00
572	9.39630E-01	3.43100E+00	9.33589E-01	1.08651E-03	0.00000E+00	0.00000E+00
573	9.47445E-01	3.43633E+00	9.33613E-01	1.08487E-03	0.00000E+00	0.00000E+00
574	9.43265E-01	3.44167E+00	9.33630E-01	1.08311E-03	0.00000E+00	0.00000E+00
575	9.65167E-01	3.44700E+00	9.33685E-01	1.08262E-03	0.00000E+00	0.00000E+00
576	9.21443E-01	3.45250E+00	9.33663E-01	1.08094E-03	0.00000E+00	0.00000E+00
577	9.34850E-01	3.45783E+00	9.33665E-01	1.07906E-03	0.00000E+00	0.00000E+00
578	9.34612E-01	3.46317E+00	9.33667E-01	1.07718E-03	0.00000E+00	0.00000E+00
579	9.42360E-01	3.46833E+00	9.33682E-01	1.07542E-03	0.00000E+00	0.00000E+00
580	8.98316E-01	3.47400E+00	9.33621E-01	1.07530E-03	0.00000E+00	0.00000E+00
581	9.52844E-01	3.47917E+00	9.33654E-01	1.07396E-03	0.00000E+00	0.00000E+00
582	9.40062E-01	3.48500E+00	9.33665E-01	1.07216E-03	0.00000E+00	0.00000E+00
583	9.70616E-01	3.49017E+00	9.33729E-01	1.07220E-03	0.00000E+00	0.00000E+00
584	9.63019E-01	3.49533E+00	9.33779E-01	1.07154E-03	0.00000E+00	0.00000E+00
585	9.23261E-01	3.50117E+00	9.33761E-01	1.06985E-03	0.00000E+00	0.00000E+00
586	9.29883E-01	3.50633E+00	9.33754E-01	1.06804E-03	0.00000E+00	0.00000E+00
587	9.23633E-01	3.51183E+00	9.33737E-01	1.06635E-03	0.00000E+00	0.00000E+00
588	9.52094E-01	3.51733E+00	9.33768E-01	1.06499E-03	0.00000E+00	0.00000E+00
589	9.25320E-01	3.52267E+00	9.33754E-01	1.06327E-03	0.00000E+00	0.00000E+00
590	9.57080E-01	3.52817E+00	9.33794E-01	1.06220E-03	0.00000E+00	0.00000E+00
591	9.22366E-01	3.53333E+00	9.33774E-01	1.06058E-03	0.00000E+00	0.00000E+00
592	9.24233E-01	3.53883E+00	9.33758E-01	1.05890E-03	0.00000E+00	0.00000E+00
593	9.39058E-01	3.54400E+00	9.33767E-01	1.05715E-03	0.00000E+00	0.00000E+00
594	9.28406E-01	3.54933E+00	9.33758E-01	1.05540E-03	0.00000E+00	0.00000E+00
595	9.59627E-01	3.55450E+00	9.33802E-01	1.05452E-03	0.00000E+00	0.00000E+00
596	9.56441E-01	3.56000E+00	9.33840E-01	1.05343E-03	0.00000E+00	0.00000E+00
597	9.01218E-01	3.56567E+00	9.33785E-01	1.05309E-03	0.00000E+00	0.00000E+00
598	9.46694E-01	3.57117E+00	9.33807E-01	1.05154E-03	0.00000E+00	0.00000E+00
599	9.63792E-01	3.57667E+00	9.33857E-01	1.05098E-03	0.00000E+00	0.00000E+00
600	9.47843E-01	3.58150E+00	9.33880E-01	1.04948E-03	0.00000E+00	0.00000E+00
601	8.87407E-01	3.58700E+00	9.33803E-01	1.05060E-03	0.00000E+00	0.00000E+00
602	9.56261E-01	3.59250E+00	9.33840E-01	1.04951E-03	0.00000E+00	0.00000E+00
603	9.06857E-01	3.59800E+00	9.33795E-01	1.04873E-03	0.00000E+00	0.00000E+00
604	9.58751E-01	3.60350E+00	9.33837E-01	1.04780E-03	0.00000E+00	0.00000E+00
605	9.78208E-01	3.60900E+00	9.33910E-01	1.04865E-03	0.00000E+00	0.00000E+00
606	8.88678E-01	3.61433E+00	9.33835E-01	1.04959E-03	0.00000E+00	0.00000E+00
607	9.11937E-01	3.61983E+00	9.33799E-01	1.04848E-03	0.00000E+00	0.00000E+00
608	9.09040E-01	3.62533E+00	9.33758E-01	1.04754E-03	0.00000E+00	0.00000E+00
609	9.20175E-01	3.63083E+00	9.33736E-01	1.04605E-03	0.00000E+00	0.00000E+00
610	9.77674E-01	3.63600E+00	9.33808E-01	1.04683E-03	0.00000E+00	0.00000E+00
611	9.82783E-01	3.64150E+00	9.33889E-01	1.04820E-03	0.00000E+00	0.00000E+00
612	9.41447E-01	3.64667E+00	9.33901E-01	1.04655E-03	0.00000E+00	0.00000E+00
613	9.57910E-01	3.65233E+00	9.33940E-01	1.04558E-03	0.00000E+00	0.00000E+00
614	9.33914E-01	3.65783E+00	9.33940E-01	1.04387E-03	0.00000E+00	0.00000E+00
615	9.26150E-01	3.66383E+00	9.33928E-01	1.04224E-03	0.00000E+00	0.00000E+00
616	9.36376E-01	3.66967E+00	9.33932E-01	1.04055E-03	0.00000E+00	0.00000E+00
617	9.51167E-01	3.67483E+00	9.33960E-01	1.03923E-03	0.00000E+00	0.00000E+00
618	9.59041E-01	3.68233E+00	9.34000E-01	1.03834E-03	0.00000E+00	0.00000E+00
619	9.51686E-01	3.69067E+00	9.34029E-01	1.03705E-03	0.00000E+00	0.00000E+00
620	9.45960E-01	3.69700E+00	9.34048E-01	1.03556E-03	0.00000E+00	0.00000E+00

621	9.38340E-01	3.70233E+00	9.34055E-01	1.03390E-03	0.00000E+00	0.00000E+00
622	9.48879E-01	3.70783E+00	9.34079E-01	1.03251E-03	0.00000E+00	0.00000E+00
623	9.56614E-01	3.71333E+00	9.34115E-01	1.03149E-03	0.00000E+00	0.00000E+00
624	9.54050E-01	3.71883E+00	9.34147E-01	1.03033E-03	0.00000E+00	0.00000E+00
625	9.47999E-01	3.72433E+00	9.34170E-01	1.02891E-03	0.00000E+00	0.00000E+00
626	9.20886E-01	3.73033E+00	9.34148E-01	1.02748E-03	0.00000E+00	0.00000E+00
627	9.39177E-01	3.73633E+00	9.34156E-01	1.02587E-03	0.00000E+00	0.00000E+00
628	1.01559E+00	3.74150E+00	9.34287E-01	1.03246E-03	0.00000E+00	0.00000E+00
629	9.60285E-01	3.74667E+00	9.34328E-01	1.03164E-03	0.00000E+00	0.00000E+00
630	9.05675E-01	3.75217E+00	9.34282E-01	1.03101E-03	0.00000E+00	0.00000E+00
631	9.64099E-01	3.75733E+00	9.34330E-01	1.03046E-03	0.00000E+00	0.00000E+00
632	9.35833E-01	3.76283E+00	9.34332E-01	1.02882E-03	0.00000E+00	0.00000E+00
633	9.21311E-01	3.76833E+00	9.34312E-01	1.02740E-03	0.00000E+00	0.00000E+00
634	9.41973E-01	3.77400E+00	9.34324E-01	1.02584E-03	0.00000E+00	0.00000E+00
635	9.66189E-01	3.77983E+00	9.34374E-01	1.02546E-03	0.00000E+00	0.00000E+00
636	9.10736E-01	3.78550E+00	9.34337E-01	1.02452E-03	0.00000E+00	0.00000E+00
637	9.43830E-01	3.79150E+00	9.34352E-01	1.02301E-03	0.00000E+00	0.00000E+00
638	9.34290E-01	3.79700E+00	9.34352E-01	1.02140E-03	0.00000E+00	0.00000E+00
639	9.64235E-01	3.80233E+00	9.34398E-01	1.02088E-03	0.00000E+00	0.00000E+00
640	9.48082E-01	3.80833E+00	9.34420E-01	1.01950E-03	0.00000E+00	0.00000E+00
641	9.77511E-01	3.81367E+00	9.34487E-01	1.02014E-03	0.00000E+00	0.00000E+00
642	9.36731E-01	3.81900E+00	9.34491E-01	1.01855E-03	0.00000E+00	0.00000E+00
643	9.67100E-01	3.82433E+00	9.34542E-01	1.01823E-03	0.00000E+00	0.00000E+00
644	9.35323E-01	3.82967E+00	9.34543E-01	1.01664E-03	0.00000E+00	0.00000E+00
645	9.45638E-01	3.83500E+00	9.34560E-01	1.01521E-03	0.00000E+00	0.00000E+00
646	9.36664E-01	3.84017E+00	9.34563E-01	1.01363E-03	0.00000E+00	0.00000E+00
647	9.42683E-01	3.84567E+00	9.34576E-01	1.01214E-03	0.00000E+00	0.00000E+00
648	8.98230E-01	3.85050E+00	9.34520E-01	1.01214E-03	0.00000E+00	0.00000E+00
649	9.36464E-01	3.85600E+00	9.34523E-01	1.01057E-03	0.00000E+00	0.00000E+00
650	9.09893E-01	3.86133E+00	9.34485E-01	1.00973E-03	0.00000E+00	0.00000E+00
651	9.86936E-01	3.86667E+00	9.34566E-01	1.01141E-03	0.00000E+00	0.00000E+00
652	9.96173E-01	3.87217E+00	9.34660E-01	1.01429E-03	0.00000E+00	0.00000E+00
653	1.00383E+00	3.87733E+00	9.34767E-01	1.01829E-03	0.00000E+00	0.00000E+00
654	9.25807E-01	3.88283E+00	9.34753E-01	1.01682E-03	0.00000E+00	0.00000E+00
655	9.05860E-01	3.88833E+00	9.34709E-01	1.01622E-03	0.00000E+00	0.00000E+00
656	8.88469E-01	3.89350E+00	9.34638E-01	1.01713E-03	0.00000E+00	0.00000E+00
657	9.40120E-01	3.89900E+00	9.34646E-01	1.01561E-03	0.00000E+00	0.00000E+00
658	9.50656E-01	3.90467E+00	9.34671E-01	1.01435E-03	0.00000E+00	0.00000E+00
659	9.36233E-01	3.91017E+00	9.34673E-01	1.01281E-03	0.00000E+00	0.00000E+00
660	9.33375E-01	3.91567E+00	9.34671E-01	1.01127E-03	0.00000E+00	0.00000E+00
661	9.39612E-01	3.92117E+00	9.34679E-01	1.00976E-03	0.00000E+00	0.00000E+00
662	9.29236E-01	3.92667E+00	9.34670E-01	1.00827E-03	0.00000E+00	0.00000E+00
663	9.04569E-01	3.93217E+00	9.34625E-01	1.00777E-03	0.00000E+00	0.00000E+00
664	9.18155E-01	3.93750E+00	9.34600E-01	1.00655E-03	0.00000E+00	0.00000E+00
665	8.98351E-01	3.94300E+00	9.34545E-01	1.00652E-03	0.00000E+00	0.00000E+00
666	9.21838E-01	3.94817E+00	9.34526E-01	1.00518E-03	0.00000E+00	0.00000E+00
667	9.40388E-01	3.95367E+00	9.34535E-01	1.00371E-03	0.00000E+00	0.00000E+00
668	9.04455E-01	3.95917E+00	9.34490E-01	1.00322E-03	0.00000E+00	0.00000E+00
669	9.12335E-01	3.96467E+00	9.34457E-01	1.00226E-03	0.00000E+00	0.00000E+00
670	9.47993E-01	3.97017E+00	9.34477E-01	1.00097E-03	0.00000E+00	0.00000E+00
671	9.44232E-01	3.97550E+00	9.34491E-01	9.99577E-04	0.00000E+00	0.00000E+00
672	8.96757E-01	3.98133E+00	9.34435E-01	9.99672E-04	0.00000E+00	0.00000E+00
673	9.12526E-01	3.98683E+00	9.34402E-01	9.98715E-04	0.00000E+00	0.00000E+00
674	9.52457E-01	3.99200E+00	9.34429E-01	9.97590E-04	0.00000E+00	0.00000E+00
675	9.32696E-01	3.99750E+00	9.34427E-01	9.96110E-04	0.00000E+00	0.00000E+00
676	9.32223E-01	4.00300E+00	9.34423E-01	9.94636E-04	0.00000E+00	0.00000E+00
677	9.28630E-01	4.00833E+00	9.34415E-01	9.93198E-04	0.00000E+00	0.00000E+00
678	8.94621E-01	4.01417E+00	9.34356E-01	9.93474E-04	0.00000E+00	0.00000E+00
679	9.79176E-01	4.01933E+00	9.34422E-01	9.94212E-04	0.00000E+00	0.00000E+00
680	9.35108E-01	4.02483E+00	9.34423E-01	9.92745E-04	0.00000E+00	0.00000E+00
681	9.49317E-01	4.03000E+00	9.34445E-01	9.91524E-04	0.00000E+00	0.00000E+00
682	9.66101E-01	4.03517E+00	9.34492E-01	9.91159E-04	0.00000E+00	0.00000E+00
683	9.19416E-01	4.04067E+00	9.34470E-01	9.89950E-04	0.00000E+00	0.00000E+00
684	9.12903E-01	4.04617E+00	9.34438E-01	9.89003E-04	0.00000E+00	0.00000E+00
685	9.48391E-01	4.05167E+00	9.34458E-01	9.87765E-04	0.00000E+00	0.00000E+00
686	9.13442E-01	4.05717E+00	9.34428E-01	9.86799E-04	0.00000E+00	0.00000E+00
687	9.37216E-01	4.06233E+00	9.34432E-01	9.85365E-04	0.00000E+00	0.00000E+00
688	9.65188E-01	4.06800E+00	9.34477E-01	9.84949E-04	0.00000E+00	0.00000E+00
689	9.03427E-01	4.07383E+00	9.34431E-01	9.84552E-04	0.00000E+00	0.00000E+00
690	9.26134E-01	4.08000E+00	9.34419E-01	9.83194E-04	0.00000E+00	0.00000E+00
691	9.62507E-01	4.08567E+00	9.34460E-01	9.82612E-04	0.00000E+00	0.00000E+00
692	9.30261E-01	4.09150E+00	9.34454E-01	9.81206E-04	0.00000E+00	0.00000E+00
693	9.87136E-01	4.09700E+00	9.34530E-01	9.82746E-04	0.00000E+00	0.00000E+00
694	9.33190E-01	4.10367E+00	9.34528E-01	9.81327E-04	0.00000E+00	0.00000E+00
695	9.26574E-01	4.11133E+00	9.34517E-01	9.79977E-04	0.00000E+00	0.00000E+00
696	9.13714E-01	4.11717E+00	9.34487E-01	9.79023E-04	0.00000E+00	0.00000E+00
697	9.25947E-01	4.12317E+00	9.34475E-01	9.77691E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 983 independent fission points were generated

698	9.03890E-01	4.12900E+00	9.34431E-01	9.77274E-04	0.00000E+00	0.00000E+00
699	9.08377E-01	4.13467E+00	9.34393E-01	9.76586E-04	0.00000E+00	0.00000E+00
700	9.48362E-01	4.14017E+00	9.34413E-01	9.75391E-04	0.00000E+00	0.00000E+00
701	9.79606E-01	4.14567E+00	9.34478E-01	9.76138E-04	0.00000E+00	0.00000E+00
702	9.57531E-01	4.15133E+00	9.34511E-01	9.75299E-04	0.00000E+00	0.00000E+00
703	9.20695E-01	4.15700E+00	9.34491E-01	9.74106E-04	0.00000E+00	0.00000E+00
704	9.74575E-01	4.16283E+00	9.34548E-01	9.74392E-04	0.00000E+00	0.00000E+00
705	9.59968E-01	4.16850E+00	9.34584E-01	9.73677E-04	0.00000E+00	0.00000E+00
706	9.30870E-01	4.17433E+00	9.34579E-01	9.72307E-04	0.00000E+00	0.00000E+00
707	9.23604E-01	4.18033E+00	9.34564E-01	9.71052E-04	0.00000E+00	0.00000E+00
708	9.41447E-01	4.18650E+00	9.34573E-01	9.69724E-04	0.00000E+00	0.00000E+00
709	9.11916E-01	4.19250E+00	9.34541E-01	9.68882E-04	0.00000E+00	0.00000E+00
710	9.25990E-01	4.19850E+00	9.34529E-01	9.67588E-04	0.00000E+00	0.00000E+00
711	9.35859E-01	4.20417E+00	9.34531E-01	9.66224E-04	0.00000E+00	0.00000E+00
712	9.29470E-01	4.21000E+00	9.34524E-01	9.64888E-04	0.00000E+00	0.00000E+00
713	9.81477E-01	4.21617E+00	9.34590E-01	9.65791E-04	0.00000E+00	0.00000E+00
714	8.96928E-01	4.22300E+00	9.34537E-01	9.65883E-04	0.00000E+00	0.00000E+00
715	9.66283E-01	4.22850E+00	9.34582E-01	9.65554E-04	0.00000E+00	0.00000E+00
716	9.37296E-01	4.23417E+00	9.34585E-01	9.64208E-04	0.00000E+00	0.00000E+00
717	9.76634E-01	4.23933E+00	9.34644E-01	9.64653E-04	0.00000E+00	0.00000E+00
718	9.17817E-01	4.24533E+00	9.34621E-01	9.63592E-04	0.00000E+00	0.00000E+00
719	9.39793E-01	4.25217E+00	9.34628E-01	9.62274E-04	0.00000E+00	0.00000E+00
720	9.91859E-01	4.25833E+00	9.34708E-01	9.64233E-04	0.00000E+00	0.00000E+00
721	9.14530E-01	4.26433E+00	9.34680E-01	9.63300E-04	0.00000E+00	0.00000E+00
722	9.34164E-01	4.27017E+00	9.34679E-01	9.61961E-04	0.00000E+00	0.00000E+00
723	9.59637E-01	4.27533E+00	9.34713E-01	9.61250E-04	0.00000E+00	0.00000E+00
724	9.17019E-01	4.28050E+00	9.34689E-01	9.60230E-04	0.00000E+00	0.00000E+00

725	9.66310E-01	4.28600E+00	9.34733E-01	9.59898E-04	0.00000E+00	0.00000E+00
726	9.54642E-01	4.29150E+00	9.34760E-01	9.58966E-04	0.00000E+00	0.00000E+00
727	8.60297E-01	4.29717E+00	9.34657E-01	9.63134E-04	0.00000E+00	0.00000E+00
728	9.20929E-01	4.30283E+00	9.34639E-01	9.61992E-04	0.00000E+00	0.00000E+00
729	9.84220E-01	4.30817E+00	9.34707E-01	9.63086E-04	0.00000E+00	0.00000E+00
730	9.08238E-01	4.31333E+00	9.34670E-01	9.62449E-04	0.00000E+00	0.00000E+00
731	9.42475E-01	4.31900E+00	9.34681E-01	9.61187E-04	0.00000E+00	0.00000E+00
732	9.97828E-01	4.32433E+00	9.34768E-01	9.63760E-04	0.00000E+00	0.00000E+00
733	9.36010E-01	4.32950E+00	9.34769E-01	9.62442E-04	0.00000E+00	0.00000E+00
734	9.23024E-01	4.33517E+00	9.34753E-01	9.61260E-04	0.00000E+00	0.00000E+00
735	9.42616E-01	4.34033E+00	9.34764E-01	9.60008E-04	0.00000E+00	0.00000E+00
736	9.62268E-01	4.34533E+00	9.34801E-01	9.59431E-04	0.00000E+00	0.00000E+00
737	9.29926E-01	4.35083E+00	9.34795E-01	9.58148E-04	0.00000E+00	0.00000E+00
738	9.64809E-01	4.35600E+00	9.34836E-01	9.57714E-04	0.00000E+00	0.00000E+00
739	9.15220E-01	4.36150E+00	9.34809E-01	9.56783E-04	0.00000E+00	0.00000E+00
740	9.38154E-01	4.36717E+00	9.34814E-01	9.55497E-04	0.00000E+00	0.00000E+00
741	9.31287E-01	4.37250E+00	9.34809E-01	9.54215E-04	0.00000E+00	0.00000E+00
742	9.74857E-01	4.37767E+00	9.34863E-01	9.54460E-04	0.00000E+00	0.00000E+00
743	9.52765E-01	4.38333E+00	9.34887E-01	9.53477E-04	0.00000E+00	0.00000E+00
744	9.43478E-01	4.38867E+00	9.34899E-01	9.52262E-04	0.00000E+00	0.00000E+00
745	9.43615E-01	4.39400E+00	9.34910E-01	9.51052E-04	0.00000E+00	0.00000E+00
746	9.40915E-01	4.39950E+00	9.34918E-01	9.49807E-04	0.00000E+00	0.00000E+00
747	9.48233E-01	4.40533E+00	9.34936E-01	9.48699E-04	0.00000E+00	0.00000E+00
748	9.68177E-01	4.41050E+00	9.34981E-01	9.48474E-04	0.00000E+00	0.00000E+00
749	9.75931E-01	4.41567E+00	9.35036E-01	9.48789E-04	0.00000E+00	0.00000E+00
750	9.62818E-01	4.42117E+00	9.35073E-01	9.48247E-04	0.00000E+00	0.00000E+00
751	9.20589E-01	4.42667E+00	9.35053E-01	9.47178E-04	0.00000E+00	0.00000E+00
752	9.62868E-01	4.43200E+00	9.35091E-01	9.46640E-04	0.00000E+00	0.00000E+00
753	9.22089E-01	4.43750E+00	9.35073E-01	9.45538E-04	0.00000E+00	0.00000E+00
754	9.29401E-01	4.44267E+00	9.35066E-01	9.44310E-04	0.00000E+00	0.00000E+00
755	9.80971E-01	4.44817E+00	9.35127E-01	9.45023E-04	0.00000E+00	0.00000E+00
756	9.41679E-01	4.45350E+00	9.35135E-01	9.43809E-04	0.00000E+00	0.00000E+00
757	9.45223E-01	4.45867E+00	9.35149E-01	9.42653E-04	0.00000E+00	0.00000E+00
758	9.52287E-01	4.46417E+00	9.35171E-01	9.41678E-04	0.00000E+00	0.00000E+00
759	9.29337E-01	4.46950E+00	9.35164E-01	9.40465E-04	0.00000E+00	0.00000E+00
760	9.05686E-01	4.47500E+00	9.35125E-01	9.40028E-04	0.00000E+00	0.00000E+00
761	9.46314E-01	4.48017E+00	9.35140E-01	9.38904E-04	0.00000E+00	0.00000E+00
762	9.34906E-01	4.48600E+00	9.35139E-01	9.37668E-04	0.00000E+00	0.00000E+00
763	9.16008E-01	4.49167E+00	9.35114E-01	9.36773E-04	0.00000E+00	0.00000E+00
764	9.28794E-01	4.49717E+00	9.35106E-01	9.35579E-04	0.00000E+00	0.00000E+00
765	8.87596E-01	4.50267E+00	9.35044E-01	9.36425E-04	0.00000E+00	0.00000E+00
766	9.45454E-01	4.50817E+00	9.35057E-01	9.35298E-04	0.00000E+00	0.00000E+00
767	9.02315E-01	4.51350E+00	9.35014E-01	9.35054E-04	0.00000E+00	0.00000E+00
768	9.33428E-01	4.51900E+00	9.35012E-01	9.33835E-04	0.00000E+00	0.00000E+00
769	8.93635E-01	4.52500E+00	9.34958E-01	9.34176E-04	0.00000E+00	0.00000E+00
770	9.23828E-01	4.53017E+00	9.34944E-01	9.33071E-04	0.00000E+00	0.00000E+00
771	9.28775E-01	4.53567E+00	9.34936E-01	9.31891E-04	0.00000E+00	0.00000E+00
772	9.08480E-01	4.54100E+00	9.34901E-01	9.31314E-04	0.00000E+00	0.00000E+00
773	8.95701E-01	4.54667E+00	9.34851E-01	9.31494E-04	0.00000E+00	0.00000E+00
774	9.28117E-01	4.55217E+00	9.34842E-01	9.30328E-04	0.00000E+00	0.00000E+00
775	9.33325E-01	4.55767E+00	9.34840E-01	9.29126E-04	0.00000E+00	0.00000E+00
776	9.65969E-01	4.56283E+00	9.34880E-01	9.28795E-04	0.00000E+00	0.00000E+00
777	9.55956E-01	4.56883E+00	9.34907E-01	9.27995E-04	0.00000E+00	0.00000E+00
778	9.19793E-01	4.57500E+00	9.34888E-01	9.27003E-04	0.00000E+00	0.00000E+00
779	9.30107E-01	4.58150E+00	9.34882E-01	9.25829E-04	0.00000E+00	0.00000E+00
780	9.33302E-01	4.58833E+00	9.34880E-01	9.24641E-04	0.00000E+00	0.00000E+00
781	9.16282E-01	4.59400E+00	9.34856E-01	9.23762E-04	0.00000E+00	0.00000E+00
782	9.44881E-01	4.59950E+00	9.34869E-01	9.22666E-04	0.00000E+00	0.00000E+00
783	9.56720E-01	4.60500E+00	9.34897E-01	9.21909E-04	0.00000E+00	0.00000E+00
784	9.84163E-01	4.61017E+00	9.34960E-01	9.22882E-04	0.00000E+00	0.00000E+00
785	9.50319E-01	4.61533E+00	9.34979E-01	9.21911E-04	0.00000E+00	0.00000E+00
786	8.86127E-01	4.62117E+00	9.34917E-01	9.22841E-04	0.00000E+00	0.00000E+00
787	9.78078E-01	4.62717E+00	9.34972E-01	9.23303E-04	0.00000E+00	0.00000E+00
788	9.05869E-01	4.63417E+00	9.34935E-01	9.22871E-04	0.00000E+00	0.00000E+00
789	9.58554E-01	4.64017E+00	9.34965E-01	9.22186E-04	0.00000E+00	0.00000E+00
790	9.08755E-01	4.64633E+00	9.34932E-01	9.21615E-04	0.00000E+00	0.00000E+00
791	9.12978E-01	4.65283E+00	9.34904E-01	9.20867E-04	0.00000E+00	0.00000E+00
792	9.60417E-01	4.65933E+00	9.34936E-01	9.20267E-04	0.00000E+00	0.00000E+00
793	9.36995E-01	4.66600E+00	9.34939E-01	9.19107E-04	0.00000E+00	0.00000E+00
794	9.64871E-01	4.67250E+00	9.34977E-01	9.18723E-04	0.00000E+00	0.00000E+00
795	9.72477E-01	4.67817E+00	9.35024E-01	9.18782E-04	0.00000E+00	0.00000E+00
796	8.97369E-01	4.68467E+00	9.34976E-01	9.18848E-04	0.00000E+00	0.00000E+00
797	9.74459E-01	4.69017E+00	9.35026E-01	9.19035E-04	0.00000E+00	0.00000E+00
798	9.62069E-01	4.69667E+00	9.35060E-01	9.18508E-04	0.00000E+00	0.00000E+00
799	9.26809E-01	4.70317E+00	9.35050E-01	9.17413E-04	0.00000E+00	0.00000E+00
800	9.61627E-01	4.70933E+00	9.35083E-01	9.16868E-04	0.00000E+00	0.00000E+00
801	9.36674E-01	4.71517E+00	9.35085E-01	9.15722E-04	0.00000E+00	0.00000E+00
802	9.25417E-01	4.72083E+00	9.35073E-01	9.14656E-04	0.00000E+00	0.00000E+00
803	8.85887E-01	4.72633E+00	9.35011E-01	9.15575E-04	0.00000E+00	0.00000E+00
804	1.00705E+00	4.73200E+00	9.35101E-01	9.18834E-04	0.00000E+00	0.00000E+00
805	9.42564E-01	4.73833E+00	9.35111E-01	9.17736E-04	0.00000E+00	0.00000E+00
806	9.68210E-01	4.74450E+00	9.35152E-01	9.17518E-04	0.00000E+00	0.00000E+00
807	9.53303E-01	4.75050E+00	9.35174E-01	9.16655E-04	0.00000E+00	0.00000E+00
808	8.94973E-01	4.75783E+00	9.35124E-01	9.16875E-04	0.00000E+00	0.00000E+00
809	9.52692E-01	4.76350E+00	9.35146E-01	9.15997E-04	0.00000E+00	0.00000E+00
810	9.08000E-01	4.77000E+00	9.35113E-01	9.15479E-04	0.00000E+00	0.00000E+00
811	9.46093E-01	4.77683E+00	9.35126E-01	9.14447E-04	0.00000E+00	0.00000E+00
812	9.37260E-01	4.78367E+00	9.35129E-01	9.13322E-04	0.00000E+00	0.00000E+00
813	9.07835E-01	4.79033E+00	9.35095E-01	9.12815E-04	0.00000E+00	0.00000E+00
814	9.28890E-01	4.79583E+00	9.35088E-01	9.11722E-04	0.00000E+00	0.00000E+00
815	9.85926E-01	4.80233E+00	9.35150E-01	9.12745E-04	0.00000E+00	0.00000E+00
816	9.77606E-01	4.80967E+00	9.35202E-01	9.13114E-04	0.00000E+00	0.00000E+00
817	9.17102E-01	4.81667E+00	9.35180E-01	9.12263E-04	0.00000E+00	0.00000E+00
818	9.47547E-01	4.82317E+00	9.35195E-01	9.11271E-04	0.00000E+00	0.00000E+00
819	9.33638E-01	4.82917E+00	9.35193E-01	9.10156E-04	0.00000E+00	0.00000E+00
820	9.76836E-01	4.83517E+00	9.35244E-01	9.10467E-04	0.00000E+00	0.00000E+00
821	9.52828E-01	4.84117E+00	9.35266E-01	9.09608E-04	0.00000E+00	0.00000E+00
822	9.62002E-01	4.84683E+00	9.35298E-01	9.09083E-04	0.00000E+00	0.00000E+00
823	9.52401E-01	4.85233E+00	9.35319E-01	9.08214E-04	0.00000E+00	0.00000E+00
824	8.93980E-01	4.85750E+00	9.35269E-01	9.08502E-04	0.00000E+00	0.00000E+00
825	9.78011E-01	4.86283E+00	9.35321E-01	9.08882E-04	0.00000E+00	0.00000E+00
826	9.35596E-01	4.86800E+00	9.35321E-01	9.07779E-04	0.00000E+00	0.00000E+00
827	9.72460E-01	4.87350E+00	9.35366E-01	9.07795E-04	0.00000E+00	0.00000E+00
828	9.82102E-01	4.87867E+00	9.35423E-01	9.08459E-04	0.00000E+00	0.00000E+00
829	9.21870E-01	4.88383E+00	9.35406E-01	9.07507E-04	0.00000E+00	0.00000E+00

830	9.57532E-01	4.88933E+00	9.35433E-01	9.06804E-04	0.00000E+00	0.00000E+00
831	9.39226E-01	4.89450E+00	9.35438E-01	9.05722E-04	0.00000E+00	0.00000E+00
832	9.25174E-01	4.90033E+00	9.35425E-01	9.04714E-04	0.00000E+00	0.00000E+00
833	8.96467E-01	4.90583E+00	9.35378E-01	9.04840E-04	0.00000E+00	0.00000E+00
834	9.12538E-01	4.91150E+00	9.35351E-01	9.04169E-04	0.00000E+00	0.00000E+00
835	9.19458E-01	4.91717E+00	9.35332E-01	9.03284E-04	0.00000E+00	0.00000E+00
836	9.24442E-01	4.92267E+00	9.35319E-01	9.02295E-04	0.00000E+00	0.00000E+00
837	9.22824E-01	4.92783E+00	9.35304E-01	9.01338E-04	0.00000E+00	0.00000E+00
838	9.39116E-01	4.93317E+00	9.35308E-01	9.00271E-04	0.00000E+00	0.00000E+00
839	9.11141E-01	4.93850E+00	9.35279E-01	8.99658E-04	0.00000E+00	0.00000E+00
840	9.51041E-01	4.94383E+00	9.35298E-01	8.98780E-04	0.00000E+00	0.00000E+00
841	9.39716E-01	4.94917E+00	9.35304E-01	8.97724E-04	0.00000E+00	0.00000E+00
842	9.23770E-01	4.95467E+00	9.35290E-01	8.96760E-04	0.00000E+00	0.00000E+00
843	9.19227E-01	4.96017E+00	9.35271E-01	8.95896E-04	0.00000E+00	0.00000E+00
844	9.09993E-01	4.96567E+00	9.35241E-01	8.95335E-04	0.00000E+00	0.00000E+00
845	8.96518E-01	4.97117E+00	9.35195E-01	8.95452E-04	0.00000E+00	0.00000E+00
846	9.39222E-01	4.97667E+00	9.35199E-01	8.94403E-04	0.00000E+00	0.00000E+00
847	9.61355E-01	4.98183E+00	9.35230E-01	8.93880E-04	0.00000E+00	0.00000E+00
848	9.52993E-01	4.98750E+00	9.35251E-01	8.93069E-04	0.00000E+00	0.00000E+00
849	9.15304E-01	4.99267E+00	9.35228E-01	8.92325E-04	0.00000E+00	0.00000E+00
850	9.55817E-01	4.99800E+00	9.35252E-01	8.91603E-04	0.00000E+00	0.00000E+00
851	9.42533E-01	5.00333E+00	9.35261E-01	8.90593E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 978 independent fission points were generated

852	8.92026E-01	5.00883E+00	9.35210E-01	8.90998E-04	0.00000E+00	0.00000E+00
853	9.56927E-01	5.01417E+00	9.35235E-01	8.90316E-04	0.00000E+00	0.00000E+00
854	8.94531E-01	5.01983E+00	9.35188E-01	8.90553E-04	0.00000E+00	0.00000E+00
855	9.50443E-01	5.02533E+00	9.35206E-01	8.89688E-04	0.00000E+00	0.00000E+00
856	9.65403E-01	5.03050E+00	9.35241E-01	8.89349E-04	0.00000E+00	0.00000E+00
857	9.51401E-01	5.03600E+00	9.35260E-01	8.88509E-04	0.00000E+00	0.00000E+00
858	9.47195E-01	5.04117E+00	9.35274E-01	8.87580E-04	0.00000E+00	0.00000E+00
859	9.57367E-01	5.04667E+00	9.35299E-01	8.86919E-04	0.00000E+00	0.00000E+00
860	9.24055E-01	5.05217E+00	9.35286E-01	8.85981E-04	0.00000E+00	0.00000E+00
861	9.36474E-01	5.05750E+00	9.35288E-01	8.84950E-04	0.00000E+00	0.00000E+00
862	9.50083E-01	5.06283E+00	9.35305E-01	8.84088E-04	0.00000E+00	0.00000E+00
863	9.12142E-01	5.06833E+00	9.35278E-01	8.83470E-04	0.00000E+00	0.00000E+00
864	9.38333E-01	5.07317E+00	9.35282E-01	8.82452E-04	0.00000E+00	0.00000E+00
865	9.11605E-01	5.07833E+00	9.35254E-01	8.81856E-04	0.00000E+00	0.00000E+00
866	9.60279E-01	5.08417E+00	9.35283E-01	8.81310E-04	0.00000E+00	0.00000E+00
867	9.41518E-01	5.08933E+00	9.35290E-01	8.80321E-04	0.00000E+00	0.00000E+00
868	9.40241E-01	5.09450E+00	9.35296E-01	8.79322E-04	0.00000E+00	0.00000E+00
869	9.30381E-01	5.10000E+00	9.35290E-01	8.78326E-04	0.00000E+00	0.00000E+00
870	9.46523E-01	5.10550E+00	9.35303E-01	8.77408E-04	0.00000E+00	0.00000E+00
871	8.99316E-01	5.11100E+00	9.35262E-01	8.77376E-04	0.00000E+00	0.00000E+00
872	9.21065E-01	5.11617E+00	9.35246E-01	8.76519E-04	0.00000E+00	0.00000E+00
873	9.51711E-01	5.12167E+00	9.35265E-01	8.75716E-04	0.00000E+00	0.00000E+00
874	9.85334E-01	5.12683E+00	9.35322E-01	8.76594E-04	0.00000E+00	0.00000E+00
875	9.11626E-01	5.13233E+00	9.35295E-01	8.76010E-04	0.00000E+00	0.00000E+00
876	9.32336E-01	5.13783E+00	9.35291E-01	8.75013E-04	0.00000E+00	0.00000E+00
877	9.23220E-01	5.14317E+00	9.35278E-01	8.74122E-04	0.00000E+00	0.00000E+00
878	9.85669E-01	5.14917E+00	9.35335E-01	8.75016E-04	0.00000E+00	0.00000E+00
879	9.32856E-01	5.15633E+00	9.35332E-01	8.74022E-04	0.00000E+00	0.00000E+00
880	8.87793E-01	5.16233E+00	9.35278E-01	8.74704E-04	0.00000E+00	0.00000E+00
881	8.89152E-01	5.16817E+00	9.35226E-01	8.75283E-04	0.00000E+00	0.00000E+00
882	9.34770E-01	5.17400E+00	9.35225E-01	8.74288E-04	0.00000E+00	0.00000E+00
883	9.28647E-01	5.17967E+00	9.35218E-01	8.73327E-04	0.00000E+00	0.00000E+00
884	9.74333E-01	5.18550E+00	9.35262E-01	8.73462E-04	0.00000E+00	0.00000E+00
885	9.43514E-01	5.19083E+00	9.35271E-01	8.72523E-04	0.00000E+00	0.00000E+00
886	9.54819E-01	5.19683E+00	9.35294E-01	8.71816E-04	0.00000E+00	0.00000E+00
887	9.21008E-01	5.20267E+00	9.35277E-01	8.70980E-04	0.00000E+00	0.00000E+00
888	9.36204E-01	5.20867E+00	9.35278E-01	8.69997E-04	0.00000E+00	0.00000E+00
889	9.37032E-01	5.21400E+00	9.35280E-01	8.69018E-04	0.00000E+00	0.00000E+00
890	9.74358E-01	5.21933E+00	9.35324E-01	8.69153E-04	0.00000E+00	0.00000E+00
891	9.68452E-01	5.22483E+00	9.35362E-01	8.68974E-04	0.00000E+00	0.00000E+00
892	9.27681E-01	5.23067E+00	9.35353E-01	8.68040E-04	0.00000E+00	0.00000E+00
893	9.42278E-01	5.23700E+00	9.35361E-01	8.67100E-04	0.00000E+00	0.00000E+00
894	9.41827E-01	5.24350E+00	9.35368E-01	8.66158E-04	0.00000E+00	0.00000E+00
895	9.10460E-01	5.24983E+00	9.35340E-01	8.65637E-04	0.00000E+00	0.00000E+00
896	9.26933E-01	5.25567E+00	9.35331E-01	8.64719E-04	0.00000E+00	0.00000E+00
897	9.50715E-01	5.26117E+00	9.35348E-01	8.63924E-04	0.00000E+00	0.00000E+00
898	9.14598E-01	5.26667E+00	9.35325E-01	8.63270E-04	0.00000E+00	0.00000E+00
899	9.05872E-01	5.27233E+00	9.35292E-01	8.62932E-04	0.00000E+00	0.00000E+00
900	9.37185E-01	5.27783E+00	9.35294E-01	8.61973E-04	0.00000E+00	0.00000E+00
901	9.70323E-01	5.28367E+00	9.35333E-01	8.61894E-04	0.00000E+00	0.00000E+00
902	9.13935E-01	5.28900E+00	9.35309E-01	8.61264E-04	0.00000E+00	0.00000E+00
903	9.21893E-01	5.29450E+00	9.35294E-01	8.60437E-04	0.00000E+00	0.00000E+00
904	9.77192E-01	5.29983E+00	9.35341E-01	8.60737E-04	0.00000E+00	0.00000E+00
905	9.15734E-01	5.30500E+00	9.35319E-01	8.60057E-04	0.00000E+00	0.00000E+00
906	9.77189E-01	5.31050E+00	9.35365E-01	8.60353E-04	0.00000E+00	0.00000E+00
907	9.31488E-01	5.31583E+00	9.35361E-01	8.59412E-04	0.00000E+00	0.00000E+00
908	9.45390E-01	5.32117E+00	9.35372E-01	8.58535E-04	0.00000E+00	0.00000E+00
909	9.43023E-01	5.32683E+00	9.35381E-01	8.57629E-04	0.00000E+00	0.00000E+00
910	9.36673E-01	5.33233E+00	9.35382E-01	8.56685E-04	0.00000E+00	0.00000E+00
911	9.10883E-01	5.33783E+00	9.35355E-01	8.56166E-04	0.00000E+00	0.00000E+00
912	8.88616E-01	5.34317E+00	9.35304E-01	8.56766E-04	0.00000E+00	0.00000E+00
913	9.49132E-01	5.34867E+00	9.35319E-01	8.55960E-04	0.00000E+00	0.00000E+00
914	9.22296E-01	5.35417E+00	9.35305E-01	8.55140E-04	0.00000E+00	0.00000E+00
915	9.48288E-01	5.35983E+00	9.35319E-01	8.54321E-04	0.00000E+00	0.00000E+00
916	9.82882E-01	5.36583E+00	9.35371E-01	8.54971E-04	0.00000E+00	0.00000E+00
917	9.17163E-01	5.37217E+00	9.35351E-01	8.54268E-04	0.00000E+00	0.00000E+00
918	9.69461E-01	5.37783E+00	9.35388E-01	8.54147E-04	0.00000E+00	0.00000E+00
919	9.79867E-01	5.38333E+00	9.35437E-01	8.54592E-04	0.00000E+00	0.00000E+00
920	9.81049E-01	5.38850E+00	9.35486E-01	8.55106E-04	0.00000E+00	0.00000E+00
921	9.39674E-01	5.39400E+00	9.35491E-01	8.54187E-04	0.00000E+00	0.00000E+00
922	9.32619E-01	5.39950E+00	9.35488E-01	8.53264E-04	0.00000E+00	0.00000E+00
923	9.09726E-01	5.40467E+00	9.35460E-01	8.52796E-04	0.00000E+00	0.00000E+00
924	8.99653E-01	5.41050E+00	9.35421E-01	8.52755E-04	0.00000E+00	0.00000E+00
925	9.17929E-01	5.41617E+00	9.35402E-01	8.52041E-04	0.00000E+00	0.00000E+00
926	9.10767E-01	5.42167E+00	9.35375E-01	8.51536E-04	0.00000E+00	0.00000E+00
927	9.19510E-01	5.42717E+00	9.35358E-01	8.50788E-04	0.00000E+00	0.00000E+00
928	9.65927E-01	5.43250E+00	9.35391E-01	8.50510E-04	0.00000E+00	0.00000E+00
929	8.75360E-01	5.43850E+00	9.35327E-01	8.52056E-04	0.00000E+00	0.00000E+00
930	9.44449E-01	5.44433E+00	9.35336E-01	8.51194E-04	0.00000E+00	0.00000E+00
931	9.24593E-01	5.45033E+00	9.35325E-01	8.50356E-04	0.00000E+00	0.00000E+00
932	9.67739E-01	5.45567E+00	9.35360E-01	8.50156E-04	0.00000E+00	0.00000E+00
933	9.37930E-01	5.46150E+00	9.35362E-01	8.49247E-04	0.00000E+00	0.00000E+00

934	9.33122E-01	5.46750E+00	9.35360E-01	8.48339E-04	0.00000E+00	0.00000E+00
935	8.98652E-01	5.47317E+00	9.35321E-01	8.48342E-04	0.00000E+00	0.00000E+00
936	9.86337E-01	5.47883E+00	9.35375E-01	8.49191E-04	0.00000E+00	0.00000E+00
937	9.67781E-01	5.48467E+00	9.35410E-01	8.48990E-04	0.00000E+00	0.00000E+00
938	9.59439E-01	5.49033E+00	9.35436E-01	8.48471E-04	0.00000E+00	0.00000E+00
939	9.69711E-01	5.49617E+00	9.35472E-01	8.48354E-04	0.00000E+00	0.00000E+00
940	9.28176E-01	5.50333E+00	9.35464E-01	8.47485E-04	0.00000E+00	0.00000E+00
941	8.98399E-01	5.50917E+00	9.35425E-01	8.47502E-04	0.00000E+00	0.00000E+00
942	9.74471E-01	5.51533E+00	9.35467E-01	8.47618E-04	0.00000E+00	0.00000E+00
943	9.55582E-01	5.52117E+00	9.35488E-01	8.46987E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 987 independent fission points were generated

944	9.16424E-01	5.52633E+00	9.35468E-01	8.46329E-04	0.00000E+00	0.00000E+00
945	9.15342E-01	5.53183E+00	9.35446E-01	8.45700E-04	0.00000E+00	0.00000E+00
946	9.02155E-01	5.53783E+00	9.35411E-01	8.45540E-04	0.00000E+00	0.00000E+00
947	8.79036E-01	5.54317E+00	9.35351E-01	8.46749E-04	0.00000E+00	0.00000E+00
948	9.56510E-01	5.54850E+00	9.35374E-01	8.46149E-04	0.00000E+00	0.00000E+00
949	8.78248E-01	5.55383E+00	9.35313E-01	8.47405E-04	0.00000E+00	0.00000E+00
950	9.28524E-01	5.55917E+00	9.35306E-01	8.46541E-04	0.00000E+00	0.00000E+00
951	8.88613E-01	5.56433E+00	9.35257E-01	8.47078E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 985 independent fission points were generated

952	8.95624E-01	5.57000E+00	9.35215E-01	8.47214E-04	0.00000E+00	0.00000E+00
953	9.59537E-01	5.57550E+00	9.35241E-01	8.46709E-04	0.00000E+00	0.00000E+00
954	9.85500E-01	5.58133E+00	9.35294E-01	8.47465E-04	0.00000E+00	0.00000E+00
955	9.68900E-01	5.58700E+00	9.35329E-01	8.47309E-04	0.00000E+00	0.00000E+00
956	9.24205E-01	5.59267E+00	9.35317E-01	8.46501E-04	0.00000E+00	0.00000E+00
957	9.02887E-01	5.59850E+00	9.35283E-01	8.46296E-04	0.00000E+00	0.00000E+00
958	9.31103E-01	5.60450E+00	9.35279E-01	8.45421E-04	0.00000E+00	0.00000E+00
959	9.22018E-01	5.60983E+00	9.35265E-01	8.44651E-04	0.00000E+00	0.00000E+00
960	9.54903E-01	5.61533E+00	9.35286E-01	8.44018E-04	0.00000E+00	0.00000E+00
961	9.18853E-01	5.62050E+00	9.35268E-01	8.43312E-04	0.00000E+00	0.00000E+00
962	8.99870E-01	5.62633E+00	9.35232E-01	8.43239E-04	0.00000E+00	0.00000E+00
963	8.97711E-01	5.63250E+00	9.35193E-01	8.43266E-04	0.00000E+00	0.00000E+00
964	9.30865E-01	5.63883E+00	9.35188E-01	8.42401E-04	0.00000E+00	0.00000E+00
965	9.67966E-01	5.64500E+00	9.35222E-01	8.42213E-04	0.00000E+00	0.00000E+00
966	9.07776E-01	5.65083E+00	9.35194E-01	8.41821E-04	0.00000E+00	0.00000E+00
967	9.18240E-01	5.65650E+00	9.35176E-01	8.41132E-04	0.00000E+00	0.00000E+00
968	9.09606E-01	5.66200E+00	9.35150E-01	8.40677E-04	0.00000E+00	0.00000E+00
969	9.15068E-01	5.66767E+00	9.35129E-01	8.40064E-04	0.00000E+00	0.00000E+00
970	9.33243E-01	5.67317E+00	9.35127E-01	8.39198E-04	0.00000E+00	0.00000E+00
971	9.07352E-01	5.67950E+00	9.35098E-01	8.38822E-04	0.00000E+00	0.00000E+00
972	9.54349E-01	5.68483E+00	9.35118E-01	8.38191E-04	0.00000E+00	0.00000E+00
973	9.35471E-01	5.69033E+00	9.35118E-01	8.37328E-04	0.00000E+00	0.00000E+00
974	9.30243E-01	5.69633E+00	9.35113E-01	8.36481E-04	0.00000E+00	0.00000E+00
975	9.37868E-01	5.70150E+00	9.35116E-01	8.35626E-04	0.00000E+00	0.00000E+00
976	9.13253E-01	5.70683E+00	9.35094E-01	8.35069E-04	0.00000E+00	0.00000E+00
977	8.96700E-01	5.71217E+00	9.35054E-01	8.35141E-04	0.00000E+00	0.00000E+00
978	9.46719E-01	5.71750E+00	9.35066E-01	8.34370E-04	0.00000E+00	0.00000E+00
979	9.10426E-01	5.72300E+00	9.35041E-01	8.33897E-04	0.00000E+00	0.00000E+00
980	9.54850E-01	5.72833E+00	9.35061E-01	8.33291E-04	0.00000E+00	0.00000E+00
981	9.21518E-01	5.73367E+00	9.35048E-01	8.32554E-04	0.00000E+00	0.00000E+00
982	9.30559E-01	5.73933E+00	9.35043E-01	8.31717E-04	0.00000E+00	0.00000E+00
983	9.13397E-01	5.74533E+00	9.35021E-01	8.31161E-04	0.00000E+00	0.00000E+00
984	9.60187E-01	5.75050E+00	9.35047E-01	8.30710E-04	0.00000E+00	0.00000E+00
985	8.96228E-01	5.75650E+00	9.35007E-01	8.30803E-04	0.00000E+00	0.00000E+00
986	9.67898E-01	5.76200E+00	9.35040E-01	8.30631E-04	0.00000E+00	0.00000E+00
987	9.59530E-01	5.76767E+00	9.35065E-01	8.30160E-04	0.00000E+00	0.00000E+00
988	9.12235E-01	5.77283E+00	9.35042E-01	8.29641E-04	0.00000E+00	0.00000E+00
989	9.60456E-01	5.77867E+00	9.35068E-01	8.29200E-04	0.00000E+00	0.00000E+00
990	9.64848E-01	5.78367E+00	9.35098E-01	8.28908E-04	0.00000E+00	0.00000E+00
991	9.52108E-01	5.78900E+00	9.35115E-01	8.28248E-04	0.00000E+00	0.00000E+00
992	9.43731E-01	5.79433E+00	9.35124E-01	8.27457E-04	0.00000E+00	0.00000E+00
993	9.03138E-01	5.80050E+00	9.35092E-01	8.27252E-04	0.00000E+00	0.00000E+00
994	9.04483E-01	5.80617E+00	9.35061E-01	8.26993E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 985 independent fission points were generated

995	8.48269E-01	5.81250E+00	9.34973E-01	8.30770E-04	0.00000E+00	0.00000E+00
996	8.97992E-01	5.81817E+00	9.34936E-01	8.30768E-04	0.00000E+00	0.00000E+00
997	9.23407E-01	5.82400E+00	9.34925E-01	8.30013E-04	0.00000E+00	0.00000E+00
998	9.60343E-01	5.83000E+00	9.34950E-01	8.29572E-04	0.00000E+00	0.00000E+00
999	9.14124E-01	5.83600E+00	9.34929E-01	8.29003E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 977 independent fission points were generated

1000	8.71814E-01	5.84200E+00	9.34866E-01	8.30583E-04	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

lifetime = 7.61643E-05 + or - 1.12291E-07 generation time = 4.08760E-05 + or - 5.30583E-08
nu bar = 2.89141E+00 + or - 3.24669E-06 average fission group = 2.17391E+02 + or - 4.20140E-03
energy(ev) of the average lethargy causing fission = 5.33315E-02 + or - 3.28875E-05

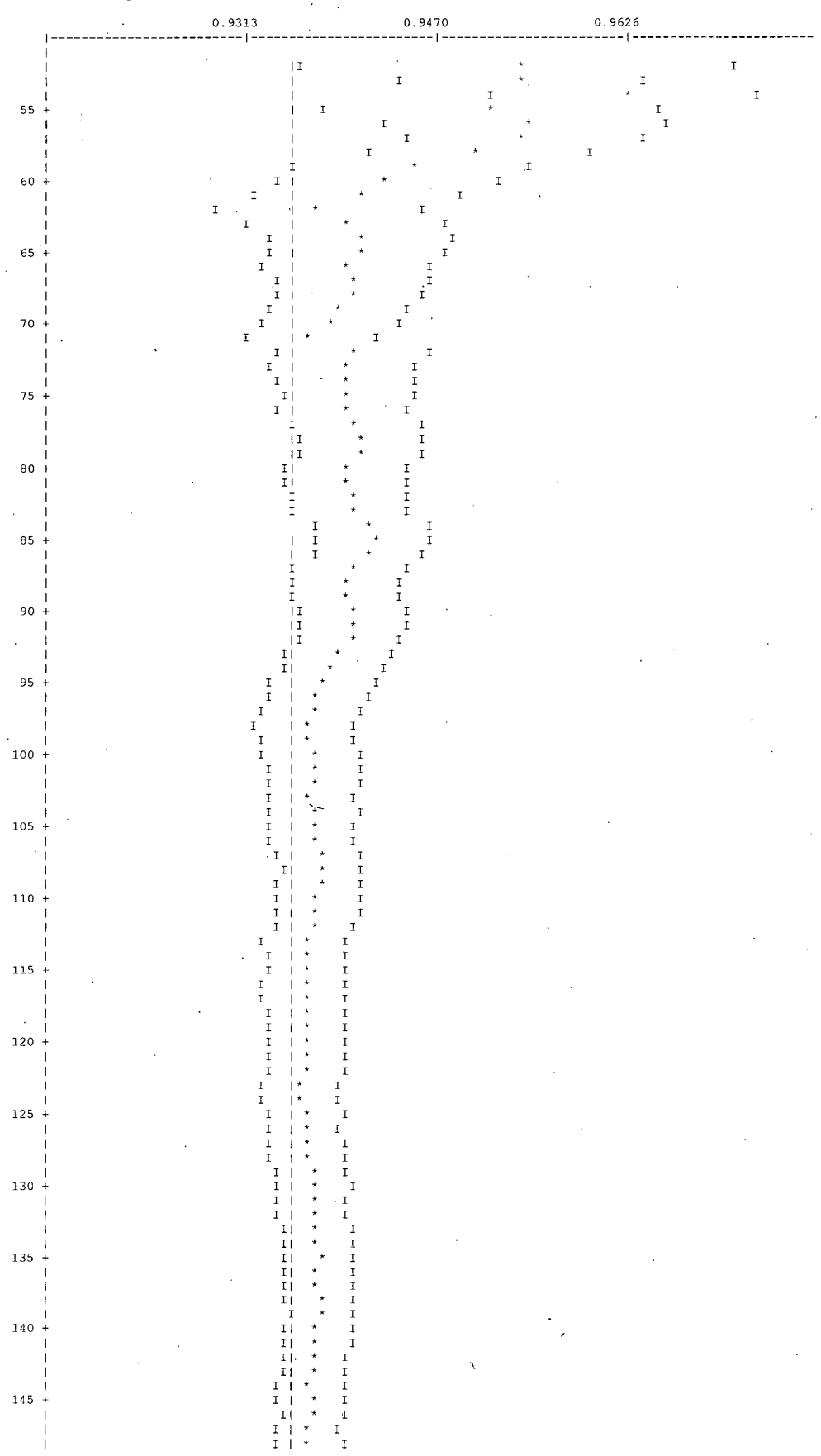
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
50	0.93513	+ or - 0.00110	0.93403 to 0.93623	0.93293 to 0.93734	0.93183 to 0.93844	950000
51	0.93513	+ or - 0.00108	0.93405 to 0.93621	0.93298 to 0.93729	0.93190 to 0.93837	949000
52	0.93509	+ or - 0.00107	0.93402 to 0.93616	0.93295 to 0.93723	0.93188 to 0.93830	948000
53	0.93507	+ or - 0.00115	0.93392 to 0.93623	0.93277 to 0.93738	0.93161 to 0.93853	947000
54	0.93502	+ or - 0.00112	0.93389 to 0.93614	0.93277 to 0.93727	0.93164 to 0.93839	946000
55	0.93504	+ or - 0.00113	0.93391 to 0.93618	0.93278 to 0.93731	0.93165 to 0.93844	945000
56	0.93501	+ or - 0.00113	0.93388 to 0.93613	0.93276 to 0.93726	0.93163 to 0.93839	944000
57	0.93499	+ or - 0.00114	0.93385 to 0.93613	0.93272 to 0.93726	0.93158 to 0.93840	943000
58	0.93500	+ or - 0.00121	0.93379 to 0.93621	0.93257 to 0.93743	0.93136 to 0.93864	942000
59	0.93504	+ or - 0.00119	0.93384 to 0.93623	0.93265 to 0.93743	0.93145 to 0.93862	941000
81	0.93497	+ or - 0.00114	0.93383 to 0.93612	0.93268 to 0.93726	0.93154 to 0.93841	919000
103	0.93503	+ or - 0.00115	0.93388 to 0.93618	0.93273 to 0.93734	0.93157 to 0.93849	897000
125	0.93501	+ or - 0.00122	0.93380 to 0.93623	0.93258 to 0.93745	0.93137 to 0.93866	875000
147	0.93496	+ or - 0.00122	0.93374 to 0.93618	0.93252 to 0.93740	0.93131 to 0.93861	853000
169	0.93511	+ or - 0.00119	0.93392 to 0.93629	0.93273 to 0.93748	0.93155 to 0.93866	831000
191	0.93534	+ or - 0.00125	0.93410 to 0.93659	0.93285 to 0.93783	0.93160 to 0.93908	809000
213	0.93546	+ or - 0.00129	0.93417 to 0.93674	0.93288 to 0.93803	0.93160 to 0.93932	787000
235	0.93554	+ or - 0.00133	0.93421 to 0.93688	0.93288 to 0.93821	0.93155 to 0.93954	765000
257	0.93571	+ or - 0.00135	0.93436 to 0.93706	0.93301 to 0.93840	0.93167 to 0.93975	743000
279	0.93591	+ or - 0.00146	0.93445 to 0.93737	0.93299 to 0.93884	0.93152 to 0.94030	721000
301	0.93606	+ or - 0.00140	0.93466 to 0.93747	0.93325 to 0.93887	0.93185 to 0.94027	699000
323	0.93627	+ or - 0.00148	0.93479 to 0.93775	0.93331 to 0.93923	0.93183 to 0.94071	677000
345	0.93634	+ or - 0.00147	0.93487 to 0.93781	0.93339 to 0.93928	0.93192 to 0.94076	655000
367	0.93643	+ or - 0.00149	0.93494 to 0.93793	0.93345 to 0.93942	0.93195 to 0.94091	633000
389	0.93696	+ or - 0.00142	0.93554 to 0.93838	0.93411 to 0.93980	0.93269 to 0.94122	611000
411	0.93704	+ or - 0.00140	0.93564 to 0.93844	0.93424 to 0.93984	0.93285 to 0.94123	589000

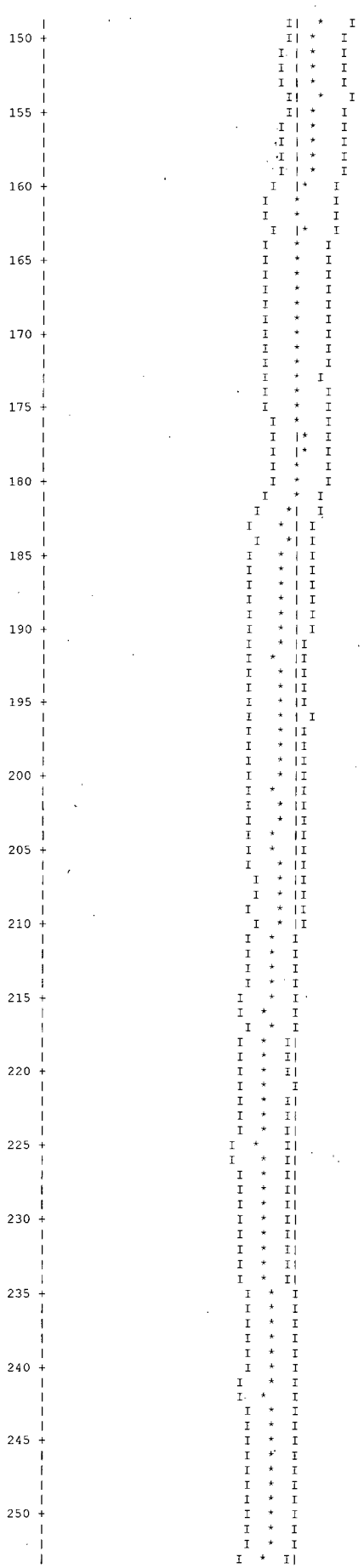
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

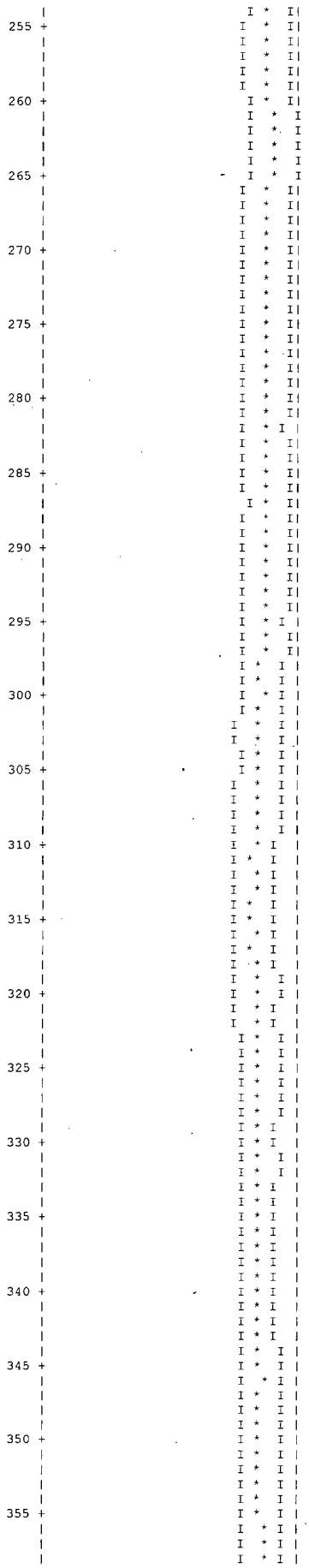
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
433	0.93706	+ or - 0.00160	0.93546 to 0.93866	0.93386 to 0.94027	0.93226 to 0.94187	567000
455	0.93720	+ or - 0.00158	0.93562 to 0.93878	0.93404 to 0.94036	0.93246 to 0.94195	545000
477	0.93735	+ or - 0.00160	0.93575 to 0.93894	0.93416 to 0.94054	0.93256 to 0.94213	523000
499	0.93705	+ or - 0.00171	0.93534 to 0.93876	0.93363 to 0.94047	0.93193 to 0.94218	501000
521	0.93666	+ or - 0.00164	0.93502 to 0.93830	0.93337 to 0.93995	0.93173 to 0.94159	479000
543	0.93725	+ or - 0.00176	0.93549 to 0.93900	0.93373 to 0.94076	0.93198 to 0.94252	457000
565	0.93683	+ or - 0.00170	0.93513 to 0.93853	0.93342 to 0.94024	0.93172 to 0.94194	435000
587	0.93647	+ or - 0.00166	0.93481 to 0.93812	0.93315 to 0.93978	0.93149 to 0.94144	413000
609	0.93662	+ or - 0.00183	0.93479 to 0.93845	0.93296 to 0.94028	0.93113 to 0.94211	391000
631	0.93578	+ or - 0.00186	0.93392 to 0.93764	0.93205 to 0.93951	0.93019 to 0.94137	369000
653	0.93505	+ or - 0.00196	0.93310 to 0.93701	0.93114 to 0.93897	0.92918 to 0.94092	347000
675	0.93578	+ or - 0.00181	0.93396 to 0.93759	0.93215 to 0.93940	0.93033 to 0.94122	325000
697	0.93576	+ or - 0.00202	0.93375 to 0.93778	0.93173 to 0.93980	0.92972 to 0.94181	303000
719	0.93547	+ or - 0.00228	0.93320 to 0.93775	0.93092 to 0.94002	0.92865 to 0.94230	281000
741	0.93503	+ or - 0.00270	0.93233 to 0.93773	0.92964 to 0.94042	0.92694 to 0.94312	259000
763	0.93407	+ or - 0.00237	0.93169 to 0.93644	0.92932 to 0.93882	0.92695 to 0.94119	237000
785	0.93445	+ or - 0.00251	0.93195 to 0.93696	0.92944 to 0.93947	0.92694 to 0.94197	215000
807	0.93358	+ or - 0.00260	0.93098 to 0.93618	0.92838 to 0.93878	0.92578 to 0.94138	193000
829	0.93225	+ or - 0.00267	0.92958 to 0.93493	0.92690 to 0.93760	0.92423 to 0.94028	171000
851	0.93262	+ or - 0.00298	0.92964 to 0.93559	0.92666 to 0.93857	0.92368 to 0.94155	149000
873	0.93213	+ or - 0.00364	0.92849 to 0.93578	0.92485 to 0.93942	0.92120 to 0.94306	127000
895	0.93083	+ or - 0.00412	0.92671 to 0.93495	0.92259 to 0.93907	0.91847 to 0.94319	105000
917	0.92952	+ or - 0.00501	0.92451 to 0.93453	0.91950 to 0.93954	0.91448 to 0.94456	83000
939	0.92555	+ or - 0.00582	0.91973 to 0.93138	0.91391 to 0.93720	0.90809 to 0.94302	61000
961	0.92497	+ or - 0.01033	0.91464 to 0.93530	0.90431 to 0.94563	0.89398 to 0.95596	39000
983	0.92593	+ or - 0.05412	0.87181 to 0.98004	0.81770 to 1.03416	0.76358 to 1.08827	17000

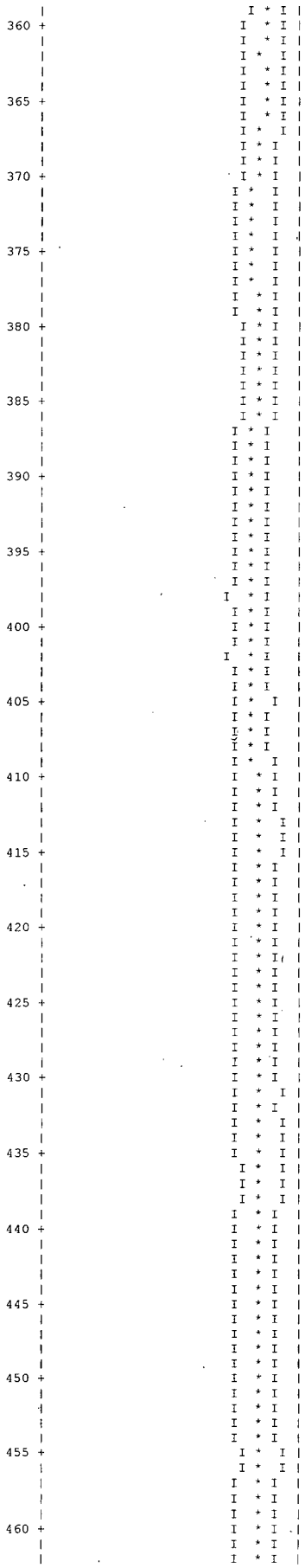
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

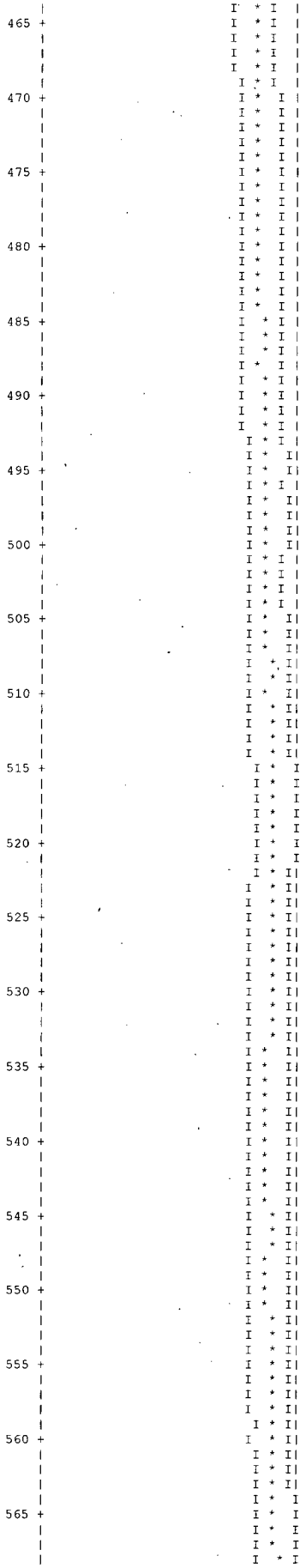
plot of average k-effective by generation run.
the line represents k-eff = 0.9353 + or - 0.0011 which occurs for 994 generations run.

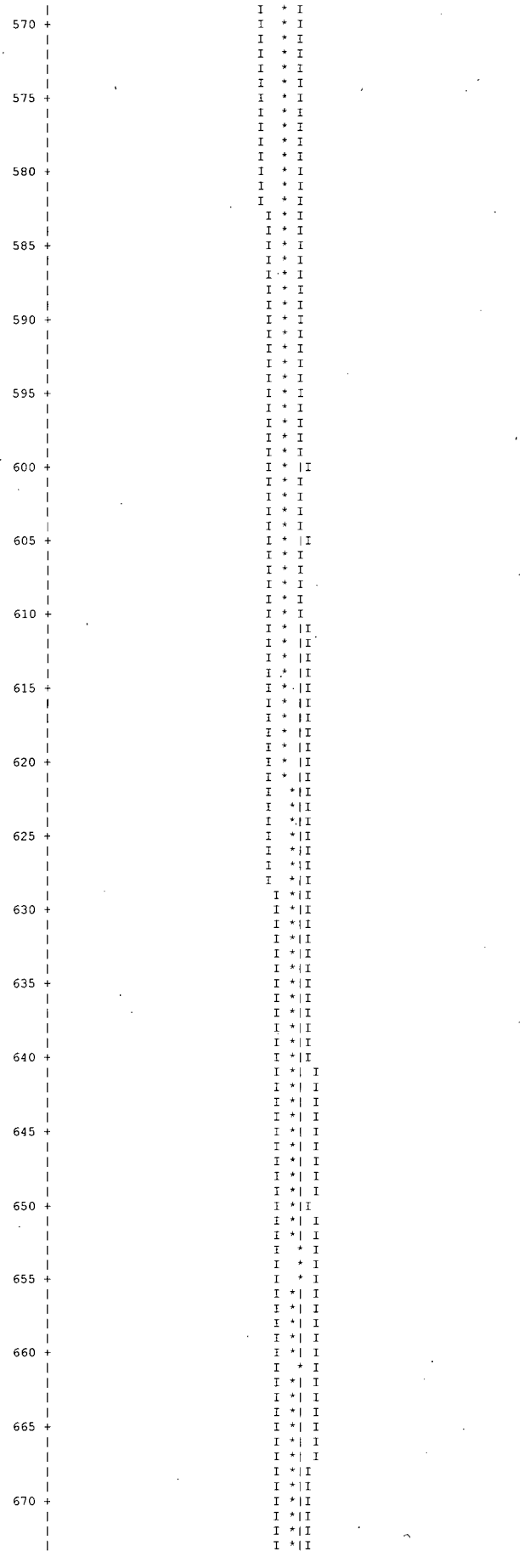


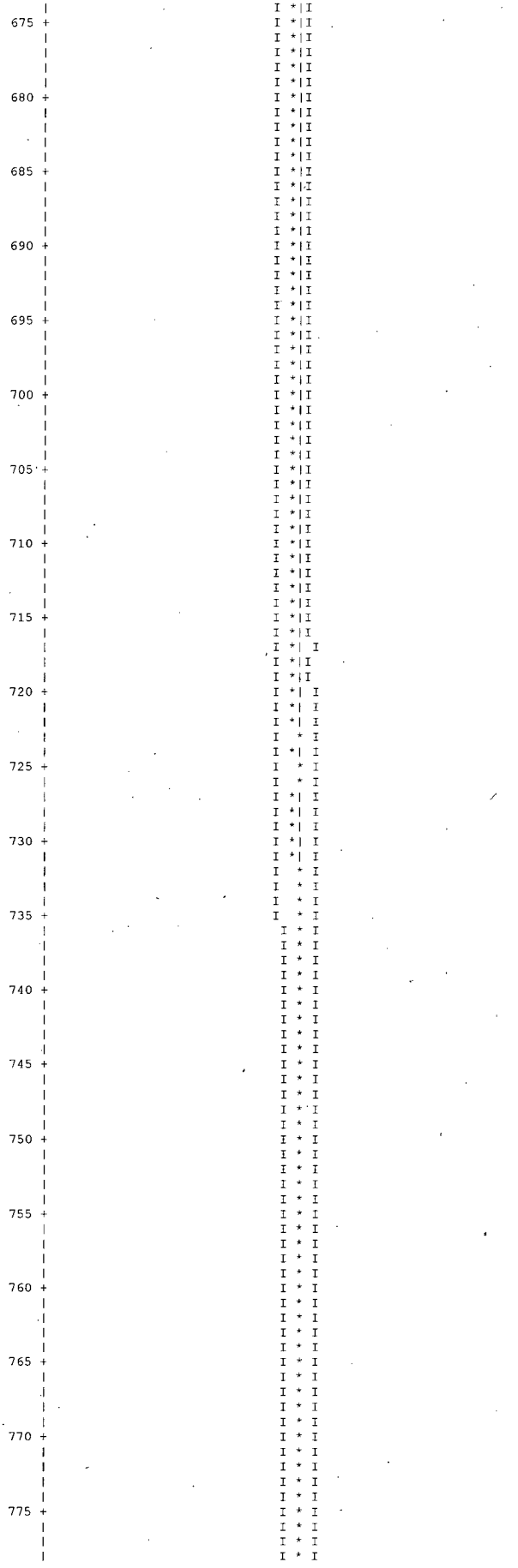


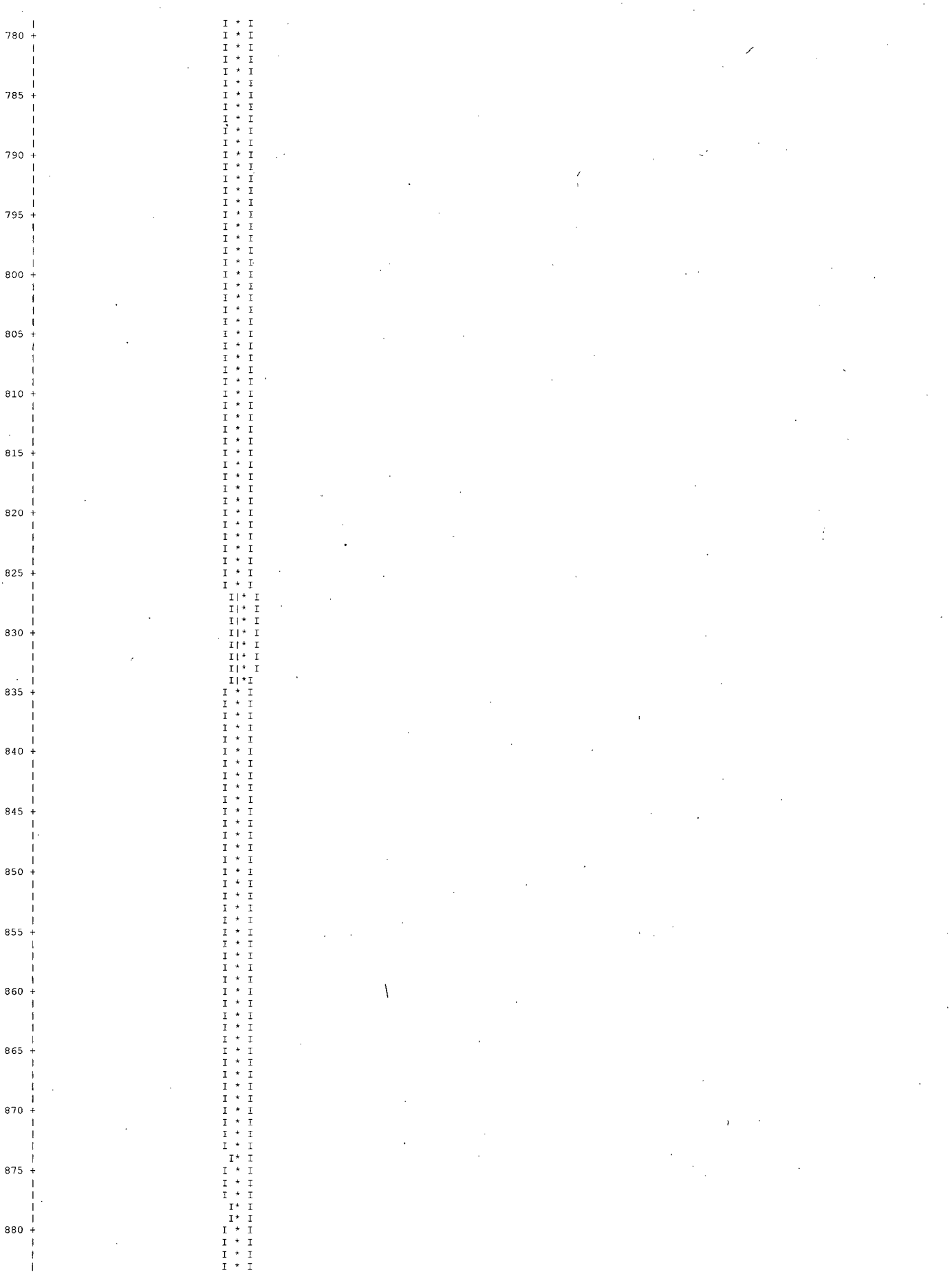








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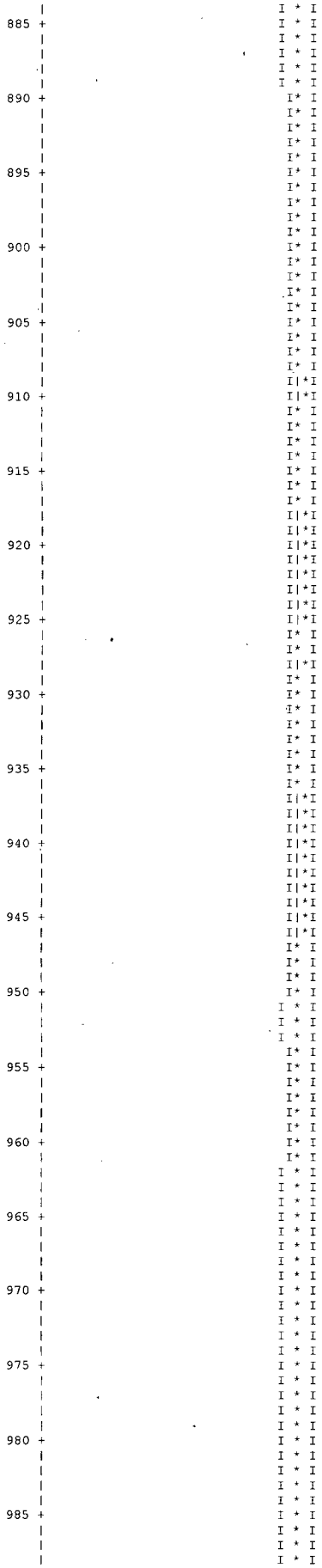

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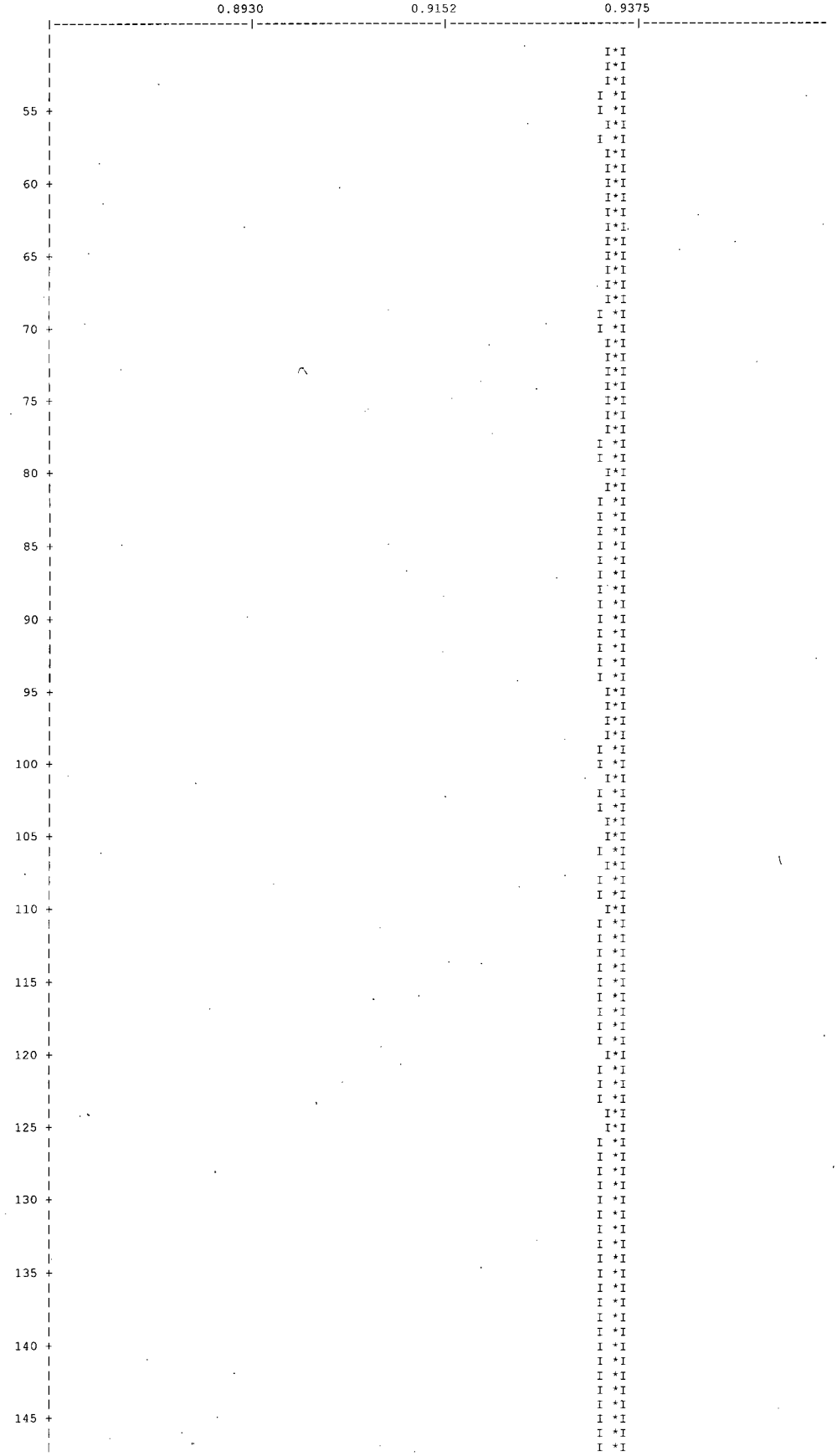
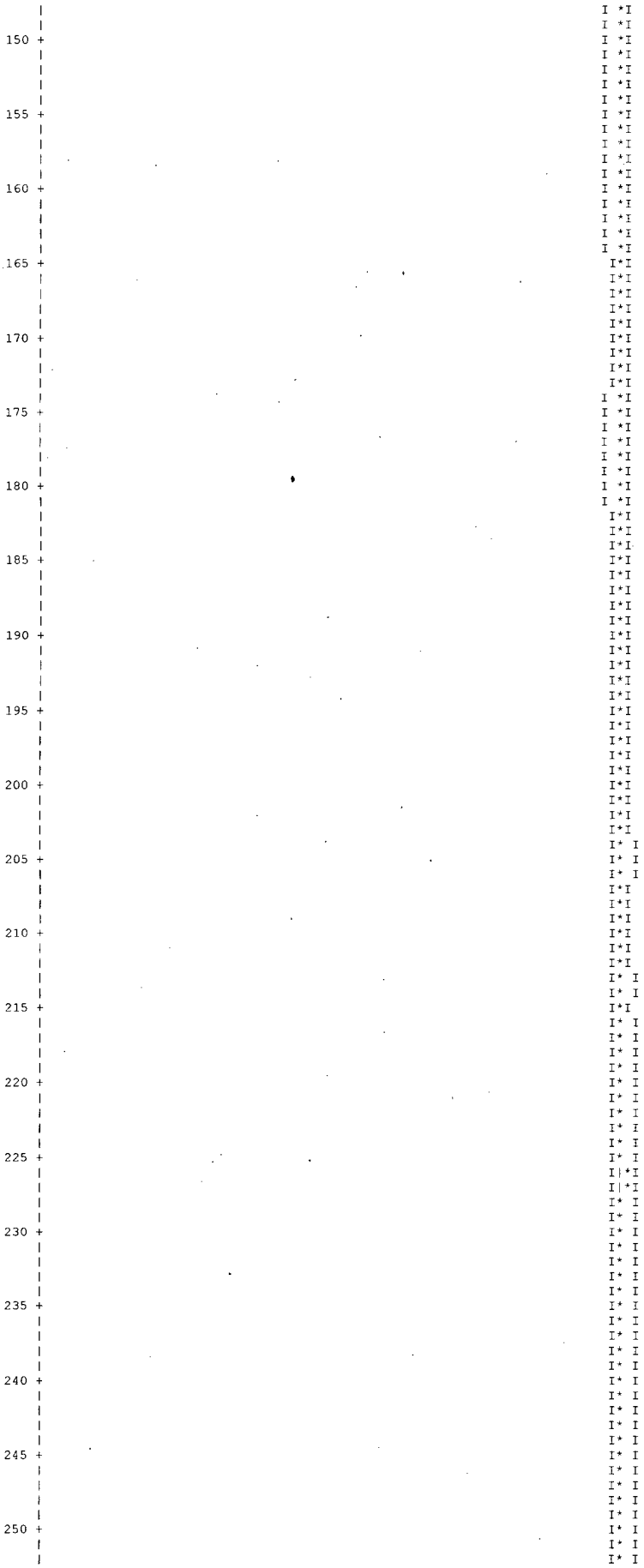
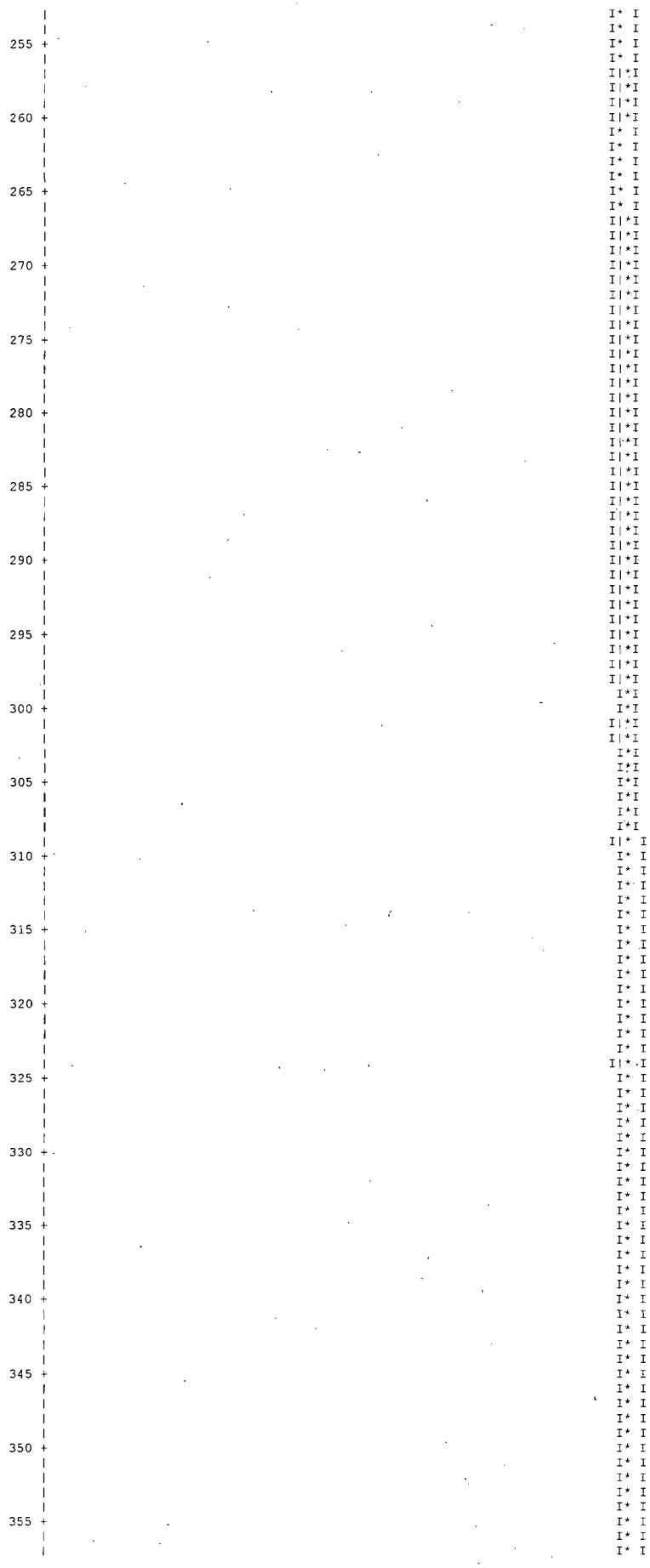
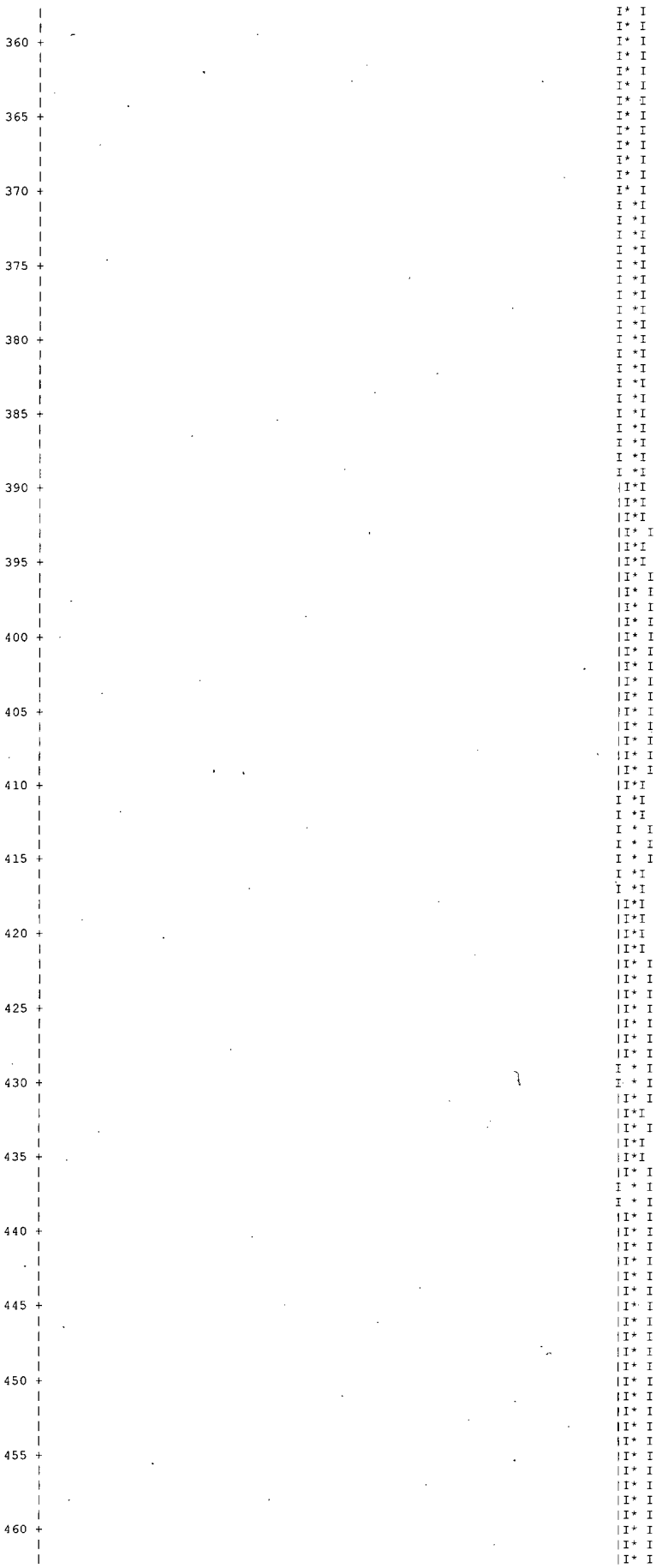
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

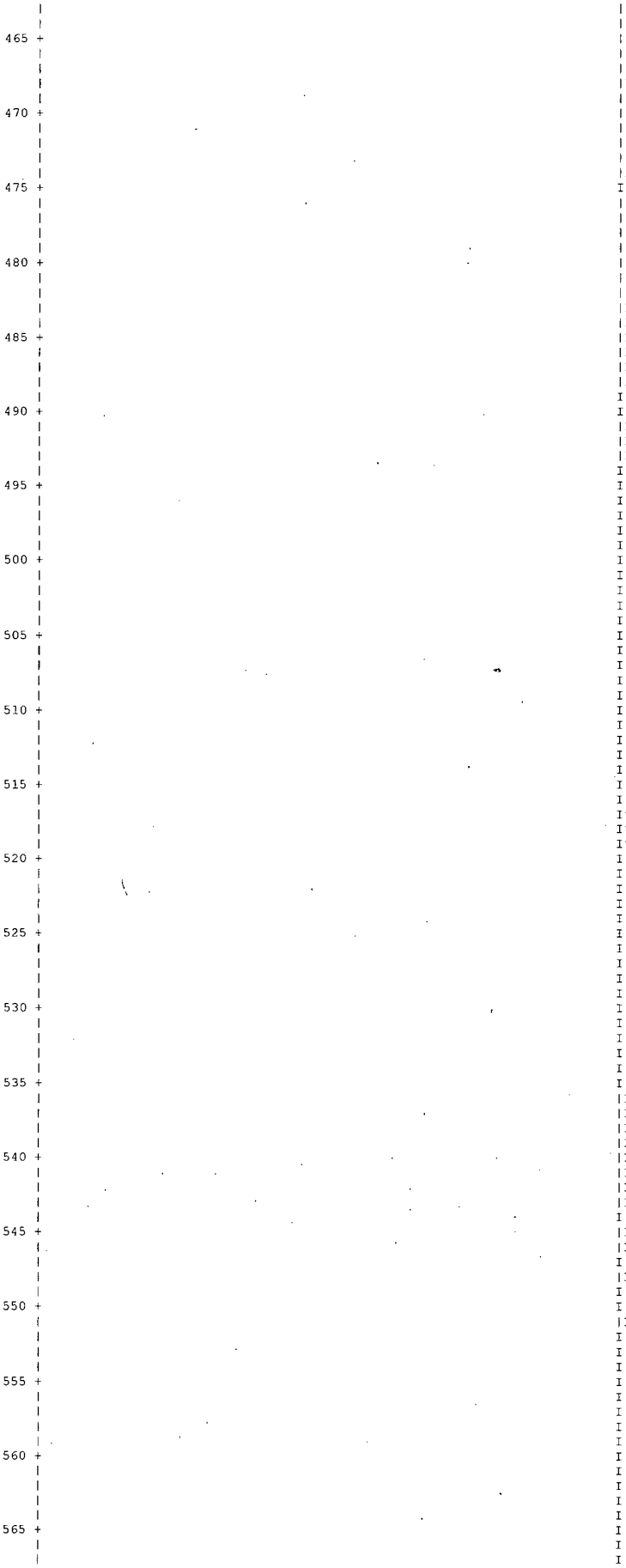
plot of average k-effective by generation skipped.
the line represents k-eff = 0.9350 + or - 0.0011 which occurs for 67 generations skipped.

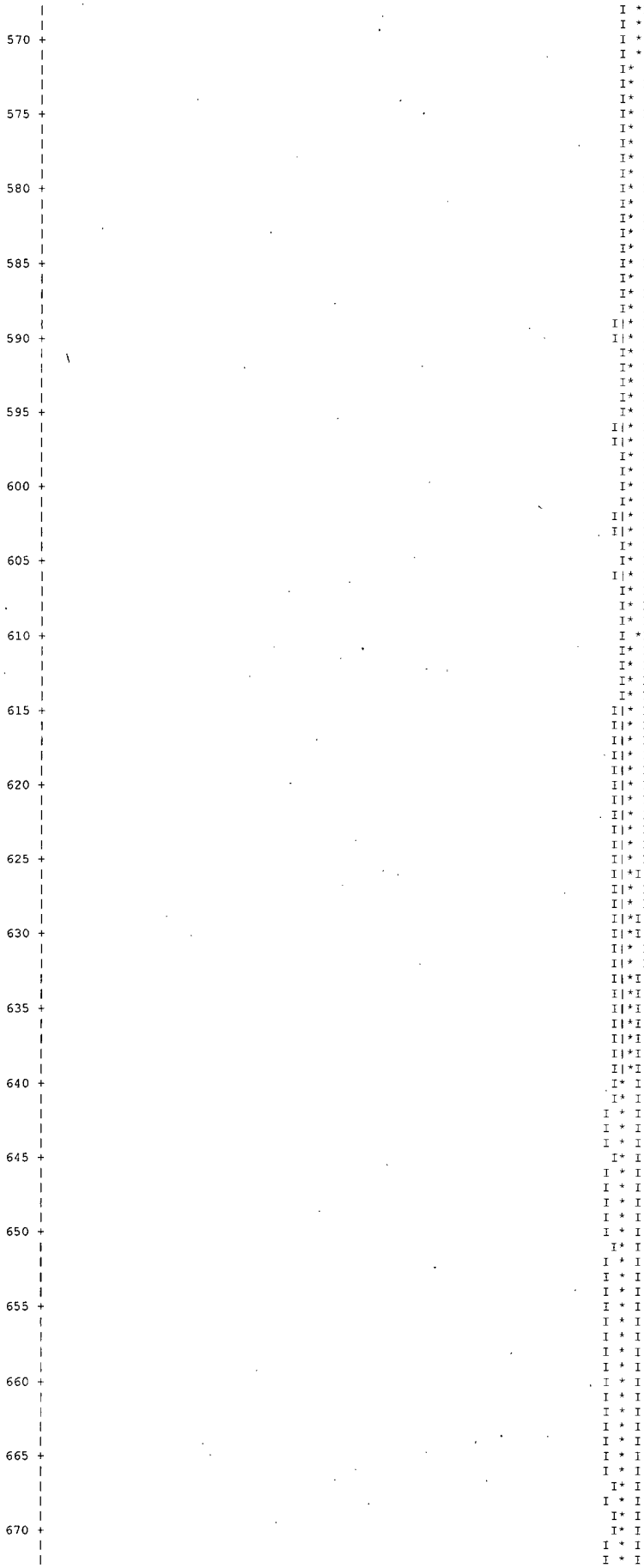


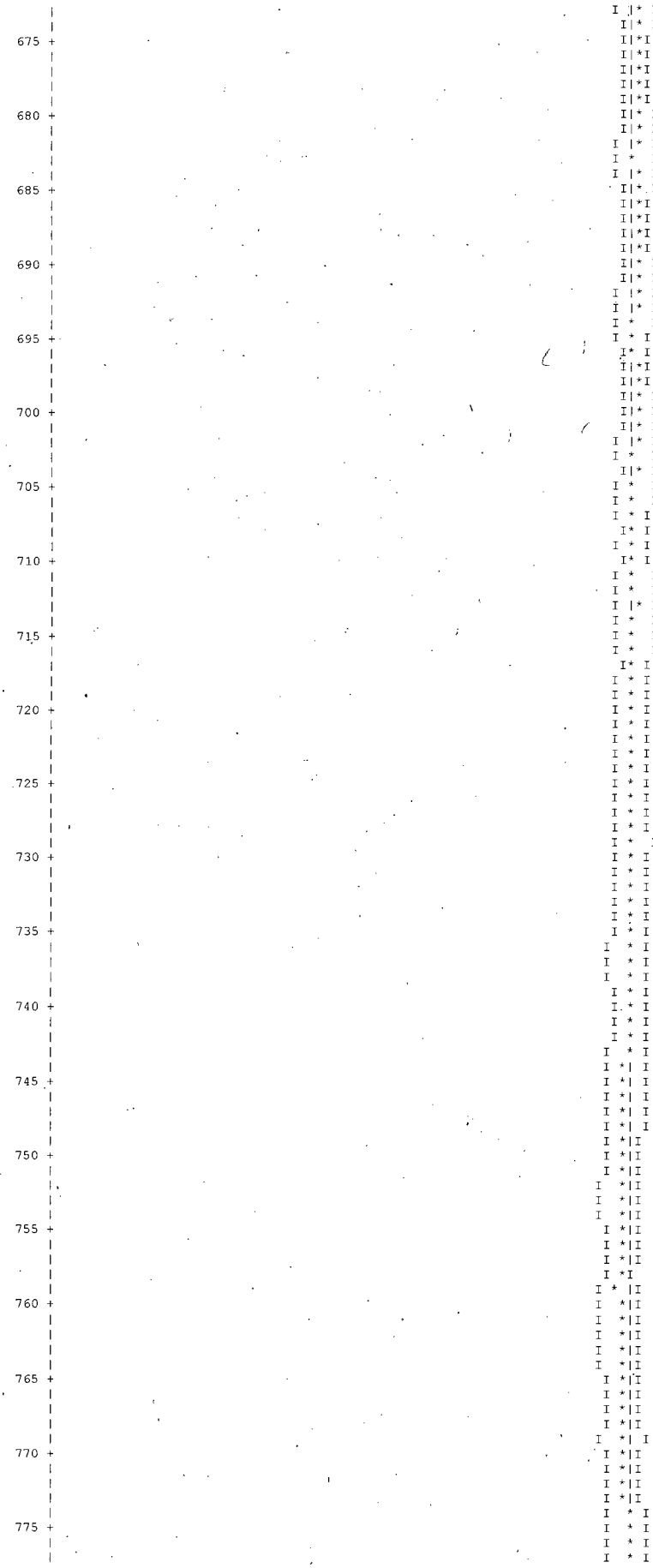








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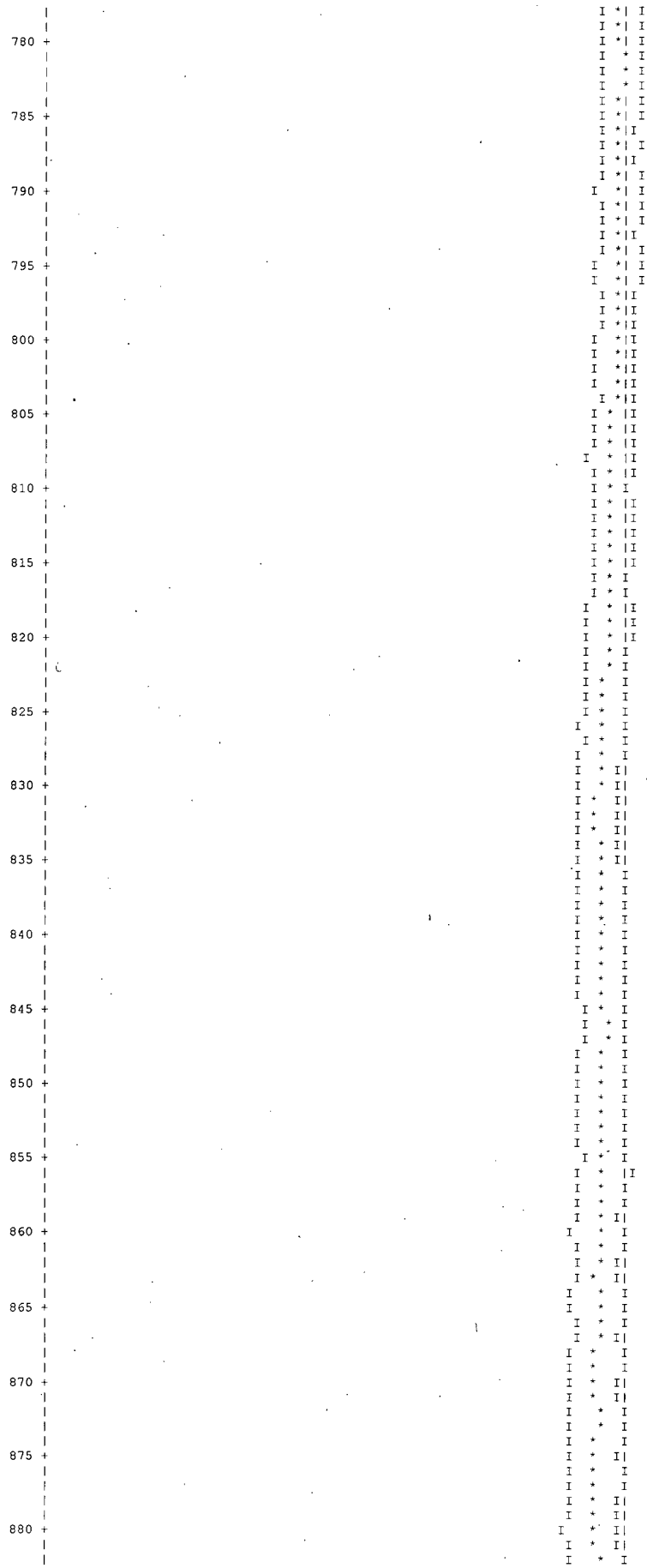

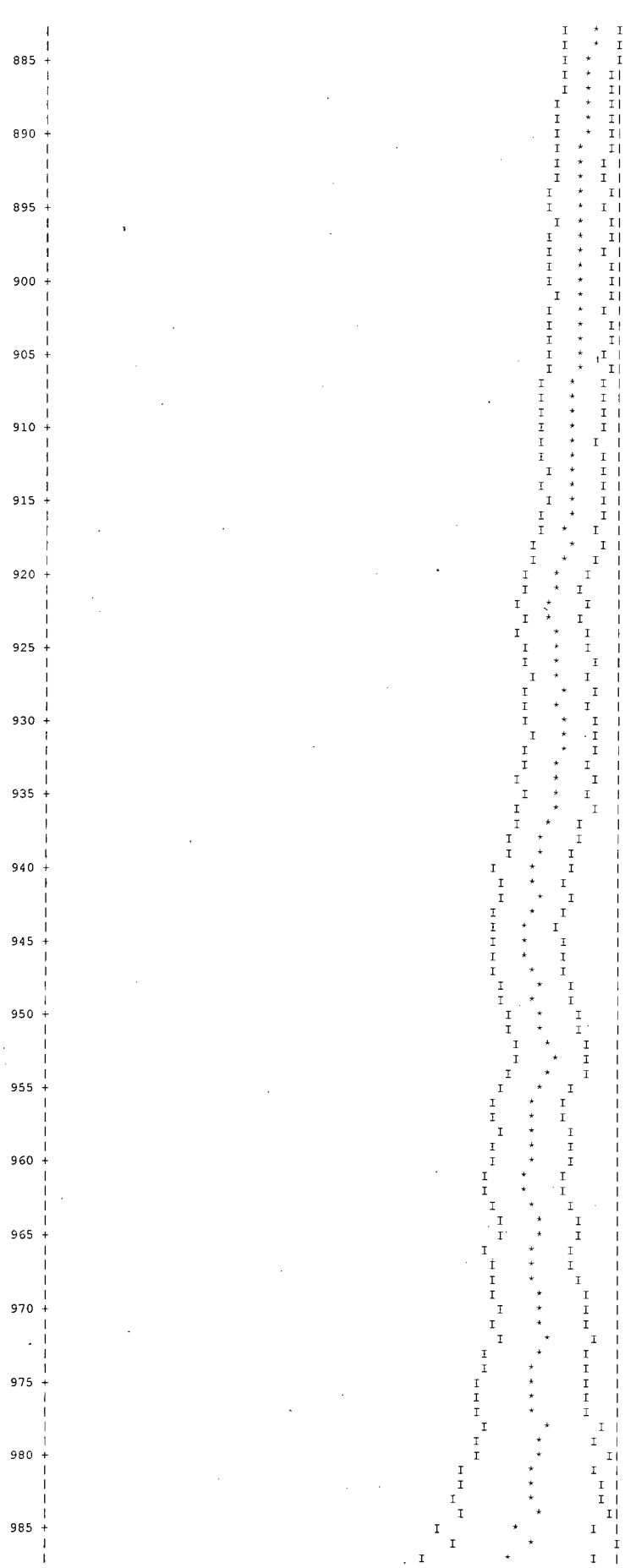
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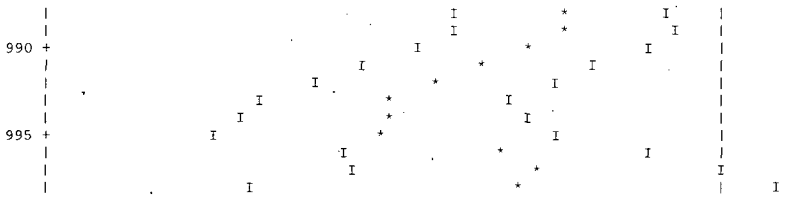

k-effective satisfies the chi**2 test for normality at the 95 % level

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			3.73359E-08	57.6742	2.61922E-07	59.8157	0.00000E+00	0.0000
2	0.0000			1.40413E-07	30.9635	1.00794E-06	29.9534	0.00000E+00	0.0000
3	0.0000			2.55505E-07	21.4923	1.95907E-06	24.6524	0.00000E+00	0.0000
4	0.0000			1.18685E-07	29.9919	2.12386E-06	24.3426	0.00000E+00	0.0000
5	0.0000			5.29725E-07	15.8962	5.74672E-06	13.0063	0.00000E+00	0.0000
6	0.0000			7.27472E-06	3.6005	8.74205E-05	3.6015	0.00000E+00	0.0000
7	0.0000			2.05281E-05	1.9161	2.94894E-04	1.6697	0.00000E+00	0.0000
8	0.0001			6.09263E-05	1.0344	3.44046E-04	1.3077	0.00000E+00	0.0000
9	0.0001			1.35126E-04	0.5416	2.91788E-04	1.2408	0.00000E+00	0.0000
10	0.0001			7.34215E-05	0.6711	1.27741E-04	1.4109	0.00000E+00	0.0000
11	0.0004			3.28809E-04	0.3066	4.48149E-04	0.5786	0.00000E+00	0.0000
12	0.0002			2.32826E-04	0.3283	2.46010E-04	0.5320	0.00000E+00	0.0000
13	0.0001			6.96762E-05	0.5356	6.23709E-05	0.7057	0.00000E+00	0.0000
14	0.0003			3.26752E-04	0.2599	2.34781E-04	0.3477	0.00000E+00	0.0000
15	0.0003			2.67383E-04	0.2718	1.62872E-04	0.3663	0.00000E+00	0.0000
16	0.0001			8.34100E-05	0.4527	4.97339E-05	0.5724	0.00000E+00	0.0000
17	0.0000			3.69576E-05	0.6231	2.43203E-05	0.8084	0.00000E+00	0.0000
18	0.0000			3.29592E-05	0.6602	2.11740E-05	0.8109	0.00000E+00	0.0000
19	0.0001			5.64762E-05	0.5031	3.95305E-05	0.6931	0.00000E+00	0.0000
20	0.0000			4.31311E-05	0.5487	3.35784E-05	0.7998	0.00000E+00	0.0000
21	0.0001			8.50330E-05	0.3989	8.25939E-05	0.7215	0.00000E+00	0.0000
22	0.0001			7.78454E-05	0.4052	7.87438E-05	0.7993	0.00000E+00	0.0000
23	0.0001			8.02311E-05	0.3619	9.94643E-05	0.8286	0.00000E+00	0.0000
24	0.0000			1.82776E-05	0.7893	2.52627E-05	1.2182	0.00000E+00	0.0000
25	0.0000			2.29902E-05	0.6716	3.61040E-05	1.2174	0.00000E+00	0.0000
26	0.0000			1.30482E-05	0.8685	1.86720E-05	1.3430	0.00000E+00	0.0000
27	0.0000			3.93245E-05	0.5057	7.14771E-05	1.0499	0.00000E+00	0.0000
28	0.0001			6.81885E-05	0.3808	1.35506E-04	0.9095	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
29	0.0001			6.90456E-05	0.3689	1.70719E-04	0.9252	0.00000E+00	0.0000
30	0.0000			8.99065E-06	0.9320	2.06447E-05	1.2594	0.00000E+00	0.0000
31	0.0001			7.00452E-05	0.3617	1.47048E-04	0.8953	0.00000E+00	0.0000
32	0.0000			2.80511E-05	0.5277	4.81246E-05	0.9562	0.00000E+00	0.0000
33	0.0000			2.38283E-05	0.5668	3.64241E-05	0.9019	0.00000E+00	0.0000
34	0.0001			5.36579E-05	0.3811	7.98648E-05	0.7998	0.00000E+00	0.0000
35	0.0000			3.24983E-05	0.4622	4.28776E-05	0.7576	0.00000E+00	0.0000
36	0.0000			3.36829E-05	0.4595	5.76778E-05	0.8024	0.00000E+00	0.0000
37	0.0000			2.30903E-05	0.5470	3.38172E-05	0.7930	0.00000E+00	0.0000
38	0.0000			2.34282E-05	0.5193	2.92153E-05	0.6967	0.00000E+00	0.0000
39	0.0001			8.58033E-05	0.2877	2.18122E-04	0.8659	0.00000E+00	0.0000
40	0.0001			7.91062E-05	0.2812	1.43721E-04	0.7976	0.00000E+00	0.0000
41	0.0001			1.02251E-04	0.2444	2.30280E-04	0.7815	0.00000E+00	0.0000
42	0.0001			8.35185E-05	0.2468	2.80422E-04	0.9506	0.00000E+00	0.0000
43	0.0000			4.19662E-05	0.3204	9.52723E-05	0.8841	0.00000E+00	0.0000
44	0.0001			6.36835E-05	0.2705	2.66229E-04	1.0398	0.00000E+00	0.0000
45	0.0000			3.65769E-05	0.3214	5.09000E-05	0.7823	0.00000E+00	0.0000
46	0.0000			7.62975E-06	0.6510	1.95934E-05	1.0986	0.00000E+00	0.0000
47	0.0000			1.95117E-05	0.4192	1.31710E-04	1.0270	0.00000E+00	0.0000
48	0.0000			6.08733E-06	0.7549	1.45240E-05	1.0780	0.00000E+00	0.0000
49	0.0000			4.25028E-05	0.2918	1.31951E-04	0.9922	0.00000E+00	0.0000
50	0.0000			3.04424E-05	0.3445	1.55782E-04	1.1230	0.00000E+00	0.0000
51	0.0000			7.97223E-06	0.6342	1.26710E-05	0.9235	0.00000E+00	0.0000
52	0.0000			1.97448E-05	0.3997	6.29333E-05	1.0100	0.00000E+00	0.0000
53	0.0001			7.45906E-05	0.2208	2.18959E-04	0.9602	0.00000E+00	0.0000
54	0.0000			3.22979E-05	0.3124	2.59637E-04	1.2253	0.00000E+00	0.0000
55	0.0001			6.89596E-05	0.2325	3.03926E-04	1.0545	0.00000E+00	0.0000
56	0.0001			4.84865E-05	0.2682	2.53383E-04	1.1501	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0001			5.85149E-05	0.2487	2.76472E-04	1.0956	0.00000E+00	0.0000
58	0.0000			3.52013E-05	0.3259	1.11571E-04	1.0312	0.00000E+00	0.0000
59	0.0001			5.87656E-05	0.2467	2.59312E-04	1.0007	0.00000E+00	0.0000
60	0.0001			9.60509E-05	0.2147	2.81594E-04	0.8665	0.00000E+00	0.0000
61	0.0000			1.06976E-05	0.6335	2.78804E-05	0.8572	0.00000E+00	0.0000
62	0.0001			6.49880E-05	0.3016	1.20019E-04	0.7528	0.00000E+00	0.0000
63	0.0001			5.08617E-05	0.3376	7.71350E-05	0.5793	0.00000E+00	0.0000
64	0.0000			3.82707E-05	0.3771	7.22683E-05	0.6499	0.00000E+00	0.0000
65	0.0000			1.07062E-05	0.6717	4.64009E-05	0.9160	0.00000E+00	0.0000
66	0.0001			5.61959E-05	0.3148	1.24698E-04	0.6944	0.00000E+00	0.0000
67	0.0000			4.38689E-05	0.3367	2.44326E-04	0.9907	0.00000E+00	0.0000
68	0.0000			8.64975E-06	0.7220	1.91995E-05	0.7388	0.00000E+00	0.0000
69	0.0001			1.29691E-04	0.2708	4.66389E-04	0.9554	0.00000E+00	0.0000
70	0.0001			1.23457E-04	0.3199	1.89515E-03	1.1116	0.00000E+00	0.0000
71	0.0002			1.56595E-04	0.2536	2.40897E-04	0.5871	0.00000E+00	0.0000
72	0.0000			7.24574E-06	0.9463	1.47557E-05	0.8610	0.00000E+00	0.0000
73	0.0002			1.41480E-04	0.3115	2.04836E-04	0.4762	0.00000E+00	0.0000
74	0.0006			5.43763E-04	0.2118	1.30361E-03	0.7944	0.00000E+00	0.0000
75	0.0001			6.22547E-05	0.4830	1.93220E-04	0.8894	0.00000E+00	0.0000
76	0.0004			3.37669E-04	0.3281	4.71352E-04	0.5854	0.00000E+00	0.0000
77	0.0001			1.14962E-04	0.3714	2.84071E-04	0.6439	0.00000E+00	0.0000
78	0.0000			2.76639E-06	1.1687	1.71163E-05	1.2368	0.00000E+00	0.0000
79	0.0003			2.63865E-04	0.4785	2.08189E-04	0.4810	0.00000E+00	0.0000
80	0.0000			1.34169E-05	0.6972	4.76612E-05	0.8669	0.00000E+00	0.0000
81	0.0006			5.47364E-04	0.2320	8.44144E-04	0.5265	0.00000E+00	0.0000
82	0.0001			6.31111E-05	0.8422	7.37357E-05	0.6944	0.00000E+00	0.0000
83	0.0002			1.64544E-04	0.7122	1.38687E-04	0.5936	0.00000E+00	0.0000
84	0.0000			1.92960E-05	0.5306	8.82782E-05	0.8539	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
85	0.0002			1.54310E-04	0.4799	2.38938E-04	0.4920	0.00000E+00	0.0000
86	0.0003			2.75394E-04	0.4133	3.39867E-04	0.4633	0.00000E+00	0.0000
87	0.0006			6.03318E-04	0.4580	4.10752E-04	0.4469	0.00000E+00	0.0000
88	0.0001			6.08799E-05	0.8503	5.75246E-05	0.7967	0.00000E+00	0.0000
89	0.0000			3.15050E-05	0.5985	8.84237E-05	0.8096	0.00000E+00	0.0000
90	0.0007			6.36547E-04	0.5668	4.11488E-04	0.5089	0.00000E+00	0.0000
91	0.0001			6.06890E-05	0.5370	1.18572E-04	0.7790	0.00000E+00	0.0000
92	0.0004			3.87408E-04	0.6626	3.02033E-04	0.5847	0.00000E+00	0.0000
93	0.0002			1.91269E-04	0.5003	1.76548E-04	0.6004	0.00000E+00	0.0000
94	0.0004			3.39551E-04	0.7304	2.00655E-04	0.6168	0.00000E+00	0.0000
95	0.0006			5.96445E-04	0.4207	4.20469E-04	0.4912	0.00000E+00	0.0000
96	0.0001			1.26734E-04	0.7761	3.01822E-04	0.6985	0.00000E+00	0.0000
97	0.0000			1.79664E-05	0.8055	5.87444E-05	0.9178	0.00000E+00	0.0000
98	0.0002			1.50777E-04	0.7659	1.81500E-04	0.6609	0.00000E+00	0.0000
99	0.0000			2.61988E-05	0.9903	4.50778E-05	1.0073	0.00000E+00	0.0000
100	0.0002			1.40344E-04	0.8206	1.10120E-04	0.6989	0.00000E+00	0.0000
101	0.0000			2.23115E-05	0.6654	8.28466E-05	0.8767	0.00000E+00	0.0000
102	0.0001			6.88705E-05	0.7891	2.77843E-04	0.6873	0.00000E+00	0.0000
103	0.0000			6.30089E-06	0.7069	7.64094E-05	0.9265	0.00000E+00	0.0000
104	0.0001			1.34265E-04	0.7176	3.13976E-04	0.6102	0.00000E+00	0.0000
105	0.0000			4.91915E-06	0.7118	7.18060E-05	0.9865	0.00000E+00	0.0000
106	0.0000			1.63489E-06	1.1072	2.57209E-05	1.3981	0.00000E+00	0.0000
107	0.0000			3.77443E-06	0.7798	5.74575E-05	1.0653	0.00000E+00	0.0000
108	0.0000			3.38387E-06	0.7935	5.45668E-05	1.0838	0.00000E+00	0.0000
109	0.0000			6.74759E-06	0.6962	9.04774E-05	0.9043	0.00000E+00	0.0000
110	0.0000			6.38468E-06	0.8084	6.51059E-05	0.9454	0.00000E+00	0.0000
111	0.0000			3.36811E-06	0.8218	5.19131E-05	1.1297	0.00000E+00	0.0000
112	0.0000			2.31510E-06	1.0325	3.16901E-05	1.3781	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0001			5.04857E-05	0.6139	1.18685E-04	0.8197	0.00000E+00	0.0000
114	0.0000			2.93136E-06	1.0368	3.46133E-05	1.3421	0.00000E+00	0.0000
115	0.0000			4.72567E-06	0.6521	8.91748E-05	0.9845	0.00000E+00	0.0000
116	0.0000			1.43366E-05	0.4504	1.99517E-04	0.9119	0.00000E+00	0.0000
117	0.0003			3.02216E-04	0.4360	4.33059E-04	0.5385	0.00000E+00	0.0000
118	0.0001			9.95196E-05	0.4117	3.09652E-04	0.8056	0.00000E+00	0.0000
119	0.0008			7.11244E-04	0.5126	5.79716E-04	0.4717	0.00000E+00	0.0000
120	0.0000			1.60038E-05	0.6209	1.29891E-04	0.9203	0.00000E+00	0.0000
121	0.0000			2.05020E-05	0.5862	1.41779E-04	0.9210	0.00000E+00	0.0000
122	0.0000			1.63996E-05	0.8038	7.74035E-05	1.0590	0.00000E+00	0.0000
123	0.0007			6.70615E-04	0.4657	7.01151E-04	0.4488	0.00000E+00	0.0000
124	0.0001			1.22666E-04	0.5431	2.21270E-04	0.7129	0.00000E+00	0.0000
125	0.0005			4.53787E-04	0.5420	3.49179E-04	0.5582	0.00000E+00	0.0000
126	0.0011			1.05298E-03	0.6465	8.84378E-04	0.5812	0.00000E+00	0.0000
127	0.0005			4.52297E-04	0.6164	3.85097E-04	0.5209	0.00000E+00	0.0000
128	0.0001			7.48311E-05	0.5379	2.32342E-04	0.7911	0.00000E+00	0.0000
129	0.0004			3.79888E-04	0.4876	5.56746E-04	0.4921	0.00000E+00	0.0000
130	0.0005			4.31752E-04	0.7249	4.66259E-04	0.6337	0.00000E+00	0.0000
131	0.0030			2.80551E-03	0.3765	1.71225E-03	0.3820	0.00000E+00	0.0000
132	0.0001			7.56211E-05	0.4521	3.65361E-04	0.8842	0.00000E+00	0.0000
133	0.0001			9.36809E-05	0.3924	4.80253E-04	0.8434	0.00000E+00	0.0000
134	0.0018			1.67020E-03	0.3845	1.54966E-03	0.4046	0.00000E+00	0.0000
135	0.0000			1.78899E-05	0.9081	9.14538E-05	1.1045	0.00000E+00	0.0000
136	0.0000			2.68861E-05	0.7175	1.53423E-04	0.9708	0.00000E+00	0.0000
137	0.0000			2.66289E-05	0.6673	1.56512E-04	0.9287	0.00000E+00	0.0000
138	0.0000			2.71511E-05	0.6768	1.66588E-04	0.9859	0.00000E+00	0.0000
139	0.0000			2.74850E-05	0.6634	1.75685E-04	0.9130	0.00000E+00	0.0000
140	0.0001			6.97046E-05	0.4214	4.55765E-04	0.9007	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
141	0.0001			5.15209E-05	0.4689	3.41036E-04	0.9118	0.00000E+00	0.0000
142	0.0000			3.47415E-05	0.5919	2.36583E-04	0.9239	0.00000E+00	0.0000
143	0.0001			1.20509E-04	0.3448	8.06297E-04	0.8967	0.00000E+00	0.0000
144	0.0001			5.14162E-05	0.5177	3.48032E-04	0.9064	0.00000E+00	0.0000
145	0.0001			4.97127E-05	0.5253	3.18791E-04	0.9003	0.00000E+00	0.0000
146	0.0001			8.80442E-05	0.4119	5.41681E-04	0.9151	0.00000E+00	0.0000
147	0.0000			2.82169E-05	0.7574	1.70149E-04	1.0216	0.00000E+00	0.0000
148	0.0000			1.47733E-05	1.0125	8.65867E-05	1.3199	0.00000E+00	0.0000
149	0.0000			9.45763E-06	1.2861	6.17317E-05	1.6752	0.00000E+00	0.0000
150	0.0000			3.33414E-05	0.7362	2.07857E-04	1.0816	0.00000E+00	0.0000
151	0.0000			3.64343E-05	0.6912	2.01402E-04	1.0451	0.00000E+00	0.0000
152	0.0000			3.89002E-05	0.7015	2.08087E-04	1.0579	0.00000E+00	0.0000
153	0.0000			4.21906E-05	0.6912	2.19818E-04	1.0783	0.00000E+00	0.0000
154	0.0000			4.51440E-05	0.7160	2.32079E-04	1.0172	0.00000E+00	0.0000
155	0.0000			4.44701E-05	0.7126	2.20486E-04	1.0622	0.00000E+00	0.0000
156	0.0000			4.19662E-05	0.7555	2.07644E-04	1.0860	0.00000E+00	0.0000
157	0.0001			5.03534E-05	0.6844	2.44524E-04	1.0906	0.00000E+00	0.0000
158	0.0001			5.44256E-05	0.6466	2.58059E-04	1.0257	0.00000E+00	0.0000
159	0.0001			8.04239E-05	0.5490	3.72363E-04	0.9473	0.00000E+00	0.0000
160	0.0000			4.45987E-05	0.7579	2.00575E-04	1.1277	0.00000E+00	0.0000
161	0.0001			6.39153E-05	0.6652	2.80104E-04	1.0505	0.00000E+00	0.0000
162	0.0001			8.00549E-05	0.6201	3.36496E-04	0.9888	0.00000E+00	0.0000
163	0.0001			8.96326E-05	0.5581	3.57320E-04	0.9929	0.00000E+00	0.0000
164	0.0001			1.01437E-04	0.5812	3.90046E-04	0.9563	0.00000E+00	0.0000
165	0.0001			1.13666E-04	0.5728	4.21489E-04	0.9437	0.00000E+00	0.0000
166	0.0001			6.97626E-05	0.7439	2.51842E-04	1.0720	0.00000E+00	0.0000
167	0.0001			7.57742E-05	0.7294	2.64284E-04	1.0697	0.00000E+00	0.0000
168	0.0001			8.21595E-05	0.7229	2.77206E-04	1.0613	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			8.81345E-05	0.6631	2.91193E-04	1.0373	0.00000E+00	0.0000
170	0.0001			9.63366E-05	0.6830	3.09358E-04	1.0506	0.00000E+00	0.0000
171	0.0001			5.12951E-05	0.9037	1.62273E-04	1.2332	0.00000E+00	0.0000
172	0.0001			5.33652E-05	0.8655	1.67569E-04	1.2764	0.00000E+00	0.0000
173	0.0001			5.54920E-05	0.8886	1.72479E-04	1.2215	0.00000E+00	0.0000
174	0.0001			5.81469E-05	0.8905	1.80658E-04	1.1872	0.00000E+00	0.0000
175	0.0000			2.40789E-05	1.3753	7.40686E-05	1.7111	0.00000E+00	0.0000
176	0.0000			2.50759E-05	1.3564	7.66944E-05	1.6277	0.00000E+00	0.0000
177	0.0000			2.52082E-05	1.3090	7.57691E-05	1.6312	0.00000E+00	0.0000
178	0.0000			2.55636E-05	1.3171	7.67613E-05	1.6481	0.00000E+00	0.0000
179	0.0000			2.59263E-05	1.4024	7.82417E-05	1.6822	0.00000E+00	0.0000
180	0.0000			2.70407E-05	1.2779	7.80917E-05	1.6463	0.00000E+00	0.0000
181	0.0000			2.82721E-05	1.3365	8.20350E-05	1.6309	0.00000E+00	0.0000
182	0.0000			2.84053E-05	1.3028	8.33783E-05	1.6510	0.00000E+00	0.0000
183	0.0000			2.86415E-05	1.2891	8.18826E-05	1.5853	0.00000E+00	0.0000
184	0.0000			2.99134E-05	1.3432	8.37896E-05	1.6108	0.00000E+00	0.0000
185	0.0000			2.97408E-05	1.3387	8.29627E-05	1.5666	0.00000E+00	0.0000
186	0.0000			3.09023E-05	1.2860	8.59547E-05	1.6135	0.00000E+00	0.0000
187	0.0000			3.13568E-05	1.2483	8.66718E-05	1.5327	0.00000E+00	0.0000
188	0.0000			3.29358E-05	1.2603	8.89510E-05	1.5232	0.00000E+00	0.0000
189	0.0000			3.30589E-05	1.2713	9.02130E-05	1.5786	0.00000E+00	0.0000
190	0.0001			8.69263E-05	0.8247	2.29603E-04	1.1118	0.00000E+00	0.0000
191	0.0001			9.40149E-05	0.7833	2.38376E-04	1.0958	0.00000E+00	0.0000
192	0.0001			1.00982E-04	0.7976	2.53894E-04	1.0504	0.00000E+00	0.0000
193	0.0001			1.09106E-04	0.7464	2.60548E-04	1.0542	0.00000E+00	0.0000
194	0.0003			2.47648E-04	0.5381	5.70435E-04	0.8774	0.00000E+00	0.0000
195	0.0003			2.91695E-04	0.5395	6.22901E-04	0.8355	0.00000E+00	0.0000
196	0.0004			3.50977E-04	0.5245	6.97478E-04	0.8198	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
197	0.0005			4.32474E-04	0.5051	7.92320E-04	0.7990	0.00000E+00	0.0000
198	0.0006			5.52713E-04	0.4799	9.05164E-04	0.7413	0.00000E+00	0.0000
199	0.0004			3.41913E-04	0.6267	5.12517E-04	0.8139	0.00000E+00	0.0000
200	0.0004			4.02054E-04	0.6462	5.68236E-04	0.8346	0.00000E+00	0.0000
201	0.0011			1.04835E-03	0.4721	1.33173E-03	0.6447	0.00000E+00	0.0000
202	0.0017			1.58811E-03	0.4184	1.72635E-03	0.5321	0.00000E+00	0.0000
203	0.0029			2.68690E-03	0.4048	2.45094E-03	0.4701	0.00000E+00	0.0000
204	0.0056			5.28297E-03	0.3972	4.07397E-03	0.4002	0.00000E+00	0.0000
205	0.0052			4.86370E-03	0.4747	3.40025E-03	0.4433	0.00000E+00	0.0000
206	0.0083			7.72015E-03	0.4784	5.22710E-03	0.4533	0.00000E+00	0.0000
207	0.0134			1.25262E-02	0.4374	8.13984E-03	0.4161	0.00000E+00	0.0000
208	0.0200			1.87271E-02	0.4248	1.18531E-02	0.4045	0.00000E+00	0.0000
209	0.0233			2.17699E-02	0.4031	1.37786E-02	0.3818	0.00000E+00	0.0000
210	0.0210			1.96324E-02	0.3639	1.27064E-02	0.3445	0.00000E+00	0.0000
211	0.0172			1.60712E-02	0.3512	1.09016E-02	0.3234	0.00000E+00	0.0000
212	0.0150			1.40646E-02	0.2895	1.02430E-02	0.2726	0.00000E+00	0.0000
213	0.0150			1.40595E-02	0.2584	1.11981E-02	0.2412	0.00000E+00	0.0000
214	0.0178			1.66010E-02	0.2292	1.45525E-02	0.2033	0.00000E+00	0.0000
215	0.0248			2.32219E-02	0.1828	2.23394E-02	0.1642	0.00000E+00	0.0000
216	0.0407			3.80239E-02	0.1541	3.93118E-02	0.1222	0.00000E+00	0.0000
217	0.0241			2.25084E-02	0.1605	2.41069E-02	0.1277	0.00000E+00	0.0000
218	0.0306			2.85859E-02	0.1471	3.13280E-02	0.1122	0.00000E+00	0.0000
219	0.0391			3.65906E-02	0.1396	4.06909E-02	0.0936	0.00000E+00	0.0000
220	0.0501			4.68736E-02	0.1261	5.27768E-02	0.0857	0.00000E+00	0.0000
221	0.0639			5.97102E-02	0.1247	6.79503E-02	0.0798	0.00000E+00	0.0000
222	0.0807			7.54325E-02	0.1197	8.62591E-02	0.0718	0.00000E+00	0.0000
223	0.0998			9.32979E-02	0.1159	1.06820E-01	0.0678	0.00000E+00	0.0000
224	0.0534			4.99407E-02	0.1218	5.69935E-02	0.0788	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
225	0.1989			1.86009E-01	0.1125	2.11665E-01	0.0621	0.00000E+00	0.0000
226	0.0317			2.96538E-02	0.1519	3.33429E-02	0.1046	0.00000E+00	0.0000
227	0.0290			2.71101E-02	0.1612	3.02574E-02	0.1138	0.00000E+00	0.0000
228	0.0104			9.72750E-03	0.2276	1.07995E-02	0.1661	0.00000E+00	0.0000
229	0.0095			8.85618E-03	0.2357	9.77472E-03	0.1756	0.00000E+00	0.0000
230	0.0043			4.00608E-03	0.3316	4.40523E-03	0.2501	0.00000E+00	0.0000
231	0.0039			3.66048E-03	0.3547	3.99342E-03	0.2479	0.00000E+00	0.0000
232	0.0036			3.35311E-03	0.3879	3.63053E-03	0.2760	0.00000E+00	0.0000
233	0.0019			1.82237E-03	0.5232	1.94722E-03	0.3644	0.00000E+00	0.0000
234	0.0011			1.06585E-03	0.6585	1.15055E-03	0.4617	0.00000E+00	0.0000
235	0.0012			1.16503E-03	0.6430	1.26111E-03	0.4518	0.00000E+00	0.0000
236	0.0010			9.40712E-04	0.7067	1.01374E-03	0.4899	0.00000E+00	0.0000
237	0.0011			9.95157E-04	0.7751	9.92741E-04	0.5365	0.00000E+00	0.0000
238	0.0001			5.77995E-05	2.9729	6.15047E-05	2.3615	0.00000E+00	0.0000
system total =				9.35133E-01	0.0915	1.00125E+00	0.0292	0.00000E+00	0.0000

elapsed time 5.84533 minutes

random number= 24F3121F1501

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

frequency for generations 51 to 1000

```
0.8461 to 0.8495     *
0.8495 to 0.8530
0.8530 to 0.8565
0.8565 to 0.8600
0.8600 to 0.8635     *
0.8635 to 0.8670     *
0.8670 to 0.8705     **
0.8705 to 0.8740     *****
0.8740 to 0.8775     **
0.8775 to 0.8810     *****
0.8810 to 0.8844     **
0.8844 to 0.8879     **************
0.8879 to 0.8914     *********
0.8914 to 0.8949     **************
0.8949 to 0.8984     *************************
0.8984 to 0.9019     *********************
0.9019 to 0.9054     **********************
0.9054 to 0.9089     ********************************
0.9089 to 0.9124     **********************************
0.9124 to 0.9158     ***************************************
0.9158 to 0.9193     ************************************
0.9193 to 0.9228     ******************************************************
0.9228 to 0.9263     *****************************************************
0.9263 to 0.9298     ************************************************
0.9298 to 0.9333     **********************************************
0.9333 to 0.9368     ****************************************************
0.9368 to 0.9403     **********************************************
0.9403 to 0.9438     ****************************************************
0.9438 to 0.9472     ****************************
0.9472 to 0.9507     *****************************************
0.9507 to 0.9542     ****************************************************
0.9542 to 0.9577     ****************************************
0.9577 to 0.9612     ******************************
0.9612 to 0.9647     *************************
0.9647 to 0.9682     ******************************
0.9682 to 0.9717     ***********************
0.9717 to 0.9752     **************
0.9752 to 0.9786     ******************
0.9786 to 0.9821     **********
0.9821 to 0.9856     *************
0.9856 to 0.9891     ********
0.9891 to 0.9926     **
0.9926 to 0.9961     ***
0.9961 to 0.9996     ****
0.9996 to 1.0031     *
1.0031 to 1.0066     **
1.0066 to 1.0100     *
1.0100 to 1.0135     **
1.0135 to 1.0170     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

frequency for generations 289 to 1000

```
0.8461 to 0.8495     *
0.8495 to 0.8530
0.8530 to 0.8565
0.8565 to 0.8600
0.8600 to 0.8635     *
0.8635 to 0.8670     *
0.8670 to 0.8705     **
0.8705 to 0.8740     ***
0.8740 to 0.8775     *
0.8775 to 0.8810     *****
0.8810 to 0.8844
0.8844 to 0.8879     **********
0.8879 to 0.8914     ******
0.8914 to 0.8949     **********
0.8949 to 0.8984     ********************
0.8984 to 0.9019     ***************
0.9019 to 0.9054     *******************
0.9054 to 0.9089     **********************
0.9089 to 0.9124     ***************************
0.9124 to 0.9158     ******************************
0.9158 to 0.9193     **********************
0.9193 to 0.9228     ****************************************
0.9228 to 0.9263     ************************************
0.9263 to 0.9298     ******************************
0.9298 to 0.9333     ******************************
0.9333 to 0.9368     ****************************************
0.9368 to 0.9403     ************************************
0.9403 to 0.9438     ************************************
0.9438 to 0.9472     **************************
0.9472 to 0.9507     ******************************
0.9507 to 0.9542     ***********************************
0.9542 to 0.9577     ************************
0.9577 to 0.9612     *************************
0.9612 to 0.9647     **********************
0.9647 to 0.9682     ****************************
0.9682 to 0.9717     ***************
0.9717 to 0.9752     ***********
0.9752 to 0.9786     ****************
0.9786 to 0.9821     **********
0.9821 to 0.9856     ***********
0.9856 to 0.9891     *******
0.9891 to 0.9926     *
0.9926 to 0.9961     *
0.9961 to 0.9996     ****
0.9996 to 1.0031     *
1.0031 to 1.0066     **
1.0066 to 1.0100     *
1.0100 to 1.0135     *
1.0135 to 1.0170     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

frequency for generations 526 to 1000

```
0.8461 to 0.8495     *
0.8495 to 0.8530
0.8530 to 0.8565
0.8565 to 0.8600
0.8600 to 0.8635     *
0.8635 to 0.8670
0.8670 to 0.8705
0.8705 to 0.8740     *
0.8740 to 0.8775     *
0.8775 to 0.8810     **
0.8810 to 0.8844
0.8844 to 0.8879     *****
0.8879 to 0.8914     *****
0.8914 to 0.8949     *****
0.8949 to 0.8984     ******************
0.8984 to 0.9019     *******
0.9019 to 0.9054     *********
0.9054 to 0.9089     ****************
0.9089 to 0.9124     ********************
0.9124 to 0.9158     *******************
0.9158 to 0.9193     *************
0.9193 to 0.9228     **************************
0.9228 to 0.9263     ****************************
0.9263 to 0.9298     ******************
0.9298 to 0.9333     ********************
0.9333 to 0.9368     ******************************
0.9368 to 0.9403     ************************
0.9403 to 0.9438     ***********************
0.9438 to 0.9472     ******************
0.9472 to 0.9507     ********************
0.9507 to 0.9542     ********************
0.9542 to 0.9577     **********************
0.9577 to 0.9612     ****************
0.9612 to 0.9647     ************
0.9647 to 0.9682     **********************
0.9682 to 0.9717     ********
0.9717 to 0.9752     ********
0.9752 to 0.9786     *************
0.9786 to 0.9821     ********
0.9821 to 0.9856     ********
0.9856 to 0.9891     *****
0.9891 to 0.9926     *
0.9926 to 0.9961
0.9961 to 0.9996     **
0.9996 to 1.0031
1.0031 to 1.0066     *
1.0066 to 1.0100     *
1.0100 to 1.0135     *
1.0135 to 1.0170     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=900

frequency for generations 763 to 1000

```
0.8461 to 0.8495     *
0.8495 to 0.8530
0.8530 to 0.8565
0.8565 to 0.8600
0.8600 to 0.8635
0.8635 to 0.8670
0.8670 to 0.8705
0.8705 to 0.8740     *
0.8740 to 0.8775     *
0.8775 to 0.8810     **
0.8810 to 0.8844
0.8844 to 0.8879     ****
0.8879 to 0.8914     ***
0.8914 to 0.8949     ****
0.8949 to 0.8984     **********
0.8984 to 0.9019     *****
0.9019 to 0.9054     *****
0.9054 to 0.9089     ********
0.9089 to 0.9124     ************
0.9124 to 0.9158     ***********
0.9158 to 0.9193     *********
0.9193 to 0.9228     **********
0.9228 to 0.9263     ***********
0.9263 to 0.9298     **********
0.9298 to 0.9333     ************
0.9333 to 0.9368     ***********
0.9368 to 0.9403     *************
0.9403 to 0.9438     ********
0.9438 to 0.9472     ********
0.9472 to 0.9507     *******
0.9507 to 0.9542     *********
0.9542 to 0.9577     ************
0.9577 to 0.9612     *********
0.9612 to 0.9647     ****
0.9647 to 0.9682     *********
0.9682 to 0.9717     ******
0.9717 to 0.9752     ******
0.9752 to 0.9786     ******
0.9786 to 0.9821     ***
0.9821 to 0.9856     ****
0.9856 to 0.9891     ***
0.9891 to 0.9926
0.9926 to 0.9961
0.9961 to 0.9996
0.9996 to 1.0031
1.0031 to 1.0066
1.0066 to 1.0100     *
1.0100 to 1.0135
1.0135 to 1.0170
```

****

congratulations! you have successfully traversed the perilous path through keno v in 5.84533 minutes

****

```
bbbbbbbbbbbb     oooooooooooo    nn          nn                    aaaaaaaaa     mm          mm  iiiiiiiiiiii     22222222222
bbbbbbbbbbbbb    oooooooooooooo  nnn         nn                   aaaaaaaaaaa    mmm         mmm  iiiiiiiiiiii    2222222222222
bb         bb    oo         oo   nnnn        nn                  aa         aa   mmmm       mmmm       ii         22         22
bb         bb    oo         oo   nn nn       nn                  aa         aa   mm mm     mm mm       ii                    22
bb         bb    oo         oo   nn   nn     nn                  aa         aa   mm   mm mm   mm       ii                    22
bbbbbbbbbbbb     oo         oo   nn    nn    nn  -------------   aaaaaaaaaaaaa   mm    mmm    mm       ii                 22
bbbbbbbbbbbb     oo         oo   nn     nn   nn  -------------   aaaaaaaaaaaaa   mm     m     mm       ii              22
bb         bb    oo         oo   nn      nn  nn                  aa         aa   mm           mm       ii            22
bb         bb    oo         oo   nn       nn nn                  aa         aa   mm           mm       ii          22
bb         bb    oo         oo   nn        nnnn                  aa         aa   mm           mm       ii        22
bbbbbbbbbbbbb    oooooooooooooo  nn         nnn                  aa         aa   mm           mm  iiiiiiiiiiii   2222222222222
bbbbbbbbbbb      oooooooooooo    nn          nn                  aa         aa   mm           mm  iiiiiiiiiiii   2222222222222


 sssssssssss     cccccccccccc     aaaaaaaaa    ll                eeeeeeeeeeeee                   pppppppppppp     cccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa  ll                eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc         cc   aa         aa ll                ee                              pp         pp    cc         cc
ss               cc              aa         aa ll                ee                              pp         pp    cc
ss               cc              aa         aa ll                ee                              pp         pp    cc
ssssssssssss     cc              aaaaaaaaaaaaa ll                eeeeeeeee       -------------   pppppppppppppp   cc
 ssssssssssss    cc              aaaaaaaaaaaaa ll                eeeeeeeee       -------------   pppppppppppp     cc
          ss     cc              aa         aa ll                ee                              pp               cc
          ss     cc              aa         aa ll                ee                              pp               cc
ss         ss    cc         cc   aa         aa ll                ee                              pp               cc         cc
ssssssssssssss   cccccccccccccc   aa         aa llllllllllllll    eeeeeeeeeeeee                   pp               cccccccccccccc
 sssssssssss     cccccccccccc     aa         aa llllllllllllll    eeeeeeeeeeeee                   pp                cccccccccccc


   0000000       666666666666                //  22222222222      0000000                  //     0000000      5555555555555
  000000000      6666666666666               //  2222222222222    000000000                //    000000000     5555555555555
 00       00     66                         //   22          22   00       00             //     00       00    55
00         00    66                        //                22   00         00           //     00         00  55
00         00    66                       //                 22   00         00          //      00         00  55
00         00    666666666666            //                22    00         00         //       00         00  555555555555
00         00    6666666666666         //                22       00         00        //        00         00  5555555555555
00         00    66         66       //              22          00         00       //         00         00            55
00         00    66         66      //             22            00         00      //          00         00            55
 00       00     66         66     //            22              00       00      //            00       00   55         55
  000000000      6666666666666   //            2222222222222      000000000     //              000000000    5555555555555
   0000000       66666666666    //             2222222222222       0000000     //                0000000      55555555555


   0000000       666666666666                  5555555555555   5555555555555                    33333333333            44
  000000000      6666666666666                 5555555555555   5555555555555                   3333333333333          444
 00       00     66                   :::     55              55                   :::        33         33        4444
00         00    66                   :::     55              55                   :::                33       44 44
00         00    66                   :::     55              55                   :::                33      44  44
00         00    666666666666                 555555555555    555555555555                     333      44   44
00         00    6666666666666                5555555555555   5555555555555                    333     44    44
00         00    66         66        :::                 55              55        :::                33   444444444444
00         00    66         66        :::                 55              55        :::                33  4444444444444
 00       00     66         66        :::     55         55   55         55        :::        33         33          44
  000000000      6666666666666                5555555555555   5555555555555                   3333333333333          44
   0000000       66666666666                   55555555555     55555555555                     33333333333          44
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa  ll             ee                             pp         pp    cc          cc
ss               cc               aa         aa  ll             ee                             pp         pp    cc
ss               cc               aa         aa  ll             ee                             pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppp     cc
           ss    cc               aa         aa  ll             ee                             pp               cc
           ss    cc               aa         aa  ll             ee                             pp               cc
ss         ss    cc          cc   aa         aa  ll             ee                             pp               cc          cc
ssssssssssssss   cccccccccccccc   aa         aa  llllllllllllll eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  llllllllllllll eeeeeeeeeeeee                  pp                ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:  o0o008

creation date:  11/11/1999

library:  c:\scale4.4a\bin

production code:  bonami

version:  4.4.0

jobname:  scale-pc

machine name:  NFA10385

date of execution:  20_jun_2005

time of execution:  06:55:34.56
```

```
-1q array has      1 entries.
 0q array has      4 entries.
 1q array has      6 entries.
 2q array has      2 entries.
```

```
logical assignments

master library   11
working library   0
scratch file     18
new library       1

p r o b l e m   d e s c r i p t i o n

igr--geometry (0/1/2/3--inf med/slab/cyl/sphere                1

izm--number of zones or material regions                       6

ms--mixing table length                                       18

ibl--shielded cross section edit option (0/1--no/yes)          0

ibr--bondarenko factor edit option (0/1--no/yes)               0

issopt--dancoff factor option                                  0

convergence criterion    1.00000E-03

geometry correction factor for wigner rational approximation  1.000E+00

        3q array has     18 entries.

        4q array has     18 entries.

        5q array has     18 entries.

        6q array has      6 entries.

        7q array has      6 entries.

        8q array has      6 entries.

        9q array has      6 entries.

       10q array has     18 entries.

       11q array has      6 entries.

m i x i n g   t a b l e

entry   mixture   isotope   number density   new identifier   explicit temperature
   1       1        1001     7.83916E-02        1001001            293.0
   2       2        1001     7.85246E-02        2001001            293.0
   3       5        1001     6.67692E-02        5001001            293.0
   4       1        4309     1.23423E-03        1004309            293.0
   5       2        4309     1.23621E-03        2004309            293.0
   6       1        6012     3.92001E-02        1006012            293.0
   7       2        6012     3.92623E-02        2006012            293.0
   8       4        6012     3.18772E-04        4006012            293.0
   9       1        8016     0.00000E+00        1008016            293.0
  10       5        8016     3.33846E-02        5008016            293.0
  11       1       94239     7.83998E-05        1094239            293.0
  12       4       14000     1.70252E-03        4014000            293.0
  13       4       15031     6.94680E-05        4015031            293.0
  14       4       24304     1.74726E-02        4024304            293.0
  15       4       25055     1.74071E-03        4025055            293.0
  16       4       26304     5.85446E-02        4026304            293.0
  17       4       28304     7.74020E-03        4028304            293.0
  18       6       82000     3.29690E-02        6082000            293.0

geometry and material description

zone   mixture   outer dimension   temperature       extra xs   type (0/1--fuel/mod)
   1      1          1.00000E+00    2.93000E+02    0.00000E+00            0
   2      2          6.00000E+00    2.93000E+02    0.00000E+00            0
   3      3          1.10000E+01   -2.93000E+02    0.00000E+00            0
   4      4          1.60000E+01    2.93000E+02    0.00000E+00            0
   5      5          2.10000E+01    2.93000E+02    0.00000E+00            0
   6      6          2.60000E+01    2.93000E+02    0.00000E+00            0

this calculation requires    36777 locations of  2000000 available to this module

power fitting for:     14000-- processes:  3-- sig0's: 8-- temperatures: 3-- max groups: 238

warning-nuclide:    14000 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

power fitting for:     94239-- processes:  5-- sig0's: 7-- temperatures: 3-- max groups:  21

warning-nuclide:    94239 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
                        temperature  3.00000E+02 will be substituted.

zone     volume   outer radius
   1   1.000E+00   1.000E+00
   2   5.000E+00   6.000E+00
   3   5.000E+00   1.100E+01
   4   5.000E+00   1.600E+01
   5   5.000E+00   2.100E+01
   6   5.000E+00   2.600E+01

fuel region volume            2.60E+01
moderator region volume       0.00E+00
fuel region radius            2.60E+01
moderator region radius       2.60E+01

  elapsed time   0.01 min.
```

infinite dilution macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.001E-01	1.062E-01	1.089E-01	1.073E-01	1.123E-01	1.201E-01	1.310E-01	1.484E-01	1.711E-01	2.056E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.494E-01	2.718E-01	2.705E-01	2.957E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.766E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.812E-01	4.985E-01	5.222E-01	5.374E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.250E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.870E-01	6.063E-01	6.291E-01	6.481E-01	6.654E-01	6.802E-01	7.180E-01	7.837E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.702E-01	2.774E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.690E-01	9.764E-01	1.062E+00	1.134E+00	1.210E+00	1.245E+00	1.267E+00	1.286E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.471E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.279E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.403E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.689E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

infinite dilution macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.791E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.797E+00	1.801E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.799E+00	1.803E+00	1.806E+00	1.798E+00	1.803E+00	1.803E+00	1.806E+00	1.800E+00	1.799E+00	1.816E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.817E+00	1.801E+00	1.810E+00	1.804E+00	1.829E+00	1.798E+00	1.810E+00	1.799E+00	1.804E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.824E+00	1.798E+00	1.819E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.814E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.814E+00	1.800E+00	1.807E+00	1.844E+00	1.812E+00	1.800E+00	1.809E+00	1.827E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.823E+00	1.799E+00	1.800E+00	1.823E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

infinite dilution macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.852E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.860E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.873E+00	1.873E+00	1.881E+00	1.892E+00	1.900E+00	1.912E+00	1.930E+00	1.935E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.957E+00	1.989E+00	2.033E+00	2.108E+00	2.191E+00	2.279E+00	2.407E+00	2.563E+00	2.627E+00	2.583E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

infinite dilution macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.522E+00	2.511E+00	2.542E+00	2.608E+00	2.702E+00	2.842E+00	2.958E+00	3.046E+00	3.153E+00	3.291E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.475E+00	3.726E+00	4.066E+00	4.388E+00	5.017E+00	5.898E+00	6.334E+00	6.801E+00	7.200E+00	7.654E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.654E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.073E+00	8.657E+00	9.415E+00	1.010E+01	1.099E+01	1.254E+01	1.729E+01	3.628E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.335E+00	2.534E+00	2.878E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

bondarenko iteration statistics

iteration	mt	max change	group	zone	new value	nuclide	sig0	first	last
1	1	-5.749E-02	50	4	6.492E+00	4014000	2.44454E+02	1	238
1	1	-2.464E-02	56	1	1.370E+01	1094239	2.10981E+04	55	75
2	all groups for nuclide		4014000 are converged to less than eps= 1.00E-03						
2	all groups for nuclide		1094239 are converged to less than eps= 1.00E-03						

elapsed time 0.01 min.

shielded macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.001E-01	1.062E-01	1.089E-01	1.073E-01	1.123E-01	1.201E-01	1.310E-01	1.484E-01	1.711E-01	2.056E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.494E-01	2.718E-01	2.705E-01	2.957E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.765E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.277E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.812E-01	4.985E-01	5.222E-01	5.374E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.249E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.870E-01	6.063E-01	6.291E-01	6.481E-01	6.654E-01	6.802E-01	7.180E-01	7.837E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.701E-01	2.773E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.690E-01	9.764E-01	1.062E+00	1.134E+00	1.210E+00	1.245E+00	1.267E+00	1.286E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.469E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.272E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.403E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.689E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

shielded macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.791E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.797E+00	1.801E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.799E+00	1.803E+00	1.806E+00	1.798E+00	1.803E+00	1.803E+00	1.806E+00	1.800E+00	1.799E+00	1.816E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.817E+00	1.801E+00	1.810E+00	1.804E+00	1.829E+00	1.798E+00	1.810E+00	1.799E+00	1.804E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.798E+00	1.824E+00	1.798E+00	1.819E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.814E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.814E+00	1.800E+00	1.807E+00	1.844E+00	1.812E+00	1.800E+00	1.809E+00	1.827E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.823E+00	1.799E+00	1.800E+00	1.823E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

shielded macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.846E+00	1.836E+00	1.840E+00	1.844E+00	1.847E+00	1.850E+00	1.852E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.860E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.858E+00	1.867E+00	1.873E+00	1.873E+00	1.881E+00	1.892E+00	1.900E+00	1.912E+00	1.930E+00	1.935E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.957E+00	1.989E+00	2.033E+00	2.108E+00	2.191E+00	2.279E+00	2.407E+00	2.563E+00	2.627E+00	2.583E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

shielded macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.522E+00	2.511E+00	2.542E+00	2.608E+00	2.702E+00	2.842E+00	2.958E+00	3.046E+00	3.153E+00	3.291E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.475E+00	3.726E+00	4.066E+00	4.388E+00	5.017E+00	5.898E+00	6.334E+00	6.801E+00	7.200E+00	7.654E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.655E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.073E+00	8.657E+00	9.415E+00	1.010E+01	1.099E+01	1.254E+01	1.729E+01	3.628E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.336E+00	2.534E+00	2.879E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

number of separate processes to treat: 8
number treated (including multi-zone): 8
maximum number of sigma-0's: 8
maximum number of temperatures: 3
offset of origen for interpolation: 2.0E+01

macroscopic escape cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

36777 locations of 36992 available are required to make a new master containing the self-shielded values

```
copy      4309   Be-metal (1304/ from log 11 to log 18    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy     24304   24CR BNL EVALDE from log 11 to log  1    bondarenko trigger 0

copy     26304   26FE 0 ORNL EVA from log 11 to log  1    bondarenko trigger 0

copy     28304   28NI 0 BNL NNDC from log 11 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 11 to log 18    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy     14000   14si 0 ornl eva from log 11 to log  1    bondarenko trigger 1

copy     25055   25mn 55 bnl eva from log 11 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 11 to log 18    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 11 to log 18    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy     15031   15p 31 lll eval from log 11 to log  1    bondarenko trigger 0

copy     82000   82pb ornl evalj from log 11 to log  1    bondarenko trigger 0

copy     94239   94pu239 lanl ju from log 11 to log  1    bondarenko trigger 1
```

```
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
      n.m.greene & l.m.petrie
        nuclear applications & methods analysis - ns&td - ornl
    tape id                              4321          number of nuclides                    18
    number of neutron groups              238          number of gamma groups                 0
    first thermal group                   149          logical unit                           1
                                  table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 111 evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took   12.90 seconds
```

```
nn          nn  iiiiiiiiiiii    tttttttttttt      aaaaaaaaa     ww          ww  ll
nnn         nn  iiiiiiiiiiii    tttttttttttt     aaaaaaaaaaa    ww          ww  ll
nnnn        nn      ii              tt         aa         aa   ww          ww  ll
nn nn       nn      ii              tt         aa         aa   ww          ww  ll
nn   nn     nn      ii              tt         aa         aa   ww          ww  ll
nn    nn    nn      ii              tt         aaaaaaaaaaaa    ww     w    ww  ll
nn     nn   nn      ii              tt         aaaaaaaaaaaa    ww    www   ww  ll
nn      nn  nn      ii              tt         aa         aa   ww   ww ww  ww  ll
nn       nn nn      ii              tt         aa         aa   ww ww    ww ww  ll
nn        nnnn      ii              tt         aa         aa   wwww      wwww  ll
nn         nnn  iiiiiiiiiiii        tt         aa         aa   www        www  llllllllllll
nn          nn  iiiiiiiiiiii        tt         aa         aa   ww          ww  llllllllllll


 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                  ppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                  pppppppppppppp ccccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                             pp         pp  cc         cc
ss              cc              aa         aa ll            ee                             pp         pp  cc
ss              cc              aa         aa ll            ee                             pp         pp  cc
ssssssssssss    cc              aaaaaaaaaaaaa ll            eeeeeeeee       -------------  pppppppppppppp cc
 ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee       -------------  pppppppppppp   cc
          ss    cc              aa         aa ll            ee                             pp             cc
          ss    cc              aa         aa ll            ee                             pp             cc
ss        ss    cc         cc   aa         aa ll            ee                             pp             cc         cc
ssssssssssssss  cccccccccccccc   aa         aa llllllllllllll eeeeeeeeeeeeee                pp             ccccccccccccc
 sssssssssss     ccccccccccc     aa         aa llllllllllllll eeeeeeeeeeeeee                pp              ccccccccccc


   0000000       666666666666              //  22222222222      0000000                //    0000000     5555555555555
  000000000     6666666666666             //  2222222222222    000000000              //    000000000    5555555555555
 00       00    66                       //   22          22   00       00           //    00       00   55
00         00   66                      //                22   00         00        //    00         00 55
00         00   66                     //                 22   00         00       //    00         00 55
00         00   666666666666          //                22    00         00      //    00         00 555555555555
00         00   6666666666666        //              22       00         00     //    00         00 5555555555555
00         00   66         66       //             22         00         00    //    00         00             55
00         00   66         66      //            22           00         00   //    00         00             55
 00       00    66         66     //            22            00       00    //     00       00   55         55
  000000000     6666666666666    //            2222222222222    000000000   //      000000000    5555555555555
   0000000       66666666666    //             2222222222222     0000000   //        0000000      55555555555


   0000000       666666666666                  5555555555555   5555555555555                          44      88888888888
  000000000     6666666666666                  5555555555555   5555555555555                         444     8888888888888
 00       00    66                  :::       55              55                  :::               4444     88         88
00         00   66                  :::       55              55                  :::             44 44      88         88
00         00   66                  :::       55              55                  :::            44  44      88         88
00         00   666666666666                  555555555555    555555555555                      44   44      88888888888
00         00   6666666666666                 5555555555555   5555555555555                    44    44      88888888888
00         00   66         66       :::                  55              55        :::        444444444444   88         88
00         00   66         66       :::                  55              55        :::       4444444444444   88         88
 00       00    66         66       :::       55         55   55         55        :::                44     88         88
  000000000     6666666666666                 5555555555555   5555555555555                          44     8888888888888
   0000000       66666666666                   55555555555     55555555555                          44      88888888888
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   ccccccccccccc    aaaaaaaaaaa   ll             eeeeeeeeeeeee                  ppppppppppppp    cccccccccccccc
ss         ss    cc          cc   aa        aa  ll             ee                             pp         pp    cc          cc
ss               cc               aa        aa  ll             ee                             pp         pp    cc
ss               cc               aa        aa  ll             ee                             pp         pp    cc
ssssssssssssss   cc               aaaaaaaaaaaaa ll             eeeeeeeee       -------------  ppppppppppppp    cc
 ssssssssssssss  cc               aaaaaaaaaaaaa ll             eeeeeeeee       -------------  ppppppppppppp    cc
          ss     cc               aa        aa  ll             ee                             pp               cc
          ss     cc               aa        aa  ll             ee                             pp               cc
ss        ss     cc          cc   aa        aa  ll             ee                             pp               cc          cc
ssssssssssssss   ccccccccccccc    aa        aa  llllllllllllll eeeeeeeeeeeee                  pp               ccccccccccccc
 sssssssssss     ccccccccccc      aa        aa  llllllllllllll eeeeeeeeeeeee                  pp                ccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

program:	o0o002
creation date:	11/11/1999
library:	c:\scale4.4a\bin
production code:	nitawl
version:	4.4.0
jobname:	scale-pc
machine name:	NFA10385
date of execution:	20_jun_2005
time of execution:	06:55:48.50

```
      -1q array has      1 entries.

       0q array has      9 entries.

       1q array has     12 entries.

select 18 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

        2 resonance calculations have been requested
       -1 output option for ampx formatted cross section data
     2001 maximum number of resonance mesh intervals
        2 order of resonance level processing

the storage allocated for this case is   2000000 words

        2q array has     18 entries.

        3q array has     30 entries.

        4q array has     18 entries.

 general information concerning cross section library
   tape identification number              4321
   number of nuclides on tape                18
   number of neutron energy groups          238
   first thermal neutron energy group       149
   number of gamma energy groups              0

   direct access unit number  9 requires 280 blocks of length  8172 words
 xsdrn tape   4321
                        scale - 238 neutron group library            based on endf-b version 5 data
                          generated with a chi-1/e-maxwellian weight spectrum
                            compiled for doe - 8/18/94           last updated - 5/16/2002
                              n.m.greene & l.m.petrie
                                nuclear applications & methods analysis - ns&td - ornl

 nuclides from xsdrn tape
    1     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  1004309
    2     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  2004309
    3     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91         4024304
    4     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91         4026304
    5     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91         4028304
    6    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               1006012
    7    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               2006012
    8    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               4006012
    9     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88              4014000
   10     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88              4025055
   11     8O 16 from version 6 evaluation                                             1008016
   12     8O 16 from version 6 evaluation                                             5008016
   13     hydrogen in water 1301/1002    mod1   11/23/92                              1001001
   14     hydrogen in water 1301/1002    mod1   11/23/92                              2001001
   15     hydrogen in water 1301/1002    mod1   11/23/92                              5001001
   16     15p 31 111 evaloct77 howerton                   mod1 12/20/88              4015031
   17     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89              6082000
   18     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89              1094239

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                1004309     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                2004309     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91       4024304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91       4026304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91       4028304     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            1006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            2006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            4006012     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88            4014000     temperature=   293.00
                                                                  process number 1007 is at temperature=   296.00

 25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88            4025055     temperature=   293.00

geometry has been set to homogeneous as lbar is  0.0000E+00

resonance data for this nuclide

mass number (a)          =    54.466              temperature(kelvin)       =   293.000

potential scatter sigma  =     3.801              lumped nuclear density    = 1.7407142E-03

spin factor (g)          =     0.000              lump dimension (a-bar)    = 0.0000000E+00

inner radius             = 0.0000000E+00          dancoff correction (c)    = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1    =    55.845              sigma(per absorber atom)= 3.4101929E+02
```

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 53.766 sigma(per absorber atom)= 1.2864024E+02

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
44	-2.573557E-05	0.000000E+00	-4.815655E-02
45	-1.291448E-04	0.000000E+00	-3.816337E-02
46	-1.606563E-04	0.000000E+00	-1.332381E-02
47	-1.056918E-04	0.000000E+00	-2.060706E-02
48	-4.179799E-05	0.000000E+00	-9.612578E-02
49	-1.779133E-04	0.000000E+00	-1.038285E-01
50	-2.606053E-04	0.000000E+00	-1.521462E-01
51	-6.117731E-05	0.000000E+00	-7.269186E-04
52	-2.276834E-04	0.000000E+00	-6.778821E-03
53	-4.136545E-04	0.000000E+00	-3.950535E-01
54	-9.016085E-04	0.000000E+00	-3.850810E-01
55	-1.889857E-03	0.000000E+00	-8.663202E-01
56	-1.682722E-04	0.000000E+00	-2.095040E-04
57	-8.006894E-04	0.000000E+00	-6.747544E-02
58	-5.832270E-03	0.000000E+00	-5.143185E+00
59	-6.111082E-03	0.000000E+00	-3.758587E+00
60	-3.959768E-03	0.000000E+00	-3.334263E-02
61	-1.836192E-06	0.000000E+00	-2.387732E-03
62	-4.381017E-04	0.000000E+00	-4.759451E-01
63	-9.039582E-03	0.000000E+00	-7.946639E+00
64	-1.435731E-02	0.000000E+00	-9.543545E+00
65	-4.290072E-03	0.000000E+00	-3.739039E+00
66	-1.355880E-02	0.000000E+00	-1.010358E+01
67	-2.306789E-04	0.000000E+00	-1.431424E-01
68	-3.245916E-06	0.000000E+00	-1.800902E-03
69	-3.050841E-03	0.000000E+00	-1.654186E-01
70	-2.155581E+00	0.000000E+00	-6.385146E+01
71	9.803476E-06	0.000000E+00	-9.597841E-04
72	-6.031858E-09	0.000000E+00	-1.791791E-06
73	-3.683254E-05	0.000000E+00	-4.341343E-03
74	-6.284016E+00	0.000000E+00	-3.027933E+02
75	-1.065459E-01	0.000000E+00	-4.692756E+00
76	-2.623990E-02	0.000000E+00	-1.060597E+00
77	-7.989248E-04	0.000000E+00	-2.867110E-02
78	-4.575271E-06	0.000000E+00	-1.544029E-04
79	-5.029187E-05	0.000000E+00	-1.677382E-03
80	-6.286984E-06	0.000000E+00	-2.025635E-04
81	-8.363011E-05	0.000000E+00	-2.566171E-03
82	-1.235011E-07	0.000000E+00	-2.377236E-06
83	-8.699079E-08	0.000000E+00	-1.242513E-06
84	6.870753E-08	0.000000E+00	3.754665E-06
85	7.176524E-07	0.000000E+00	1.973096E-06

excess resonance integrals

	resolved
absorption	3.13724E+00
fission	0.00000E+00

elapsed time 0.08 min.

process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 1008016 temperature= 293.00
process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 5008016 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 1001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 2001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 5001001 temperature= 293.00
process number 1007 is at temperature= 296.00

15p 31 111 evaloct77 howerton mod1 12/20/88 4015031 temperature= 293.00
process number 1007 is at temperature= 296.00

82pb ornl evaljul71 c.y.fu and f.g. mod2 01/04/89 6082000 temperature= 293.00
process number 1007 is at temperature= 296.00

94pu239 lanl jun83 e.arthur p.you mod2 02/28/89 1094239 temperature= 293.00

geometry has been set to homogeneous as 1bar is 0.0000E+00

resonance data for this nuclide

mass number (a) = 237.000 temperature(kelvin) = 293.000

potential scatter sigma = 10.200 lumped nuclear density = 7.8399811E-05

spin factor (g) = 0.000 lump dimension (a-bar) = 0.0000000E+00

inner radius = 0.0000000E+00 dancoff correction (c) = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1 = 1.008 sigma(per absorber atom)= 2.0378738E+04

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 11.852 sigma(per absorber atom)= 2.4627246E+03

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
75	-2.623731E-02	-1.013813E-02	-4.346830E-03
76	-3.028461E-01	-1.040428E-01	-1.725623E-01
77	-9.507835E-02	-1.899282E-02	-1.786652E-02
78	-1.063903E-01	-1.583003E-02	-1.097797E-02
79	-3.104387E-01	-2.419474E-01	-4.652530E-02
80	-8.120368E-03	-2.863711E-03	-3.912089E-04
81	-2.146223E-01	-5.476533E-02	-8.706399E-02
82	-7.760951E-01	-3.798770E-01	-2.025202E-01
83	-1.505815E+00	-7.533947E-01	-3.741375E-01
84	-3.199741E-03	-1.200079E-03	-1.320063E-04
85	-5.927462E-01	-1.853962E-01	-8.875371E-02
86	-8.117601E-01	-1.607340E-01	-1.887547E-01
87	-6.169138E-01	-2.179067E-01	-7.767047E-02
88	-3.660104E-03	-3.492619E-03	-9.781852E-05
89	-2.579085E-03	-1.917957E-03	-1.051416E-03
90	-6.526797E+00	-4.493943E+00	-1.053752E+00
91	-3.978318E-04	-2.764319E-04	-6.310611E-05
92	-4.488922E+00	-2.159083E+00	-4.272141E-01
93	-1.831526E-02	-1.238443E-02	1.016556E-04
94	-1.029515E+00	-7.480478E-01	-2.805586E-02
95	-2.366580E-01	-1.671519E-01	-4.888011E-03
96	-1.036044E+01	-1.668351E+00	-1.928625E+00
97	-7.865442E-03	-3.122345E-03	-1.536087E-03
98	-1.297804E+00	-3.121359E-01	-7.413412E-02
99	-1.422589E-02	-1.220372E-02	-1.284354E-04
100	-1.415250E-01	-1.140039E-01	-2.710929E-03
101	-3.982554E-03	-2.287630E-03	-5.967065E-04
102	-7.469911E+00	-7.204040E-01	-1.039963E+00
103	-4.025756E-03	-6.488402E-04	-4.310209E-04
104	-3.853407E+00	-4.650152E-01	-2.826017E-01
105	-6.678605E-03	-9.147275E-04	4.705035E-04
106	-1.227608E-04	-2.683324E-05	6.892636E-05
107	-3.816022E-05	-9.768270E-06	2.656634E-05
108	-1.543636E-05	-3.526297E-06	5.214970E-06
109	-2.631576E-02	-2.549961E-03	5.175939E-04
110	2.377200E-03	2.271721E-04	-1.223118E-03
111	-8.726376E-05	-3.076715E-05	1.272770E-05
112	-2.391464E-04	-1.660726E-04	-2.136366E-05
113	-1.652853E-02	-1.173058E-02	-6.728691E-05
114	-1.138482E-03	-8.082100E-04	6.096395E-05
115	-7.083159E-05	-5.013437E-05	7.141212E-06
116	-1.552135E-03	-1.817867E-04	-1.051423E-04
117	-9.778589E-01	-4.953447E-01	-1.834637E-02
118	-6.580653E-02	-3.874637E-02	-3.832490E-03
119	-4.750941E+00	-2.843193E+00	-1.239827E-01
120	-3.759450E-04	-2.249290E-04	4.518580E-05
121	-1.679869E-04	-9.143934E-05	-2.061377E-05
122	-8.345501E-04	-4.054618E-04	-1.441620E-04
123	-4.728953E+00	-2.201779E+00	-1.098209E-01
124	-8.816496E-03	-7.654718E-03	2.364945E-05
125	-2.202542E-02	-1.745583E-02	-5.581594E-04
126	-1.320829E+01	-6.013994E+00	-3.331001E-01
127	-1.179610E+00	-7.541628E-01	-1.151556E-02
128	-2.057128E-03	-1.278906E-03	1.031018E-04
129	-3.288892E+00	-1.233620E+00	-6.409936E-02
130	-7.454418E+00	-2.800630E+00	-1.277651E-01
131	-6.770153E+00	-5.251563E+00	-7.156828E-02
132	-1.889664E-03	-1.438502E-03	8.787920E-05
133	-1.477902E-02	-7.917484E-03	-7.986223E-04
134	-8.542903E+00	-4.554083E+00	-9.229685E-02
135	-2.041525E-03	-1.092534E-03	1.025367E-04
136	-8.274332E-04	-4.446769E-04	5.493973E-05
137	-3.209000E-04	-1.739856E-04	2.761155E-05
138	-1.534413E-04	-8.420897E-05	1.605324E-05
139	-8.414161E-05	-4.676431E-05	1.027233E-05
140	-6.398943E-05	-3.542240E-05	1.193382E-05
141	-1.868411E-05	-1.086774E-05	3.322083E-06
142	-1.224578E-05	-7.274019E-06	2.293485E-06
143	-8.153403E-06	-4.930464E-06	1.750084E-06
144	-4.984535E-06	-3.108840E-06	1.057821E-06
145	-4.190127E-06	-2.639860E-06	9.001955E-07
146	-3.508365E-06	-2.233057E-06	7.623689E-07
147	-3.081072E-06	-1.976441E-06	6.680751E-07
148	-2.960783E-06	-1.903782E-06	6.415767E-07
149	-2.900124E-06	-1.867075E-06	6.281290E-07
150	-2.806748E-06	-1.810474E-06	6.074125E-07
151	-2.653609E-06	-1.718898E-06	5.726516E-07
152	-1.215311E-06	-9.429044E-07	2.136642E-07
153	-1.179819E-06	-9.153678E-07	2.061153E-07
154	-1.146858E-06	-8.897949E-07	1.989163E-07
155	-1.117800E-06	-8.672500E-07	1.923822E-07
156	-1.813903E-07	-1.407325E-07	3.119239E-08

excess resonance integrals

	resolved
absorption	3.12316E+02
fission	1.75838E+02

elapsed time 0.12 min.

process number 1007 is at temperature= 296.00

elapsed time 0.12 min.

```
this xsdrn working tape was created 06/20/05 at 06:55:48
the title of the parent case is as follows
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
    tape id                          4321          number of nuclides                  18
    number of neutron groups          238          number of gamma groups               0
    first thermal group               149          logical unit                         4
                                table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 lll evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    6.16 seconds
```

```
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooo                    vv          vv
kk         kk   eeeeeeeeeeeee  nnn         nn  oooooooooooo                   vv          vv
kk        kk    ee             nnnn        nn  oo         oo                  vv          vv
kk       kk     ee             nn nn       nn  oo         oo                  vv          vv
kk      kk      ee             nn   nn     nn  oo         oo                  vv          vv
kkkkkkkk        eeeeeeeee      nn    nn    nn  oo         oo  -------------   vv          vv
kkkkkkkk        eeeeeeeee      nn     nn   nn  oo         oo  -------------    vv        vv
kk      kk      ee             nn      nn  nn  oo         oo                     vv     vv
kk       kk     ee             nn       nn nn  oo         oo                      vv   vv
kk        kk    ee             nn        nnnn  oo         oo                       vv vv
kk         kk   eeeeeeeeeeeee  nn         nnn  oooooooooooo                         vvv
kk          kk  eeeeeeeeeeeee  nn          nn   oooooooooo                           v
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa    ll             eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss          ss  cc          cc   aa         aa  ll             ee                             pp          pp   cc       cc
ss              cc               aa         aa  ll             ee                             pp          pp   cc
ss              cc               aa         aa  ll             ee                             pp          pp   cc
ssssssssssss    cc               aaaaaaaaaaaaa  ll             eeeeeeeee      -------------   pppppppppppppp   cc
 ssssssssssss   cc               aaaaaaaaaaaaa  ll             eeeeeeeee      -------------   pppppppppppp     cc
           ss   cc               aa         aa  ll             ee                             pp               cc
           ss   cc               aa         aa  ll             ee                             pp               cc
ss          ss  cc          cc   aa         aa  ll             ee                             pp               cc          cc
ssssssssssssss  cccccccccccccc   aa         aa  llllllllllllll eeeeeeeeeeeee                  pp               cccccccccccccc
 ssssssssssss    ccccccccccc      aa         aa  llllllllllllll eeeeeeeeeeeee                  pp                ccccccccccc
```

```
   0000000       666666666666              //   22222222222       0000000                  //     0000000      5555555555555
  000000000     6666666666666             //   2222222222222     000000000               //     000000000     5555555555555
 00        00   66                       //    22          22    00        00           //     00        00   55
00          00  66                      //                 22   00          00         //     00          00  55
00          00  66                     //                  22   00          00        //      00          00  55
00          00  666666666666          //                 22    00          00       //       00          00  555555555555
00          00  6666666666666        //               22       00          00      //        00          00  5555555555555
00          00  66          66      //              22         00          00     //         00          00            55
00          00  66          66     //             22          00          00    //          00          00            55
 00        00   66          66    //             22            00        00   //            00        00   55          55
  000000000     6666666666666   //                2222222222222   000000000  //              000000000     5555555555555
   0000000       66666666666   //                 2222222222222    0000000  //                0000000       55555555555
```

```
   0000000       666666666666                    5555555555555    666666666666                      0000000       22222222222
  000000000     6666666666666                    5555555555555   6666666666666                     000000000     2222222222222
 00        00   66                   :::        55              66                   :::        00        00   22          22
00          00  66                   :::        55              66                   :::       00          00              22
00          00  66                   :::        55              66                   :::       00          00              22
00          00  666666666666                    555555555555    666666666666                      00          00            22
00          00  6666666666666                   5555555555555   6666666666666                     00          00          22
00          00  66          66       :::                    55  66          66       :::          00          00        22
00          00  66          66       :::                    55  66          66       :::          00          00      22
 00        00   66          66       :::        55          55  66          66       :::           00        00    22
  000000000     6666666666666                   5555555555555   6666666666666                      000000000     2222222222222
   0000000       66666666666                     55555555555     66666666666                       0000000       2222222222222
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll             eeeeeeeeeeeee                  pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll             eeeeeeeeeeeee                  pppppppppppppp   cccccccccccccc
ss         ss    cc         cc    aa         aa  ll             ee                             pp         pp    cc         cc
ss               cc               aa         aa  ll             ee                             pp         pp    cc
ss               cc               aa         aa  ll             ee                             pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll             eeeeeeeee       -------------  pppppppppppp     cc
          ss     cc               aa         aa  ll             ee                             pp               cc
          ss     cc               aa         aa  ll             ee                             pp               cc
ss        ss     cc         cc    aa         aa  ll             ee                             pp               cc         cc
ssssssssssssss   cccccccccccccc   aa         aa  llllllllllllll eeeeeeeeeeeee                  pp               cccccccccccccc
 sssssssssss     ccccccccccc      aa         aa  llllllllllllll eeeeeeeeeeeee                  pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o009                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/18/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  kenova                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  06:56:02.14                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
*****************************************************************************************************
***                                                                                                 ***
***                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000      ***
***                                                                                                 ***
*****************************************************************************************************
***                          ******    numeric parameters      ******                               ***
***                                                                                                 ***
***                                                                                                 ***
***          tme     maximum problem time (min)                                  120.00             ***
***                                                                                                 ***
***          tba     time per generation (min)                                     5.00             ***
***                                                                                                 ***
***          gen     number of generations                                        1000              ***
***                                                                                                 ***
***          npg     number per generation                                        1000              ***
***                                                                                                 ***
***          nsk     number of generations to be skipped                            50              ***
***                                                                                                 ***
***          beg     beginning generation number                                     1              ***
***                                                                                                 ***
***          res     generations between checkpoints                                 0              ***
***                                                                                                 ***
***          xld     number of extra 1-d cross sections                              1              ***
***                                                                                                 ***
***          nbk     neutron bank size                                            1025              ***
***                                                                                                 ***
***          xnb     extra positions in neutron bank                                 0              ***
***                                                                                                 ***
***          nfb     fission bank size                                            1000              ***
***                                                                                                 ***
***          xfb     extra positions in fission bank                                 0              ***
***                                                                                                 ***
***          wta     default value of weight average                            0.5000              ***
***                                                                                                 ***
***          wth     weight high for splitting                                  3.0000              ***
***                                                                                                 ***
***          wtl     weight low for russian roulette                            0.3333              ***
***                                                                                                 ***
***          rnd     starting random number                                BB827100001              ***
***                                                                                                 ***
***          nb8     number of d.a. blocks on unit  8                             200              ***
***                                                                                                 ***
***          nl8     length of d.a. blocks on unit  8                             512              ***
***                                                                                                 ***
***          adj     mode of calculation                                       forward              ***
***                                                                                                 ***
***                  input data written on restart unit                             no              ***
***                                                                                                 ***
***                  binary data interface                                         yes              ***
***                                                                                                 ***
***                                                                                                 ***
*****************************************************************************************************
*****************************************************************************************************
```

```
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000          ***
***                                                                                                           ***
*****************************************************************************************************************
***                                 ******      logical parameters        ******                              ***
***                                                                                                           ***
***  run  execute problem after checking data    yes          plt  plot picture map(s)                    yes ***
***                                                                                                           ***
***  flx  compute flux                            no          fdn  compute fission densities               no ***
***                                                                                                           ***
***  smu  compute avg unit self-multiplication    no          nub  compute nu-bar & avg fission group      yes ***
***                                                                                                           ***
***  mku  compute matrix k-eff by unit number     no          mkp  compute matrix k-eff by unit location    no ***
***                                                                                                           ***
***  cku  compute cofactor k-eff by unit number   no          ckp  compute cofactor k-eff by unit location  no ***
***                                                                                                           ***
***  fmu  print fiss prod matrix by unit number   no          fmp  print fiss prod matrix by unit location  no ***
***                                                                                                           ***
***  mkh  compute matrix k-eff by hole number     no          mka  compute matrix k-eff by array number     no ***
***                                                                                                           ***
***  ckh  compute cofactor k-eff by hole number   no          cka  compute cofactor k-eff by array number   no ***
***                                                                                                           ***
***  fmh  print fiss prod matrix by hole number   no          fma  print fiss prod matrix by array number   no ***
***                                                                                                           ***
***  hhl  collect matrix by highest hole level    no          hal  collect matrix by highest array level    no ***
***                                                                                                           ***
***  amx  print all mixed cross sections          no          far  print fis. and abs. by region            no ***
***                                                                                                           ***
***  xs1  print 1-d mixture x-sections            no          gas  print far by group                       no ***
***                                                                                                           ***
***  xs2  print 2-d mixture x-sections            no          pax  print xsec-albedo correlation tables     no ***
***                                                                                                           ***
***  xap  print mixture angles & probabilities    no          pwt  print weight average array               no ***
***                                                                                                           ***
***  pki  print fission spectrum                  no          pgm  print input geometry                     no ***
***                                                                                                           ***
***  pld  print extra 1-d cross sections          no          bug  print debug information                  no ***
***                                                                                                           ***
***                                                           trk  print tracking information               no ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
                                    parameter input completed

                        ........    0 io's were used reading the parameter data      ........

                       *************** data reading completed ***************
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000          ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***          unit                                                  volume                                      ***
***         number              data set name                       name        unit function                 ***
***         ------              -------------                       ----        -------------                 ***
***                                                                                                           ***
***      xsc  14     C:\scale4.4a\tmpdir\ft14f001                                mixed cross sections          ***
***                                                                                                           ***
***      alb  79     C:\scale4.4a\data\ft79f001                                  input albedos                 ***
***                                                                                                           ***
***      wts  80     C:\scale4.4a\data\ft80f001                                  input weights                 ***
***                                                                                                           ***
***      skt  16      unknown                                                    write scratch data            ***
***                                                                                                           ***
***      bin  95     C:\scale4.4a\tmpdir\ft95f001                                binary input data             ***
***                                                                                                           ***
***      rst  95     C:\scale4.4a\tmpdir\ft95f001                                read restart data             ***
***                                                                                                           ***
***      lib   4     C:\scale4.4a\tmpdir\ft04f001                                input ampx working library    ***
***                                                                                                           ***
***            8     C:\scale4.4a\tmpdir\ft08f001                                input data direct access      ***
***                                                                                                           ***
***            9      unknown                                                    super grouped direct access   ***
***                                                                                                           ***
***           10      unknown                                                    xsec mixing direct access     ***
***                                                                                                           ***
*****************************************************************************************************************

                        ........    0 io's were used preparing input data    ........


                         cross sections read from the ampx working library on unit    4
```

```
                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

                                mixing table

                        number of scattering angles =  2
                    cross section message threshold =3.0E-05


mixture =     1          density(g/cc) = 0.96189
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   1001001  7.83916E-02  1.36366E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   1004309  1.23423E-03  1.92027E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   1006012  3.92001E-02  8.12077E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   1008016  0.00000E+00  0.00000E+00    8016    15.9904      8O 16 from version 6 evaluation
   1094239  7.83998E-05  3.23544E-02   94239   239.0526      94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

mixture =     2          density(g/cc) = 0.93226
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   2001001  7.85246E-02  1.40939E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   2004309  1.23621E-03  1.98448E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   2006012  3.92623E-02  8.39216E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas

mixture =     4          density(g/cc) =  7.9400
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   4006012  3.18772E-04  8.00006E-04    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   4014000  1.70252E-03  9.99998E-03   14000    28.0853      14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
   4015031  6.94680E-05  4.50000E-04   15031    30.9741      15p 31 lll evaloct77 howerton                    mod1 12/20/88
   4024304  1.74726E-02  1.90000E-01   24000    51.9957      24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
   4025055  1.74071E-03  1.99999E-02   25055    54.9379      25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
   4026304  5.85446E-02  6.83750E-01   26000    55.8447      26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
   4028304  7.74020E-03  9.50001E-02   28000    58.6872      28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91

mixture =     5          density(g/cc) = 0.99817
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   5001001  6.67692E-02  1.11927E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   5008016  3.33846E-02  8.88074E-01    8016    15.9904      8O 16 from version 6 evaluation

mixture =     6          density(g/cc) =  11.344
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   6082000  3.29690E-02  1.00000E+00   82000   207.2100      82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89


                    1004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    2004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                    4024304     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
                    4026304     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
                    4028304     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91
                    1006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    2006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                    4014000     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
                    4025055     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
                    1008016     8O 16 from version 6 evaluation
                    5008016     8O 16 from version 6 evaluation
                    1001001     hydrogen in water 1301/1002    mod1   11/23/92
                    2001001     hydrogen in water 1301/1002    mod1   11/23/92
                    5001001     hydrogen in water 1301/1002    mod1   11/23/92
                    4015031     15p 31 lll evaloct77 howerton                    mod1 12/20/88
                    6082000     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89
                    1094239     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

k5-64  the angular scattering distribution for mixture   1 has bad moments for the transfer from group   61 to group  114
               2 moments were accepted. the p0 coefficient is  1.16528E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   61 to group  126
               2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.631344E-04   1.013883E-05  -8.062199E-05  -1.511034E-05
            the moments corresponding to this distribution are
        6.215014E-02   3.862655E-03   2.400404E-04
            the moments corresponding to the generated distribution are
        6.215014E-02   3.862655E-03   2.400606E-04
            the legendre expansion corresponding to these moments is
        1.631344E-04   1.013883E-05  -8.062199E-05  -1.511033E-05
            the weights/angles for this distribution are
        9.999999E-01   9.999343E-08
        6.215018E-02  -3.252188E-01
            the moments corresponding to this distribution are
        6.215014E-02   3.862655E-03   2.400606E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   61 to group  130
               2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        9.321945E-05   5.160027E-06  -4.618128E-05  -7.700502E-06
            the moments corresponding to this distribution are
        5.535355E-02   3.064058E-03   1.696615E-04
            the moments corresponding to the generated distribution are
        5.535355E-02   3.064058E-03   1.696428E-04
            the legendre expansion corresponding to these moments is
        9.321945E-05   5.160027E-06  -4.618128E-05  -7.700506E-06
            the weights/angles for this distribution are
        9.999999E-01   8.130367E-08
        5.535349E-02   7.848479E-01
            the moments corresponding to this distribution are
        5.535355E-02   3.064058E-03   1.696428E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   64 to group  138
               2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        9.166400E-05   4.697753E-06  -4.547085E-05  -7.015766E-06
            the moments corresponding to this distribution are
        5.124970E-02   2.626591E-03   1.346789E-04
            the moments corresponding to the generated distribution are
        5.124970E-02   2.626591E-03   1.346702E-04
```

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          the legendre expansion corresponding to these moments is
     9.166400E-05   4.697753E-06  -4.547085E-05  -7.015768E-06
          the weights/angles for this distribution are
     9.999999E-01   7.764716E-08
     5.124963E-02   9.264608E-01
          the moments corresponding to this distribution are
     5.124970E-02   2.626591E-03   1.346702E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   64 to group  155
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.299871E-05   1.043060E-06  -1.644990E-05  -1.561978E-06
          the moments corresponding to this distribution are
     3.160912E-02   9.991971E-04   3.166819E-05
          the moments corresponding to the generated distribution are
     3.160912E-02   9.991971E-04   3.162445E-05
          the legendre expansion corresponding to these moments is
     3.299871E-05   1.043060E-06  -1.644990E-05  -1.561981E-06
          the weights/angles for this distribution are
     9.999998E-01   1.641735E-07
     3.160902E-02   6.394737E-01
          the moments corresponding to this distribution are
     3.160912E-02   9.991971E-04   3.162445E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  130
               1 moments were accepted. the p0 coefficient is  1.58758E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   72 to group  207
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.295305E-05   7.360239E-07  -1.645186E-05  -1.103113E-06
          the moments corresponding to this distribution are
     2.233553E-02   4.989292E-04   1.120238E-05
          the moments corresponding to the generated distribution are
     2.233553E-02   4.989292E-04   1.119414E-05
          the legendre expansion corresponding to these moments is
     3.295305E-05   7.360239E-07  -1.645186E-05  -1.103114E-06
          the weights/angles for this distribution are
     9.999999E-01   6.566582E-08
     2.233547E-02   9.226058E-01
          the moments corresponding to this distribution are
     2.233553E-02   4.989292E-04   1.119414E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   80 to group  206
               1 moments were accepted. the p0 coefficient is  1.17861E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   88 to group  218
               2 moments were accepted. the p0 coefficient is  1.10149E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   90 to group  169
               2 moments were accepted. the p0 coefficient is  6.02376E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  100 to group  190
               1 moments were accepted. the p0 coefficient is  4.68120E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  205
               1 moments were accepted. the p0 coefficient is  5.34562E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  107 to group  192
               2 moments were accepted. the p0 coefficient is  5.78684E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  108 to group  171
               2 moments were accepted. the p0 coefficient is  5.94879E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  112 to group  199
               2 moments were accepted. the p0 coefficient is  6.65806E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  114 to group  207
               2 moments were accepted. the p0 coefficient is  7.08077E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  143 to group  230
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.024583E-04   2.576573E-06  -5.113193E-05  -3.860777E-06
          the moments corresponding to this distribution are
     2.514754E-02   6.324259E-04   1.593862E-05
          the moments corresponding to the generated distribution are
     2.514754E-02   6.324259E-04   1.592477E-05
          the legendre expansion corresponding to these moments is
     1.024583E-04   2.576573E-06  -5.113193E-05  -3.860781E-06
          the weights/angles for this distribution are
     9.999999E-01   5.234135E-08
     2.514750E-02   7.441841E-01
          the moments corresponding to this distribution are
     2.514754E-02   6.324259E-04   1.592477E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  147 to group  177
               2 moments were accepted. the p0 coefficient is  2.87829E-03

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  149 to group  149
               2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.409119E-02   3.271408E-02   3.028330E-02   2.744820E-02
          the moments corresponding to this distribution are
     9.596049E-01   9.255352E-01   8.978192E-01
          the moments corresponding to the generated distribution are
     9.596049E-01   9.255352E-01   8.957816E-01
          the legendre expansion corresponding to these moments is
     3.409119E-02   3.271408E-02   3.028330E-02   2.727454E-02
          the weights/angles for this distribution are
     9.528824E-01   4.711758E-02
     9.748393E-01   6.515119E-01
          the moments corresponding to this distribution are
     9.596049E-01   9.255352E-01   8.957816E-01
```

```
keno message number k5-222     136 transfers for mixture     1 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   17 to group   73
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
          the moments corresponding to this distribution are
     2.103383E-02   4.424545E-04   9.340116E-06
          the moments corresponding to the generated distribution are
     2.103383E-02   4.424545E-04   9.338884E-06
          the legendre expansion corresponding to these moments is
     6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
          the weights/angles for this distribution are
     1.000000E+00   3.506203E-08
     2.103380E-02   9.809266E-01
          the moments corresponding to this distribution are
     2.103383E-02   4.424545E-04   9.338884E-06

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   31 to group   67
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.020880E-04   1.552948E-05  -1.498463E-04  -2.319124E-05
          the moments corresponding to this distribution are
     5.140713E-02   2.643117E-03   1.363483E-04
          the moments corresponding to the generated distribution are
     5.140713E-02   2.643117E-03   1.362936E-04
          the legendre expansion corresponding to these moments is
     3.020880E-04   1.552948E-05  -1.498463E-04  -2.319128E-05
          the weights/angles for this distribution are
     9.999995E-01   5.426291E-07
     5.140665E-02   9.355055E-01
          the moments corresponding to this distribution are
     5.140713E-02   2.643117E-03   1.362936E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   36 to group   75
            1 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.436553E-05   8.753364E-07  -1.714932E-05  -1.311583E-06
          the moments corresponding to this distribution are
     2.547135E-02   6.487885E-04   1.654347E-05
          the moments corresponding to the generated distribution are
     2.547135E-02   6.487908E-04   1.652561E-05
          the legendre expansion corresponding to these moments is
     3.436553E-05   8.753364E-07  -1.714932E-05  -1.311585E-06
          the weights/angles for this distribution are
     9.999982E-01   1.759111E-06
     2.547139E-02  -4.483616E-08
          the moments corresponding to this distribution are
     2.547135E-02   6.487908E-04   1.652561E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   86
            1 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.550883E-04   6.403348E-06  -7.714756E-05  -9.577728E-06
          the moments corresponding to this distribution are
     4.128841E-02   1.704733E-03   7.039822E-05
          the moments corresponding to the generated distribution are.
     4.128841E-02   1.704733E-03   7.038573E-05
          the legendre expansion corresponding to these moments is
     1.550883E-04   6.403348E-06  -7.714756E-05  -9.577732E-06
          the weights/angles for this distribution are
     9.999999E-01   1.260091E-07
     4.128842E-02  -5.211604E-09
          the moments corresponding to this distribution are
     4.128841E-02   1.704733E-03   7.038573E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     6.978938E-05   2.469208E-06  -3.476364E-05  -3.696076E-06
          the moments corresponding to this distribution are
     3.538085E-02   1.251836E-03   4.433614E-05
          the moments corresponding to the generated distribution are
     3.538085E-02   1.251836E-03   4.431055E-05
          the legendre expansion corresponding to these moments is
     6.978938E-05   2.469208E-06  -3.476364E-05  -3.696081E-06
          the weights/angles for this distribution are
     9.999999E-01   1.014716E-07
     3.538080E-02   5.900701E-01
          the moments corresponding to this distribution are
     3.538085E-02   1.251836E-03   4.431055E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   51 to group   87
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.360841E-04   5.588769E-06  -6.769771E-05  -8.359530E-06
          the moments corresponding to this distribution are
     4.106850E-02   1.686766E-03   6.943713E-05
          the moments corresponding to the generated distribution are
     4.106850E-02   1.686766E-03   6.940783E-05
          the legendre expansion corresponding to these moments is
     1.360841E-04   5.588769E-06  -6.769771E-05  -8.359540E-06
          the weights/angles for this distribution are
     9.999998E-01   1.956027E-07
     4.106834E-02   8.979992E-01
          the moments corresponding to this distribution are
     4.106850E-02   1.686766E-03   6.940783E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   65 to group  101
            1 moments were accepted. the p0 coefficient is  7.14843E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   68 to group  107
            2 moments were accepted. the p0 coefficient is  6.43298E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   75 to group  194
```

```
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.513644E-04   8.247675E-06  -7.500807E-05  -1.231030E-05
          the moments corresponding to this distribution are
     5.448889E-02   2.969040E-03   1.617684E-04
          the moments corresponding to the generated distribution are
     5.448889E-02   2.969040E-03   1.617797E-04
          the legendre expansion corresponding to these moments is
     1.513644E-04   8.247675E-06  -7.500807E-05  -1.231029E-05
          the weights/angles for this distribution are
     9.999997E-01   2.777653E-07
     5.448890E-02  -1.518020E-08
          the moments corresponding to this distribution are
     5.448889E-02   2.969040E-03   1.617797E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   77 to group  209
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     9.945100E-05   3.561977E-06  -4.953412E-05  -5.331510E-06
          the moments corresponding to this distribution are
     3.581641E-02   1.282931E-03   4.607786E-05
          the moments corresponding to the generated distribution are
     3.581641E-02   1.282931E-03   4.606247E-05
          the legendre expansion corresponding to these moments is
     9.945100E-05   3.561977E-06  -4.953412E-05  -5.331513E-06
          the weights/angles for this distribution are
     9.999999E-01   1.439254E-07
     3.581628E-02   9.337027E-01
          the moments corresponding to this distribution are
     3.581641E-02   1.282931E-03   4.606247E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   80 to group  172
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
          the moments corresponding to this distribution are
     8.005312E-02   6.408680E-03   5.132358E-04
          the moments corresponding to the generated distribution are
     8.005312E-02   6.408680E-03   5.132162E-04
          the legendre expansion corresponding to these moments is
     1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
          the weights/angles for this distribution are
     9.999998E-01   2.368696E-07
     8.005292E-02   9.445136E-01
          the moments corresponding to this distribution are
     8.005312E-02   6.408680E-03   5.132162E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   82 to group  162
            2 moments were accepted. the p0 coefficient is  6.66650E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   98 to group  214
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     4.471841E-04   2.551503E-05  -2.214081E-04  -3.806459E-05
          the moments corresponding to this distribution are
     5.705712E-02   3.255749E-03   1.860170E-04
          the moments corresponding to the generated distribution are
     5.705712E-02   3.255749E-03   1.860059E-04
          the legendre expansion corresponding to these moments is
     4.471841E-04   2.551503E-05  -2.214081E-04  -3.806460E-05
          the weights/angles for this distribution are
     9.999997E-01   2.774108E-07
     5.705686E-02   9.762922E-01
          the moments corresponding to this distribution are
     5.705712E-02   3.255749E-03   1.860059E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  100 to group  190
            2 moments were accepted. the p0 coefficient is  4.68299E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  104 to group  205
            1 moments were accepted. the p0 coefficient is  5.35149E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  105 to group  210
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.537484E-04   4.469354E-05  -2.714633E-04  -6.631247E-05
          the moments corresponding to this distribution are
     8.071091E-02   6.514266E-03   5.257494E-04
          the moments corresponding to the generated distribution are
     8.071091E-02   6.514266E-03   5.257672E-04
          the legendre expansion corresponding to these moments is
     5.537484E-04   4.469354E-05  -2.714633E-04  -6.631245E-05
          the weights/angles for this distribution are
     9.999999E-01   6.184942E-08
     8.071094E-02  -4.163174E-01
          the moments corresponding to this distribution are
     8.071091E-02   6.514266E-03   5.257672E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  192
            2 moments were accepted. the p0 coefficient is  7.08334E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  207
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     7.083302E-04   7.331732E-05  -3.427817E-04  -1.080120E-04
          the moments corresponding to this distribution are
     1.035073E-01   1.071382E-02   1.109050E-03
          the moments corresponding to the generated distribution are
     1.035073E-01   1.071382E-02   1.109007E-03
          the legendre expansion corresponding to these moments is
     7.083302E-04   7.331732E-05  -3.427817E-04  -1.080121E-04
          the weights/angles for this distribution are
     9.999998E-01   2.029094E-07
     1.035072E-01   6.642933E-01
          the moments corresponding to this distribution are
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          1.035073E-01   1.071382E-02   1.109007E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  122 to group  229
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          4.760356E-05   6.498871E-07  -2.378847E-05  -9.745249E-07
             the moments corresponding to this distribution are
          1.365207E-02   1.863943E-04   2.568987E-06
             the moments corresponding to the generated distribution are
          1.365207E-02   1.863943E-04   2.551278E-06
             the legendre expansion corresponding to these moments is
          4.760356E-05   6.498871E-07  -2.378847E-05  -9.745271E-07
             the weights/angles for this distribution are
          9.999999E-01   9.257298E-08
          1.365203E-02   4.196166E-01
             the moments corresponding to this distribution are
          1.365207E-02   1.863943E-04   2.551278E-06

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  130 to group  175
                2 moments were accepted. the p0 coefficient is  7.62811E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
             the moments corresponding to this distribution are
          2.667994E-02   7.118417E-04   1.901619E-05
             the moments corresponding to the generated distribution are
          2.667994E-02   7.118417E-04   1.901414E-05
             the legendre expansion corresponding to these moments is
          1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
             the weights/angles for this distribution are
          1.000000E+00   2.632260E-08
          2.667991E-02   9.547741E-01
             the moments corresponding to this distribution are
          2.667994E-02   7.118417E-04   1.901414E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  147 to group  177
                2 moments were accepted. the p0 coefficient is  2.87948E-03

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  149 to group  149
                1 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          3.392408E-02   3.268915E-02   3.028554E-02   2.745581E-02
             the moments corresponding to this distribution are
          9.635975E-01   9.284965E-01   9.018909E-01
             the moments corresponding to the generated distribution are
          9.635975E-01   9.285436E-01   8.947650E-01
             the legendre expansion corresponding to these moments is
          3.392408E-02   3.268915E-02   3.028794E-02   2.685146E-02
             the weights/angles for this distribution are
          9.999746E-01   2.536909E-05
          9.636219E-01  -3.422353E-04
             the moments corresponding to this distribution are
          9.635975E-01   9.285436E-01   8.947650E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  150 to group  150
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.160285E-02   4.909516E-02   4.461168E-02   3.940127E-02
             the moments corresponding to this distribution are
          9.514041E-01   9.096799E-01   8.762618E-01
             the moments corresponding to the generated distribution are
          9.514041E-01   9.096799E-01   8.714495E-01
             the legendre expansion corresponding to these moments is
          5.160285E-02   4.909516E-02   4.461168E-02   3.878044E-02
             the weights/angles for this distribution are
          9.870113E-01   1.298868E-02
          9.591081E-01   3.659778E-01
             the moments corresponding to this distribution are
          9.514041E-01   9.096799E-01   8.714495E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  151 to group  151
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.254969E-02   4.995038E-02   4.532984E-02   3.997005E-02
             the moments corresponding to this distribution are
          9.505360E-01   9.084061E-01   8.745673E-01
             the moments corresponding to the generated distribution are
          9.505360E-01   9.084061E-01   8.704781E-01
             the legendre expansion corresponding to these moments is
          5.254969E-02   4.995038E-02   4.532984E-02   3.943283E-02
             the weights/angles for this distribution are
          9.790505E-01   2.094948E-02
          9.607624E-01   4.726190E-01
             the moments corresponding to this distribution are
          9.505360E-01   9.084061E-01   8.704781E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  152 to group  152
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
          5.445168E-02   5.164695E-02   4.673397E-02   4.110458E-02
             the moments corresponding to this distribution are
          9.484915E-01   9.055100E-01   8.710476E-01
             the moments corresponding to the generated distribution are
          9.484915E-01   9.055100E-01   8.682405E-01
             the legendre expansion corresponding to these moments is
          5.445168E-02   5.164695E-02   4.673397E-02   4.072245E-02
             the weights/angles for this distribution are
          9.456984E-01   5.430165E-02
          9.668567E-01   6.286492E-01
             the moments corresponding to this distribution are
          9.484915E-01   9.055100E-01   8.682405E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  153 to group  153
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            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.650781E-02   5.348388E-02   4.824280E-02   4.225094E-02
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.669722E-01
          the moments corresponding to the generated distribution are
     9.464864E-01   9.024911E-01   8.656703E-01
          the legendre expansion corresponding to these moments is
     5.650781E-02   5.348388E-02   4.824280E-02   4.206703E-02
          the weights/angles for this distribution are
     8.593679E-01   1.406321E-01
     9.794865E-01   7.448307E-01
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.656703E-01

keno message number k5-222     149 transfers for mixture     2 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   25 to group   63
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947598E-05
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764563E-04
          the moments corresponding to the generated distribution are
     5.606000E-02   3.142957E-03   1.764250E-04
          the legendre expansion corresponding to these moments is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947601E-05
          the weights/angles for this distribution are
     9.999997E-01   3.036038E-07
     5.605973E-02   9.328158E-01
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764250E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   46 to group   75
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867983E-05
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.099896E-04
          the moments corresponding to the generated distribution are
     5.944100E-02   3.533259E-03   2.100019E-04
          the legendre expansion corresponding to these moments is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867982E-05
          the weights/angles for this distribution are
     1.000000E+00   3.845905E-08
     5.944103E-02  -7.662296E-01
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.100019E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     7.176521E-05   2.539114E-06  -3.574785E-05  -3.800717E-06
          the moments corresponding to this distribution are
     3.538085E-02   1.251842E-03   4.433718E-05
          the moments corresponding to the generated distribution are
     3.538085E-02   1.251842E-03   4.432188E-05
          the legendre expansion corresponding to these moments is
     7.176521E-05   2.539114E-06  -3.574785E-05  -3.800719E-06
          the weights/angles for this distribution are
     9.999999E-01   6.443804E-08
     3.538080E-02   7.931237E-01
          the moments corresponding to this distribution are
     3.538085E-02   1.251842E-03   4.432188E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   65 to group  101
            2 moments were accepted. the p0 coefficient is  7.31570E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  209
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.017605E-04   3.644696E-06  -5.068443E-05  -5.455322E-06
          the moments corresponding to this distribution are
     3.581641E-02   1.282915E-03   4.607288E-05
          the moments corresponding to the generated distribution are
     3.581641E-02   1.282915E-03   4.603329E-05
          the legendre expansion corresponding to these moments is
     1.017605E-04   3.644696E-06  -5.068443E-05  -5.455332E-06
          the weights/angles for this distribution are
     9.999998E-01   1.703986E-07
     3.581627E-02   8.022606E-01
          the moments corresponding to this distribution are
     3.581641E-02   1.282915E-03   4.603329E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  213
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     1.017610E-04   2.943045E-06  -5.075281E-05  -4.408409E-06
          the moments corresponding to this distribution are
     2.892116E-02   8.364365E-04   2.420515E-05
          the moments corresponding to the generated distribution are
     2.892116E-02   8.364365E-04   2.419080E-05
          the legendre expansion corresponding to these moments is
     1.017610E-04   2.943045E-06  -5.075281E-05  -4.408413E-06
          the weights/angles for this distribution are
     9.999962E-01   3.840111E-06
     2.892127E-02  -1.111543E-07
          the moments corresponding to this distribution are
     2.892116E-02   8.364365E-04   2.419080E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  171
            2 moments were accepted. the p0 coefficient is  1.20653E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  206
            1 moments were accepted
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                the legendre expansion of the cross section (p0-pn) is
          1.206511E-04   5.280875E-06  -5.997885E-05  -7.896021E-06
                the moments corresponding to this distribution are
          4.376979E-02   1.915793E-03   8.384988E-05
                the moments corresponding to the generated distribution are
          4.376979E-02   1.915796E-03   8.385408E-05
                the legendre expansion corresponding to these moments is
          1.206511E-04   5.280875E-06  -5.997885E-05  -7.896020E-06
                the weights/angles for this distribution are
          9.999992E-01   8.131593E-07
          4.376983E-02  -3.566019E-08
                the moments corresponding to this distribution are
          4.376979E-02   1.915796E-03   8.385408E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  222
                2 moments were accepted
                the legendre expansion of the cross section (p0-pn) is
          4.826018E-05   7.438963E-07  -2.411289E-05  -1.115404E-06
                the moments corresponding to this distribution are
          1.541429E-02   2.376060E-04   3.652759E-06
                the moments corresponding to the generated distribution are
          1.541429E-02   2.376060E-04   3.660935E-06
                the legendre expansion corresponding to these moments is
          4.826018E-05   7.438963E-07  -2.411289E-05  -1.115403E-06
                the weights/angles for this distribution are
          9.999999E-01   6.128777E-08
          1.541431E-02  -2.913944E-01
                the moments corresponding to this distribution are
          1.541429E-02   2.376060E-04   3.660935E-06

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   83 to group  161
                2 moments were accepted. the p0 coefficient is  6.24506E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   84 to group  160
                2 moments were accepted. the p0 coefficient is  4.91713E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   89 to group  148
                2 moments were accepted. the p0 coefficient is  5.85610E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   90 to group  169
                2 moments were accepted. the p0 coefficient is  6.17329E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   93 to group  181
                2 moments were accepted. the p0 coefficient is  1.45037E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   94 to group  112
                2 moments were accepted. the p0 coefficient is  7.61129E-03

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   97 to group  189
                1 moments were accepted. the p0 coefficient is  1.78001E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   99 to group  176
                1 moments were accepted. the p0 coefficient is  1.87371E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  104 to group  205
                1 moments were accepted. the p0 coefficient is  5.47573E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  105 to group  210
                2 moments were accepted
                the legendre expansion of the cross section (p0-pn) is
          5.666031E-04   4.573105E-05  -2.777650E-04  -6.785186E-05
                the moments corresponding to this distribution are
          8.071091E-02   6.514271E-03   5.257461E-04
                the moments corresponding to the generated distribution are
          8.071091E-02   6.514271E-03   5.257637E-04
                the legendre expansion corresponding to these moments is
          5.666031E-04   4.573105E-05  -2.777650E-04  -6.785183E-05
                the weights/angles for this distribution are
          1.000000E+00   4.936485E-08
          8.071094E-02  -5.467504E-01
                the moments corresponding to this distribution are
          8.071091E-02   6.514271E-03   5.257637E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  106 to group  177
                2 moments were accepted. the p0 coefficient is  2.32080E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  114 to group  192
                2 moments were accepted. the p0 coefficient is  7.24779E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
                the legendre expansion of the cross section (p0-pn) is
          1.182311E-04   3.154398E-06  -5.898930E-05  -4.725976E-06
                the moments corresponding to this distribution are
          2.667994E-02   7.118348E-04   1.901552E-05
                the moments corresponding to the generated distribution are
          2.667994E-02   7.118348E-04   1.900025E-05
                the legendre expansion corresponding to these moments is
          1.182311E-04   3.154398E-06  -5.898930E-05  -4.725981E-06
                the weights/angles for this distribution are
          9.999999E-01   6.598613E-08
          2.667990E-02   5.153067E-01
                the moments corresponding to this distribution are
          2.667994E-02   7.118348E-04   1.900025E-05

keno message number k5-222     129 transfers for mixture     5 were corrected for bad moments.

                               ........    0 io's were used mixing cross-sections       ........

                                1-d cross section array id numbers
                                   1  2002  1452    27    18  1018

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                        the number of direct access blocks for unit  8 has been increased to 1079.
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****

..... 0 io's were used preparing the cross sections .....

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*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                              ****** additional information ******                 ***
***                                                                                   ***
***  number of energy groups              238       use lattice geometry                no  ***
***                                                                                   ***
***  no. of fission spectrum source group  1        global array number                  0  ***
***                                                                                   ***
***  no. of scattering angles in xsecs     2        number of units in the global x dir.  0  ***
***                                                                                   ***
***  entries/neutron in the neutron bank  17        number of units in the global y dir.  0  ***
***                                                                                   ***
***  entries/neutron in the fission bank  10        number of units in the global z dir.  0  ***
***                                                                                   ***
***  number of mixtures used               5        use a global reflector            yes  ***
***                                                                                   ***
***  number of bias id's used              1        use nested holes                   no  ***
***                                                                                   ***
***  number of differential albedos used   0        number of holes                     1  ***
***                                                                                   ***
***  total input geometry regions          7        maximum hole nesting level          1  ***
***                                                                                   ***
***  number of geometry regions used       7        use nested arrays                  no  ***
***                                                                                   ***
***  largest geometry unit number         10        number of arrays used               0  ***
***                                                                                   ***
***  largest array number                  1        maximum array nesting level         0  ***
***                                                                                   ***
***                                                                                   ***
***  +x boundary condition            mirror        -x boundary condition          mirror  ***
***                                                                                   ***
***  +y boundary condition            mirror        -y boundary condition          mirror  ***
***                                                                                   ***
***  +z boundary condition            mirror        -z boundary condition          mirror  ***
***                                                                                   ***
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```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    ****** space and supergroup information ******                 ***
***                                                                                   ***
***      2000000 words is the total space available.                                  ***
***                                                                                   ***
***        30661 words were used for non-supergroup storage.                          ***
***                                                                                   ***
***      1969339 words of storage are available for supergrouped data.                ***
***                                                                                   ***
***      1999416 words of storage are available for constructing the supergroups.     ***
***                                                                                   ***
***      1968857 words of storage are available to each supergroup.                   ***
***                                                                                   ***
***         5835 words are needed for the largest group.                              ***
***                                                                                   ***
***        38400 words of storage is sufficient to run this problem.                  ***
***                                                                                   ***
***       469323 words of storage will allow the problem to run with one supergroup.  ***
***                                                                                   ***
***       469632 words of storage will be used to run this problem.                   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    starting      ending       xsec       albedo      total        ***
***   supergroup         group        group      length      length      length       ***
***                                                                                   ***
***                                                                                   ***
***          1            1           238       105618           0      438180        ***
***                                                                                   ***
*****************************************************************************************

            ........    0 io's were used in supergrouping    ........

            ........    0 io's were used loading the data    ........
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

```
                    media bias      geometry description for those units utilized in this problem
region              num   id

                                                  -----   unit     1   -----

pu sphere

 1 sphere           1  1  radius =  12.341     the center is located at ( 0.00000    , 0.00000    , 0.00000    ).

                                        ******************   global   ******************
                                                  -----   unit    10   -----

ru-tru 72-b package w/ pu sphere

  1 cylinder        2  1  radius =  39.688     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

    hole number     1        at x = 0.00000      y =  27.340      z =  141.96     is unit number      1

  2 cylinder        4  1  radius =  43.180     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  3 cylinder        6  1  radius =  47.943     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  4 cylinder        4  1  radius =  52.070     +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  5 cylinder        4  1  radius =  52.070     +z =  187.33     -z = -170.82     centerline is at  x = 0.00000      y = 0.00000

  6 cuboid          5  1      +x =  72.390     -x = -72.390     +y =  72.390     -y = -72.390     +z =  216.54     -z = -200.03
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	7.87222E+03 cm**3	7.87222E+03 cm**3
10	1	2	1.51928E+06 cm**3	1.52715E+06 cm**3
	2	3	2.80605E+05 cm**3	1.80775E+06 cm**3
	3	4	4.20760E+05 cm**3	2.22851E+06 cm**3
	4	5	4.00235E+05 cm**3	2.62875E+06 cm**3
	5	6	4.21884E+05 cm**3	3.05063E+06 cm**3
	6	7	5.68119E+06 cm**3	8.73183E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	7.87222E+03 cm**3
10	1	1	2	1.51928E+06 cm**3
		2	4	2.80605E+05 cm**3
		3	6	4.20760E+05 cm**3
		4	4	4.00235E+05 cm**3
		5	4	4.21884E+05 cm**3
		6	5	5.68119E+06 cm**3

total mixture volumes

mixture	total volume	mass(g)
1	7.87222E+03 cm**3	7.57219E+03
2	1.51928E+06 cm**3	1.41636E+06
4	1.10272E+06 cm**3	8.75563E+06
5	5.68119E+06 cm**3	5.67080E+06
6	4.20760E+05 cm**3	4.77310E+06

```
*****************************************************************************************************
***                                                                                               ***
***                                   biasing information                                         ***
***                                                                                               ***
***     a default weight of    0.500 will be used for all bias id's.                              ***
***                                                                                               ***
*****************************************************************************************************
```

..... 0 io's were used in keno-v before tracking .....

..... 0.06717 minutes were used processing data. .....

volume fraction of fissile material in the core= 9.01555E-04

start type 0 was used.

the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
the flag to start neutrons in the reflector was turned off

0.05667 minutes were required for starting. total elapsed time is 0.12067 minutes.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
keno message number k5-132		warning....only	961 independent	fission points were	generated	
1	8.87961E-01	1.28667E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	963 independent	fission points were	generated	
2	9.14764E-01	1.34333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
3	9.15453E-01	1.40167E-01	9.15453E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.22057E-01	1.46667E-01	9.18755E-01	3.30195E-03	0.00000E+00	0.00000E+00
5	9.37102E-01	1.52667E-01	9.24871E-01	6.40602E-03	0.00000E+00	0.00000E+00
6	9.46095E-01	1.58167E-01	9.30177E-01	6.97668E-03	0.00000E+00	0.00000E+00
7	9.34868E-01	1.67000E-01	9.31115E-01	5.48495E-03	0.00000E+00	0.00000E+00
8	1.02020E+00	1.72667E-01	9.45962E-01	1.55077E-02	0.00000E+00	0.00000E+00
9	8.89654E-01	1.81500E-01	9.37918E-01	1.53780E-02	0.00000E+00	0.00000E+00
10	8.92323E-01	1.87500E-01	9.32219E-01	1.44860E-02	0.00000E+00	0.00000E+00
11	9.66282E-01	1.95667E-01	9.36003E-01	1.33243E-02	0.00000E+00	0.00000E+00
12	9.32417E-01	2.01333E-01	9.35645E-01	1.19231E-02	0.00000E+00	0.00000E+00
13	9.52549E-01	2.06833E-01	9.37182E-01	1.08937E-02	0.00000E+00	0.00000E+00
14	9.55683E-01	2.14833E-01	9.38723E-01	1.00634E-02	0.00000E+00	0.00000E+00
15	9.34570E-01	2.20333E-01	9.38404E-01	9.26248E-03	0.00000E+00	0.00000E+00
16	9.50280E-01	2.25833E-01	9.39252E-01	8.61725E-03	0.00000E+00	0.00000E+00
17	9.15493E-01	2.33833E-01	9.37668E-01	8.17710E-03	0.00000E+00	0.00000E+00
18	9.26640E-01	2.40167E-01	9.36979E-01	7.67997E-03	0.00000E+00	0.00000E+00
19	9.28198E-01	2.47667E-01	9.36462E-01	7.23254E-03	0.00000E+00	0.00000E+00
20	9.54206E-01	2.53333E-01	9.37448E-01	6.88979E-03	0.00000E+00	0.00000E+00
21	9.67730E-01	2.58833E-01	9.39042E-01	6.70914E-03	0.00000E+00	0.00000E+00
22	8.85387E-01	2.65833E-01	9.36359E-01	6.90712E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	993 independent	fission points were	generated	
23	8.66037E-01	2.72333E-01	9.33011E-01	7.37416E-03	0.00000E+00	0.00000E+00
24	9.67785E-01	2.79667E-01	9.34591E-01	7.20647E-03	0.00000E+00	0.00000E+00
25	9.12075E-01	2.84833E-01	9.33612E-01	6.95526E-03	0.00000E+00	0.00000E+00
26	9.08445E-01	2.90333E-01	9.32564E-01	6.74122E-03	0.00000E+00	0.00000E+00
27	9.32868E-01	2.96833E-01	9.32576E-01	6.46596E-03	0.00000E+00	0.00000E+00
28	9.49975E-01	3.02833E-01	9.33245E-01	6.24823E-03	0.00000E+00	0.00000E+00
29	9.23062E-01	3.08333E-01	9.32868E-01	6.02418E-03	0.00000E+00	0.00000E+00
30	9.34038E-01	3.15333E-01	9.32910E-01	5.80520E-03	0.00000E+00	0.00000E+00
31	9.52772E-01	3.21333E-01	9.33594E-01	5.64316E-03	0.00000E+00	0.00000E+00
32	9.50457E-01	3.28167E-01	9.34157E-01	5.48071E-03	0.00000E+00	0.00000E+00
33	9.24232E-01	3.34333E-01	9.33836E-01	5.31063E-03	0.00000E+00	0.00000E+00
34	9.51285E-01	3.39833E-01	9.34382E-01	5.17082E-03	0.00000E+00	0.00000E+00
35	9.64482E-01	3.46167E-01	9.35294E-01	5.09401E-03	0.00000E+00	0.00000E+00
36	8.91956E-01	3.51833E-01	9.34019E-01	5.10365E-03	0.00000E+00	0.00000E+00
37	9.40931E-01	3.57000E-01	9.34217E-01	4.95962E-03	0.00000E+00	0.00000E+00
38	9.63082E-01	3.63333E-01	9.35019E-01	4.88613E-03	0.00000E+00	0.00000E+00
39	9.11090E-01	3.69000E-01	9.34372E-01	4.79603E-03	0.00000E+00	0.00000E+00
40	8.86711E-01	3.74167E-01	9.33118E-01	4.83367E-03	0.00000E+00	0.00000E+00
41	8.98436E-01	3.80667E-01	9.32228E-01	4.79135E-03	0.00000E+00	0.00000E+00
42	9.54877E-01	3.86667E-01	9.32795E-01	4.70423E-03	0.00000E+00	0.00000E+00
43	9.62053E-01	3.92500E-01	9.33508E-01	4.64323E-03	0.00000E+00	0.00000E+00
44	9.61430E-01	3.99167E-01	9.34173E-01	4.57983E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	991 independent	fission points were	generated	
45	9.22000E-01	4.04667E-01	9.33890E-01	4.48101E-03	0.00000E+00	0.00000E+00
46	9.20950E-01	4.11000E-01	9.33596E-01	4.38785E-03	0.00000E+00	0.00000E+00
47	9.35416E-01	4.17167E-01	9.33636E-01	4.28942E-03	0.00000E+00	0.00000E+00
48	9.47794E-01	4.23167E-01	9.33944E-01	4.20641E-03	0.00000E+00	0.00000E+00
49	9.77966E-01	4.29167E-01	9.34881E-01	4.22117E-03	0.00000E+00	0.00000E+00
50	9.86591E-01	4.34333E-01	9.35958E-01	4.27041E-03	0.00000E+00	0.00000E+00
51	9.25485E-01	4.39833E-01	9.35744E-01	4.18781E-03	0.00000E+00	0.00000E+00
52	9.29186E-01	4.45500E-01	9.35613E-01	4.10530E-03	0.00000E+00	0.00000E+00
53	9.90834E-01	4.50833E-01	9.36696E-01	4.16712E-03	0.00000E+00	0.00000E+00
54	9.03037E-01	4.57333E-01	9.36048E-01	4.13715E-03	0.00000E+00	0.00000E+00
55	9.45612E-01	4.63000E-01	9.36229E-01	4.06235E-03	0.00000E+00	0.00000E+00
56	8.95841E-01	4.68833E-01	9.35481E-01	4.05597E-03	0.00000E+00	0.00000E+00
57	9.44443E-01	4.74500E-01	9.35644E-01	3.98487E-03	0.00000E+00	0.00000E+00
58	9.98210E-01	4.80167E-01	9.36761E-01	4.06944E-03	0.00000E+00	0.00000E+00
59	9.47543E-01	4.86500E-01	9.36950E-01	4.00188E-03	0.00000E+00	0.00000E+00
60	8.83866E-01	4.92667E-01	9.36035E-01	4.03739E-03	0.00000E+00	0.00000E+00
61	9.69837E-01	4.98667E-01	9.36608E-01	4.00951E-03	0.00000E+00	0.00000E+00
62	9.48816E-01	5.05167E-01	9.36811E-01	3.94737E-03	0.00000E+00	0.00000E+00
63	9.22402E-01	5.11000E-01	9.36575E-01	3.88930E-03	0.00000E+00	0.00000E+00
64	9.49168E-01	5.17000E-01	9.36778E-01	3.83144E-03	0.00000E+00	0.00000E+00
65	9.37245E-01	5.22333E-01	9.36786E-01	3.77014E-03	0.00000E+00	0.00000E+00
66	9.26772E-01	5.28167E-01	9.36629E-01	3.71406E-03	0.00000E+00	0.00000E+00
67	9.38422E-01	5.33833E-01	9.36657E-01	3.65658E-03	0.00000E+00	0.00000E+00
68	9.24307E-01	5.40167E-01	9.36470E-01	3.60561E-03	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	990 independent	fission points were	generated	
69	8.70874E-01	5.46667E-01	9.35491E-01	3.68387E-03	0.00000E+00	0.00000E+00
70	9.61150E-01	5.52667E-01	9.35868E-01	3.64885E-03	0.00000E+00	0.00000E+00
71	9.59505E-01	5.58333E-01	9.36211E-01	3.61186E-03	0.00000E+00	0.00000E+00
72	9.26526E-01	5.63833E-01	9.36072E-01	3.56258E-03	0.00000E+00	0.00000E+00
73	9.36036E-01	5.69833E-01	9.36072E-01	3.51204E-03	0.00000E+00	0.00000E+00
74	9.27978E-01	5.76000E-01	9.35959E-01	3.46475E-03	0.00000E+00	0.00000E+00
75	9.60856E-01	5.82000E-01	9.36300E-01	3.43393E-03	0.00000E+00	0.00000E+00
76	9.29091E-01	5.88500E-01	9.36203E-01	3.38861E-03	0.00000E+00	0.00000E+00
77	9.36446E-01	5.94500E-01	9.36206E-01	3.34313E-03	0.00000E+00	0.00000E+00
78	9.33908E-01	6.00500E-01	9.36176E-01	3.29898E-03	0.00000E+00	0.00000E+00
79	8.98370E-01	6.06000E-01	9.35685E-01	3.29267E-03	0.00000E+00	0.00000E+00
80	9.06440E-01	6.11500E-01	9.35310E-01	3.27174E-03	0.00000E+00	0.00000E+00
81	9.25092E-01	6.17167E-01	9.35181E-01	3.23264E-03	0.00000E+00	0.00000E+00
82	9.16220E-01	6.23000E-01	9.34944E-01	3.20077E-03	0.00000E+00	0.00000E+00
83	9.10744E-01	6.30167E-01	9.34645E-01	3.17509E-03	0.00000E+00	0.00000E+00
84	9.81265E-01	6.36167E-01	9.35214E-01	3.18725E-03	0.00000E+00	0.00000E+00
85	9.48746E-01	6.42667E-01	9.35377E-01	3.15283E-03	0.00000E+00	0.00000E+00
86	9.55238E-01	6.49000E-01	9.35613E-01	3.12403E-03	0.00000E+00	0.00000E+00
87	9.71408E-01	6.54500E-01	9.36034E-01	3.11565E-03	0.00000E+00	0.00000E+00
88	9.22813E-01	6.59833E-01	9.35880E-01	3.08305E-03	0.00000E+00	0.00000E+00
89	9.44292E-01	6.65333E-01	9.35977E-01	3.04894E-03	0.00000E+00	0.00000E+00
90	9.01786E-01	6.71167E-01	9.35589E-01	3.03903E-03	0.00000E+00	0.00000E+00
91	9.26831E-01	6.76500E-01	9.35490E-01	3.00630E-03	0.00000E+00	0.00000E+00
92	9.11969E-01	6.82833E-01	9.35229E-01	2.98418E-03	0.00000E+00	0.00000E+00
93	9.14250E-01	6.88500E-01	9.34998E-01	2.96019E-03	0.00000E+00	0.00000E+00
94	9.88137E-01	6.95000E-01	9.35576E-01	2.98427E-03	0.00000E+00	0.00000E+00
95	9.47945E-01	7.00833E-01	9.35709E-01	2.95500E-03	0.00000E+00	0.00000E+00
96	9.35857E-01	7.07333E-01	9.35710E-01	2.92339E-03	0.00000E+00	0.00000E+00

97	9.45755E-01	7.13333E-01	9.35816E-01	2.89439E-03	0.00000E+00	0.00000E+00
98	9.49969E-01	7.19333E-01	9.35964E-01	2.86787E-03	0.00000E+00	0.00000E+00
99	8.86535E-01	7.25000E-01	9.35454E-01	2.88353E-03	0.00000E+00	0.00000E+00
100	9.33061E-01	7.30667E-01	9.35430E-01	2.85406E-03	0.00000E+00	0.00000E+00
101	9.53845E-01	7.36500E-01	9.35616E-01	2.83121E-03	0.00000E+00	0.00000E+00
102	9.16897E-01	7.42500E-01	9.35428E-01	2.80899E-03	0.00000E+00	0.00000E+00
103	9.63963E-01	7.49000E-01	9.35711E-01	2.79536E-03	0.00000E+00	0.00000E+00
104	9.35386E-01	7.54667E-01	9.35708E-01	2.76782E-03	0.00000E+00	0.00000E+00
105	9.42217E-01	7.61167E-01	9.35771E-01	2.74154E-03	0.00000E+00	0.00000E+00
106	9.66173E-01	7.67500E-01	9.36063E-01	2.73074E-03	0.00000E+00	0.00000E+00
107	9.04488E-01	7.73500E-01	9.35763E-01	2.72128E-03	0.00000E+00	0.00000E+00
108	9.41525E-01	7.79167E-01	9.35817E-01	2.69603E-03	0.00000E+00	0.00000E+00
109	9.49878E-01	7.84667E-01	9.35948E-01	2.67395E-03	0.00000E+00	0.00000E+00
110	9.24053E-01	7.90167E-01	9.35838E-01	2.65136E-03	0.00000E+00	0.00000E+00
111	9.14448E-01	7.95500E-01	9.35642E-01	2.63424E-03	0.00000E+00	0.00000E+00
112	9.41738E-01	8.01000E-01	9.35697E-01	2.61077E-03	0.00000E+00	0.00000E+00
113	9.25575E-01	8.06500E-01	9.35606E-01	2.58875E-03	0.00000E+00	0.00000E+00
114	9.26870E-01	8.12000E-01	9.35528E-01	2.56672E-03	0.00000E+00	0.00000E+00
115	9.51755E-01	8.17667E-01	9.35672E-01	2.54796E-03	0.00000E+00	0.00000E+00
116	9.75866E-01	8.23167E-01	9.36024E-01	2.55000E-03	0.00000E+00	0.00000E+00
117	8.90688E-01	8.28667E-01	9.35630E-01	2.55829E-03	0.00000E+00	0.00000E+00
118	9.29012E-01	8.34333E-01	9.35573E-01	2.53678E-03	0.00000E+00	0.00000E+00
119	9.05314E-01	8.40167E-01	9.35314E-01	2.52826E-03	0.00000E+00	0.00000E+00
120	9.69638E-01	8.45500E-01	9.35605E-01	2.52357E-03	0.00000E+00	0.00000E+00
121	9.20453E-01	8.51000E-01	9.35478E-01	2.50551E-03	0.00000E+00	0.00000E+00
122	9.41661E-01	8.57000E-01	9.35530E-01	2.48508E-03	0.00000E+00	0.00000E+00
123	9.41942E-01	8.63333E-01	9.35583E-01	2.46502E-03	0.00000E+00	0.00000E+00
124	9.19057E-01	8.68667E-01	9.35447E-01	2.44848E-03	0.00000E+00	0.00000E+00
125	9.04342E-01	8.75333E-01	9.35194E-01	2.44163E-03	0.00000E+00	0.00000E+00
126	9.36136E-01	8.81500E-01	9.35202E-01	2.42187E-03	0.00000E+00	0.00000E+00
127	9.33800E-01	8.87833E-01	9.35191E-01	2.40244E-03	0.00000E+00	0.00000E+00
128	9.06810E-01	8.93167E-01	9.34965E-01	2.39392E-03	0.00000E+00	0.00000E+00
129	9.38549E-01	8.99000E-01	9.34994E-01	2.37516E-03	0.00000E+00	0.00000E+00
130	9.44341E-01	9.04500E-01	9.35067E-01	2.35766E-03	0.00000E+00	0.00000E+00
131	9.08281E-01	9.09833E-01	9.34859E-01	2.34851E-03	0.00000E+00	0.00000E+00
132	9.40951E-01	9.15333E-01	9.34906E-01	2.33085E-03	0.00000E+00	0.00000E+00
133	9.40552E-01	9.20500E-01	9.34949E-01	2.31339E-03	0.00000E+00	0.00000E+00
134	9.06619E-01	9.26500E-01	9.34734E-01	2.30580E-03	0.00000E+00	0.00000E+00
135	9.46064E-01	9.32333E-01	9.34819E-01	2.28999E-03	0.00000E+00	0.00000E+00
136	9.70690E-01	9.37500E-01	9.35087E-01	2.28854E-03	0.00000E+00	0.00000E+00
137	9.95072E-01	9.43000E-01	9.35531E-01	2.31458E-03	0.00000E+00	0.00000E+00
138	9.14992E-01	9.48500E-01	9.35380E-01	2.30245E-03	0.00000E+00	0.00000E+00
139	8.96977E-01	9.53833E-01	9.35100E-01	2.30271E-03	0.00000E+00	0.00000E+00
140	9.26516E-01	9.60167E-01	9.35038E-01	2.28681E-03	0.00000E+00	0.00000E+00
141	9.32244E-01	9.66333E-01	9.35018E-01	2.27039E-03	0.00000E+00	0.00000E+00
142	9.42710E-01	9.72167E-01	9.35073E-01	2.25478E-03	0.00000E+00	0.00000E+00
143	8.90605E-01	9.78333E-01	9.34757E-01	2.26084E-03	0.00000E+00	0.00000E+00
144	9.37584E-01	9.84333E-01	9.34777E-01	2.24495E-03	0.00000E+00	0.00000E+00
145	9.62034E-01	9.89500E-01	9.34968E-01	2.23733E-03	0.00000E+00	0.00000E+00
146	9.17821E-01	9.95500E-01	9.34849E-01	2.22493E-03	0.00000E+00	0.00000E+00
147	9.07911E-01	1.00133E+00	9.34663E-01	2.21733E-03	0.00000E+00	0.00000E+00
148	9.46230E-01	1.00683E+00	9.34742E-01	2.20351E-03	0.00000E+00	0.00000E+00
149	9.47769E-01	1.01200E+00	9.34831E-01	2.19026E-03	0.00000E+00	0.00000E+00
150	9.35713E-01	1.01800E+00	9.34837E-01	2.17542E-03	0.00000E+00	0.00000E+00
151	9.46064E-01	1.02350E+00	9.34912E-01	2.16209E-03	0.00000E+00	0.00000E+00
152	9.27432E-01	1.02933E+00	9.34862E-01	2.14820E-03	0.00000E+00	0.00000E+00
153	8.73762E-01	1.03567E+00	9.34458E-01	2.17195E-03	0.00000E+00	0.00000E+00
154	9.47719E-01	1.04133E+00	9.34545E-01	2.15938E-03	0.00000E+00	0.00000E+00
155	9.52338E-01	1.04683E+00	9.34661E-01	2.14837E-03	0.00000E+00	0.00000E+00
156	9.63848E-01	1.05267E+00	9.34851E-01	2.14277E-03	0.00000E+00	0.00000E+00
157	9.39507E-01	1.05850E+00	9.34881E-01	2.12911E-03	0.00000E+00	0.00000E+00
158	9.47276E-01	1.06433E+00	9.34960E-01	2.11691E-03	0.00000E+00	0.00000E+00
159	9.01984E-01	1.07033E+00	9.34750E-01	2.11385E-03	0.00000E+00	0.00000E+00
160	9.28194E-01	1.07650E+00	9.34709E-01	2.10084E-03	0.00000E+00	0.00000E+00
161	9.16958E-01	1.08200E+00	9.34597E-01	2.09057E-03	0.00000E+00	0.00000E+00
162	9.26209E-01	1.08767E+00	9.34545E-01	2.07812E-03	0.00000E+00	0.00000E+00
163	9.41113E-01	1.09350E+00	9.34585E-01	2.06557E-03	0.00000E+00	0.00000E+00
164	9.20875E-01	1.09917E+00	9.34501E-01	2.05453E-03	0.00000E+00	0.00000E+00
165	9.08792E-01	1.10500E+00	9.34343E-01	2.04797E-03	0.00000E+00	0.00000E+00
166	9.31992E-01	1.11067E+00	9.34329E-01	2.03549E-03	0.00000E+00	0.00000E+00
167	9.45204E-01	1.11683E+00	9.34395E-01	2.02419E-03	0.00000E+00	0.00000E+00
168	9.36650E-01	1.12267E+00	9.34408E-01	2.01201E-03	0.00000E+00	0.00000E+00
169	9.52537E-01	1.12833E+00	9.34517E-01	2.00287E-03	0.00000E+00	0.00000E+00
170	9.07896E-01	1.13533E+00	9.34358E-01	1.99720E-03	0.00000E+00	0.00000E+00
171	9.24239E-01	1.14083E+00	9.34298E-01	1.98625E-03	0.00000E+00	0.00000E+00
172	9.70686E-01	1.14683E+00	9.34513E-01	1.98610E-03	0.00000E+00	0.00000E+00
173	9.01763E-01	1.15233E+00	9.34321E-01	1.98372E-03	0.00000E+00	0.00000E+00
174	8.90302E-01	1.15800E+00	9.34065E-01	1.98869E-03	0.00000E+00	0.00000E+00
175	9.49476E-01	1.16350E+00	9.34154E-01	1.97917E-03	0.00000E+00	0.00000E+00
176	9.18430E-01	1.16900E+00	9.34064E-01	1.96983E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 945 independent fission points were generated

177	8.32691E-01	1.17450E+00	9.33485E-01	2.04242E-03	0.00000E+00	0.00000E+00
178	8.81137E-01	1.18017E+00	9.33187E-01	2.05244E-03	0.00000E+00	0.00000E+00
179	9.59004E-01	1.18567E+00	9.33333E-01	2.04602E-03	0.00000E+00	0.00000E+00
180	8.98246E-01	1.19133E+00	9.33136E-01	2.04402E-03	0.00000E+00	0.00000E+00
181	9.31976E-01	1.19717E+00	9.33129E-01	2.03258E-03	0.00000E+00	0.00000E+00
182	9.19766E-01	1.20283E+00	9.33055E-01	2.02262E-03	0.00000E+00	0.00000E+00
183	9.49515E-01	1.20883E+00	9.33146E-01	2.01347E-03	0.00000E+00	0.00000E+00
184	9.54835E-01	1.21400E+00	9.33265E-01	2.00592E-03	0.00000E+00	0.00000E+00
185	9.10284E-01	1.21950E+00	9.33140E-01	1.99887E-03	0.00000E+00	0.00000E+00
186	9.39231E-01	1.22517E+00	9.33173E-01	1.98826E-03	0.00000E+00	0.00000E+00
187	9.49329E-01	1.23050E+00	9.33260E-01	1.97941E-03	0.00000E+00	0.00000E+00
188	9.29123E-01	1.23600E+00	9.33238E-01	1.96886E-03	0.00000E+00	0.00000E+00
189	1.00171E+00	1.24133E+00	9.33604E-01	1.99224E-03	0.00000E+00	0.00000E+00
190	9.44956E-01	1.24683E+00	9.33664E-01	1.98254E-03	0.00000E+00	0.00000E+00
191	9.31669E-01	1.25317E+00	9.33654E-01	1.97205E-03	0.00000E+00	0.00000E+00
192	9.25698E-01	1.25883E+00	9.33612E-01	1.96209E-03	0.00000E+00	0.00000E+00
193	9.33446E-01	1.26433E+00	9.33611E-01	1.95179E-03	0.00000E+00	0.00000E+00
194	8.98765E-01	1.27000E+00	9.33430E-01	1.95006E-03	0.00000E+00	0.00000E+00
195	9.20480E-01	1.27583E+00	9.33362E-01	1.94109E-03	0.00000E+00	0.00000E+00
196	9.30771E-01	1.28150E+00	9.33349E-01	1.93111E-03	0.00000E+00	0.00000E+00
197	9.52243E-01	1.28700E+00	9.33446E-01	1.92362E-03	0.00000E+00	0.00000E+00
198	9.61723E-01	1.29267E+00	9.33590E-01	1.91921E-03	0.00000E+00	0.00000E+00
199	9.20688E-01	1.29867E+00	9.33525E-01	1.91057E-03	0.00000E+00	0.00000E+00
200	9.42774E-01	1.30467E+00	9.33572E-01	1.90147E-03	0.00000E+00	0.00000E+00

201	9.52735E-01	1.31033E+00	9.33668E-01	1.89434E-03	0.00000E+00	0.00000E+00
202	9.36809E-01	1.31633E+00	9.33684E-01	1.88491E-03	0.00000E+00	0.00000E+00
203	9.20484E-01	1.32233E+00	9.33618E-01	1.87665E-03	0.00000E+00	0.00000E+00
204	9.51672E-01	1.32883E+00	9.33707E-01	1.86948E-03	0.00000E+00	0.00000E+00
205	9.45411E-01	1.33483E+00	9.33765E-01	1.86114E-03	0.00000E+00	0.00000E+00
206	9.40648E-01	1.34117E+00	9.33799E-01	1.85230E-03	0.00000E+00	0.00000E+00
207	9.32798E-01	1.34717E+00	9.33794E-01	1.84325E-03	0.00000E+00	0.00000E+00
208	9.57903E-01	1.35250E+00	9.33911E-01	1.83801E-03	0.00000E+00	0.00000E+00
209	9.90266E-01	1.35833E+00	9.34183E-01	1.84926E-03	0.00000E+00	0.00000E+00
210	8.77891E-01	1.36483E+00	9.33912E-01	1.86014E-03	0.00000E+00	0.00000E+00
211	9.36956E-01	1.37000E+00	9.33927E-01	1.85128E-03	0.00000E+00	0.00000E+00
212	9.42907E-01	1.37550E+00	9.33970E-01	1.84293E-03	0.00000E+00	0.00000E+00
213	9.49012E-01	1.38100E+00	9.34041E-01	1.83556E-03	0.00000E+00	0.00000E+00
214	9.73650E-01	1.38650E+00	9.34228E-01	1.83641E-03	0.00000E+00	0.00000E+00
215	9.50434E-01	1.39250E+00	9.34304E-01	1.82936E-03	0.00000E+00	0.00000E+00
216	9.42335E-01	1.39833E+00	9.34341E-01	1.82117E-03	0.00000E+00	0.00000E+00
217	9.48371E-01	1.40417E+00	9.34407E-01	1.81386E-03	0.00000E+00	0.00000E+00
218	9.95807E-01	1.40933E+00	9.34691E-01	1.82768E-03	0.00000E+00	0.00000E+00
219	9.22639E-01	1.41483E+00	9.34635E-01	1.82009E-03	0.00000E+00	0.00000E+00
220	9.20049E-01	1.42083E+00	9.34569E-01	1.81295E-03	0.00000E+00	0.00000E+00
221	9.32041E-01	1.42650E+00	9.34557E-01	1.80469E-03	0.00000E+00	0.00000E+00
222	9.09196E-01	1.43233E+00	9.34442E-01	1.80017E-03	0.00000E+00	0.00000E+00
223	9.44430E-01	1.43800E+00	9.34487E-01	1.79257E-03	0.00000E+00	0.00000E+00
224	9.38017E-01	1.44417E+00	9.34503E-01	1.78455E-03	0.00000E+00	0.00000E+00
225	9.21774E-01	1.45050E+00	9.34446E-01	1.77745E-03	0.00000E+00	0.00000E+00
226	9.16324E-01	1.45617E+00	9.34365E-01	1.77134E-03	0.00000E+00	0.00000E+00
227	9.41755E-01	1.46200E+00	9.34398E-01	1.76376E-03	0.00000E+00	0.00000E+00
228	9.48644E-01	1.46750E+00	9.34461E-01	1.75707E-03	0.00000E+00	0.00000E+00
229	9.44556E-01	1.47317E+00	9.34505E-01	1.74988E-03	0.00000E+00	0.00000E+00
230	9.47503E-01	1.47917E+00	9.34562E-01	1.74312E-03	0.00000E+00	0.00000E+00
231	9.79375E-01	1.48433E+00	9.34758E-01	1.74648E-03	0.00000E+00	0.00000E+00
232	9.67988E-01	1.49033E+00	9.34902E-01	1.74487E-03	0.00000E+00	0.00000E+00
233	9.32051E-01	1.49633E+00	9.34890E-01	1.73734E-03	0.00000E+00	0.00000E+00
234	9.34041E-01	1.50233E+00	9.34886E-01	1.72984E-03	0.00000E+00	0.00000E+00
235	9.50615E-01	1.50750E+00	9.34954E-01	1.72372E-03	0.00000E+00	0.00000E+00
236	8.81467E-01	1.51350E+00	9.34725E-01	1.73149E-03	0.00000E+00	0.00000E+00
237	9.11233E-01	1.51917E+00	9.34625E-01	1.72701E-03	0.00000E+00	0.00000E+00
238	9.08208E-01	1.52517E+00	9.34513E-01	1.72331E-03	0.00000E+00	0.00000E+00
239	9.83385E-01	1.53150E+00	9.34720E-01	1.72837E-03	0.00000E+00	0.00000E+00
240	9.55390E-01	1.53717E+00	9.34806E-01	1.72328E-03	0.00000E+00	0.00000E+00
241	9.37500E-01	1.54300E+00	9.34818E-01	1.71609E-03	0.00000E+00	0.00000E+00
242	9.19938E-01	1.54833E+00	9.34756E-01	1.71005E-03	0.00000E+00	0.00000E+00
243	9.59221E-01	1.55417E+00	9.34857E-01	1.70597E-03	0.00000E+00	0.00000E+00
244	9.07423E-01	1.56033E+00	9.34744E-01	1.70268E-03	0.00000E+00	0.00000E+00
245	8.96386E-01	1.56617E+00	9.34586E-01	1.70299E-03	0.00000E+00	0.00000E+00
246	9.40777E-01	1.57183E+00	9.34611E-01	1.69619E-03	0.00000E+00	0.00000E+00
247	8.97553E-01	1.57750E+00	9.34460E-01	1.69601E-03	0.00000E+00	0.00000E+00
248	9.26552E-01	1.58483E+00	9.34428E-01	1.68940E-03	0.00000E+00	0.00000E+00
249	9.18872E-01	1.59067E+00	9.34365E-01	1.68373E-03	0.00000E+00	0.00000E+00
250	9.21438E-01	1.59683E+00	9.34313E-01	1.67774E-03	0.00000E+00	0.00000E+00
251	9.28278E-01	1.60317E+00	9.34289E-01	1.67116E-03	0.00000E+00	0.00000E+00
252	9.44631E-01	1.60917E+00	9.34330E-01	1.66498E-03	0.00000E+00	0.00000E+00
253	9.27436E-01	1.61483E+00	9.34303E-01	1.65856E-03	0.00000E+00	0.00000E+00
254	9.30078E-01	1.62050E+00	9.34286E-01	1.65205E-03	0.00000E+00	0.00000E+00
255	9.16406E-01	1.62633E+00	9.34215E-01	1.64702E-03	0.00000E+00	0.00000E+00
256	9.65824E-01	1.63167E+00	9.34340E-01	1.64524E-03	0.00000E+00	0.00000E+00
257	9.64046E-01	1.63700E+00	9.34456E-01	1.64291E-03	0.00000E+00	0.00000E+00
258	9.32875E-01	1.64267E+00	9.34450E-01	1.63649E-03	0.00000E+00	0.00000E+00
259	9.65551E-01	1.64817E+00	9.34571E-01	1.63460E-03	0.00000E+00	0.00000E+00
260	9.82811E-01	1.65333E+00	9.34758E-01	1.63895E-03	0.00000E+00	0.00000E+00
261	9.44918E-01	1.65883E+00	9.34797E-01	1.63308E-03	0.00000E+00	0.00000E+00
262	9.37367E-01	1.66450E+00	9.34807E-01	1.62682E-03	0.00000E+00	0.00000E+00
263	9.73267E-01	1.67000E+00	9.34954E-01	1.62726E-03	0.00000E+00	0.00000E+00
264	9.26430E-01	1.67567E+00	9.34922E-01	1.62136E-03	0.00000E+00	0.00000E+00
265	9.87586E-01	1.68167E+00	9.35122E-01	1.62755E-03	0.00000E+00	0.00000E+00
266	9.78727E-01	1.68800E+00	9.35287E-01	1.62976E-03	0.00000E+00	0.00000E+00
267	9.21712E-01	1.69367E+00	9.35236E-01	1.62441E-03	0.00000E+00	0.00000E+00
268	9.29530E-01	1.69917E+00	9.35214E-01	1.61843E-03	0.00000E+00	0.00000E+00
269	8.72510E-01	1.70517E+00	9.34980E-01	1.62937E-03	0.00000E+00	0.00000E+00
270	9.44758E-01	1.71083E+00	9.35016E-01	1.62369E-03	0.00000E+00	0.00000E+00
271	9.33176E-01	1.71667E+00	9.35009E-01	1.61766E-03	0.00000E+00	0.00000E+00
272	9.44228E-01	1.72233E+00	9.35043E-01	1.61202E-03	0.00000E+00	0.00000E+00
273	9.26433E-01	1.72817E+00	9.35012E-01	1.60637E-03	0.00000E+00	0.00000E+00
274	9.68430E-01	1.73350E+00	9.35135E-01	1.60517E-03	0.00000E+00	0.00000E+00
275	9.49164E-01	1.73933E+00	9.35186E-01	1.60010E-03	0.00000E+00	0.00000E+00
276	9.25397E-01	1.74500E+00	9.35150E-01	1.59465E-03	0.00000E+00	0.00000E+00
277	9.45801E-01	1.75100E+00	9.35189E-01	1.58931E-03	0.00000E+00	0.00000E+00
278	9.55421E-01	1.75700E+00	9.35262E-01	1.58524E-03	0.00000E+00	0.00000E+00
279	9.42981E-01	1.76267E+00	9.35290E-01	1.57975E-03	0.00000E+00	0.00000E+00
280	9.33753E-01	1.76817E+00	9.35285E-01	1.57407E-03	0.00000E+00	0.00000E+00
281	9.42166E-01	1.77400E+00	9.35309E-01	1.56861E-03	0.00000E+00	0.00000E+00
282	9.62654E-01	1.77933E+00	9.35407E-01	1.56605E-03	0.00000E+00	0.00000E+00
283	9.21762E-01	1.78467E+00	9.35358E-01	1.56122E-03	0.00000E+00	0.00000E+00
284	9.45897E-01	1.79033E+00	9.35396E-01	1.55612E-03	0.00000E+00	0.00000E+00
285	8.97747E-01	1.79600E+00	9.35263E-01	1.55631E-03	0.00000E+00	0.00000E+00
286	9.13034E-01	1.80150E+00	9.35184E-01	1.55280E-03	0.00000E+00	0.00000E+00
287	8.87834E-01	1.80750E+00	9.35018E-01	1.55623E-03	0.00000E+00	0.00000E+00
288	9.63454E-01	1.81317E+00	9.35118E-01	1.55396E-03	0.00000E+00	0.00000E+00
289	9.26325E-01	1.81917E+00	9.35087E-01	1.54884E-03	0.00000E+00	0.00000E+00
290	9.51430E-01	1.82500E+00	9.35144E-01	1.54450E-03	0.00000E+00	0.00000E+00
291	9.15941E-01	1.83050E+00	9.35077E-01	1.54058E-03	0.00000E+00	0.00000E+00
292	9.60952E-01	1.83567E+00	9.35167E-01	1.53785E-03	0.00000E+00	0.00000E+00
293	9.31813E-01	1.84117E+00	9.35155E-01	1.53260E-03	0.00000E+00	0.00000E+00
294	9.75088E-01	1.84683E+00	9.35292E-01	1.53345E-03	0.00000E+00	0.00000E+00
295	9.36276E-01	1.85233E+00	9.35295E-01	1.52821E-03	0.00000E+00	0.00000E+00
296	9.20423E-01	1.85783E+00	9.35245E-01	1.52384E-03	0.00000E+00	0.00000E+00
297	9.31510E-01	1.86350E+00	9.35232E-01	1.51872E-03	0.00000E+00	0.00000E+00
298	9.53443E-01	1.86900E+00	9.35293E-01	1.51483E-03	0.00000E+00	0.00000E+00
299	8.92744E-01	1.87500E+00	9.35150E-01	1.51651E-03	0.00000E+00	0.00000E+00
300	9.23521E-01	1.88100E+00	9.35111E-01	1.51191E-03	0.00000E+00	0.00000E+00
301	9.17409E-01	1.88650E+00	9.35052E-01	1.50801E-03	0.00000E+00	0.00000E+00
302	9.77126E-01	1.89183E+00	9.35192E-01	1.50950E-03	0.00000E+00	0.00000E+00
303	9.63285E-01	1.89783E+00	9.35286E-01	1.50737E-03	0.00000E+00	0.00000E+00
304	9.31505E-01	1.90367E+00	9.35273E-01	1.50243E-03	0.00000E+00	0.00000E+00
305	9.44993E-01	1.90883E+00	9.35305E-01	1.49780E-03	0.00000E+00	0.00000E+00

306	9.45280E-01	1.91433E+00	9.35338E-01	1.49323E-03	0.00000E+00	0.00000E+00
307	9.48883E-01	1.91983E+00	9.35382E-01	1.48899E-03	0.00000E+00	0.00000E+00
308	9.87907E-01	1.92550E+00	9.35554E-01	1.49401E-03	0.00000E+00	0.00000E+00
309	9.10840E-01	1.93117E+00	9.35473E-01	1.49131E-03	0.00000E+00	0.00000E+00
310	9.17922E-01	1.93700E+00	9.35416E-01	1.48755E-03	0.00000E+00	0.00000E+00
311	9.08581E-01	1.94267E+00	9.35330E-01	1.48527E-03	0.00000E+00	0.00000E+00
312	9.62599E-01	1.94783E+00	9.35418E-01	1.48308E-03	0.00000E+00	0.00000E+00
313	9.70743E-01	1.95333E+00	9.35531E-01	1.48266E-03	0.00000E+00	0.00000E+00
314	9.43006E-01	1.95933E+00	9.35555E-01	1.47809E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 970 independent fission points were generated

315	8.84230E-01	1.96550E+00	9.35391E-01	1.48246E-03	0.00000E+00	0.00000E+00
316	9.21001E-01	1.97150E+00	9.35345E-01	1.47844E-03	0.00000E+00	0.00000E+00
317	9.19875E-01	1.97783E+00	9.35296E-01	1.47456E-03	0.00000E+00	0.00000E+00
318	9.29588E-01	1.98350E+00	9.35278E-01	1.47000E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 992 independent fission points were generated

319	8.84567E-01	1.98933E+00	9.35118E-01	1.47406E-03	0.00000E+00	0.00000E+00
320	9.69672E-01	1.99533E+00	9.35227E-01	1.47343E-03	0.00000E+00	0.00000E+00
321	9.55273E-01	2.00067E+00	9.35290E-01	1.47015E-03	0.00000E+00	0.00000E+00
322	9.31430E-01	2.00667E+00	9.35278E-01	1.46559E-03	0.00000E+00	0.00000E+00
323	9.54624E-01	2.01267E+00	9.35338E-01	1.46226E-03	0.00000E+00	0.00000E+00
324	9.28291E-01	2.01817E+00	9.35316E-01	1.45788E-03	0.00000E+00	0.00000E+00
325	9.15225E-01	2.02417E+00	9.35254E-01	1.45469E-03	0.00000E+00	0.00000E+00
326	9.37106E-01	2.02983E+00	9.35260E-01	1.45020E-03	0.00000E+00	0.00000E+00
327	9.22889E-01	2.03533E+00	9.35221E-01	1.44624E-03	0.00000E+00	0.00000E+00
328	9.57214E-01	2.04083E+00	9.35289E-01	1.44337E-03	0.00000E+00	0.00000E+00
329	9.21991E-01	2.04633E+00	9.35248E-01	1.43952E-03	0.00000E+00	0.00000E+00
330	9.36376E-01	2.05283E+00	9.35252E-01	1.43513E-03	0.00000E+00	0.00000E+00
331	9.52241E-01	2.05883E+00	9.35303E-01	1.43170E-03	0.00000E+00	0.00000E+00
332	9.64689E-01	2.06450E+00	9.35392E-01	1.43013E-03	0.00000E+00	0.00000E+00
333	9.35408E-01	2.07050E+00	9.35392E-01	1.42580E-03	0.00000E+00	0.00000E+00
334	9.33497E-01	2.07700E+00	9.35387E-01	1.42151E-03	0.00000E+00	0.00000E+00
335	9.05205E-01	2.08283E+00	9.35296E-01	1.42013E-03	0.00000E+00	0.00000E+00
336	9.27651E-01	2.08817E+00	9.35273E-01	1.41606E-03	0.00000E+00	0.00000E+00
337	9.21662E-01	2.09400E+00	9.35233E-01	1.41241E-03	0.00000E+00	0.00000E+00
338	9.38105E-01	2.09967E+00	9.35241E-01	1.40822E-03	0.00000E+00	0.00000E+00
339	9.06357E-01	2.10517E+00	9.35155E-01	1.40665E-03	0.00000E+00	0.00000E+00
340	9.42185E-01	2.11033E+00	9.35176E-01	1.40264E-03	0.00000E+00	0.00000E+00
341	9.33313E-01	2.11667E+00	9.35171E-01	1.39850E-03	0.00000E+00	0.00000E+00
342	9.63763E-01	2.12267E+00	9.35255E-01	1.39692E-03	0.00000E+00	0.00000E+00
343	9.36381E-01	2.12833E+00	9.35258E-01	1.39282E-03	0.00000E+00	0.00000E+00
344	9.12113E-01	2.13433E+00	9.35190E-01	1.39039E-03	0.00000E+00	0.00000E+00
345	9.41037E-01	2.13983E+00	9.35207E-01	1.38644E-03	0.00000E+00	0.00000E+00
346	9.17663E-01	2.14650E+00	9.35156E-01	1.38334E-03	0.00000E+00	0.00000E+00
347	9.22907E-01	2.15233E+00	9.35121E-01	1.37978E-03	0.00000E+00	0.00000E+00
348	9.12451E-01	2.15850E+00	9.35055E-01	1.37735E-03	0.00000E+00	0.00000E+00
349	8.97066E-01	2.16450E+00	9.34946E-01	1.37773E-03	0.00000E+00	0.00000E+00
350	9.40810E-01	2.17050E+00	9.34963E-01	1.37387E-03	0.00000E+00	0.00000E+00
351	9.36475E-01	2.17633E+00	9.34967E-01	1.36993E-03	0.00000E+00	0.00000E+00
352	9.49666E-01	2.18167E+00	9.35009E-01	1.36666E-03	0.00000E+00	0.00000E+00
353	9.30704E-01	2.18750E+00	9.34997E-01	1.36281E-03	0.00000E+00	0.00000E+00
354	9.58975E-01	2.19317E+00	9.35065E-01	1.36064E-03	0.00000E+00	0.00000E+00
355	9.62328E-01	2.19867E+00	9.35142E-01	1.35898E-03	0.00000E+00	0.00000E+00
356	9.40228E-01	2.20417E+00	9.35157E-01	1.35521E-03	0.00000E+00	0.00000E+00
357	9.49676E-01	2.20983E+00	9.35197E-01	1.35201E-03	0.00000E+00	0.00000E+00
358	9.20680E-01	2.21583E+00	9.35157E-01	1.34882E-03	0.00000E+00	0.00000E+00
359	9.19975E-01	2.22183E+00	9.35114E-01	1.34571E-03	0.00000E+00	0.00000E+00
360	9.41849E-01	2.22800E+00	9.35133E-01	1.34208E-03	0.00000E+00	0.00000E+00
361	9.30621E-01	2.23383E+00	9.35120E-01	1.33839E-03	0.00000E+00	0.00000E+00
362	9.42220E-01	2.23983E+00	9.35140E-01	1.33481E-03	0.00000E+00	0.00000E+00
363	9.31609E-01	2.24550E+00	9.35130E-01	1.33115E-03	0.00000E+00	0.00000E+00
364	9.10671E-01	2.25067E+00	9.35063E-01	1.32918E-03	0.00000E+00	0.00000E+00
365	9.46008E-01	2.25617E+00	9.35093E-01	1.32586E-03	0.00000E+00	0.00000E+00
366	9.23595E-01	2.26167E+00	9.35061E-01	1.32259E-03	0.00000E+00	0.00000E+00
367	8.93950E-01	2.26733E+00	9.34949E-01	1.32376E-03	0.00000E+00	0.00000E+00
368	9.01561E-01	2.27383E+00	9.34858E-01	1.32329E-03	0.00000E+00	0.00000E+00
369	9.08774E-01	2.27967E+00	9.34786E-01	1.32159E-03	0.00000E+00	0.00000E+00
370	9.21123E-01	2.28583E+00	9.34749E-01	1.31852E-03	0.00000E+00	0.00000E+00
371	9.70510E-01	2.29133E+00	9.34846E-01	1.31850E-03	0.00000E+00	0.00000E+00
372	9.57476E-01	2.29683E+00	9.34907E-01	1.31636E-03	0.00000E+00	0.00000E+00
373	8.99125E-01	2.30233E+00	9.34811E-01	1.31634E-03	0.00000E+00	0.00000E+00
374	8.79330E-01	2.30800E+00	9.34662E-01	1.32124E-03	0.00000E+00	0.00000E+00
375	9.35627E-01	2.31350E+00	9.34664E-01	1.31770E-03	0.00000E+00	0.00000E+00
376	9.46714E-01	2.31900E+00	9.34697E-01	1.31457E-03	0.00000E+00	0.00000E+00
377	9.15796E-01	2.32467E+00	9.34646E-01	1.31203E-03	0.00000E+00	0.00000E+00
378	9.31529E-01	2.33017E+00	9.34638E-01	1.30856E-03	0.00000E+00	0.00000E+00
379	9.18333E-01	2.33567E+00	9.34595E-01	1.30580E-03	0.00000E+00	0.00000E+00
380	9.08006E-01	2.34117E+00	9.34524E-01	1.30424E-03	0.00000E+00	0.00000E+00
381	9.04210E-01	2.34767E+00	9.34444E-01	1.30325E-03	0.00000E+00	0.00000E+00
382	9.18751E-01	2.35333E+00	9.34403E-01	1.30047E-03	0.00000E+00	0.00000E+00
383	9.56595E-01	2.35883E+00	9.34461E-01	1.29836E-03	0.00000E+00	0.00000E+00
384	9.33547E-01	2.36533E+00	9.34459E-01	1.29496E-03	0.00000E+00	0.00000E+00
385	9.19516E-01	2.37150E+00	9.34420E-01	1.29216E-03	0.00000E+00	0.00000E+00
386	9.51033E-01	2.37733E+00	9.34463E-01	1.28952E-03	0.00000E+00	0.00000E+00
387	9.37544E-01	2.38283E+00	9.34471E-01	1.28619E-03	0.00000E+00	0.00000E+00
388	9.24059E-01	2.38850E+00	9.34444E-01	1.28314E-03	0.00000E+00	0.00000E+00
389	9.58066E-01	2.39450E+00	9.34505E-01	1.28127E-03	0.00000E+00	0.00000E+00
390	9.43421E-01	2.40100E+00	9.34528E-01	1.27817E-03	0.00000E+00	0.00000E+00
391	9.31090E-01	2.40717E+00	9.34519E-01	1.27491E-03	0.00000E+00	0.00000E+00
392	9.22607E-01	2.41300E+00	9.34489E-01	1.27201E-03	0.00000E+00	0.00000E+00
393	9.29670E-01	2.41867E+00	9.34476E-01	1.26881E-03	0.00000E+00	0.00000E+00
394	8.89555E-01	2.42467E+00	9.34362E-01	1.27075E-03	0.00000E+00	0.00000E+00
395	9.18942E-01	2.43033E+00	9.34323E-01	1.26811E-03	0.00000E+00	0.00000E+00
396	9.55272E-01	2.43617E+00	9.34376E-01	1.26601E-03	0.00000E+00	0.00000E+00
397	9.25073E-01	2.44217E+00	9.34352E-01	1.26302E-03	0.00000E+00	0.00000E+00
398	8.93137E-01	2.44783E+00	9.34248E-01	1.26412E-03	0.00000E+00	0.00000E+00
399	9.29295E-01	2.45417E+00	9.34236E-01	1.26099E-03	0.00000E+00	0.00000E+00
400	8.77820E-01	2.46033E+00	9.34094E-01	1.26578E-03	0.00000E+00	0.00000E+00
401	9.32699E-01	2.46583E+00	9.34090E-01	1.26261E-03	0.00000E+00	0.00000E+00
402	9.01974E-01	2.47133E+00	9.34010E-01	1.26201E-03	0.00000E+00	0.00000E+00
403	9.23203E-01	2.47700E+00	9.33983E-01	1.25914E-03	0.00000E+00	0.00000E+00
404	9.82530E-01	2.48333E+00	9.34104E-01	1.26180E-03	0.00000E+00	0.00000E+00
405	9.78760E-01	2.48867E+00	9.34215E-01	1.26353E-03	0.00000E+00	0.00000E+00
406	9.43896E-01	2.49467E+00	9.34239E-01	1.26063E-03	0.00000E+00	0.00000E+00
407	9.08846E-01	2.50050E+00	9.34176E-01	1.25907E-03	0.00000E+00	0.00000E+00
408	9.57656E-01	2.50567E+00	9.34234E-01	1.25730E-03	0.00000E+00	0.00000E+00

409	9.15180E-01	2.51133E+00	9.34187E-01	1.25508E-03	0.00000E+00	0.00000E+00
410	9.36425E-01	2.51683E+00	9.34193E-01	1.25201E-03	0.00000E+00	0.00000E+00
411	9.28593E-01	2.52233E+00	9.34179E-01	1.24902E-03	0.00000E+00	0.00000E+00
412	9.61807E-01	2.52783E+00	9.34246E-01	1.24779E-03	0.00000E+00	0.00000E+00
413	9.45191E-01	2.53333E+00	9.34273E-01	1.24504E-03	0.00000E+00	0.00000E+00
414	9.56095E-01	2.53900E+00	9.34326E-01	1.24314E-03	0.00000E+00	0.00000E+00
415	8.96767E-01	2.54533E+00	9.34235E-01	1.24346E-03	0.00000E+00	0.00000E+00
416	9.48060E-01	2.55100E+00	9.34268E-01	1.24090E-03	0.00000E+00	0.00000E+00
417	9.88249E-01	2.55667E+00	9.34398E-01	1.24472E-03	0.00000E+00	0.00000E+00
418	9.63001E-01	2.56250E+00	9.34467E-01	1.24363E-03	0.00000E+00	0.00000E+00
419	9.12689E-01	2.56867E+00	9.34415E-01	1.24174E-03	0.00000E+00	0.00000E+00
420	9.27519E-01	2.57417E+00	9.34398E-01	1.23888E-03	0.00000E+00	0.00000E+00
421	9.34603E-01	2.58017E+00	9.34399E-01	1.23592E-03	0.00000E+00	0.00000E+00
422	9.59593E-01	2.58583E+00	9.34459E-01	1.23443E-03	0.00000E+00	0.00000E+00
423	9.00876E-01	2.59183E+00	9.34379E-01	1.23407E-03	0.00000E+00	0.00000E+00
424	9.24032E-01	2.59733E+00	9.34355E-01	1.23139E-03	0.00000E+00	0.00000E+00
425	8.89257E-01	2.60333E+00	9.34248E-01	1.23309E-03	0.00000E+00	0.00000E+00
426	9.51280E-01	2.60883E+00	9.34288E-01	1.23084E-03	0.00000E+00	0.00000E+00
427	9.52829E-01	2.61400E+00	9.34332E-01	1.22871E-03	0.00000E+00	0.00000E+00
428	9.06982E-01	2.61967E+00	9.34268E-01	1.22750E-03	0.00000E+00	0.00000E+00
429	9.12324E-01	2.62500E+00	9.34216E-01	1.22570E-03	0.00000E+00	0.00000E+00
430	9.28072E-01	2.63033E+00	9.34202E-01	1.22292E-03	0.00000E+00	0.00000E+00
431	9.61667E-01	2.63567E+00	9.34266E-01	1.22175E-03	0.00000E+00	0.00000E+00
432	9.58019E-01	2.64083E+00	9.34321E-01	1.22015E-03	0.00000E+00	0.00000E+00
433	9.42880E-01	2.64633E+00	9.34341E-01	1.21748E-03	0.00000E+00	0.00000E+00
434	9.42884E-01	2.65250E+00	9.34361E-01	1.21482E-03	0.00000E+00	0.00000E+00
435	9.32411E-01	2.65850E+00	9.34356E-01	1.21202E-03	0.00000E+00	0.00000E+00
436	9.12119E-01	2.66450E+00	9.34305E-01	1.21031E-03	0.00000E+00	0.00000E+00
437	9.18074E-01	2.67000E+00	9.34268E-01	1.20810E-03	0.00000E+00	0.00000E+00
438	9.59981E-01	2.67600E+00	9.34327E-01	1.20677E-03	0.00000E+00	0.00000E+00
439	9.35929E-01	2.68200E+00	9.34330E-01	1.20401E-03	0.00000E+00	0.00000E+00
440	9.74134E-01	2.68767E+00	9.34421E-01	1.20469E-03	0.00000E+00	0.00000E+00
441	9.39749E-01	2.69350E+00	9.34433E-01	1.20200E-03	0.00000E+00	0.00000E+00
442	9.31410E-01	2.69917E+00	9.34426E-01	1.19929E-03	0.00000E+00	0.00000E+00
443	9.40146E-01	2.70483E+00	9.34439E-01	1.19663E-03	0.00000E+00	0.00000E+00
444	9.43033E-01	2.71067E+00	9.34459E-01	1.19408E-03	0.00000E+00	0.00000E+00
445	9.06421E-01	2.71667E+00	9.34396E-01	1.19306E-03	0.00000E+00	0.00000E+00
446	9.40454E-01	2.72233E+00	9.34409E-01	1.19045E-03	0.00000E+00	0.00000E+00
447	9.47300E-01	2.72833E+00	9.34438E-01	1.18813E-03	0.00000E+00	0.00000E+00
448	9.29663E-01	2.73400E+00	9.34427E-01	1.18551E-03	0.00000E+00	0.00000E+00
449	9.79175E-01	2.74000E+00	9.34528E-01	1.18708E-03	0.00000E+00	0.00000E+00
450	8.99695E-01	2.74600E+00	9.34450E-01	1.18698E-03	0.00000E+00	0.00000E+00
451	9.57963E-01	2.75200E+00	9.34502E-01	1.18549E-03	0.00000E+00	0.00000E+00
452	9.45384E-01	2.75767E+00	9.34526E-01	1.18310E-03	0.00000E+00	0.00000E+00
453	9.01297E-01	2.76350E+00	9.34453E-01	1.18277E-03	0.00000E+00	0.00000E+00
454	9.28934E-01	2.76950E+00	9.34440E-01	1.18021E-03	0.00000E+00	0.00000E+00
455	9.44026E-01	2.77550E+00	9.34462E-01	1.17780E-03	0.00000E+00	0.00000E+00
456	8.94004E-01	2.78100E+00	9.34373E-01	1.17857E-03	0.00000E+00	0.00000E+00
457	9.43662E-01	2.78633E+00	9.34393E-01	1.17616E-03	0.00000E+00	0.00000E+00
458	9.26754E-01	2.79183E+00	9.34376E-01	1.17369E-03	0.00000E+00	0.00000E+00
459	9.63943E-01	2.79733E+00	9.34441E-01	1.17291E-03	0.00000E+00	0.00000E+00
460	9.03922E-01	2.80333E+00	9.34374E-01	1.17224E-03	0.00000E+00	0.00000E+00
461	9.43206E-01	2.80883E+00	9.34394E-01	1.16984E-03	0.00000E+00	0.00000E+00
462	9.50403E-01	2.81450E+00	9.34428E-01	1.16781E-03	0.00000E+00	0.00000E+00
463	9.32530E-01	2.82050E+00	9.34424E-01	1.16529E-03	0.00000E+00	0.00000E+00
464	9.42038E-01	2.82617E+00	9.34441E-01	1.16288E-03	0.00000E+00	0.00000E+00
465	9.48269E-01	2.83200E+00	9.34471E-01	1.16075E-03	0.00000E+00	0.00000E+00
466	9.34776E-01	2.83767E+00	9.34471E-01	1.15824E-03	0.00000E+00	0.00000E+00
467	8.96601E-01	2.84367E+00	9.34390E-01	1.15862E-03	0.00000E+00	0.00000E+00
468	9.47646E-01	2.84967E+00	9.34418E-01	1.15648E-03	0.00000E+00	0.00000E+00
469	9.24620E-01	2.85517E+00	9.34397E-01	1.15419E-03	0.00000E+00	0.00000E+00
470	9.15280E-01	2.86117E+00	9.34356E-01	1.15244E-03	0.00000E+00	0.00000E+00
471	9.41848E-01	2.86683E+00	9.34372E-01	1.15009E-03	0.00000E+00	0.00000E+00
472	9.70275E-01	2.87233E+00	9.34449E-01	1.15018E-03	0.00000E+00	0.00000E+00
473	9.42202E-01	2.87800E+00	9.34465E-01	1.14786E-03	0.00000E+00	0.00000E+00
474	9.16829E-01	2.88350E+00	9.34428E-01	1.14603E-03	0.00000E+00	0.00000E+00
475	9.30515E-01	2.88933E+00	9.34420E-01	1.14364E-03	0.00000E+00	0.00000E+00
476	9.28876E-01	2.89550E+00	9.34408E-01	1.14128E-03	0.00000E+00	0.00000E+00
477	9.11644E-01	2.90183E+00	9.34360E-01	1.13988E-03	0.00000E+00	0.00000E+00
478	9.27118E-01	2.90800E+00	9.34345E-01	1.13759E-03	0.00000E+00	0.00000E+00
479	9.05220E-01	2.91367E+00	9.34284E-01	1.13684E-03	0.00000E+00	0.00000E+00
480	9.09502E-01	2.92000E+00	9.34232E-01	1.13565E-03	0.00000E+00	0.00000E+00
481	9.03022E-01	2.92567E+00	9.34167E-01	1.13514E-03	0.00000E+00	0.00000E+00
482	9.82894E-01	2.93150E+00	9.34268E-01	1.13732E-03	0.00000E+00	0.00000E+00
483	9.64865E-01	2.93750E+00	9.34332E-01	1.13673E-03	0.00000E+00	0.00000E+00
484	9.38038E-01	2.94333E+00	9.34339E-01	1.13440E-03	0.00000E+00	0.00000E+00
485	9.75072E-01	2.94917E+00	9.34424E-01	1.13518E-03	0.00000E+00	0.00000E+00
486	9.31912E-01	2.95567E+00	9.34419E-01	1.13285E-03	0.00000E+00	0.00000E+00
487	9.63539E-01	2.96133E+00	9.34479E-01	1.13210E-03	0.00000E+00	0.00000E+00
488	9.30352E-01	2.96717E+00	9.34470E-01	1.12980E-03	0.00000E+00	0.00000E+00
489	9.30453E-01	2.97283E+00	9.34462E-01	1.12751E-03	0.00000E+00	0.00000E+00
490	9.40629E-01	2.97883E+00	9.34475E-01	1.12527E-03	0.00000E+00	0.00000E+00
491	9.67751E-01	2.98400E+00	9.34543E-01	1.12502E-03	0.00000E+00	0.00000E+00
492	9.62499E-01	2.99033E+00	9.34600E-01	1.12417E-03	0.00000E+00	0.00000E+00
493	9.54732E-01	2.99550E+00	9.34641E-01	1.12263E-03	0.00000E+00	0.00000E+00
494	9.42513E-01	3.00100E+00	9.34657E-01	1.12046E-03	0.00000E+00	0.00000E+00
495	9.59617E-01	3.00617E+00	9.34707E-01	1.11933E-03	0.00000E+00	0.00000E+00
496	9.76093E-01	3.01183E+00	9.34791E-01	1.12020E-03	0.00000E+00	0.00000E+00
497	9.30547E-01	3.01783E+00	9.34783E-01	1.11797E-03	0.00000E+00	0.00000E+00
498	9.12565E-01	3.02383E+00	9.34738E-01	1.11661E-03	0.00000E+00	0.00000E+00
499	8.96664E-01	3.02983E+00	9.34661E-01	1.11699E-03	0.00000E+00	0.00000E+00
500	8.99006E-01	3.03567E+00	9.34590E-01	1.11704E-03	0.00000E+00	0.00000E+00
501	9.14706E-01	3.04133E+00	9.34550E-01	1.11551E-03	0.00000E+00	0.00000E+00
502	9.24846E-01	3.04700E+00	9.34530E-01	1.11345E-03	0.00000E+00	0.00000E+00
503	9.64036E-01	3.05250E+00	9.34589E-01	1.11279E-03	0.00000E+00	0.00000E+00
504	9.84707E-01	3.05767E+00	9.34689E-01	1.11504E-03	0.00000E+00	0.00000E+00
505	9.37383E-01	3.06600E+00	9.34694E-01	1.11284E-03	0.00000E+00	0.00000E+00
506	9.19266E-01	3.07183E+00	9.34664E-01	1.11105E-03	0.00000E+00	0.00000E+00
507	9.43996E-01	3.07750E+00	9.34682E-01	1.10900E-03	0.00000E+00	0.00000E+00
508	9.53377E-01	3.08333E+00	9.34719E-01	1.10742E-03	0.00000E+00	0.00000E+00
509	9.37572E-01	3.08917E+00	9.34725E-01	1.10525E-03	0.00000E+00	0.00000E+00
510	9.52572E-01	3.09500E+00	9.34760E-01	1.10363E-03	0.00000E+00	0.00000E+00
511	9.12947E-01	3.10067E+00	9.34717E-01	1.10230E-03	0.00000E+00	0.00000E+00
512	9.50352E-01	3.10617E+00	9.34748E-01	1.10056E-03	0.00000E+00	0.00000E+00
513	9.30339E-01	3.11167E+00	9.34739E-01	1.09844E-03	0.00000E+00	0.00000E+00

514	9.74203E-01	3.11683E+00	9.34816E-01	1.09900E-03	0.00000E+00	0.00000E+00
515	9.31279E-01	3.12233E+00	9.34809E-01	1.09687E-03	0.00000E+00	0.00000E+00
516	9.22730E-01	3.12750E+00	9.34786E-01	1.09499E-03	0.00000E+00	0.00000E+00
517	9.27757E-01	3.13300E+00	9.34772E-01	1.09295E-03	0.00000E+00	0.00000E+00
518	9.32685E-01	3.13850E+00	9.34768E-01	1.09083E-03	0.00000E+00	0.00000E+00
519	9.14652E-01	3.14400E+00	9.34729E-01	1.08942E-03	0.00000E+00	0.00000E+00
520	9.31716E-01	3.14967E+00	9.34723E-01	1.08733E-03	0.00000E+00	0.00000E+00
521	9.37214E-01	3.15517E+00	9.34728E-01	1.08524E-03	0.00000E+00	0.00000E+00
522	9.57414E-01	3.16067E+00	9.34772E-01	1.08403E-03	0.00000E+00	0.00000E+00
523	9.69034E-01	3.16633E+00	9.34838E-01	1.08395E-03	0.00000E+00	0.00000E+00
524	9.14384E-01	3.17200E+00	9.34798E-01	1.08258E-03	0.00000E+00	0.00000E+00
525	9.16646E-01	3.17833E+00	9.34764E-01	1.08106E-03	0.00000E+00	0.00000E+00
526	9.57316E-01	3.18400E+00	9.34807E-01	1.07985E-03	0.00000E+00	0.00000E+00
527	9.55397E-01	3.19000E+00	9.34846E-01	1.07851E-03	0.00000E+00	0.00000E+00
528	9.39336E-01	3.19633E+00	9.34854E-01	1.07649E-03	0.00000E+00	0.00000E+00
529	9.17795E-01	3.20167E+00	9.34822E-01	1.07493E-03	0.00000E+00	0.00000E+00
530	9.35853E-01	3.20717E+00	9.34824E-01	1.07290E-03	0.00000E+00	0.00000E+00
531	9.67241E-01	3.21267E+00	9.34885E-01	1.07262E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 997 independent fission points were generated

532	8.97430E-01	3.21833E+00	9.34815E-01	1.07292E-03	0.00000E+00	0.00000E+00
533	9.10026E-01	3.22383E+00	9.34768E-01	1.07192E-03	0.00000E+00	0.00000E+00
534	8.89852E-01	3.23017E+00	9.34684E-01	1.07323E-03	0.00000E+00	0.00000E+00
535	9.42965E-01	3.23583E+00	9.34699E-01	1.07132E-03	0.00000E+00	0.00000E+00
536	9.65655E-01	3.24167E+00	9.34757E-01	1.07089E-03	0.00000E+00	0.00000E+00
537	8.97373E-01	3.24750E+00	9.34687E-01	1.07116E-03	0.00000E+00	0.00000E+00
538	9.33746E-01	3.25350E+00	9.34685E-01	1.06917E-03	0.00000E+00	0.00000E+00
539	9.22536E-01	3.25900E+00	9.34663E-01	1.06741E-03	0.00000E+00	0.00000E+00
540	9.24145E-01	3.26450E+00	9.34643E-01	1.06561E-03	0.00000E+00	0.00000E+00
541	9.41173E-01	3.27017E+00	9.34655E-01	1.06370E-03	0.00000E+00	0.00000E+00
542	9.22406E-01	3.27650E+00	9.34633E-01	1.06197E-03	0.00000E+00	0.00000E+00
543	9.32142E-01	3.28200E+00	9.34628E-01	1.06001E-03	0.00000E+00	0.00000E+00
544	9.58792E-01	3.28717E+00	9.34673E-01	1.05899E-03	0.00000E+00	0.00000E+00
545	9.65240E-01	3.29283E+00	9.34729E-01	1.05854E-03	0.00000E+00	0.00000E+00
546	9.49061E-01	3.29867E+00	9.34755E-01	1.05692E-03	0.00000E+00	0.00000E+00
547	9.70734E-01	3.30467E+00	9.34821E-01	1.05704E-03	0.00000E+00	0.00000E+00
548	9.16829E-01	3.31033E+00	9.34788E-01	1.05562E-03	0.00000E+00	0.00000E+00
549	9.03346E-01	3.31600E+00	9.34731E-01	1.05525E-03	0.00000E+00	0.00000E+00
550	9.33257E-01	3.32150E+00	9.34728E-01	1.05333E-03	0.00000E+00	0.00000E+00
551	9.55151E-01	3.32700E+00	9.34765E-01	1.05207E-03	0.00000E+00	0.00000E+00
552	9.62472E-01	3.33267E+00	9.34816E-01	1.05136E-03	0.00000E+00	0.00000E+00
553	9.17754E-01	3.33867E+00	9.34785E-01	1.04991E-03	0.00000E+00	0.00000E+00
554	9.62690E-01	3.34417E+00	9.34835E-01	1.04922E-03	0.00000E+00	0.00000E+00
555	9.70509E-01	3.35017E+00	9.34900E-01	1.04931E-03	0.00000E+00	0.00000E+00
556	9.31637E-01	3.35567E+00	9.34894E-01	1.04743E-03	0.00000E+00	0.00000E+00
557	9.38966E-01	3.36117E+00	9.34901E-01	1.04557E-03	0.00000E+00	0.00000E+00
558	8.94553E-01	3.36650E+00	9.34829E-01	1.04620E-03	0.00000E+00	0.00000E+00
559	9.59683E-01	3.37250E+00	9.34873E-01	1.04528E-03	0.00000E+00	0.00000E+00
560	9.55931E-01	3.37783E+00	9.34911E-01	1.04408E-03	0.00000E+00	0.00000E+00
561	9.36705E-01	3.38350E+00	9.34914E-01	1.04222E-03	0.00000E+00	0.00000E+00
562	9.48877E-01	3.38900E+00	9.34939E-01	1.04066E-03	0.00000E+00	0.00000E+00
563	9.44074E-01	3.39467E+00	9.34955E-01	1.03893E-03	0.00000E+00	0.00000E+00
564	9.52832E-01	3.40017E+00	9.34987E-01	1.03756E-03	0.00000E+00	0.00000E+00
565	9.60835E-01	3.40617E+00	9.35033E-01	1.03674E-03	0.00000E+00	0.00000E+00
566	9.35335E-01	3.41217E+00	9.35034E-01	1.03490E-03	0.00000E+00	0.00000E+00
567	9.63914E-01	3.41783E+00	9.35085E-01	1.03433E-03	0.00000E+00	0.00000E+00
568	9.53970E-01	3.42333E+00	9.35118E-01	1.03304E-03	0.00000E+00	0.00000E+00
569	9.06281E-01	3.42900E+00	9.35067E-01	1.03247E-03	0.00000E+00	0.00000E+00
570	9.22099E-01	3.43533E+00	9.35045E-01	1.03090E-03	0.00000E+00	0.00000E+00
571	9.06377E-01	3.44100E+00	9.34994E-01	1.03032E-03	0.00000E+00	0.00000E+00
572	9.83947E-01	3.44700E+00	9.35080E-01	1.03209E-03	0.00000E+00	0.00000E+00
573	9.45420E-01	3.45250E+00	9.35098E-01	1.03044E-03	0.00000E+00	0.00000E+00
574	9.41058E-01	3.45817E+00	9.35109E-01	1.02869E-03	0.00000E+00	0.00000E+00
575	9.39989E-01	3.46367E+00	9.35117E-01	1.02693E-03	0.00000E+00	0.00000E+00
576	9.79164E-01	3.46917E+00	9.35194E-01	1.02801E-03	0.00000E+00	0.00000E+00
577	9.23940E-01	3.47483E+00	9.35174E-01	1.02640E-03	0.00000E+00	0.00000E+00
578	9.37162E-01	3.48067E+00	9.35178E-01	1.02462E-03	0.00000E+00	0.00000E+00
579	9.45022E-01	3.48683E+00	9.35195E-01	1.02299E-03	0.00000E+00	0.00000E+00
580	9.21351E-01	3.49233E+00	9.35171E-01	1.02150E-03	0.00000E+00	0.00000E+00
581	8.82928E-01	3.49783E+00	9.35081E-01	1.02372E-03	0.00000E+00	0.00000E+00
582	9.23453E-01	3.50383E+00	9.35061E-01	1.02215E-03	0.00000E+00	0.00000E+00
583	9.34394E-01	3.50933E+00	9.35059E-01	1.02039E-03	0.00000E+00	0.00000E+00
584	9.37208E-01	3.51483E+00	9.35063E-01	1.01864E-03	0.00000E+00	0.00000E+00
585	9.32644E-01	3.52050E+00	9.35059E-01	1.01690E-03	0.00000E+00	0.00000E+00
586	9.16179E-01	3.52600E+00	9.35027E-01	1.01567E-03	0.00000E+00	0.00000E+00
587	9.20836E-01	3.53167E+00	9.35002E-01	1.01422E-03	0.00000E+00	0.00000E+00
588	8.91003E-01	3.53767E+00	9.34927E-01	1.01527E-03	0.00000E+00	0.00000E+00
589	9.50613E-01	3.54317E+00	9.34954E-01	1.01389E-03	0.00000E+00	0.00000E+00
590	9.35810E-01	3.54867E+00	9.34955E-01	1.01217E-03	0.00000E+00	0.00000E+00
591	9.71942E-01	3.55383E+00	9.35018E-01	1.01240E-03	0.00000E+00	0.00000E+00
592	9.62073E-01	3.55950E+00	9.35064E-01	1.01172E-03	0.00000E+00	0.00000E+00
593	9.33678E-01	3.56533E+00	9.35062E-01	1.01001E-03	0.00000E+00	0.00000E+00
594	9.11594E-01	3.57067E+00	9.35022E-01	1.00908E-03	0.00000E+00	0.00000E+00
595	9.39297E-01	3.57617E+00	9.35029E-01	1.00740E-03	0.00000E+00	0.00000E+00
596	8.81036E-01	3.58167E+00	9.34938E-01	1.00981E-03	0.00000E+00	0.00000E+00
597	9.26289E-01	3.58717E+00	9.34924E-01	1.00821E-03	0.00000E+00	0.00000E+00
598	8.96337E-01	3.59267E+00	9.34859E-01	1.00860E-03	0.00000E+00	0.00000E+00
599	9.31219E-01	3.59800E+00	9.34853E-01	1.00693E-03	0.00000E+00	0.00000E+00
600	9.61993E-01	3.60350E+00	9.34898E-01	1.00626E-03	0.00000E+00	0.00000E+00
601	9.53881E-01	3.60883E+00	9.34930E-01	1.00508E-03	0.00000E+00	0.00000E+00
602	9.68814E-01	3.61417E+00	9.34987E-01	1.00499E-03	0.00000E+00	0.00000E+00
603	9.01433E-01	3.61967E+00	9.34931E-01	1.00487E-03	0.00000E+00	0.00000E+00
604	9.04730E-01	3.62550E+00	9.34881E-01	1.00446E-03	0.00000E+00	0.00000E+00
605	9.83642E-01	3.63083E+00	9.34961E-01	1.00604E-03	0.00000E+00	0.00000E+00
606	9.18976E-01	3.63667E+00	9.34935E-01	1.00473E-03	0.00000E+00	0.00000E+00
607	9.38796E-01	3.64183E+00	9.34941E-01	1.00308E-03	0.00000E+00	0.00000E+00
608	9.61075E-01	3.64750E+00	9.34984E-01	1.00236E-03	0.00000E+00	0.00000E+00
609	9.16941E-01	3.65300E+00	9.34955E-01	1.00114E-03	0.00000E+00	0.00000E+00
610	9.13119E-01	3.65850E+00	9.34919E-01	1.00014E-03	0.00000E+00	0.00000E+00
611	9.45635E-01	3.66367E+00	9.34936E-01	9.98653E-04	0.00000E+00	0.00000E+00
612	9.42661E-01	3.66917E+00	9.34949E-01	9.97095E-04	0.00000E+00	0.00000E+00
613	9.54491E-01	3.67483E+00	9.34981E-01	9.95975E-04	0.00000E+00	0.00000E+00
614	9.21455E-01	3.68033E+00	9.34959E-01	9.94592E-04	0.00000E+00	0.00000E+00
615	9.22969E-01	3.68550E+00	9.34939E-01	9.93161E-04	0.00000E+00	0.00000E+00
616	9.44438E-01	3.69083E+00	9.34955E-01	9.91662E-04	0.00000E+00	0.00000E+00
617	9.31860E-01	3.69633E+00	9.34950E-01	9.90061E-04	0.00000E+00	0.00000E+00

618	9.36495E-01	3.70167E+00	9.34952E-01	9.88456E-04	0.00000E+00	0.00000E+00
619	9.43209E-01	3.70717E+00	9.34966E-01	9.86943E-04	0.00000E+00	0.00000E+00
620	9.41430E-01	3.71267E+00	9.34976E-01	9.85401E-04	0.00000E+00	0.00000E+00
621	9.18151E-01	3.71833E+00	9.34949E-01	9.84183E-04	0.00000E+00	0.00000E+00
622	9.05113E-01	3.72383E+00	9.34901E-01	9.83772E-04	0.00000E+00	0.00000E+00
623	9.01247E-01	3.72933E+00	9.34847E-01	9.83680E-04	0.00000E+00	0.00000E+00
624	9.26997E-01	3.73500E+00	9.34834E-01	9.82179E-04	0.00000E+00	0.00000E+00
625	9.43216E-01	3.74050E+00	9.34848E-01	9.80693E-04	0.00000E+00	0.00000E+00
626	8.89116E-01	3.74633E+00	9.34774E-01	9.81859E-04	0.00000E+00	0.00000E+00
627	9.39662E-01	3.75150E+00	9.34782E-01	9.80318E-04	0.00000E+00	0.00000E+00
628	9.55999E-01	3.75717E+00	9.34816E-01	9.79338E-04	0.00000E+00	0.00000E+00
629	9.50601E-01	3.76233E+00	9.34841E-01	9.78099E-04	0.00000E+00	0.00000E+00
630	9.28727E-01	3.76817E+00	9.34831E-01	9.76588E-04	0.00000E+00	0.00000E+00
631	8.75956E-01	3.77367E+00	9.34738E-01	9.79517E-04	0.00000E+00	0.00000E+00
632	9.48331E-01	3.77933E+00	9.34759E-01	9.78199E-04	0.00000E+00	0.00000E+00
633	9.25797E-01	3.78483E+00	9.34745E-01	9.76751E-04	0.00000E+00	0.00000E+00
634	9.26372E-01	3.79083E+00	9.34732E-01	9.75294E-04	0.00000E+00	0.00000E+00
635	9.46624E-01	3.79633E+00	9.34751E-01	9.73933E-04	0.00000E+00	0.00000E+00
636	9.41017E-01	3.80167E+00	9.34761E-01	9.72446E-04	0.00000E+00	0.00000E+00
637	8.97206E-01	3.80717E+00	9.34701E-01	9.72713E-04	0.00000E+00	0.00000E+00
638	9.27245E-01	3.81267E+00	9.34690E-01	9.71253E-04	0.00000E+00	0.00000E+00
639	9.19052E-01	3.81833E+00	9.34665E-01	9.70038E-04	0.00000E+00	0.00000E+00
640	9.41344E-01	3.82383E+00	9.34676E-01	9.68573E-04	0.00000E+00	0.00000E+00
641	9.27491E-01	3.82900E+00	9.34664E-01	9.67121E-04	0.00000E+00	0.00000E+00
642	9.69171E-01	3.83450E+00	9.34718E-01	9.67113E-04	0.00000E+00	0.00000E+00
643	9.20064E-01	3.84000E+00	9.34695E-01	9.65874E-04	0.00000E+00	0.00000E+00
644	9.62818E-01	3.84567E+00	9.34739E-01	9.65363E-04	0.00000E+00	0.00000E+00
645	8.87844E-01	3.85117E+00	9.34666E-01	9.66615E-04	0.00000E+00	0.00000E+00
646	9.08072E-01	3.85667E+00	9.34625E-01	9.65996E-04	0.00000E+00	0.00000E+00
647	9.13064E-01	3.86217E+00	9.34592E-01	9.65077E-04	0.00000E+00	0.00000E+00
648	9.54451E-01	3.86767E+00	9.34622E-01	9.64072E-04	0.00000E+00	0.00000E+00
649	9.03072E-01	3.87300E+00	9.34574E-01	9.63815E-04	0.00000E+00	0.00000E+00
650	9.05130E-01	3.87900E+00	9.34528E-01	9.63399E-04	0.00000E+00	0.00000E+00
651	9.01900E-01	3.88500E+00	9.34478E-01	9.63226E-04	0.00000E+00	0.00000E+00
652	9.14188E-01	3.89050E+00	9.34447E-01	9.62249E-04	0.00000E+00	0.00000E+00
653	9.10201E-01	3.89600E+00	9.34409E-01	9.61492E-04	0.00000E+00	0.00000E+00
654	9.74913E-01	3.90150E+00	9.34472E-01	9.62024E-04	0.00000E+00	0.00000E+00
655	9.48340E-01	3.90700E+00	9.34493E-01	9.60784E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 992 independent fission points were generated

656	9.07582E-01	3.91233E+00	9.34452E-01	9.60196E-04	0.00000E+00	0.00000E+00
657	9.09385E-01	3.91783E+00	9.34413E-01	9.59492E-04	0.00000E+00	0.00000E+00
658	8.92750E-01	3.92333E+00	9.34350E-01	9.60132E-04	0.00000E+00	0.00000E+00
659	9.34536E-01	3.92883E+00	9.34350E-01	9.58669E-04	0.00000E+00	0.00000E+00
660	9.58268E-01	3.93433E+00	9.34387E-01	9.57901E-04	0.00000E+00	0.00000E+00
661	9.52905E-01	3.94050E+00	9.34415E-01	9.56859E-04	0.00000E+00	0.00000E+00
662	8.60474E-01	3.94683E+00	9.34303E-01	9.61954E-04	0.00000E+00	0.00000E+00
663	9.73976E-01	3.95300E+00	9.34363E-01	9.62371E-04	0.00000E+00	0.00000E+00
664	8.83204E-01	3.95933E+00	9.34285E-01	9.64019E-04	0.00000E+00	0.00000E+00
665	9.15605E-01	3.96500E+00	9.34257E-01	9.62976E-04	0.00000E+00	0.00000E+00
666	9.41684E-01	3.97067E+00	9.34268E-01	9.61590E-04	0.00000E+00	0.00000E+00
667	9.77124E-01	3.97617E+00	9.34333E-01	9.62303E-04	0.00000E+00	0.00000E+00
668	8.98969E-01	3.98200E+00	9.34280E-01	9.62323E-04	0.00000E+00	0.00000E+00
669	9.52314E-01	3.98783E+00	9.34307E-01	9.61259E-04	0.00000E+00	0.00000E+00
670	8.95483E-01	3.99967E+00	9.34249E-01	9.61577E-04	0.00000E+00	0.00000E+00
671	9.10682E-01	4.01283E+00	9.34213E-01	9.60785E-04	0.00000E+00	0.00000E+00
672	8.99969E-01	4.01917E+00	9.34162E-01	9.60710E-04	0.00000E+00	0.00000E+00
673	9.51055E-01	4.02467E+00	9.34187E-01	9.59608E-04	0.00000E+00	0.00000E+00
674	9.16328E-01	4.03067E+00	9.34161E-01	9.58547E-04	0.00000E+00	0.00000E+00
675	9.38051E-01	4.03617E+00	9.34167E-01	9.57139E-04	0.00000E+00	0.00000E+00
676	8.99529E-01	4.04200E+00	9.34115E-01	9.57099E-04	0.00000E+00	0.00000E+00
677	9.05623E-01	4.04800E+00	9.34073E-01	9.56612E-04	0.00000E+00	0.00000E+00
678	9.41051E-01	4.05400E+00	9.34083E-01	9.55251E-04	0.00000E+00	0.00000E+00
679	9.51223E-01	4.05983E+00	9.34109E-01	9.54175E-04	0.00000E+00	0.00000E+00
680	9.49872E-01	4.06550E+00	9.34132E-01	9.53051E-04	0.00000E+00	0.00000E+00
681	9.30823E-01	4.07117E+00	9.34127E-01	9.51658E-04	0.00000E+00	0.00000E+00
682	9.14772E-01	4.07717E+00	9.34099E-01	9.50684E-04	0.00000E+00	0.00000E+00
683	9.75268E-01	4.08300E+00	9.34159E-01	9.51210E-04	0.00000E+00	0.00000E+00
684	9.15348E-01	4.08867E+00	9.34131E-01	9.50215E-04	0.00000E+00	0.00000E+00
685	9.47758E-01	4.09567E+00	9.34151E-01	9.49032E-04	0.00000E+00	0.00000E+00
686	9.03497E-01	4.10400E+00	9.34107E-01	9.48703E-04	0.00000E+00	0.00000E+00
687	9.39202E-01	4.10983E+00	9.34114E-01	9.47346E-04	0.00000E+00	0.00000E+00
688	9.51553E-01	4.11583E+00	9.34139E-01	9.46306E-04	0.00000E+00	0.00000E+00
689	9.63014E-01	4.12117E+00	9.34181E-01	9.45861E-04	0.00000E+00	0.00000E+00
690	9.60632E-01	4.12650E+00	9.34220E-01	9.45268E-04	0.00000E+00	0.00000E+00
691	9.31476E-01	4.13250E+00	9.34216E-01	9.43903E-04	0.00000E+00	0.00000E+00
692	9.24746E-01	4.13817E+00	9.34202E-01	9.42634E-04	0.00000E+00	0.00000E+00
693	9.45477E-01	4.14383E+00	9.34219E-01	9.41410E-04	0.00000E+00	0.00000E+00
694	9.14909E-01	4.14967E+00	9.34191E-01	9.40463E-04	0.00000E+00	0.00000E+00
695	9.59319E-01	4.15533E+00	9.34227E-01	9.39805E-04	0.00000E+00	0.00000E+00
696	9.44808E-01	4.16117E+00	9.34242E-01	9.38574E-04	0.00000E+00	0.00000E+00
697	9.21975E-01	4.16700E+00	9.34224E-01	9.37388E-04	0.00000E+00	0.00000E+00
698	9.64133E-01	4.17250E+00	9.34267E-01	9.37026E-04	0.00000E+00	0.00000E+00
699	8.95893E-01	4.17850E+00	9.34212E-01	9.37299E-04	0.00000E+00	0.00000E+00
700	9.59847E-01	4.18433E+00	9.34249E-01	9.36676E-04	0.00000E+00	0.00000E+00
701	9.41052E-01	4.18967E+00	9.34259E-01	9.35385E-04	0.00000E+00	0.00000E+00
702	9.14976E-01	4.19567E+00	9.34231E-01	9.34454E-04	0.00000E+00	0.00000E+00
703	9.80780E-01	4.20117E+00	9.34298E-01	9.35480E-04	0.00000E+00	0.00000E+00
704	9.39423E-01	4.20667E+00	9.34305E-01	9.34175E-04	0.00000E+00	0.00000E+00
705	9.56020E-01	4.21350E+00	9.34336E-01	9.33357E-04	0.00000E+00	0.00000E+00
706	9.47806E-01	4.21867E+00	9.34355E-01	9.32226E-04	0.00000E+00	0.00000E+00
707	8.86388E-01	4.22433E+00	9.34287E-01	9.33386E-04	0.00000E+00	0.00000E+00
708	9.04305E-01	4.23017E+00	9.34245E-01	9.33030E-04	0.00000E+00	0.00000E+00
709	9.43946E-01	4.23550E+00	9.34258E-01	9.31810E-04	0.00000E+00	0.00000E+00
710	9.07721E-01	4.24183E+00	9.34221E-01	9.31248E-04	0.00000E+00	0.00000E+00
711	8.91254E-01	4.24750E+00	9.34160E-01	9.31906E-04	0.00000E+00	0.00000E+00
712	9.19083E-01	4.25350E+00	9.34139E-01	9.30835E-04	0.00000E+00	0.00000E+00
713	9.28805E-01	4.25933E+00	9.34131E-01	9.29555E-04	0.00000E+00	0.00000E+00
714	9.18095E-01	4.26550E+00	9.34109E-01	9.28522E-04	0.00000E+00	0.00000E+00
715	9.40420E-01	4.27067E+00	9.34118E-01	9.27261E-04	0.00000E+00	0.00000E+00
716	9.70705E-01	4.27617E+00	9.34169E-01	9.27378E-04	0.00000E+00	0.00000E+00
717	9.77710E-01	4.28133E+00	9.34230E-01	9.28080E-04	0.00000E+00	0.00000E+00
718	9.18495E-01	4.28717E+00	9.34208E-01	9.27044E-04	0.00000E+00	0.00000E+00
719	9.67412E-01	4.29267E+00	9.34254E-01	9.26907E-04	0.00000E+00	0.00000E+00
720	9.35794E-01	4.29800E+00	9.34256E-01	9.25618E-04	0.00000E+00	0.00000E+00
721	9.50335E-01	4.30383E+00	9.34279E-01	9.24600E-04	0.00000E+00	0.00000E+00

722	9.18003E-01	4.30950E+00	9.34256E-01	9.23592E-04	0.00000E+00	0.00000E+00
723	9.06643E-01	4.31500E+00	9.34218E-01	9.23105E-04	0.00000E+00	0.00000E+00
724	9.46409E-01	4.32050E+00	9.34235E-01	9.21980E-04	0.00000E+00	0.00000E+00
725	9.19805E-01	4.32650E+00	9.34215E-01	9.20920E-04	0.00000E+00	0.00000E+00
726	9.74763E-01	4.33183E+00	9.34271E-01	9.21351E-04	0.00000E+00	0.00000E+00
727	9.20843E-01	4.33733E+00	9.34252E-01	9.20266E-04	0.00000E+00	0.00000E+00
728	9.91389E-01	4.34283E+00	9.34331E-01	9.22361E-04	0.00000E+00	0.00000E+00
729	9.80416E-01	4.34833E+00	9.34394E-01	9.23270E-04	0.00000E+00	0.00000E+00
730	9.31054E-01	4.35383E+00	9.34390E-01	9.22012E-04	0.00000E+00	0.00000E+00
731	9.08628E-01	4.35933E+00	9.34354E-01	9.21425E-04	0.00000E+00	0.00000E+00
732	9.57389E-01	4.36467E+00	9.34386E-01	9.20702E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 988 independent fission points were generated

733	8.97919E-01	4.37017E+00	9.34336E-01	9.20794E-04	0.00000E+00	0.00000E+00
734	9.27347E-01	4.37533E+00	9.34327E-01	9.19585E-04	0.00000E+00	0.00000E+00
735	8.92033E-01	4.38117E+00	9.34269E-01	9.20141E-04	0.00000E+00	0.00000E+00
736	9.51966E-01	4.38667E+00	9.34293E-01	9.19203E-04	0.00000E+00	0.00000E+00
737	9.34404E-01	4.39200E+00	9.34293E-01	9.17951E-04	0.00000E+00	0.00000E+00
738	9.49886E-01	4.39750E+00	9.34314E-01	9.16948E-04	0.00000E+00	0.00000E+00
739	9.36805E-01	4.40350E+00	9.34318E-01	9.15709E-04	0.00000E+00	0.00000E+00
740	9.49723E-01	4.40900E+00	9.34339E-01	9.14706E-04	0.00000E+00	0.00000E+00
741	9.22462E-01	4.41500E+00	9.34322E-01	9.13608E-04	0.00000E+00	0.00000E+00
742	9.65195E-01	4.42117E+00	9.34364E-01	9.13326E-04	0.00000E+00	0.00000E+00
743	9.43602E-01	4.42717E+00	9.34377E-01	9.12178E-04	0.00000E+00	0.00000E+00
744	9.52130E-01	4.43317E+00	9.34401E-01	9.11262E-04	0.00000E+00	0.00000E+00
745	9.09412E-01	4.43917E+00	9.34367E-01	9.10656E-04	0.00000E+00	0.00000E+00
746	9.45665E-01	4.44500E+00	9.34382E-01	9.09558E-04	0.00000E+00	0.00000E+00
747	9.15674E-01	4.45100E+00	9.34357E-01	9.08683E-04	0.00000E+00	0.00000E+00
748	9.25953E-01	4.45683E+00	9.34346E-01	9.07534E-04	0.00000E+00	0.00000E+00
749	9.25286E-01	4.46283E+00	9.34334E-01	9.06400E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 999 independent fission points were generated

750	8.72394E-01	4.46917E+00	9.34251E-01	9.08967E-04	0.00000E+00	0.00000E+00
751	9.17861E-01	4.47567E+00	9.34229E-01	9.08016E-04	0.00000E+00	0.00000E+00
752	9.57613E-01	4.48217E+00	9.34260E-01	9.07341E-04	0.00000E+00	0.00000E+00
753	9.80782E-01	4.48850E+00	9.34322E-01	9.08247E-04	0.00000E+00	0.00000E+00
754	9.38896E-01	4.49467E+00	9.34328E-01	9.07058E-04	0.00000E+00	0.00000E+00
755	8.90129E-01	4.50150E+00	9.34269E-01	9.07753E-04	0.00000E+00	0.00000E+00
756	9.46097E-01	4.50817E+00	9.34285E-01	9.06684E-04	0.00000E+00	0.00000E+00
757	9.56300E-01	4.51600E+00	9.34314E-01	9.05951E-04	0.00000E+00	0.00000E+00
758	9.81916E-01	4.52200E+00	9.34377E-01	9.06941E-04	0.00000E+00	0.00000E+00
759	9.54697E-01	4.52767E+00	9.34404E-01	9.06140E-04	0.00000E+00	0.00000E+00
760	9.26146E-01	4.53367E+00	9.34393E-01	9.05009E-04	0.00000E+00	0.00000E+00
761	9.25651E-01	4.53917E+00	9.34382E-01	9.03889E-04	0.00000E+00	0.00000E+00
762	9.19680E-01	4.54517E+00	9.34362E-01	9.02906E-04	0.00000E+00	0.00000E+00
763	9.61488E-01	4.55117E+00	9.34398E-01	9.02423E-04	0.00000E+00	0.00000E+00
764	9.46064E-01	4.55717E+00	9.34413E-01	9.01368E-04	0.00000E+00	0.00000E+00
765	9.74158E-01	4.56267E+00	9.34465E-01	9.01692E-04	0.00000E+00	0.00000E+00
766	8.94544E-01	4.56817E+00	9.34413E-01	9.02026E-04	0.00000E+00	0.00000E+00
767	9.41766E-01	4.57383E+00	9.34423E-01	9.00897E-04	0.00000E+00	0.00000E+00
768	9.47066E-01	4.57950E+00	9.34439E-01	8.99872E-04	0.00000E+00	0.00000E+00
769	9.69361E-01	4.58533E+00	9.34485E-01	8.99850E-04	0.00000E+00	0.00000E+00
770	9.45358E-01	4.59083E+00	9.34499E-01	8.98789E-04	0.00000E+00	0.00000E+00
771	9.57868E-01	4.59617E+00	9.34529E-01	8.98134E-04	0.00000E+00	0.00000E+00
772	9.26125E-01	4.60217E+00	9.34518E-01	8.97033E-04	0.00000E+00	0.00000E+00
773	9.69567E-01	4.60750E+00	9.34564E-01	8.97022E-04	0.00000E+00	0.00000E+00
774	9.46459E-01	4.61367E+00	9.34579E-01	8.95991E-04	0.00000E+00	0.00000E+00
775	8.78218E-01	4.61967E+00	9.34506E-01	8.97797E-04	0.00000E+00	0.00000E+00
776	9.37993E-01	4.62533E+00	9.34511E-01	8.96648E-04	0.00000E+00	0.00000E+00
777	9.72815E-01	4.63133E+00	9.34560E-01	8.96853E-04	0.00000E+00	0.00000E+00
778	8.91865E-01	4.63683E+00	9.34505E-01	8.97385E-04	0.00000E+00	0.00000E+00
779	9.24947E-01	4.64250E+00	9.34493E-01	8.96313E-04	0.00000E+00	0.00000E+00
780	9.54163E-01	4.64833E+00	9.34518E-01	8.95518E-04	0.00000E+00	0.00000E+00
781	9.51120E-01	4.65383E+00	9.34540E-01	8.94621E-04	0.00000E+00	0.00000E+00
782	9.14615E-01	4.66000E+00	9.34514E-01	8.93839E-04	0.00000E+00	0.00000E+00
783	9.59586E-01	4.66550E+00	9.34546E-01	8.93270E-04	0.00000E+00	0.00000E+00
784	9.02385E-01	4.67150E+00	9.34505E-01	8.93075E-04	0.00000E+00	0.00000E+00
785	9.34296E-01	4.67717E+00	9.34505E-01	8.91934E-04	0.00000E+00	0.00000E+00
786	9.54630E-01	4.68267E+00	9.34530E-01	8.91165E-04	0.00000E+00	0.00000E+00
787	9.25200E-01	4.68817E+00	9.34519E-01	8.90108E-04	0.00000E+00	0.00000E+00
788	9.83384E-01	4.69383E+00	9.34581E-01	8.91146E-04	0.00000E+00	0.00000E+00
789	9.78883E-01	4.69917E+00	9.34637E-01	8.91792E-04	0.00000E+00	0.00000E+00
790	9.34895E-01	4.70433E+00	9.34637E-01	8.90659E-04	0.00000E+00	0.00000E+00
791	8.90882E-01	4.70983E+00	9.34582E-01	8.91257E-04	0.00000E+00	0.00000E+00
792	9.49091E-01	4.71550E+00	9.34600E-01	8.90317E-04	0.00000E+00	0.00000E+00
793	8.96206E-01	4.72100E+00	9.34552E-01	8.90515E-04	0.00000E+00	0.00000E+00
794	9.25613E-01	4.72667E+00	9.34540E-01	8.89461E-04	0.00000E+00	0.00000E+00
795	9.60264E-01	4.73217E+00	9.34573E-01	8.88931E-04	0.00000E+00	0.00000E+00
796	9.19146E-01	4.73767E+00	9.34553E-01	8.88024E-04	0.00000E+00	0.00000E+00
797	8.89238E-01	4.74333E+00	9.34496E-01	8.88736E-04	0.00000E+00	0.00000E+00
798	9.25230E-01	4.74883E+00	9.34485E-01	8.87695E-04	0.00000E+00	0.00000E+00
799	9.27893E-01	4.75450E+00	9.34476E-01	8.86619E-04	0.00000E+00	0.00000E+00
800	9.20004E-01	4.76000E+00	9.34458E-01	8.85693E-04	0.00000E+00	0.00000E+00
801	9.29634E-01	4.76550E+00	9.34452E-01	8.84604E-04	0.00000E+00	0.00000E+00
802	9.40710E-01	4.77067E+00	9.34460E-01	8.83532E-04	0.00000E+00	0.00000E+00
803	9.38470E-01	4.77617E+00	9.34465E-01	8.82443E-04	0.00000E+00	0.00000E+00
804	9.32395E-01	4.78167E+00	9.34463E-01	8.81346E-04	0.00000E+00	0.00000E+00
805	9.07163E-01	4.78717E+00	9.34429E-01	8.80904E-04	0.00000E+00	0.00000E+00
806	8.93422E-01	4.79317E+00	9.34378E-01	8.81284E-04	0.00000E+00	0.00000E+00
807	9.52961E-01	4.79883E+00	9.34401E-01	8.80492E-04	0.00000E+00	0.00000E+00
808	9.44716E-01	4.80483E+00	9.34413E-01	8.79492E-04	0.00000E+00	0.00000E+00
809	9.08028E-01	4.81083E+00	9.34381E-01	8.79009E-04	0.00000E+00	0.00000E+00
810	9.47660E-01	4.81650E+00	9.34397E-01	8.78075E-04	0.00000E+00	0.00000E+00
811	9.02192E-01	4.82233E+00	9.34357E-01	8.77892E-04	0.00000E+00	0.00000E+00
812	9.18943E-01	4.82833E+00	9.34338E-01	8.77014E-04	0.00000E+00	0.00000E+00
813	9.16866E-01	4.83417E+00	9.34317E-01	8.76197E-04	0.00000E+00	0.00000E+00
814	9.43300E-01	4.83967E+00	9.34328E-01	8.75187E-04	0.00000E+00	0.00000E+00
815	9.10415E-01	4.84550E+00	9.34298E-01	8.74604E-04	0.00000E+00	0.00000E+00
816	9.13276E-01	4.85117E+00	9.34273E-01	8.73911E-04	0.00000E+00	0.00000E+00
817	9.54133E-01	4.85683E+00	9.34297E-01	8.73178E-04	0.00000E+00	0.00000E+00
818	9.76643E-01	4.86317E+00	9.34349E-01	8.73650E-04	0.00000E+00	0.00000E+00
819	9.07991E-01	4.86917E+00	9.34317E-01	8.73176E-04	0.00000E+00	0.00000E+00
820	9.67793E-01	4.87483E+00	9.34358E-01	8.73068E-04	0.00000E+00	0.00000E+00
821	9.08385E-01	4.88083E+00	9.34326E-01	8.72578E-04	0.00000E+00	0.00000E+00
822	9.23141E-01	4.88733E+00	9.34312E-01	8.71620E-04	0.00000E+00	0.00000E+00
823	9.33851E-01	4.89567E+00	9.34312E-01	8.70557E-04	0.00000E+00	0.00000E+00
824	9.52091E-01	4.90200E+00	9.34333E-01	8.69767E-04	0.00000E+00	0.00000E+00

825	9.20034E-01	4.90817E+00	9.34316E-01	8.68883E-04	0.00000E+00	0.00000E+00
826	9.07838E-01	4.91417E+00	9.34284E-01	8.68423E-04	0.00000E+00	0.00000E+00
827	9.32264E-01	4.92017E+00	9.34281E-01	8.67373E-04	0.00000E+00	0.00000E+00
828	9.46828E-01	4.92583E+00	9.34296E-01	8.66455E-04	0.00000E+00	0.00000E+00
829	9.36946E-01	4.93217E+00	9.34300E-01	8.65413E-04	0.00000E+00	0.00000E+00
830	9.38099E-01	4.93817E+00	9.34304E-01	8.64379E-04	0.00000E+00	0.00000E+00
831	9.58688E-01	4.94433E+00	9.34334E-01	8.63837E-04	0.00000E+00	0.00000E+00
832	8.72662E-01	4.95067E+00	9.34259E-01	8.65989E-04	0.00000E+00	0.00000E+00
833	9.05577E-01	4.95667E+00	9.34225E-01	8.65635E-04	0.00000E+00	0.00000E+00
834	9.06555E-01	4.96233E+00	9.34192E-01	8.65233E-04	0.00000E+00	0.00000E+00
835	9.23943E-01	4.96817E+00	9.34179E-01	8.64281E-04	0.00000E+00	0.00000E+00
836	9.41279E-01	4.97350E+00	9.34188E-01	8.63286E-04	0.00000E+00	0.00000E+00
837	9.29107E-01	4.97933E+00	9.34182E-01	8.62273E-04	0.00000E+00	0.00000E+00
838	9.57130E-01	4.98500E+00	9.34209E-01	8.61678E-04	0.00000E+00	0.00000E+00
839	9.33304E-01	4.99067E+00	9.34208E-01	8.60649E-04	0.00000E+00	0.00000E+00
840	9.59477E-01	4.99650E+00	9.34238E-01	8.60150E-04	0.00000E+00	0.00000E+00
841	9.05098E-01	5.00200E+00	9.34204E-01	8.59826E-04	0.00000E+00	0.00000E+00
842	9.39716E-01	5.00767E+00	9.34210E-01	8.58827E-04	0.00000E+00	0.00000E+00
843	9.12185E-01	5.01317E+00	9.34184E-01	8.58205E-04	0.00000E+00	0.00000E+00
844	9.22296E-01	5.01833E+00	9.34170E-01	8.57301E-04	0.00000E+00	0.00000E+00
845	9.06309E-01	5.02483E+00	9.34137E-01	8.56921E-04	0.00000E+00	0.00000E+00
846	9.04639E-01	5.03117E+00	9.34102E-01	8.56619E-04	0.00000E+00	0.00000E+00
847	9.79455E-01	5.03733E+00	9.34155E-01	8.57286E-04	0.00000E+00	0.00000E+00
848	9.01863E-01	5.04317E+00	9.34117E-01	8.57122E-04	0.00000E+00	0.00000E+00
849	9.73931E-01	5.04933E+00	9.34164E-01	8.57399E-04	0.00000E+00	0.00000E+00
850	8.99597E-01	5.05567E+00	9.34124E-01	8.57357E-04	0.00000E+00	0.00000E+00
851	9.49599E-01	5.06133E+00	9.34142E-01	8.56541E-04	0.00000E+00	0.00000E+00
852	9.38285E-01	5.06733E+00	9.34147E-01	8.55546E-04	0.00000E+00	0.00000E+00
853	9.25044E-01	5.07283E+00	9.34136E-01	8.54607E-04	0.00000E+00	0.00000E+00
854	9.38072E-01	5.07883E+00	9.34141E-01	8.53616E-04	0.00000E+00	0.00000E+00
855	9.28626E-01	5.08483E+00	9.34134E-01	8.52639E-04	0.00000E+00	0.00000E+00
856	9.13382E-01	5.09067E+00	9.34110E-01	8.51987E-04	0.00000E+00	0.00000E+00
857	9.17828E-01	5.09667E+00	9.34091E-01	8.51203E-04	0.00000E+00	0.00000E+00
858	9.90623E-01	5.10217E+00	9.34157E-01	8.52769E-04	0.00000E+00	0.00000E+00
859	9.27057E-01	5.10817E+00	9.34149E-01	8.51814E-04	0.00000E+00	0.00000E+00
860	9.18378E-01	5.11450E+00	9.34130E-01	8.51019E-04	0.00000E+00	0.00000E+00
861	8.94962E-01	5.12017E+00	9.34085E-01	8.51250E-04	0.00000E+00	0.00000E+00
862	9.55982E-01	5.12583E+00	9.34110E-01	8.50641E-04	0.00000E+00	0.00000E+00
863	9.12820E-01	5.13183E+00	9.34085E-01	8.50012E-04	0.00000E+00	0.00000E+00
864	9.18688E-01	5.13767E+00	9.34067E-01	8.49213E-04	0.00000E+00	0.00000E+00
865	9.85492E-01	5.14333E+00	9.34127E-01	8.50319E-04	0.00000E+00	0.00000E+00
866	8.80758E-01	5.14900E+00	9.34065E-01	8.51577E-04	0.00000E+00	0.00000E+00
867	9.51878E-01	5.15483E+00	9.34086E-01	8.50842E-04	0.00000E+00	0.00000E+00
868	9.34501E-01	5.16100E+00	9.34086E-01	8.49859E-04	0.00000E+00	0.00000E+00
869	9.26587E-01	5.16650E+00	9.34078E-01	8.48922E-04	0.00000E+00	0.00000E+00
870	8.93299E-01	5.17200E+00	9.34031E-01	8.49244E-04	0.00000E+00	0.00000E+00
871	9.25807E-01	5.17767E+00	9.34021E-01	8.48319E-04	0.00000E+00	0.00000E+00
872	9.65555E-01	5.18317E+00	9.34057E-01	8.48118E-04	0.00000E+00	0.00000E+00
873	9.06586E-01	5.18900E+00	9.34026E-01	8.47731E-04	0.00000E+00	0.00000E+00
874	9.38891E-01	5.19433E+00	9.34031E-01	8.46776E-04	0.00000E+00	0.00000E+00
875	9.36058E-01	5.19983E+00	9.34034E-01	8.45809E-04	0.00000E+00	0.00000E+00
876	9.03433E-01	5.20500E+00	9.33999E-01	8.45566E-04	0.00000E+00	0.00000E+00
877	9.51435E-01	5.21083E+00	9.34019E-01	8.44834E-04	0.00000E+00	0.00000E+00
878	9.03951E-01	5.21650E+00	9.33984E-01	8.44567E-04	0.00000E+00	0.00000E+00
879	8.91489E-01	5.22200E+00	9.33936E-01	8.44994E-04	0.00000E+00	0.00000E+00
880	9.25115E-01	5.22750E+00	9.33926E-01	8.44090E-04	0.00000E+00	0.00000E+00
881	9.11517E-01	5.23267E+00	9.33900E-01	8.43515E-04	0.00000E+00	0.00000E+00
882	9.31093E-01	5.23817E+00	9.33897E-01	8.42562E-04	0.00000E+00	0.00000E+00
883	8.94315E-01	5.24367E+00	9.33852E-01	8.42803E-04	0.00000E+00	0.00000E+00
884	8.84516E-01	5.24933E+00	9.33796E-01	8.43704E-04	0.00000E+00	0.00000E+00
885	9.27498E-01	5.25450E+00	9.33789E-01	8.42778E-04	0.00000E+00	0.00000E+00
886	9.23542E-01	5.26033E+00	9.33778E-01	8.41904E-04	0.00000E+00	0.00000E+00
887	9.18938E-01	5.26567E+00	9.33761E-01	8.41119E-04	0.00000E+00	0.00000E+00
888	9.12842E-01	5.27117E+00	9.33737E-01	8.40501E-04	0.00000E+00	0.00000E+00
889	9.68477E-01	5.27667E+00	9.33776E-01	8.40466E-04	0.00000E+00	0.00000E+00
890	9.48450E-01	5.28217E+00	9.33793E-01	8.39681E-04	0.00000E+00	0.00000E+00
891	9.49771E-01	5.28733E+00	9.33811E-01	8.38929E-04	0.00000E+00	0.00000E+00
892	9.09405E-01	5.29300E+00	9.33783E-01	8.38434E-04	0.00000E+00	0.00000E+00
893	9.03526E-01	5.29850E+00	9.33750E-01	8.38181E-04	0.00000E+00	0.00000E+00
894	9.04218E-01	5.30433E+00	9.33716E-01	8.37895E-04	0.00000E+00	0.00000E+00
895	9.16141E-01	5.31000E+00	9.33697E-01	8.37187E-04	0.00000E+00	0.00000E+00
896	9.67609E-01	5.31550E+00	9.33735E-01	8.37110E-04	0.00000E+00	0.00000E+00
897	9.14143E-01	5.32067E+00	9.33713E-01	8.36461E-04	0.00000E+00	0.00000E+00
898	9.47750E-01	5.32617E+00	9.33728E-01	8.35674E-04	0.00000E+00	0.00000E+00
899	9.65641E-01	5.33167E+00	9.33764E-01	8.35500E-04	0.00000E+00	0.00000E+00
900	9.02391E-01	5.33717E+00	9.33729E-01	8.35300E-04	0.00000E+00	0.00000E+00
901	8.96111E-01	5.34250E+00	9.33687E-01	8.35418E-04	0.00000E+00	0.00000E+00
902	9.09323E-01	5.34850E+00	9.33660E-01	8.34929E-04	0.00000E+00	0.00000E+00
903	9.44641E-01	5.35400E+00	9.33672E-01	8.34091E-04	0.00000E+00	0.00000E+00
904	8.83423E-01	5.35967E+00	9.33617E-01	8.35026E-04	0.00000E+00	0.00000E+00
905	9.41739E-01	5.36550E+00	9.33626E-01	8.34149E-04	0.00000E+00	0.00000E+00
906	9.56106E-01	5.37067E+00	9.33651E-01	8.33597E-04	0.00000E+00	0.00000E+00
907	9.94847E-01	5.37617E+00	9.33718E-01	8.35416E-04	0.00000E+00	0.00000E+00
908	9.80642E-01	5.38167E+00	9.33770E-01	8.36099E-04	0.00000E+00	0.00000E+00
909	9.46717E-01	5.38683E+00	9.33784E-01	8.35299E-04	0.00000E+00	0.00000E+00
910	9.65296E-01	5.39250E+00	9.33819E-01	8.35100E-04	0.00000E+00	0.00000E+00
911	9.40050E-01	5.39783E+00	9.33826E-01	8.34209E-04	0.00000E+00	0.00000E+00
912	9.35717E-01	5.40317E+00	9.33828E-01	8.33294E-04	0.00000E+00	0.00000E+00
913	9.20750E-01	5.40867E+00	9.33813E-01	8.32503E-04	0.00000E+00	0.00000E+00
914	9.12108E-01	5.41450E+00	9.33790E-01	8.31930E-04	0.00000E+00	0.00000E+00
915	9.29444E-01	5.41983E+00	9.33785E-01	8.31032E-04	0.00000E+00	0.00000E+00
916	9.38446E-01	5.42533E+00	9.33790E-01	8.30138E-04	0.00000E+00	0.00000E+00
917	9.40213E-01	5.43083E+00	9.33797E-01	8.29260E-04	0.00000E+00	0.00000E+00
918	9.05168E-01	5.43650E+00	9.33766E-01	8.28944E-04	0.00000E+00	0.00000E+00
919	9.14310E-01	5.44200E+00	9.33745E-01	8.28311E-04	0.00000E+00	0.00000E+00
920	9.51155E-01	5.44750E+00	9.33764E-01	8.27625E-04	0.00000E+00	0.00000E+00
921	9.18425E-01	5.45300E+00	9.33747E-01	8.26893E-04	0.00000E+00	0.00000E+00
922	9.23922E-01	5.45817E+00	9.33736E-01	8.26063E-04	0.00000E+00	0.00000E+00
923	9.08869E-01	5.46383E+00	9.33709E-01	8.25607E-04	0.00000E+00	0.00000E+00
924	9.29491E-01	5.46933E+00	9.33705E-01	8.24724E-04	0.00000E+00	0.00000E+00
925	9.22551E-01	5.47517E+00	9.33693E-01	8.23918E-04	0.00000E+00	0.00000E+00
926	9.45672E-01	5.48033E+00	9.33705E-01	8.23128E-04	0.00000E+00	0.00000E+00
927	8.97043E-01	5.48583E+00	9.33666E-01	8.23193E-04	0.00000E+00	0.00000E+00
928	9.74634E-01	5.49100E+00	9.33710E-01	8.23492E-04	0.00000E+00	0.00000E+00
929	8.95414E-01	5.49650E+00	9.33669E-01	8.23640E-04	0.00000E+00	0.00000E+00

930	8.99297E-01	5.50217E+00	9.33632E-01	8.23585E-04	0.00000E+00	0.00000E+00
931	9.29137E-01	5.50767E+00	9.33627E-01	8.22713E-04	0.00000E+00	0.00000E+00
932	9.31795E-01	5.51333E+00	9.33625E-01	8.21830E-04	0.00000E+00	0.00000E+00
933	9.14817E-01	5.51883E+00	9.33605E-01	8.21195E-04	0.00000E+00	0.00000E+00
934	9.63478E-01	5.52433E+00	9.33637E-01	8.20940E-04	0.00000E+00	0.00000E+00
935	9.20826E-01	5.53033E+00	9.33623E-01	8.20174E-04	0.00000E+00	0.00000E+00
936	8.95807E-01	5.53600E+00	9.33583E-01	8.20295E-04	0.00000E+00	0.00000E+00
937	9.09676E-01	5.54150E+00	9.33557E-01	8.19816E-04	0.00000E+00	0.00000E+00
938	9.42177E-01	5.54667E+00	9.33566E-01	8.18992E-04	0.00000E+00	0.00000E+00
939	9.31655E-01	5.55317E+00	9.33564E-01	8.18120E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 993 independent fission points were generated

940	8.91043E-01	5.55900E+00	9.33519E-01	8.18504E-04	0.00000E+00	0.00000E+00
941	9.58298E-01	5.56517E+00	9.33545E-01	8.18057E-04	0.00000E+00	0.00000E+00
942	9.19888E-01	5.57150E+00	9.33531E-01	8.17316E-04	0.00000E+00	0.00000E+00
943	8.98788E-01	5.57717E+00	9.33494E-01	8.17281E-04	0.00000E+00	0.00000E+00
944	9.29608E-01	5.58350E+00	9.33490E-01	8.16423E-04	0.00000E+00	0.00000E+00
945	9.25573E-01	5.58917E+00	9.33481E-01	8.15600E-04	0.00000E+00	0.00000E+00
946	8.99641E-01	5.59483E+00	9.33445E-01	8.15524E-04	0.00000E+00	0.00000E+00
947	8.81197E-01	5.60067E+00	9.33390E-01	8.16535E-04	0.00000E+00	0.00000E+00
948	9.28177E-01	5.60617E+00	9.33385E-01	8.15690E-04	0.00000E+00	0.00000E+00
949	9.26366E-01	5.61183E+00	9.33377E-01	8.14862E-04	0.00000E+00	0.00000E+00
950	9.37321E-01	5.61800E+00	9.33381E-01	8.14012E-04	0.00000E+00	0.00000E+00
951	9.11864E-01	5.62450E+00	9.33359E-01	8.13470E-04	0.00000E+00	0.00000E+00
952	9.25600E-01	5.63117E+00	9.33351E-01	8.12654E-04	0.00000E+00	0.00000E+00
953	9.09958E-01	5.63767E+00	9.33326E-01	8.12172E-04	0.00000E+00	0.00000E+00
954	9.60474E-01	5.64367E+00	9.33354E-01	8.11819E-04	0.00000E+00	0.00000E+00
955	9.29105E-01	5.64983E+00	9.33350E-01	8.10979E-04	0.00000E+00	0.00000E+00
956	9.23324E-01	5.65867E+00	9.33339E-01	8.10197E-04	0.00000E+00	0.00000E+00
957	9.44886E-01	5.66467E+00	9.33352E-01	8.09438E-04	0.00000E+00	0.00000E+00
958	9.03223E-01	5.67117E+00	9.33320E-01	8.09205E-04	0.00000E+00	0.00000E+00
959	9.27647E-01	5.67700E+00	9.33314E-01	8.08381E-04	0.00000E+00	0.00000E+00
960	8.91959E-01	5.68267E+00	9.33271E-01	8.08690E-04	0.00000E+00	0.00000E+00
961	9.33220E-01	5.68833E+00	9.33271E-01	8.07846E-04	0.00000E+00	0.00000E+00
962	9.48362E-01	5.69417E+00	9.33287E-01	8.07157E-04	0.00000E+00	0.00000E+00
963	9.10317E-01	5.69950E+00	9.33263E-01	8.06671E-04	0.00000E+00	0.00000E+00
964	9.55859E-01	5.70483E+00	9.33286E-01	8.06174E-04	0.00000E+00	0.00000E+00
965	8.98665E-01	5.71083E+00	9.33250E-01	8.06139E-04	0.00000E+00	0.00000E+00
966	9.03459E-01	5.71683E+00	9.33219E-01	8.05895E-04	0.00000E+00	0.00000E+00
967	9.03299E-01	5.72283E+00	9.33188E-01	8.05656E-04	0.00000E+00	0.00000E+00
968	9.10681E-01	5.72867E+00	9.33165E-01	8.05159E-04	0.00000E+00	0.00000E+00
969	9.76327E-01	5.73450E+00	9.33210E-01	8.05563E-04	0.00000E+00	0.00000E+00
970	9.22921E-01	5.74017E+00	9.33199E-01	8.04801E-04	0.00000E+00	0.00000E+00
971	9.24129E-01	5.74567E+00	9.33190E-01	8.04024E-04	0.00000E+00	0.00000E+00
972	9.40113E-01	5.75167E+00	9.33197E-01	8.03227E-04	0.00000E+00	0.00000E+00
973	9.39251E-01	5.75733E+00	9.33203E-01	8.02423E-04	0.00000E+00	0.00000E+00
974	9.59135E-01	5.76333E+00	9.33230E-01	8.02041E-04	0.00000E+00	0.00000E+00
975	9.42085E-01	5.76933E+00	9.33239E-01	8.01268E-04	0.00000E+00	0.00000E+00
976	9.90811E-01	5.77517E+00	9.33298E-01	8.02625E-04	0.00000E+00	0.00000E+00
977	9.09445E-01	5.78050E+00	9.33273E-01	8.02174E-04	0.00000E+00	0.00000E+00
978	9.31854E-01	5.78633E+00	9.33272E-01	8.01353E-04	0.00000E+00	0.00000E+00
979	9.24780E-01	5.79200E+00	9.33263E-01	8.00580E-04	0.00000E+00	0.00000E+00
980	9.04488E-01	5.79750E+00	9.33234E-01	8.00302E-04	0.00000E+00	0.00000E+00
981	9.53976E-01	5.80267E+00	9.33255E-01	7.99764E-04	0.00000E+00	0.00000E+00
982	9.33127E-01	5.80817E+00	9.33255E-01	7.98948E-04	0.00000E+00	0.00000E+00
983	9.39578E-01	5.81383E+00	9.33261E-01	7.98159E-04	0.00000E+00	0.00000E+00
984	8.67424E-01	5.81967E+00	9.33194E-01	8.00160E-04	0.00000E+00	0.00000E+00
985	9.45320E-01	5.82517E+00	9.33207E-01	7.99440E-04	0.00000E+00	0.00000E+00
986	9.81636E-01	5.83050E+00	9.33256E-01	8.00143E-04	0.00000E+00	0.00000E+00
987	9.40884E-01	5.83600E+00	9.33264E-01	7.99367E-04	0.00000E+00	0.00000E+00
988	8.78574E-01	5.84183E+00	9.33208E-01	8.00480E-04	0.00000E+00	0.00000E+00
989	9.11736E-01	5.84717E+00	9.33186E-01	7.99965E-04	0.00000E+00	0.00000E+00
990	9.34821E-01	5.85250E+00	9.33188E-01	7.99156E-04	0.00000E+00	0.00000E+00
991	9.62762E-01	5.85783E+00	9.33218E-01	7.98908E-04	0.00000E+00	0.00000E+00
992	9.26687E-01	5.86333E+00	9.33211E-01	7.98128E-04	0.00000E+00	0.00000E+00
993	9.60548E-01	5.86917E+00	9.33239E-01	7.97799E-04	0.00000E+00	0.00000E+00
994	9.28518E-01	5.87483E+00	9.33234E-01	7.97008E-04	0.00000E+00	0.00000E+00
995	9.45570E-01	5.88050E+00	9.33247E-01	7.96302E-04	0.00000E+00	0.00000E+00
996	9.22547E-01	5.88600E+00	9.33236E-01	7.95574E-04	0.00000E+00	0.00000E+00
997	9.95222E-01	5.89117E+00	9.33298E-01	7.97211E-04	0.00000E+00	0.00000E+00
998	9.68919E-01	5.89667E+00	9.33334E-01	7.97213E-04	0.00000E+00	0.00000E+00
999	9.37984E-01	5.90217E+00	9.33339E-01	7.96427E-04	0.00000E+00	0.00000E+00
1000	9.03687E-01	5.90767E+00	9.33309E-01	7.96183E-04	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

lifetime = 7.70217E-05 + or - 1.06801E-07 generation time = 4.34325E-05 + or - 5.60498E-08
nu bar = 2.89148E+00 + or - 2.92120E-06 average fission group = 2.17743E+02 + or - 3.89759E-03
energy(ev) of the average lethargy causing fission = 5.13098E-02 + or - 2.95090E-05

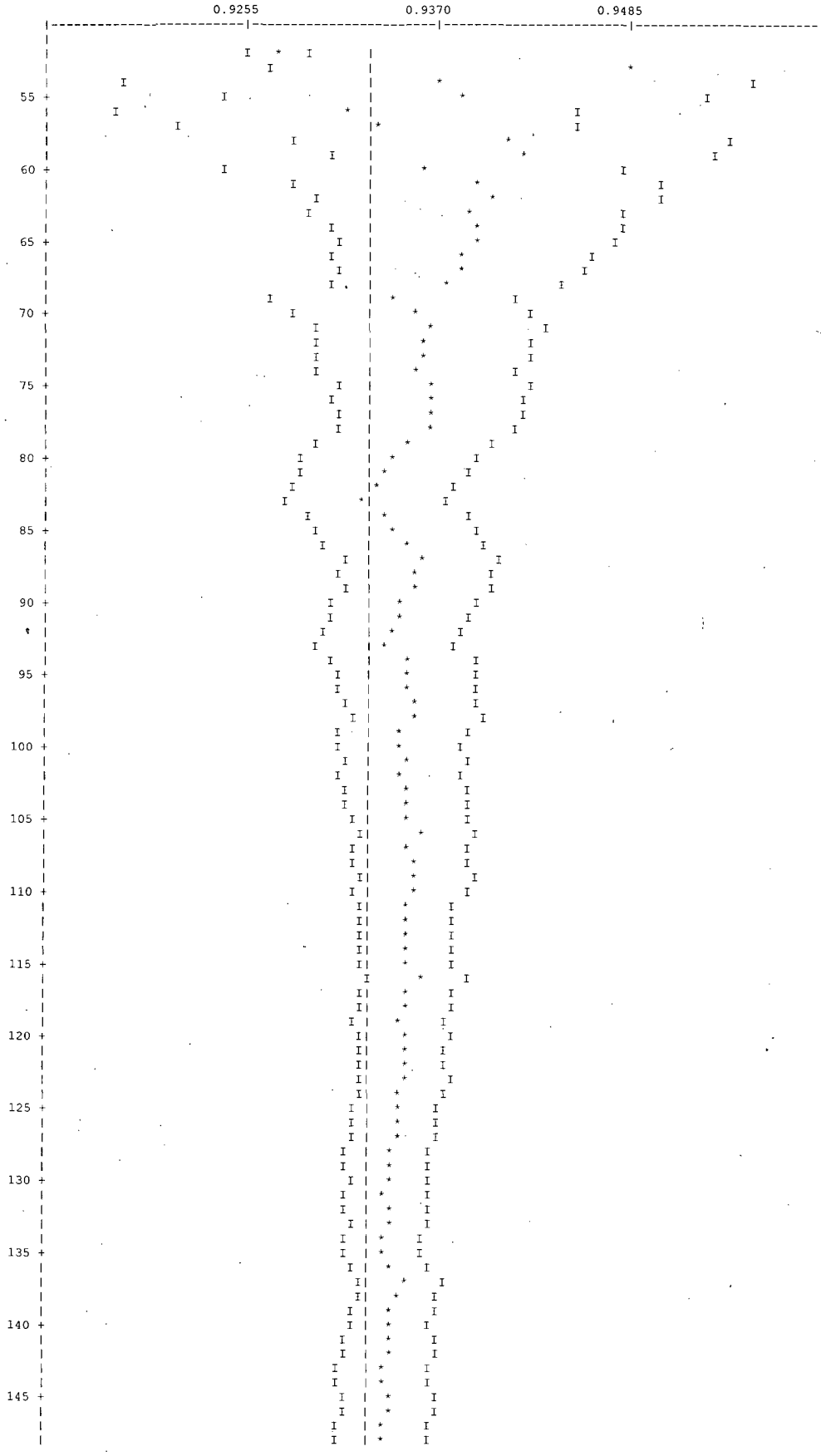
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
50	0.93318	+ or - 0.00088	0.93230 to 0.93405	0.93142 to 0.93493	0.93055 to 0.93580	950000
51	0.93318	+ or - 0.00085	0.93233 to 0.93404	0.93148 to 0.93489	0.93062 to 0.93574	949000
52	0.93319	+ or - 0.00089	0.93230 to 0.93408	0.93141 to 0.93496	0.93052 to 0.93585	948000
53	0.93313	+ or - 0.00089	0.93224 to 0.93402	0.93135 to 0.93491	0.93046 to 0.93580	947000
54	0.93316	+ or - 0.00087	0.93228 to 0.93403	0.93141 to 0.93491	0.93053 to 0.93578	946000
55	0.93315	+ or - 0.00091	0.93224 to 0.93406	0.93133 to 0.93497	0.93041 to 0.93588	945000
56	0.93318	+ or - 0.00092	0.93226 to 0.93410	0.93134 to 0.93502	0.93042 to 0.93594	944000
57	0.93317	+ or - 0.00092	0.93225 to 0.93409	0.93134 to 0.93501	0.93042 to 0.93593	943000
58	0.93310	+ or - 0.00091	0.93219 to 0.93402	0.93128 to 0.93493	0.93036 to 0.93584	942000
59	0.93309	+ or - 0.00090	0.93219 to 0.93399	0.93129 to 0.93489	0.93039 to 0.93579	941000
81	0.93315	+ or - 0.00091	0.93224 to 0.93405	0.93134 to 0.93496	0.93043 to 0.93586	919000
103	0.93304	+ or - 0.00093	0.93210 to 0.93397	0.93117 to 0.93491	0.93023 to 0.93584	897000
125	0.93304	+ or - 0.00101	0.93203 to 0.93406	0.93102 to 0.93507	0.93001 to 0.93608	875000
147	0.93308	+ or - 0.00100	0.93208 to 0.93408	0.93108 to 0.93508	0.93008 to 0.93608	853000
169	0.93307	+ or - 0.00098	0.93208 to 0.93405	0.93110 to 0.93503	0.93012 to 0.93602	831000
191	0.93323	+ or - 0.00097	0.93226 to 0.93420	0.93129 to 0.93517	0.93032 to 0.93614	809000
213	0.93311	+ or - 0.00105	0.93206 to 0.93416	0.93101 to 0.93521	0.92997 to 0.93626	787000
235	0.93281	+ or - 0.00104	0.93177 to 0.93385	0.93073 to 0.93489	0.92968 to 0.93593	765000
257	0.93292	+ or - 0.00112	0.93179 to 0.93404	0.93067 to 0.93516	0.92955 to 0.93628	743000
279	0.93255	+ or - 0.00098	0.93157 to 0.93353	0.93059 to 0.93450	0.92961 to 0.93548	721000
301	0.93256	+ or - 0.00107	0.93149 to 0.93364	0.93041 to 0.93471	0.92934 to 0.93579	699000
323	0.93235	+ or - 0.00105	0.93130 to 0.93340	0.93025 to 0.93444	0.92920 to 0.93549	677000
345	0.93231	+ or - 0.00114	0.93117 to 0.93346	0.93003 to 0.93460	0.92889 to 0.93574	655000
367	0.93236	+ or - 0.00109	0.93127 to 0.93346	0.93018 to 0.93455	0.92908 to 0.93564	633000
389	0.93255	+ or - 0.00116	0.93139 to 0.93371	0.93024 to 0.93487	0.92908 to 0.93602	611000
411	0.93270	+ or - 0.00123	0.93147 to 0.93394	0.93024 to 0.93517	0.92901 to 0.93640	589000

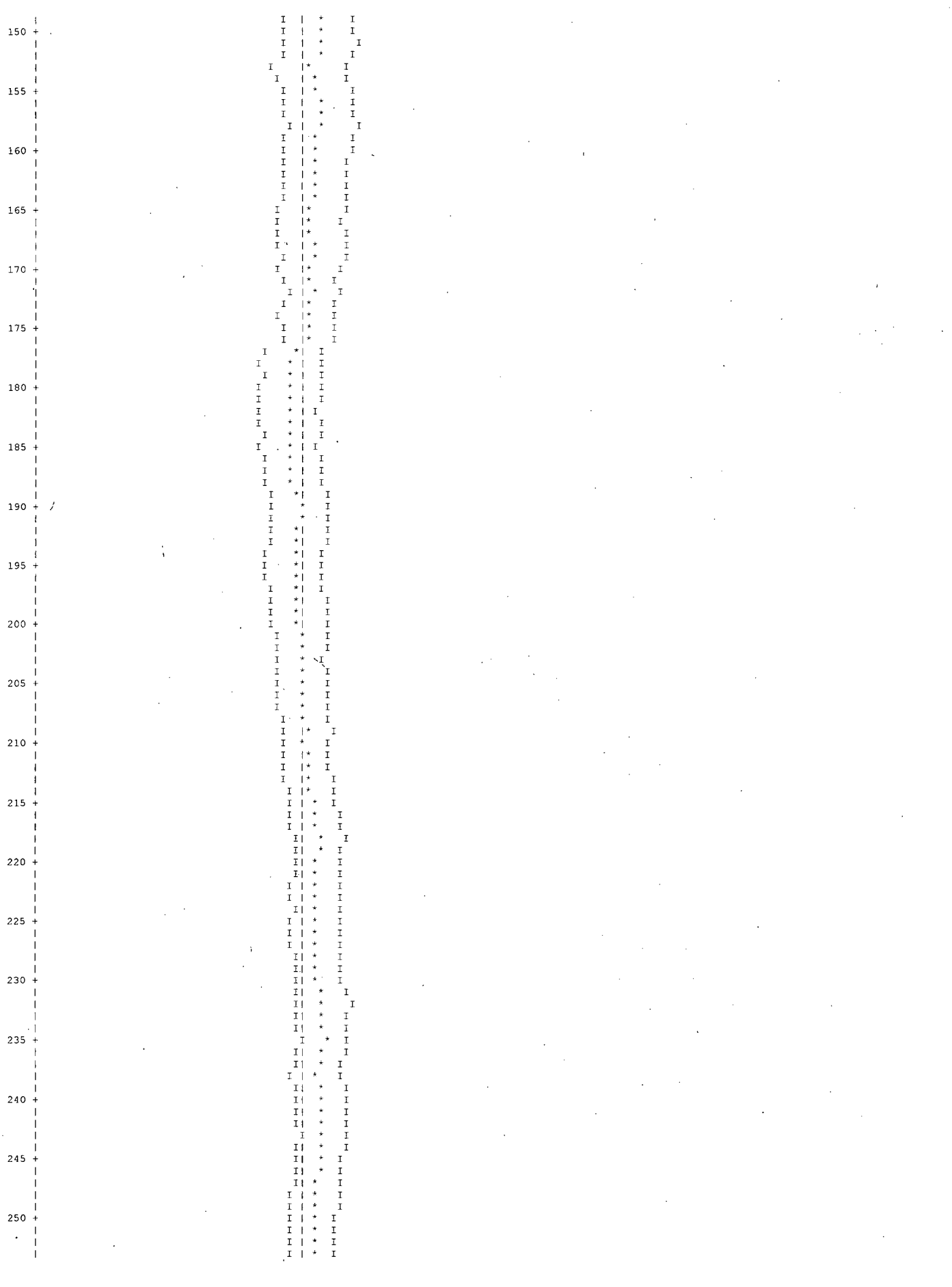
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

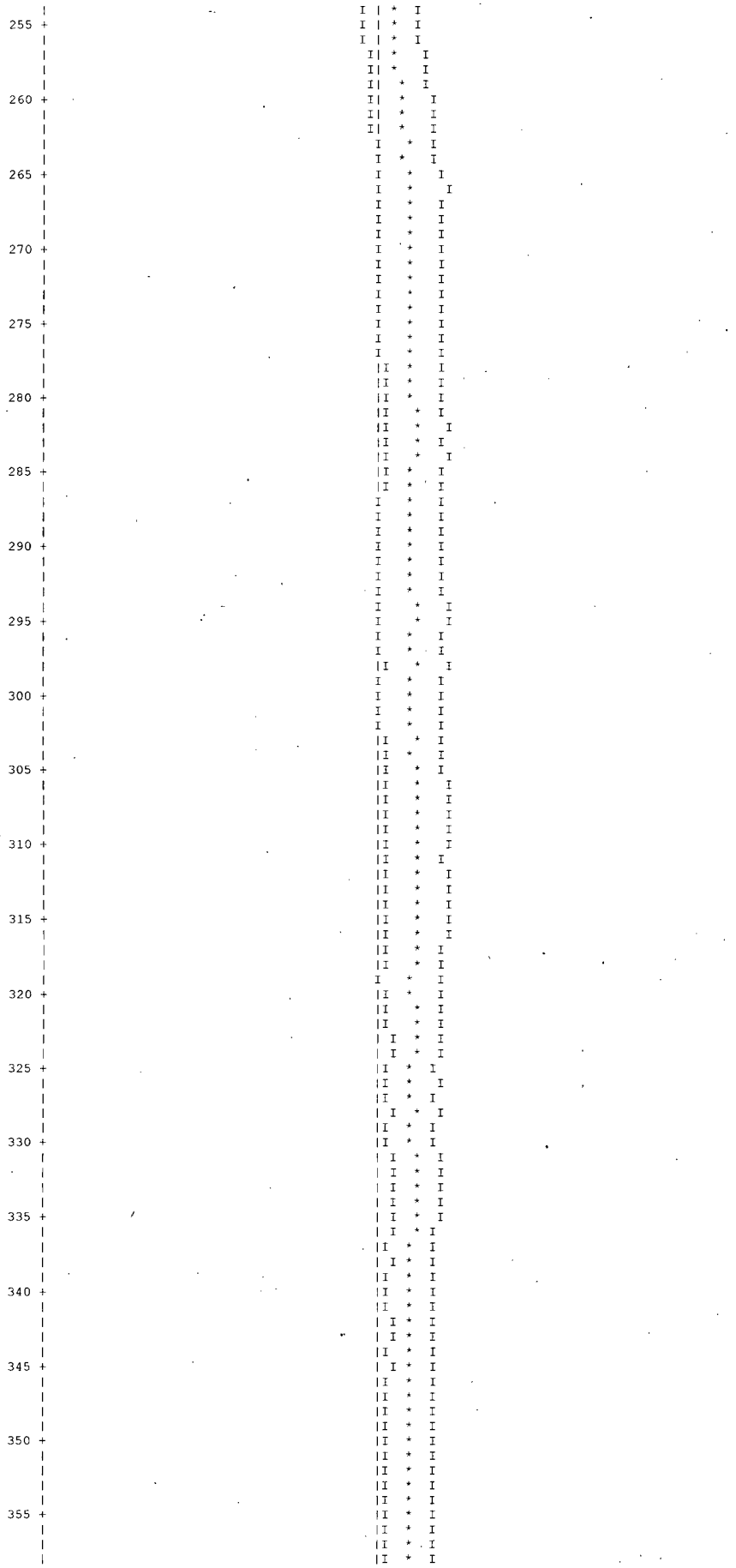
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
433	0.93252	+ or - 0.00119	0.93133 to 0.93372	0.93013 to 0.93491	0.92894 to 0.93611	567000
455	0.93235	+ or - 0.00126	0.93109 to 0.93361	0.92982 to 0.93488	0.92856 to 0.93614	545000
477	0.93235	+ or - 0.00132	0.93103 to 0.93368	0.92970 to 0.93500	0.92838 to 0.93633	523000
499	0.93197	+ or - 0.00131	0.93066 to 0.93328	0.92934 to 0.93459	0.92803 to 0.93590	501000
521	0.93177	+ or - 0.00130	0.93047 to 0.93307	0.92917 to 0.93437	0.92787 to 0.93567	479000
543	0.93175	+ or - 0.00154	0.93021 to 0.93329	0.92867 to 0.93483	0.92713 to 0.93637	457000
565	0.93108	+ or - 0.00138	0.92970 to 0.93245	0.92832 to 0.93383	0.92695 to 0.93521	435000
587	0.93091	+ or - 0.00138	0.92954 to 0.93229	0.92816 to 0.93366	0.92678 to 0.93504	413000
609	0.93075	+ or - 0.00144	0.92931 to 0.93220	0.92787 to 0.93364	0.92642 to 0.93509	391000
631	0.93087	+ or - 0.00157	0.92930 to 0.93244	0.92773 to 0.93401	0.92616 to 0.93558	369000
653	0.93124	+ or - 0.00160	0.92965 to 0.93284	0.92805 to 0.93444	0.92645 to 0.93603	347000
675	0.93153	+ or - 0.00187	0.92966 to 0.93341	0.92779 to 0.93528	0.92592 to 0.93715	325000
697	0.93121	+ or - 0.00186	0.92935 to 0.93307	0.92749 to 0.93493	0.92563 to 0.93679	303000
719	0.93090	+ or - 0.00183	0.92907 to 0.93272	0.92725 to 0.93455	0.92542 to 0.93637	281000
741	0.93042	+ or - 0.00189	0.92853 to 0.93230	0.92665 to 0.93419	0.92476 to 0.93607	259000
763	0.92981	+ or - 0.00186	0.92796 to 0.93167	0.92610 to 0.93352	0.92424 to 0.93538	237000
785	0.92895	+ or - 0.00187	0.92708 to 0.93082	0.92522 to 0.93269	0.92335 to 0.93456	215000
807	0.92876	+ or - 0.00203	0.92672 to 0.93079	0.92469 to 0.93282	0.92266 to 0.93485	193000
829	0.92852	+ or - 0.00226	0.92625 to 0.93078	0.92399 to 0.93304	0.92173 to 0.93531	171000
851	0.92856	+ or - 0.00251	0.92605 to 0.93108	0.92354 to 0.93359	0.92102 to 0.93610	149000
873	0.92839	+ or - 0.00306	0.92533 to 0.93145	0.92228 to 0.93451	0.91922 to 0.93756	127000
895	0.93001	+ or - 0.00365	0.92636 to 0.93366	0.92272 to 0.93731	0.91907 to 0.94095	105000
917	0.92793	+ or - 0.00427	0.92366 to 0.93220	0.91939 to 0.93646	0.91512 to 0.94073	83000
939	0.92939	+ or - 0.00525	0.92414 to 0.93464	0.91889 to 0.93989	0.91364 to 0.94514	61000
961	0.93424	+ or - 0.00599	0.92825 to 0.94023	0.92226 to 0.94622	0.91627 to 0.95221	39000
983	0.93605	+ or - 0.03236	0.90369 to 0.96841	0.87132 to 1.00077	0.83896 to 1.03314	17000

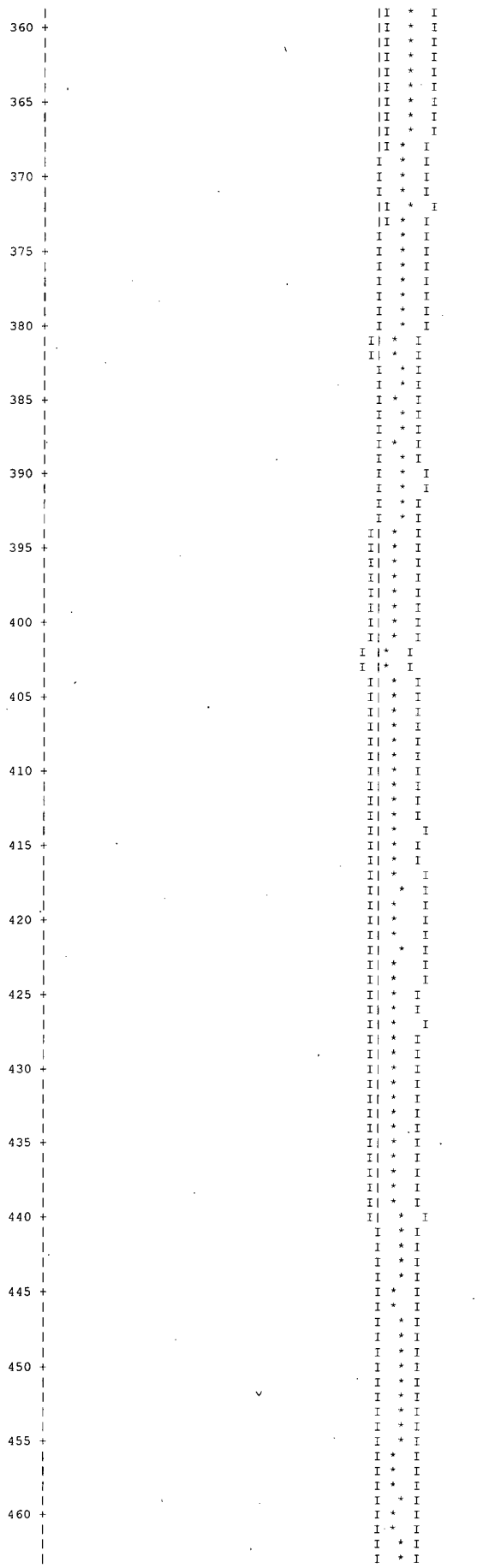
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

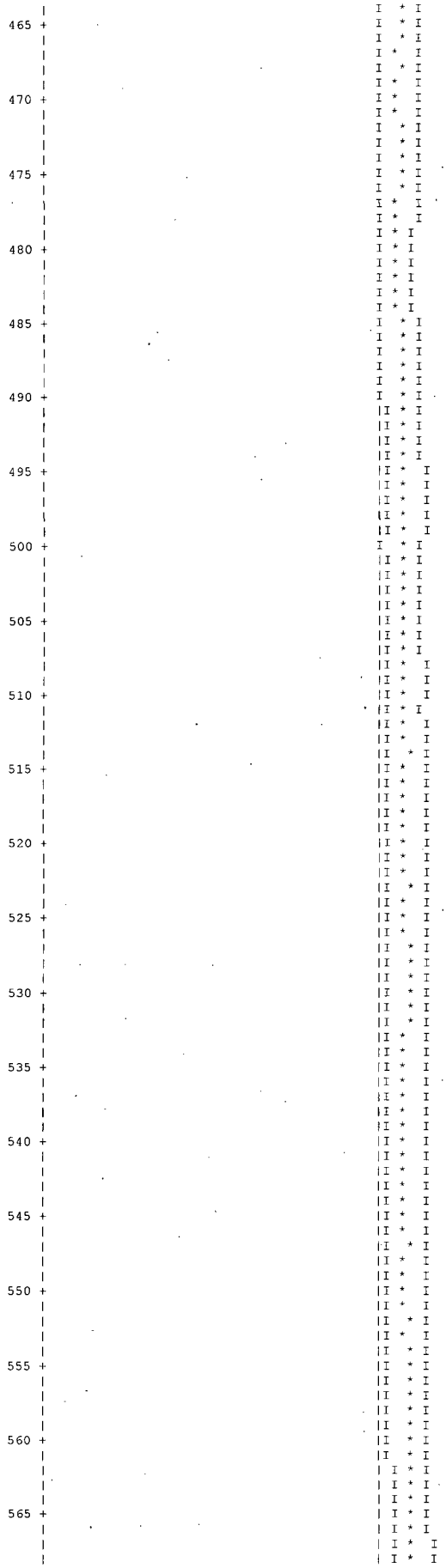
plot of average k-effective by generation run.
the line represents k-eff = 0.9331 + or - 0.0009 which occurs for 996 generations run.

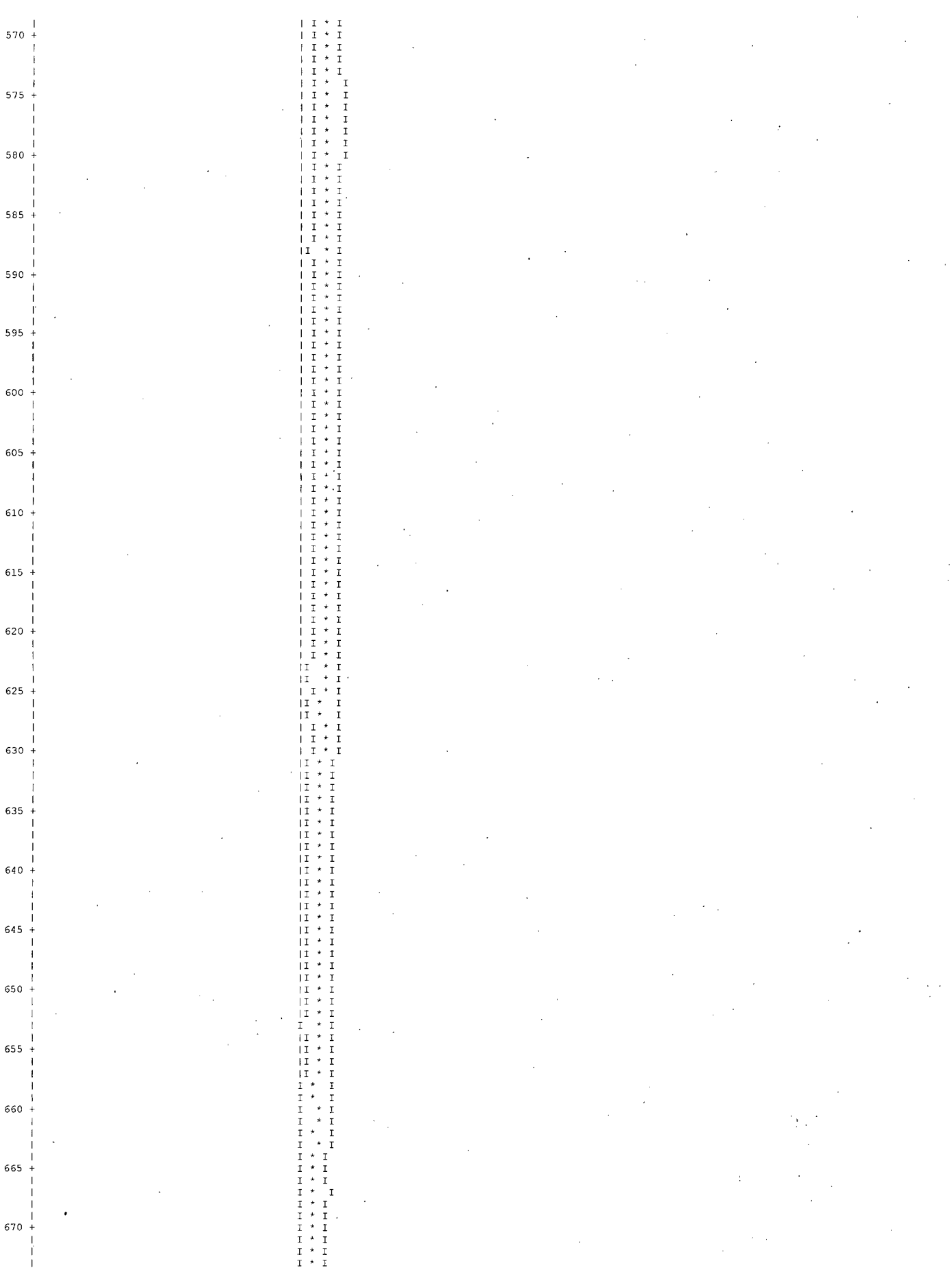


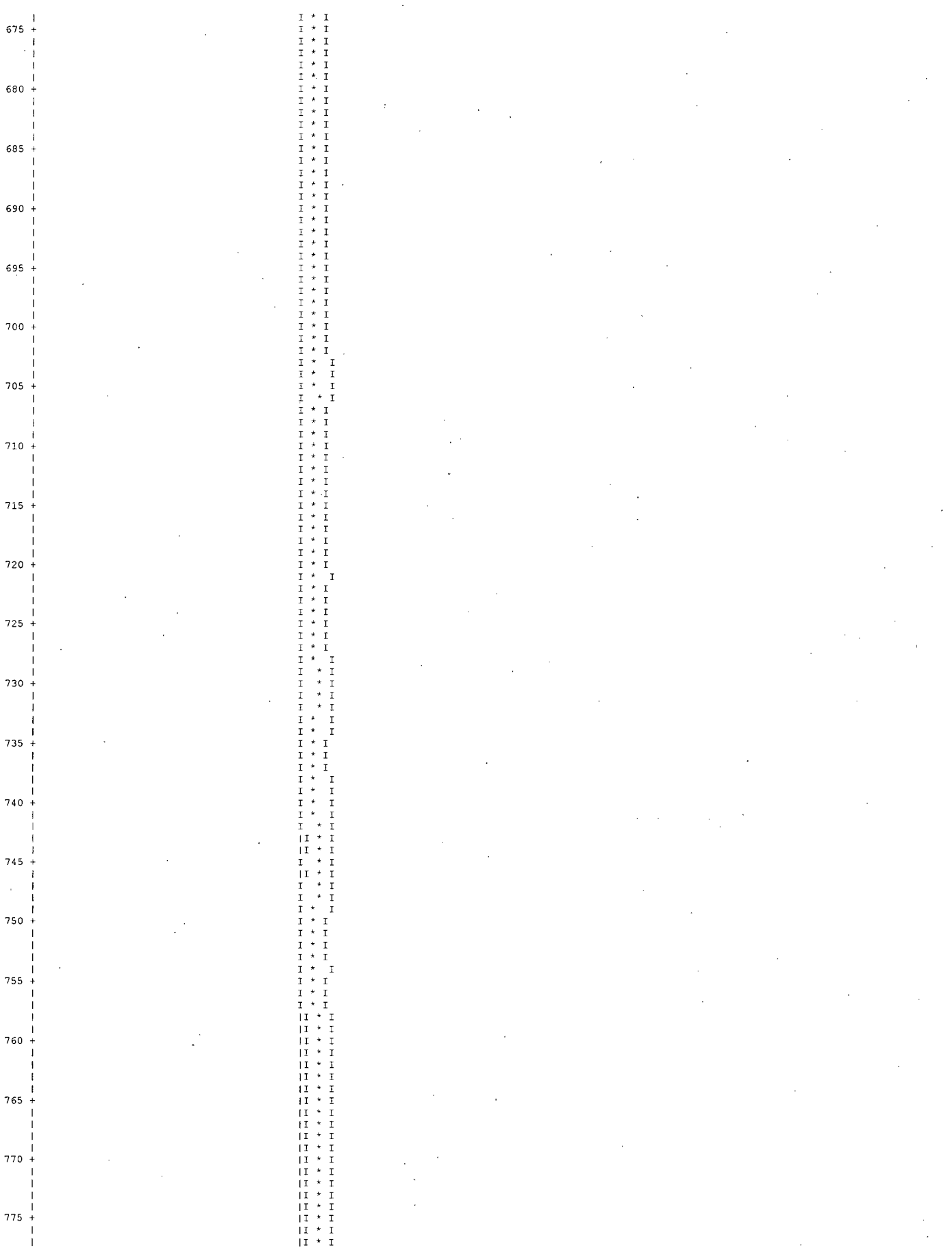


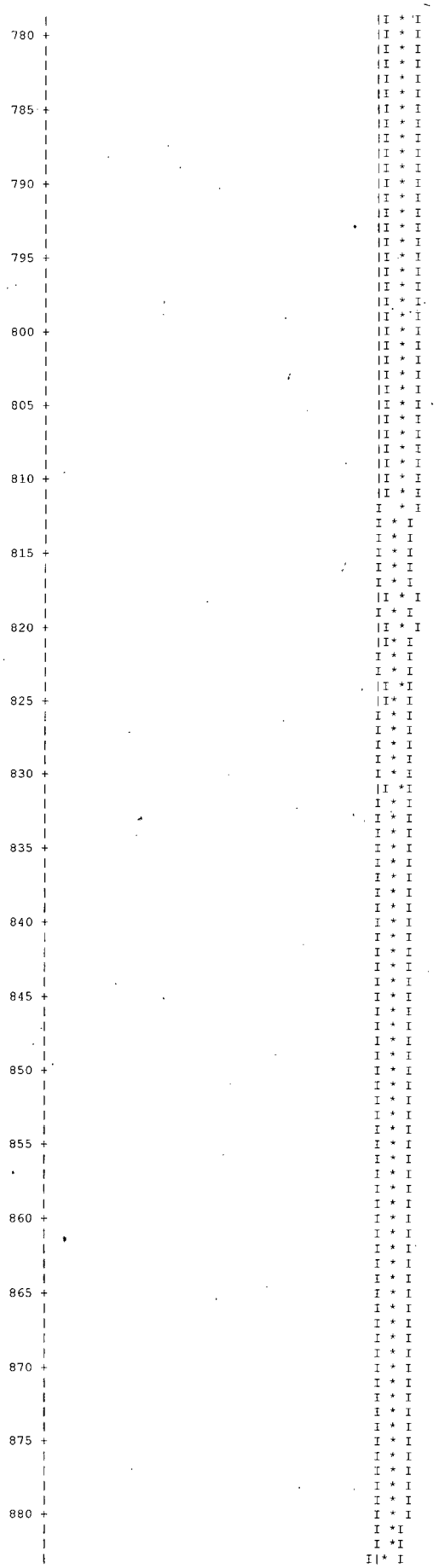








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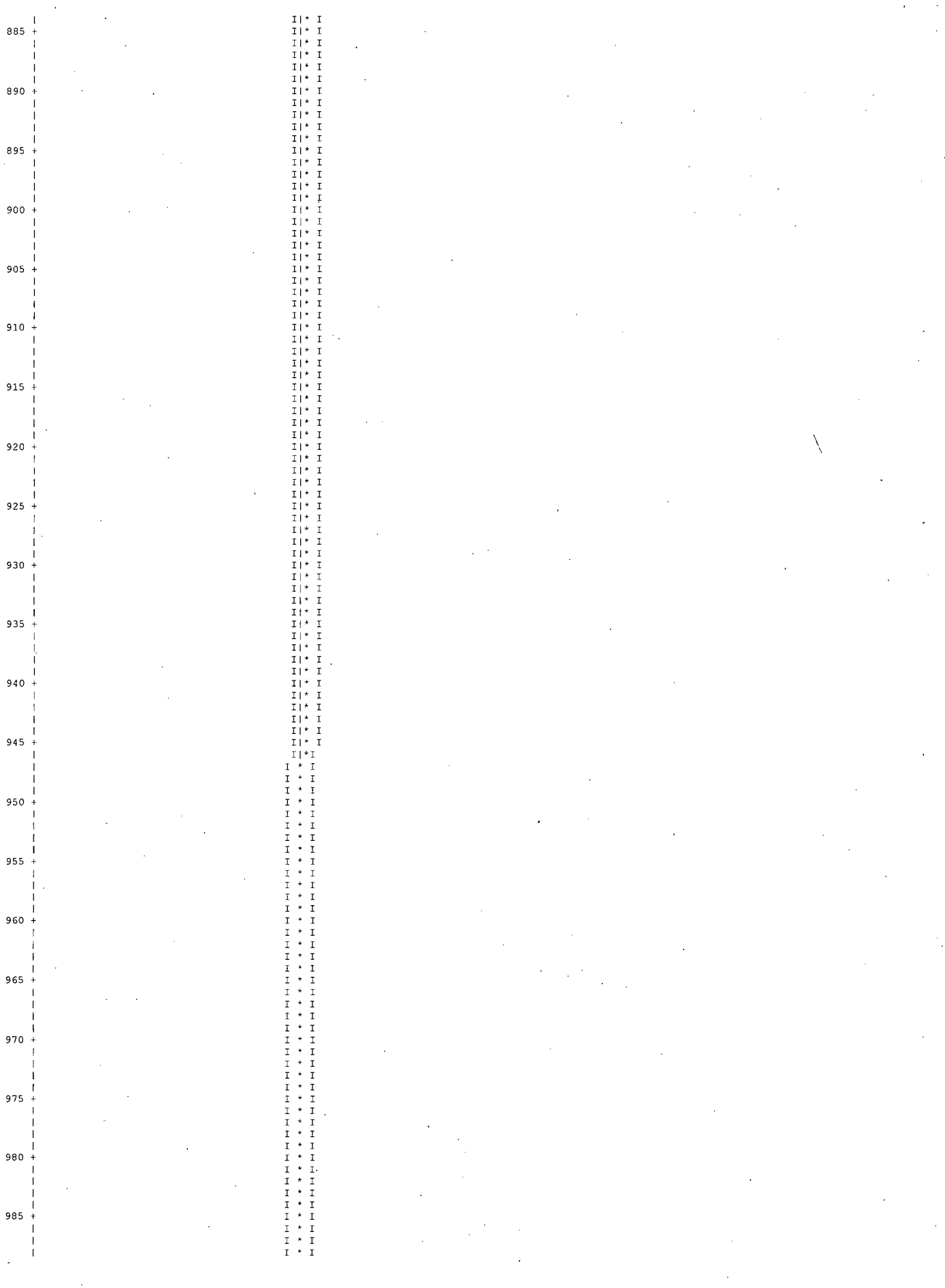
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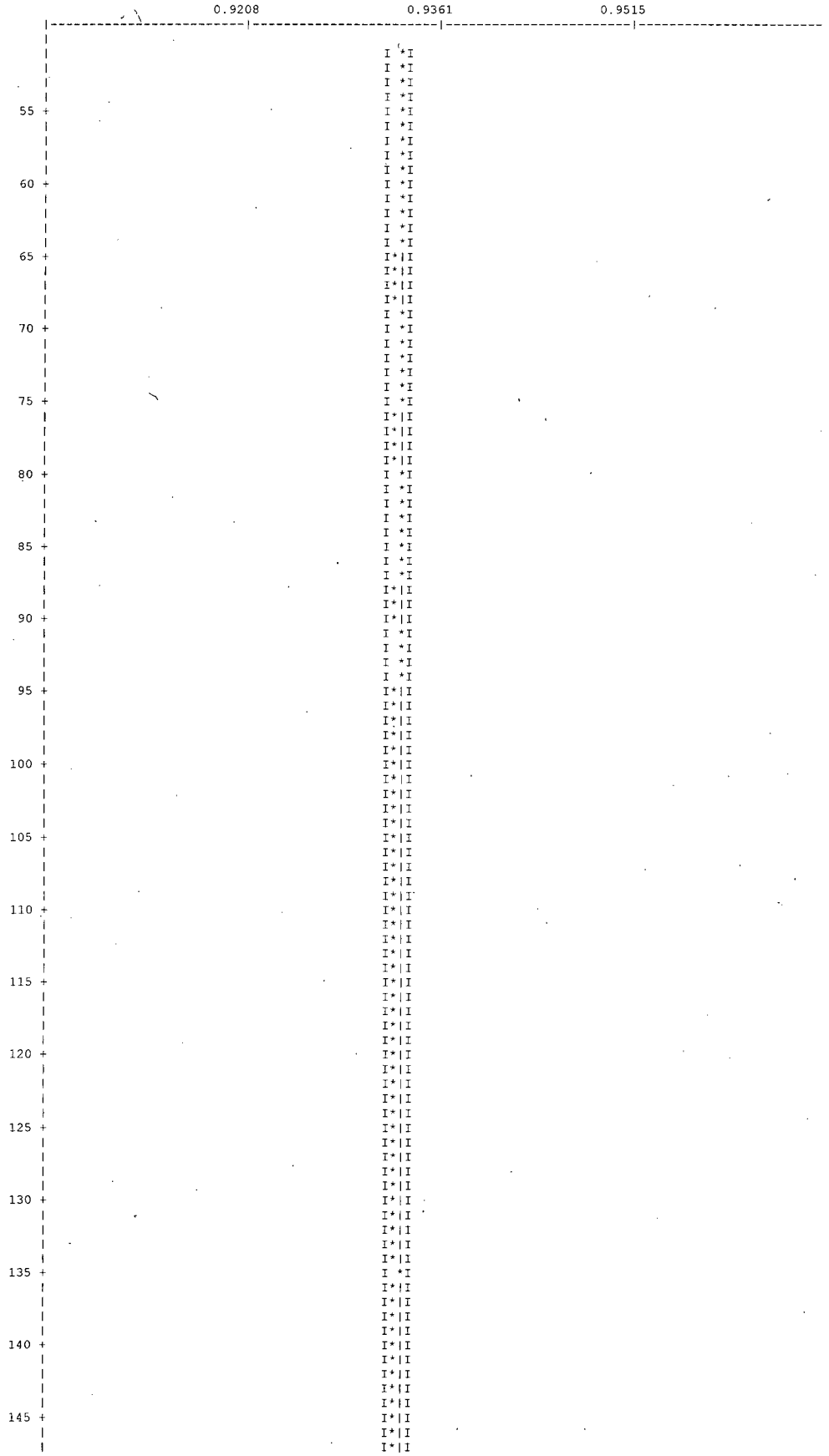
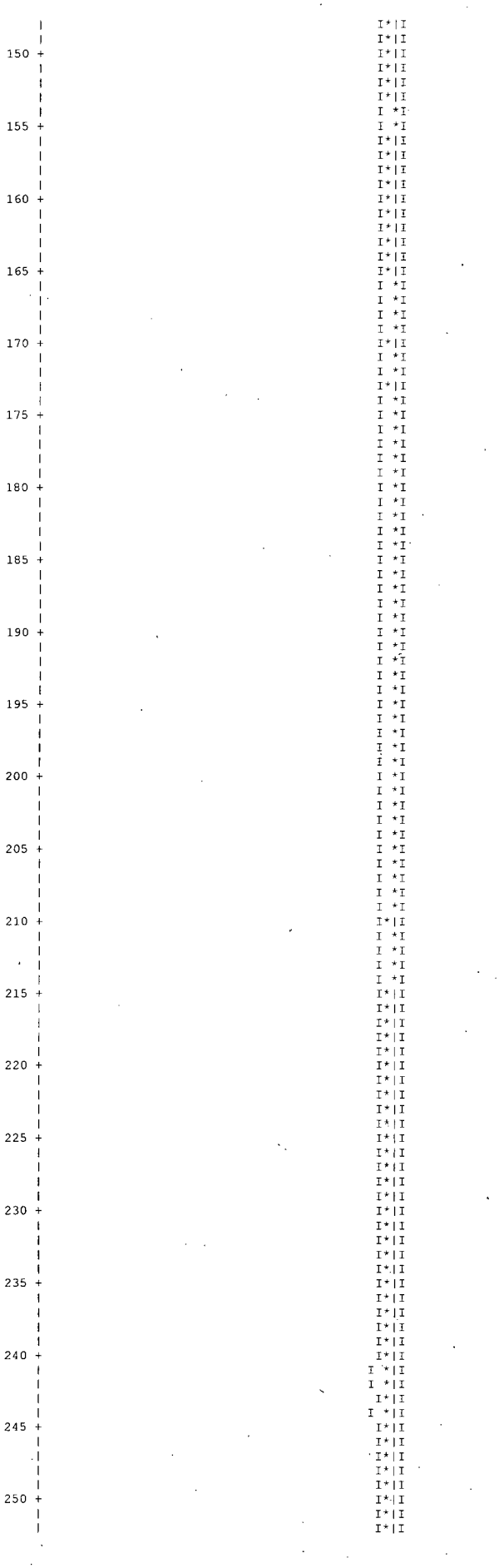
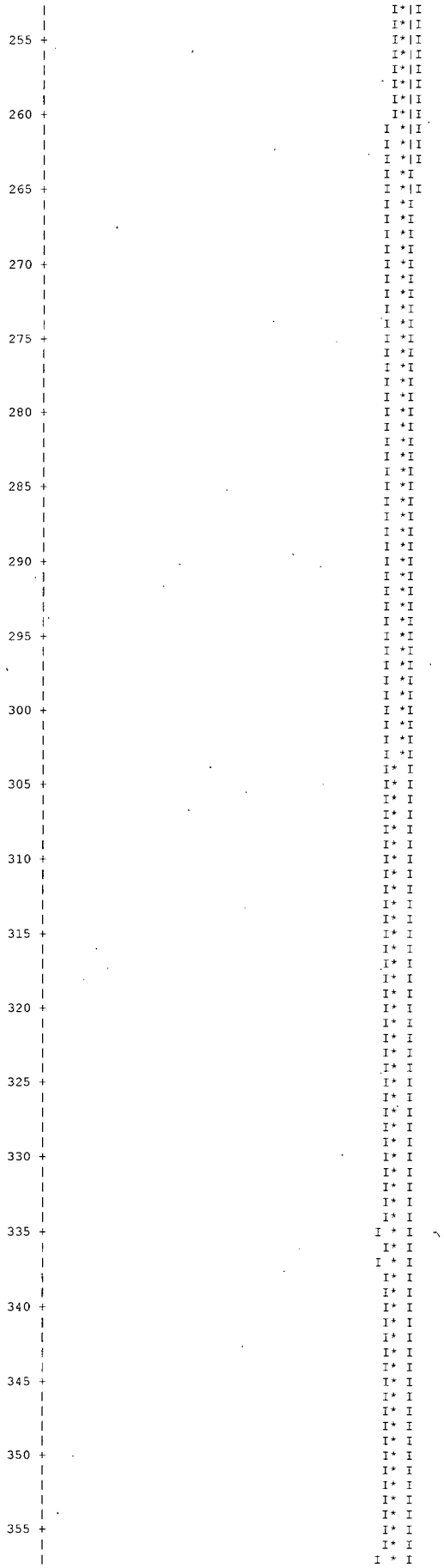
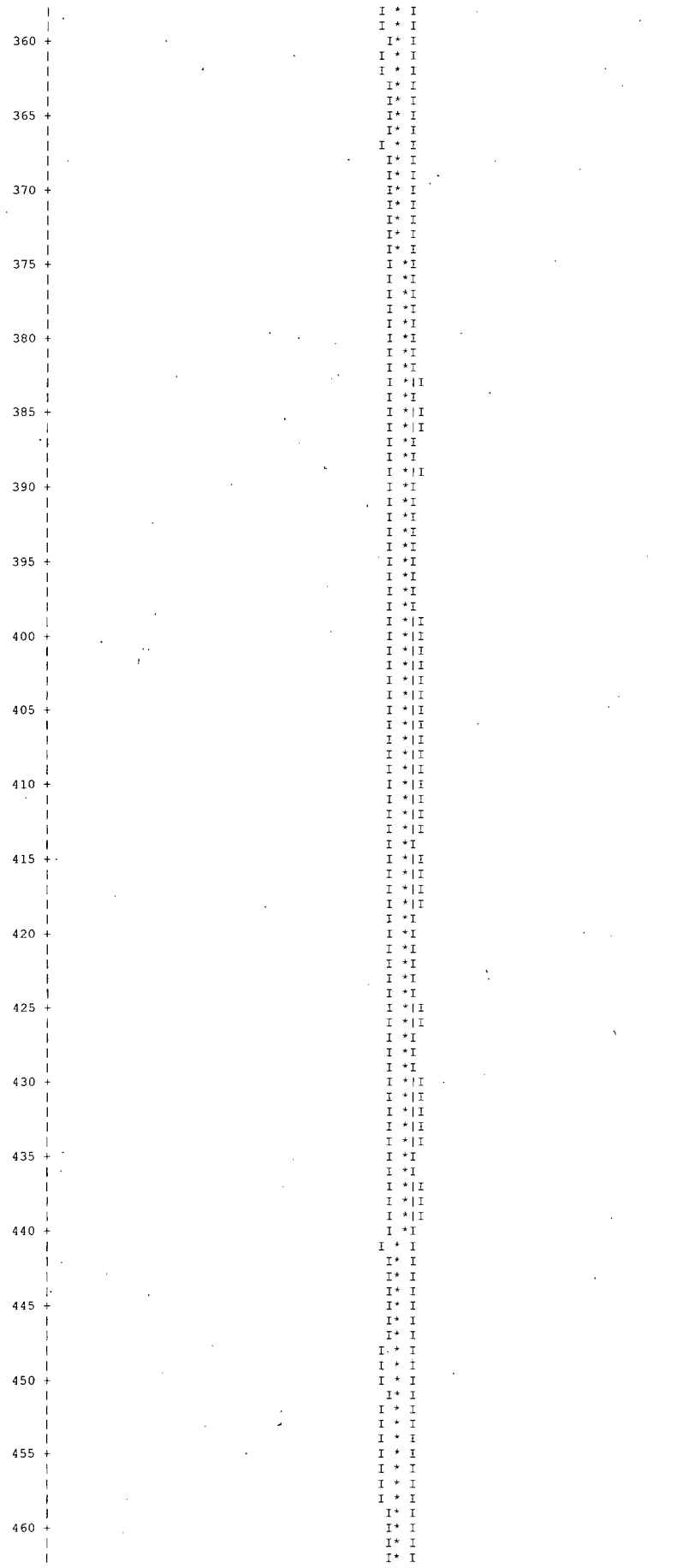
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

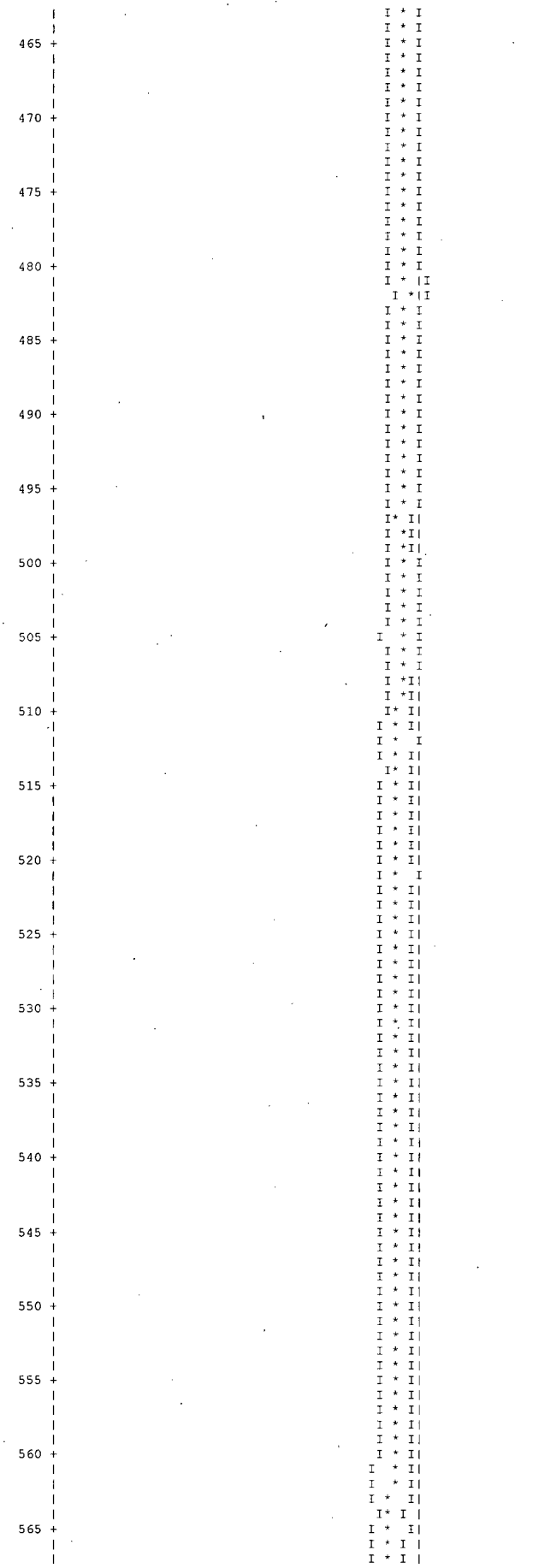
plot of average k-effective by generation skipped.
the line represents k-eff = 0.9332 + or - 0.0009 which occurs for 51 generations skipped.

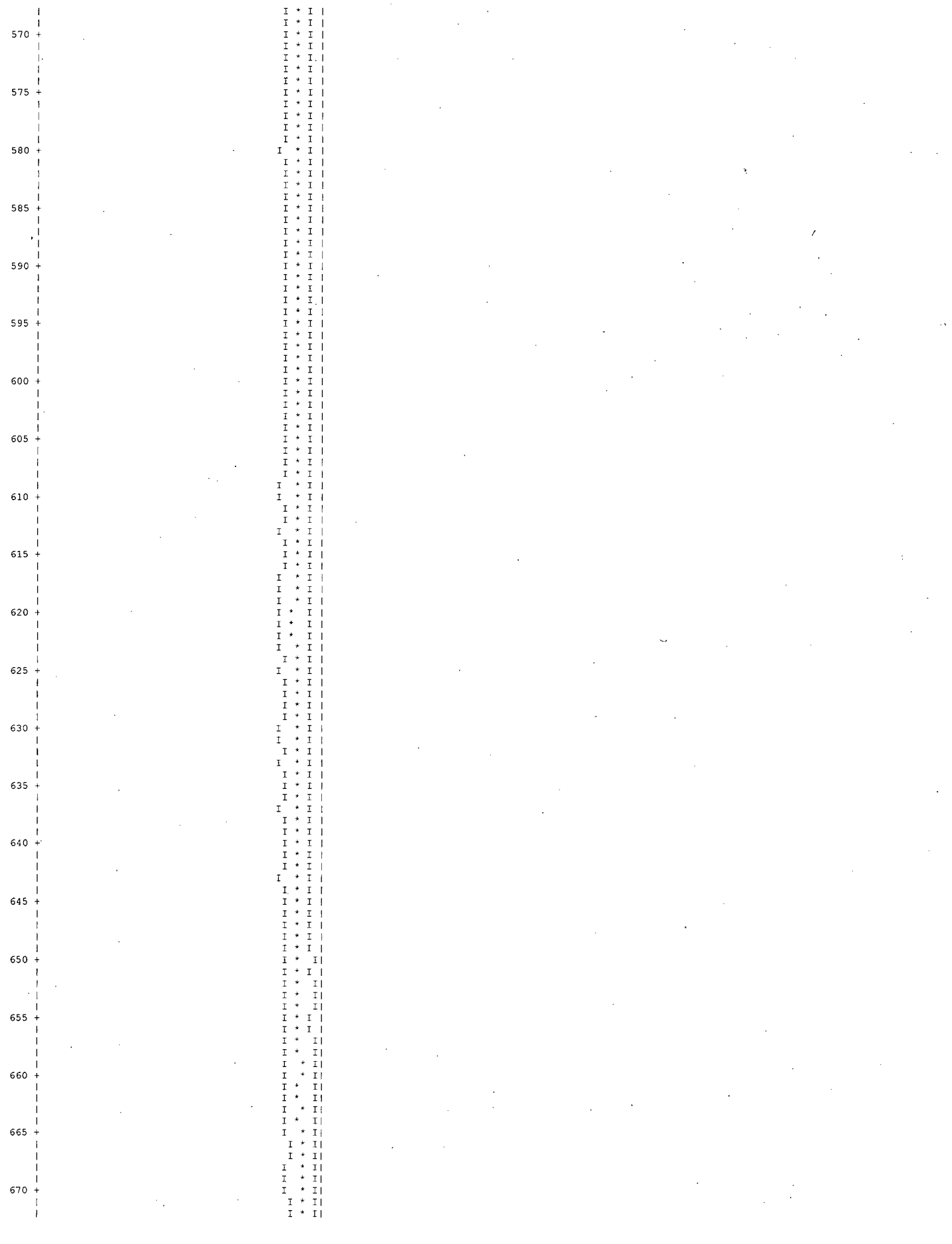


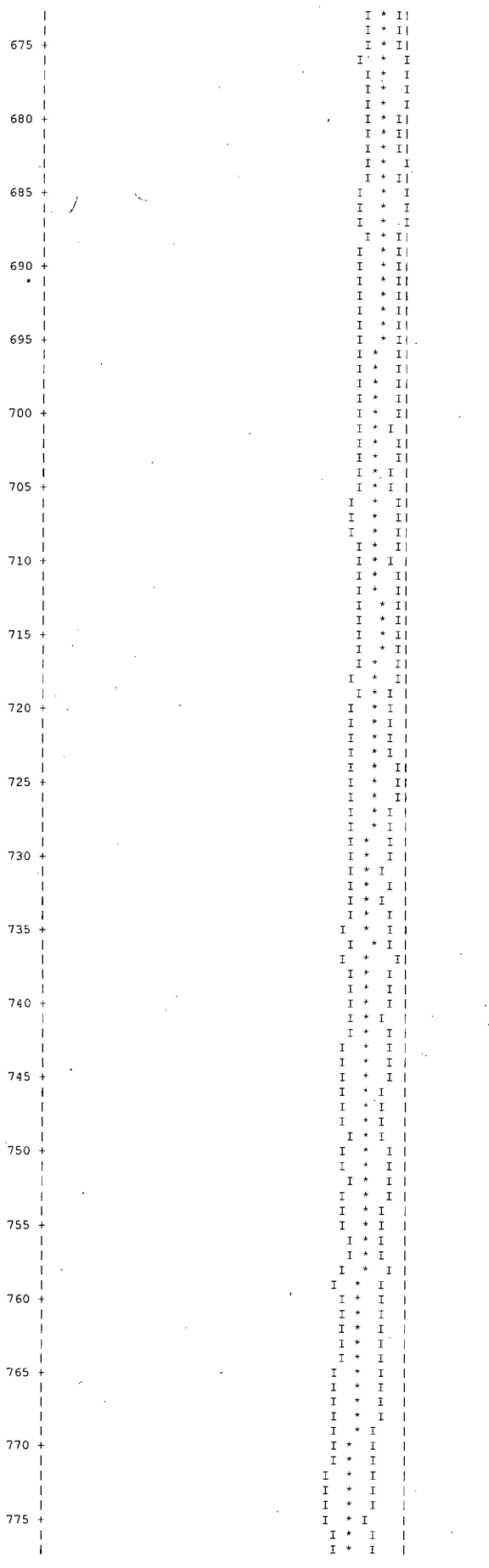








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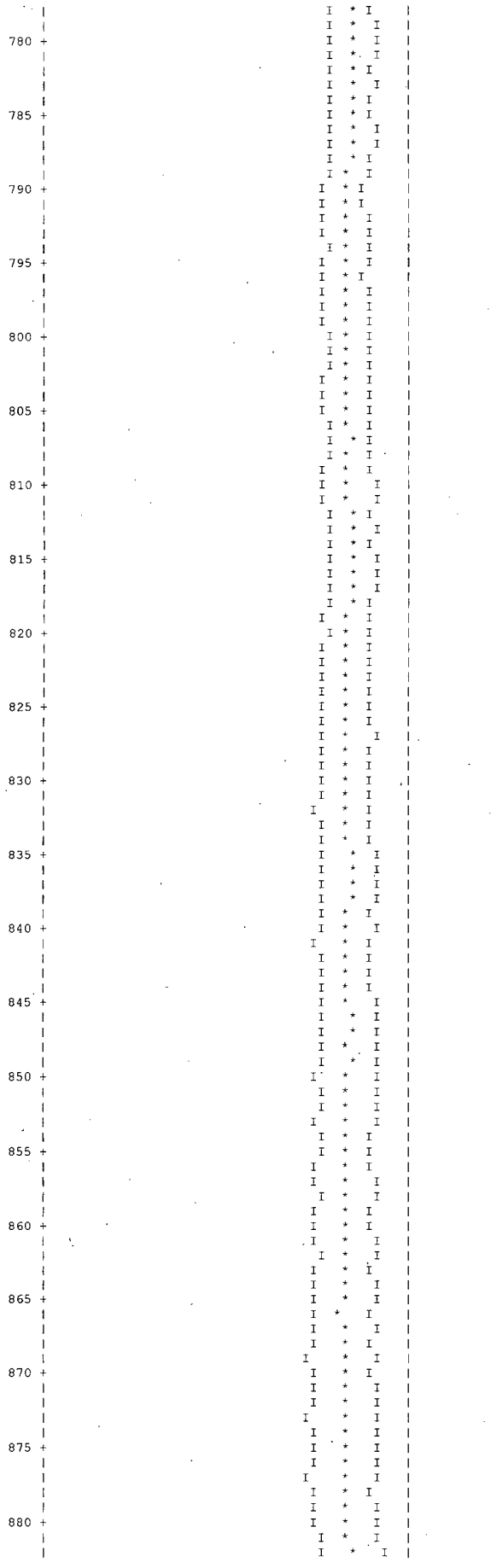
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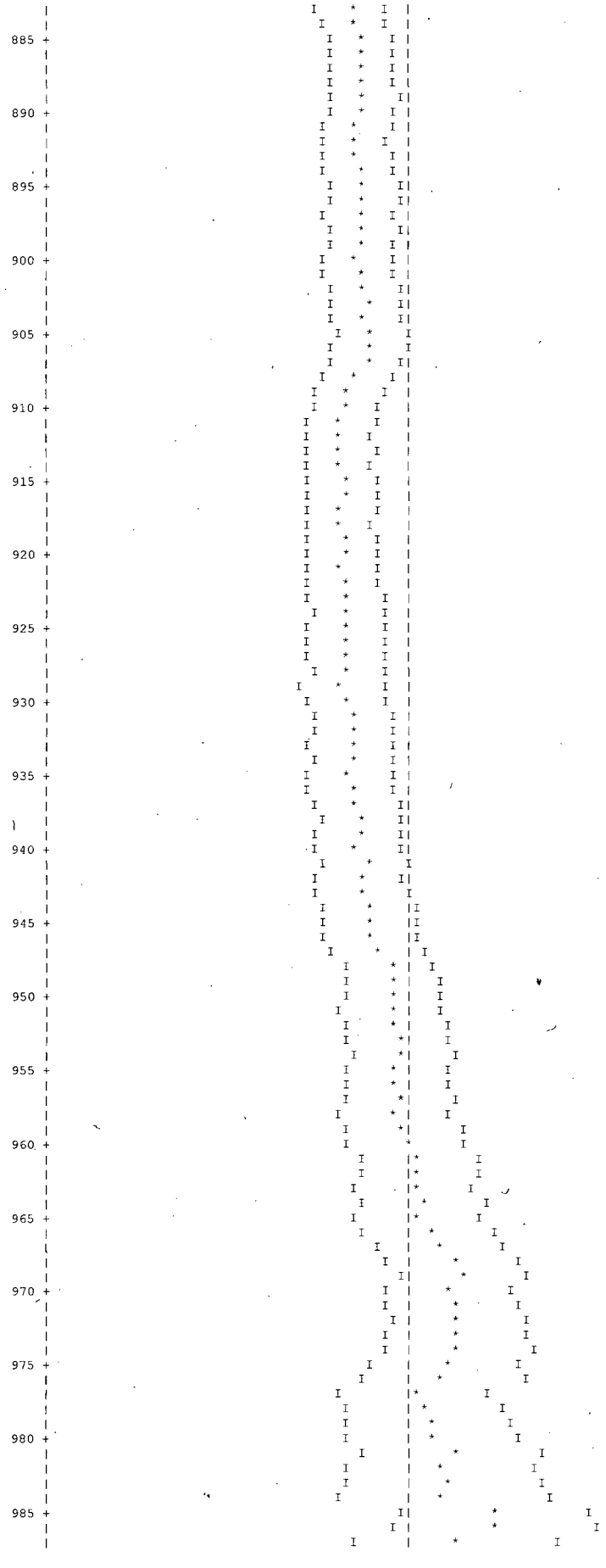

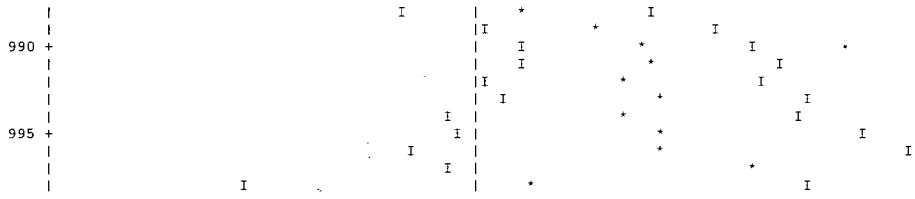

k-effective satisfies the chi**2 test for normality at the 95 % level

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			3.31170E-08	74.2804	4.20588E-07	58.7778	0.00000E+00	0.0000
2	0.0000			1.66929E-07	32.3920	1.16649E-06	26.6972	0.00000E+00	0.0000
3	0.0000			2.18912E-07	24.5539	1.49813E-06	19.2300	0.00000E+00	0.0000
4	0.0000			1.54605E-07	26.3098	1.27318E-06	25.8252	0.00000E+00	0.0000
5	0.0000			4.45086E-07	14.7798	6.34044E-06	13.2759	0.00000E+00	0.0000
6	0.0000			6.70657E-06	3.7208	8.61891E-05	3.6644	0.00000E+00	0.0000
7	0.0000			1.91215E-05	1.9899	3.04343E-04	1.6824	0.00000E+00	0.0000
8	0.0001			5.59350E-05	1.0062	3.37972E-04	1.3586	0.00000E+00	0.0000
9	0.0001			1.22299E-04	0.5595	2.85256E-04	1.2481	0.00000E+00	0.0000
10	0.0001			6.70288E-05	0.6632	1.17837E-04	1.4332	0.00000E+00	0.0000
11	0.0003			3.01403E-04	0.2994	4.27627E-04	0.6180	0.00000E+00	0.0000
12	0.0002			2.14130E-04	0.3284	2.35947E-04	0.5584	0.00000E+00	0.0000
13	0.0001			6.24614E-05	0.5430	5.83569E-05	0.7176	0.00000E+00	0.0000
14	0.0003			2.99326E-04	0.2549	2.22431E-04	0.3536	0.00000E+00	0.0000
15	0.0003			2.45553E-04	0.2592	1.53989E-04	0.3634	0.00000E+00	0.0000
16	0.0001			7.69242E-05	0.4413	4.68503E-05	0.5517	0.00000E+00	0.0000
17	0.0000			3.37244E-05	0.5984	2.28139E-05	0.8379	0.00000E+00	0.0000
18	0.0000			3.01637E-05	0.6702	1.97408E-05	0.8066	0.00000E+00	0.0000
19	0.0001			5.23553E-05	0.4922	3.67715E-05	0.7073	0.00000E+00	0.0000
20	0.0000			3.94695E-05	0.5404	3.07479E-05	0.8193	0.00000E+00	0.0000
21	0.0001			7.86313E-05	0.3948	7.75551E-05	0.7863	0.00000E+00	0.0000
22	0.0001			7.16482E-05	0.3800	7.41415E-05	0.8455	0.00000E+00	0.0000
23	0.0001			7.39536E-05	0.3489	9.34167E-05	0.8444	0.00000E+00	0.0000
24	0.0000			1.65067E-05	0.7426	2.32432E-05	1.2542	0.00000E+00	0.0000
25	0.0000			2.13156E-05	0.6585	3.38307E-05	1.1845	0.00000E+00	0.0000
26	0.0000			1.21023E-05	0.8758	1.70358E-05	1.3951	0.00000E+00	0.0000
27	0.0000			3.62239E-05	0.4944	6.71055E-05	1.0509	0.00000E+00	0.0000
28	0.0001			6.30558E-05	0.3801	1.26088E-04	0.9504	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
29	0.0001			6.35740E-05	0.3542	1.59423E-04	0.9112	0.00000E+00	0.0000
30	0.0000			8.10597E-06	0.9393	1.91287E-05	1.3131	0.00000E+00	0.0000
31	0.0001			6.48552E-05	0.3470	1.38620E-04	0.8943	0.00000E+00	0.0000
32	0.0000			2.57262E-05	0.5220	4.50081E-05	0.9795	0.00000E+00	0.0000
33	0.0000			2.20862E-05	0.5811	3.38224E-05	0.9047	0.00000E+00	0.0000
34	0.0001			4.95397E-05	0.3698	7.52443E-05	0.8060	0.00000E+00	0.0000
35	0.0000			3.00065E-05	0.4640	4.03135E-05	0.8039	0.00000E+00	0.0000
36	0.0000			3.11018E-05	0.4453	5.34766E-05	0.8288	0.00000E+00	0.0000
37	0.0000			2.09803E-05	0.5346	3.11152E-05	0.8506	0.00000E+00	0.0000
38	0.0000			2.13064E-05	0.5316	2.71679E-05	0.7721	0.00000E+00	0.0000
39	0.0001			7.85900E-05	0.2859	2.04899E-04	0.8724	0.00000E+00	0.0000
40	0.0001			7.26039E-05	0.2711	1.37767E-04	0.8617	0.00000E+00	0.0000
41	0.0001			9.35578E-05	0.2346	2.18973E-04	0.8526	0.00000E+00	0.0000
42	0.0001			7.67747E-05	0.2446	2.66355E-04	0.9681	0.00000E+00	0.0000
43	0.0000			3.83987E-05	0.3132	9.09818E-05	0.9041	0.00000E+00	0.0000
44	0.0001			5.84034E-05	0.2589	2.54884E-04	1.0283	0.00000E+00	0.0000
45	0.0000			3.34269E-05	0.3201	4.85198E-05	0.8097	0.00000E+00	0.0000
46	0.0000			7.09316E-06	0.6452	1.88706E-05	1.0886	0.00000E+00	0.0000
47	0.0000			1.79780E-05	0.4113	1.24373E-04	1.0670	0.00000E+00	0.0000
48	0.0000			5.68104E-06	0.7284	1.34969E-05	1.1236	0.00000E+00	0.0000
49	0.0000			3.88107E-05	0.2903	1.25764E-04	1.0120	0.00000E+00	0.0000
50	0.0000			2.78817E-05	0.3409	1.49904E-04	1.1561	0.00000E+00	0.0000
51	0.0000			7.37463E-06	0.6316	1.20033E-05	0.8968	0.00000E+00	0.0000
52	0.0000			1.81799E-05	0.3886	6.05977E-05	1.0176	0.00000E+00	0.0000
53	0.0001			6.87494E-05	0.2199	2.06594E-04	1.0176	0.00000E+00	0.0000
54	0.0000			2.99084E-05	0.3091	2.40746E-04	1.1975	0.00000E+00	0.0000
55	0.0001			6.35452E-05	0.2303	2.88274E-04	1.0987	0.00000E+00	0.0000
56	0.0000			4.46359E-05	0.2619	2.34377E-04	1.2167	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0001			5.39453E-05	0.2392	2.56635E-04	1.1160	0.00000E+00	0.0000
58	0.0000			3.23229E-05	0.3183	1.02605E-04	1.0531	0.00000E+00	0.0000
59	0.0001			5.41753E-05	0.2581	2.39934E-04	1.0848	0.00000E+00	0.0000
60	0.0001			8.81154E-05	0.2145	2.62312E-04	0.8513	0.00000E+00	0.0000
61	0.0000			9.86477E-06	0.6283	2.62773E-05	0.8890	0.00000E+00	0.0000
62	0.0001			6.02497E-05	0.2855	1.13221E-04	0.7746	0.00000E+00	0.0000
63	0.0001			4.70438E-05	0.3289	7.28055E-05	0.6102	0.00000E+00	0.0000
64	0.0000			3.53227E-05	0.3843	6.77583E-05	0.7033	0.00000E+00	0.0000
65	0.0000			9.83887E-06	0.6503	4.31850E-05	0.9706	0.00000E+00	0.0000
66	0.0001			5.21264E-05	0.3082	1.18340E-04	0.7569	0.00000E+00	0.0000
67	0.0000			4.05782E-05	0.3415	2.30043E-04	1.0147	0.00000E+00	0.0000
68	0.0000			8.05308E-06	0.7204	1.81655E-05	0.7965	0.00000E+00	0.0000
69	0.0001			1.20102E-04	0.2637	4.40415E-04	1.0248	0.00000E+00	0.0000
70	0.0001			1.13957E-04	0.2976	1.80633E-03	1.1673	0.00000E+00	0.0000
71	0.0002			1.44303E-04	0.2541	2.26972E-04	0.5903	0.00000E+00	0.0000
72	0.0000			6.71538E-06	0.9232	1.41032E-05	0.8619	0.00000E+00	0.0000
73	0.0001			1.30031E-04	0.3065	1.92802E-04	0.5523	0.00000E+00	0.0000
74	0.0005			4.99019E-04	0.1944	1.22648E-03	0.8190	0.00000E+00	0.0000
75	0.0001			5.72326E-05	0.4887	1.84579E-04	0.8825	0.00000E+00	0.0000
76	0.0003			3.13057E-04	0.3220	4.44170E-04	0.6012	0.00000E+00	0.0000
77	0.0001			1.06518E-04	0.3523	2.66703E-04	0.6404	0.00000E+00	0.0000
78	0.0000			2.43888E-06	1.1518	1.61969E-05	1.2718	0.00000E+00	0.0000
79	0.0003			2.43678E-04	0.4927	1.95378E-04	0.4976	0.00000E+00	0.0000
80	0.0000			1.24595E-05	0.7044	4.48867E-05	0.8793	0.00000E+00	0.0000
81	0.0005			5.04479E-04	0.2319	7.93199E-04	0.5542	0.00000E+00	0.0000
82	0.0001			5.81218E-05	0.7808	6.90637E-05	0.6910	0.00000E+00	0.0000
83	0.0002			1.50759E-04	0.7032	1.28650E-04	0.6091	0.00000E+00	0.0000
84	0.0000			1.76563E-05	0.5501	8.37501E-05	0.8640	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
85	0.0002			1.43081E-04	0.4834	2.25656E-04	0.5175	0.00000E+00	0.0000
86	0.0003			2.55779E-04	0.4034	3.22075E-04	0.4908	0.00000E+00	0.0000
87	0.0006			5.54343E-04	0.4317	3.83397E-04	0.4474	0.00000E+00	0.0000
88	0.0001			5.72550E-05	0.8328	5.49500E-05	0.8176	0.00000E+00	0.0000
89	0.0000			2.89775E-05	0.5699	8.43865E-05	0.8447	0.00000E+00	0.0000
90	0.0006			5.91989E-04	0.5779	3.84814E-04	0.5181	0.00000E+00	0.0000
91	0.0001			5.62419E-05	0.5069	1.13298E-04	0.8339	0.00000E+00	0.0000
92	0.0004			3.62428E-04	0.6698	2.82723E-04	0.5864	0.00000E+00	0.0000
93	0.0002			1.78802E-04	0.5006	1.66096E-04	0.6030	0.00000E+00	0.0000
94	0.0003			3.12454E-04	0.6883	1.86195E-04	0.6144	0.00000E+00	0.0000
95	0.0006			5.49159E-04	0.4210	3.92998E-04	0.5047	0.00000E+00	0.0000
96	0.0001			1.18298E-04	0.7881	2.82551E-04	0.7040	0.00000E+00	0.0000
97	0.0000			1.64526E-05	0.7562	5.51470E-05	0.9694	0.00000E+00	0.0000
98	0.0001			1.39650E-04	0.7730	1.69241E-04	0.6589	0.00000E+00	0.0000
99	0.0000			2.42745E-05	0.9347	4.20991E-05	1.0295	0.00000E+00	0.0000
100	0.0001			1.31875E-04	0.7405	1.03589E-04	0.6656	0.00000E+00	0.0000
101	0.0000			2.05914E-05	0.6545	7.92631E-05	0.8882	0.00000E+00	0.0000
102	0.0001			6.53484E-05	0.7751	2.63418E-04	0.6804	0.00000E+00	0.0000
103	0.0000			5.85383E-06	0.6708	7.23639E-05	0.9211	0.00000E+00	0.0000
104	0.0001			1.22155E-04	0.6994	2.87447E-04	0.6153	0.00000E+00	0.0000
105	0.0000			4.61508E-06	0.6960	6.85660E-05	0.9579	0.00000E+00	0.0000
106	0.0000			1.50753E-06	1.1426	2.47704E-05	1.4702	0.00000E+00	0.0000
107	0.0000			3.47836E-06	0.7544	5.43621E-05	1.1211	0.00000E+00	0.0000
108	0.0000			3.09765E-06	0.7869	5.23537E-05	1.1341	0.00000E+00	0.0000
109	0.0000			6.27213E-06	0.6432	8.66844E-05	0.9220	0.00000E+00	0.0000
110	0.0000			5.94801E-06	0.8207	6.21929E-05	0.9582	0.00000E+00	0.0000
111	0.0000			3.10177E-06	0.8232	5.02764E-05	1.1169	0.00000E+00	0.0000
112	0.0000			2.09837E-06	1.0522	2.97289E-05	1.3131	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0000			4.60447E-05	0.6565	1.15186E-04	0.8454	0.00000E+00	0.0000
114	0.0000			2.74366E-06	0.9875	3.35221E-05	1.3337	0.00000E+00	0.0000
115	0.0000			4.31812E-06	0.6271	8.57501E-05	0.9884	0.00000E+00	0.0000
116	0.0000			1.31709E-05	0.4364	1.91300E-04	0.9306	0.00000E+00	0.0000
117	0.0003			2.78744E-04	0.4413	4.07132E-04	0.5448	0.00000E+00	0.0000
118	0.0001			9.20651E-05	0.4236	2.99447E-04	0.8029	0.00000E+00	0.0000
119	0.0007			6.71185E-04	0.4896	5.50856E-04	0.4523	0.00000E+00	0.0000
120	0.0000			1.46981E-05	0.5713	1.25290E-04	0.9063	0.00000E+00	0.0000
121	0.0000			1.89623E-05	0.5668	1.36999E-04	0.9095	0.00000E+00	0.0000
122	0.0000			1.51637E-05	0.8376	7.37162E-05	1.0313	0.00000E+00	0.0000
123	0.0007			6.17723E-04	0.4662	6.55809E-04	0.4744	0.00000E+00	0.0000
124	0.0001			1.13490E-04	0.5311	2.11187E-04	0.7645	0.00000E+00	0.0000
125	0.0004			4.17709E-04	0.5585	3.26424E-04	0.5674	0.00000E+00	0.0000
126	0.0011			9.81388E-04	0.5766	8.29706E-04	0.5221	0.00000E+00	0.0000
127	0.0004			4.14735E-04	0.6334	3.56964E-04	0.5705	0.00000E+00	0.0000
128	0.0001			6.88737E-05	0.5090	2.22214E-04	0.8434	0.00000E+00	0.0000
129	0.0004			3.54575E-04	0.4654	5.23158E-04	0.5290	0.00000E+00	0.0000
130	0.0004			3.98449E-04	0.7131	4.31982E-04	0.6114	0.00000E+00	0.0000
131	0.0027			2.56544E-03	0.3745	1.57569E-03	0.3943	0.00000E+00	0.0000
132	0.0001			7.05234E-05	0.4401	3.42799E-04	0.8649	0.00000E+00	0.0000
133	0.0001			8.59034E-05	0.3933	4.49236E-04	0.9009	0.00000E+00	0.0000
134	0.0017			1.55206E-03	0.3837	1.44545E-03	0.4217	0.00000E+00	0.0000
135	0.0000			1.65645E-05	0.8624	8.55604E-05	1.1029	0.00000E+00	0.0000
136	0.0000			2.50134E-05	0.7025	1.44462E-04	0.9642	0.00000E+00	0.0000
137	0.0000			2.44805E-05	0.6636	1.50262E-04	0.9812	0.00000E+00	0.0000
138	0.0000			2.50547E-05	0.6645	1.56470E-04	0.9606	0.00000E+00	0.0000
139	0.0000			2.51273E-05	0.6638	1.63893E-04	0.9691	0.00000E+00	0.0000
140	0.0001			6.50546E-05	0.4263	4.34645E-04	0.8951	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
141	0.0001			4.76754E-05	0.4782	3.24968E-04	0.9134	0.00000E+00	0.0000
142	0.0000			3.19354E-05	0.5952	2.21678E-04	0.9210	0.00000E+00	0.0000
143	0.0001			1.11977E-04	0.3250	7.67190E-04	0.9423	0.00000E+00	0.0000
144	0.0001			4.74998E-05	0.5112	3.23178E-04	0.8974	0.00000E+00	0.0000
145	0.0000			4.61846E-05	0.5284	3.01439E-04	0.9195	0.00000E+00	0.0000
146	0.0001			8.19096E-05	0.4149	5.18257E-04	0.9468	0.00000E+00	0.0000
147	0.0000			2.63124E-05	0.7291	1.60588E-04	1.0479	0.00000E+00	0.0000
148	0.0000			1.37195E-05	1.0215	8.25098E-05	1.3303	0.00000E+00	0.0000
149	0.0000			8.80964E-06	1.3025	5.94357E-05	1.7122	0.00000E+00	0.0000
150	0.0000			3.11116E-05	0.7211	1.96615E-04	1.0459	0.00000E+00	0.0000
151	0.0000			3.35755E-05	0.6708	1.95326E-04	1.1048	0.00000E+00	0.0000
152	0.0000			3.59693E-05	0.7181	1.98756E-04	1.0810	0.00000E+00	0.0000
153	0.0000			3.89754E-05	0.6841	2.11576E-04	1.0886	0.00000E+00	0.0000
154	0.0000			4.19640E-05	0.6714	2.21523E-04	1.0533	0.00000E+00	0.0000
155	0.0000			4.10564E-05	0.7174	2.11535E-04	1.0823	0.00000E+00	0.0000
156	0.0000			3.90837E-05	0.7167	1.94901E-04	1.1050	0.00000E+00	0.0000
157	0.0001			4.71299E-05	0.6604	2.33356E-04	1.0319	0.00000E+00	0.0000
158	0.0001			5.10153E-05	0.6443	2.45862E-04	1.0492	0.00000E+00	0.0000
159	0.0001			7.45439E-05	0.5526	3.52989E-04	0.9851	0.00000E+00	0.0000
160	0.0000			4.09995E-05	0.7690	1.88796E-04	1.0802	0.00000E+00	0.0000
161	0.0001			5.93555E-05	0.6453	2.65444E-04	1.0157	0.00000E+00	0.0000
162	0.0001			7.41327E-05	0.6223	3.15826E-04	0.9769	0.00000E+00	0.0000
163	0.0001			8.29410E-05	0.5874	3.43692E-04	0.9500	0.00000E+00	0.0000
164	0.0001			9.35171E-05	0.5591	3.69071E-04	0.9510	0.00000E+00	0.0000
165	0.0001			1.06125E-04	0.5689	3.92498E-04	0.9620	0.00000E+00	0.0000
166	0.0001			6.40632E-05	0.7267	2.38918E-04	1.0722	0.00000E+00	0.0000
167	0.0001			6.98915E-05	0.6486	2.48801E-04	1.0637	0.00000E+00	0.0000
168	0.0001			7.61563E-05	0.6779	2.69060E-04	1.0397	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			8.16138E-05	0.6696	2.77228E-04	1.0657	0.00000E+00	0.0000
170	0.0001			9.00677E-05	0.6584	2.99999E-04	1.0292	0.00000E+00	0.0000
171	0.0001			4.73902E-05	0.9177	1.56951E-04	1.2280	0.00000E+00	0.0000
172	0.0001			4.90503E-05	0.9262	1.60205E-04	1.2487	0.00000E+00	0.0000
173	0.0001			5.17249E-05	0.8848	1.63638E-04	1.2294	0.00000E+00	0.0000
174	0.0001			5.50808E-05	0.8437	1.73060E-04	1.2231	0.00000E+00	0.0000
175	0.0000			2.24089E-05	1.3601	7.06597E-05	1.7200	0.00000E+00	0.0000
176	0.0000			2.28263E-05	1.2969	6.98374E-05	1.7340	0.00000E+00	0.0000
177	0.0000			2.36216E-05	1.3422	7.09693E-05	1.7124	0.00000E+00	0.0000
178	0.0000			2.38729E-05	1.3820	7.23843E-05	1.6565	0.00000E+00	0.0000
179	0.0000			2.42788E-05	1.2757	7.54796E-05	1.5900	0.00000E+00	0.0000
180	0.0000			2.46064E-05	1.3468	7.53739E-05	1.6070	0.00000E+00	0.0000
181	0.0000			2.56267E-05	1.3050	7.65475E-05	1.6047	0.00000E+00	0.0000
182	0.0000			2.52805E-05	1.3043	7.32783E-05	1.6467	0.00000E+00	0.0000
183	0.0000			2.68187E-05	1.3152	7.91783E-05	1.6186	0.00000E+00	0.0000
184	0.0000			2.71369E-05	1.2932	7.79162E-05	1.5897	0.00000E+00	0.0000
185	0.0000			2.68193E-05	1.3414	7.89713E-05	1.6205	0.00000E+00	0.0000
186	0.0000			2.85408E-05	1.2667	8.02598E-05	1.5815	0.00000E+00	0.0000
187	0.0000			2.92149E-05	1.3299	8.23414E-05	1.5181	0.00000E+00	0.0000
188	0.0000			2.98297E-05	1.2549	8.31054E-05	1.6726	0.00000E+00	0.0000
189	0.0000			3.07644E-05	1.2290	8.43250E-05	1.5181	0.00000E+00	0.0000
190	0.0001			7.93661E-05	0.8385	2.15162E-04	1.1474	0.00000E+00	0.0000
191	0.0001			8.68036E-05	0.8049	2.30634E-04	1.1006	0.00000E+00	0.0000
192	0.0001			9.32406E-05	0.7949	2.37838E-04	1.0986	0.00000E+00	0.0000
193	0.0001			1.00576E-04	0.7860	2.44603E-04	1.0914	0.00000E+00	0.0000
194	0.0002			2.26333E-04	0.5705	5.32396E-04	0.9016	0.00000E+00	0.0000
195	0.0003			2.70011E-04	0.5412	5.88614E-04	0.8383	0.00000E+00	0.0000
196	0.0003			3.24788E-04	0.4952	6.57275E-04	0.8588	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
197	0.0004			4.03337E-04	0.5000	7.55585E-04	0.7912	0.00000E+00	0.0000
198	0.0006			5.14807E-04	0.4933	8.75282E-04	0.7450	0.00000E+00	0.0000
199	0.0003			3.14103E-04	0.6141	4.91217E-04	0.8456	0.00000E+00	0.0000
200	0.0004			3.69355E-04	0.6427	5.37115E-04	0.8185	0.00000E+00	0.0000
201	0.0011			9.87320E-04	0.4570	1.26206E-03	0.6174	0.00000E+00	0.0000
202	0.0016			1.48123E-03	0.4193	1.63613E-03	0.5472	0.00000E+00	0.0000
203	0.0027			2.49941E-03	0.3882	2.32618E-03	0.4871	0.00000E+00	0.0000
204	0.0053			4.94158E-03	0.3703	3.84630E-03	0.3871	0.00000E+00	0.0000
205	0.0048			4.50504E-03	0.4880	3.17662E-03	0.4555	0.00000E+00	0.0000
206	0.0077			7.19595E-03	0.4554	4.89385E-03	0.4212	0.00000E+00	0.0000
207	0.0127			1.18563E-02	0.4493	7.72161E-03	0.4166	0.00000E+00	0.0000
208	0.0190			1.77649E-02	0.4152	1.12637E-02	0.3944	0.00000E+00	0.0000
209	0.0221			2.05771E-02	0.3732	1.30298E-02	0.3537	0.00000E+00	0.0000
210	0.0201			1.87810E-02	0.3547	1.21712E-02	0.3352	0.00000E+00	0.0000
211	0.0164			1.53385E-02	0.3337	1.04475E-02	0.3109	0.00000E+00	0.0000
212	0.0144			1.34358E-02	0.3094	9.84096E-03	0.2898	0.00000E+00	0.0000
213	0.0145			1.35015E-02	0.2565	1.08542E-02	0.2488	0.00000E+00	0.0000
214	0.0172			1.60961E-02	0.2127	1.42675E-02	0.1997	0.00000E+00	0.0000
215	0.0245			2.28371E-02	0.1642	2.21106E-02	0.1535	0.00000E+00	0.0000
216	0.0405			3.78323E-02	0.1427	3.92963E-02	0.1170	0.00000E+00	0.0000
217	0.0241			2.24848E-02	0.1490	2.41476E-02	0.1192	0.00000E+00	0.0000
218	0.0307			2.86470E-02	0.1392	3.13945E-02	0.1084	0.00000E+00	0.0000
219	0.0394			3.67323E-02	0.1285	4.08485E-02	0.0965	0.00000E+00	0.0000
220	0.0505			4.71193E-02	0.1213	5.30658E-02	0.0857	0.00000E+00	0.0000
221	0.0645			6.02031E-02	0.1177	6.84537E-02	0.0788	0.00000E+00	0.0000
222	0.0816			7.61097E-02	0.1099	8.68703E-02	0.0715	0.00000E+00	0.0000
223	0.1013			9.44875E-02	0.1120	1.07771E-01	0.0680	0.00000E+00	0.0000
224	0.0543			5.06664E-02	0.1189	5.76609E-02	0.0790	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
225	0.2025			1.88988E-01	0.1085	2.14192E-01	0.0631	0.00000E+00	0.0000
226	0.0323			3.01437E-02	0.1455	3.37290E-02	0.0979	0.00000E+00	0.0000
227	0.0296			2.76640E-02	0.1519	3.07148E-02	0.1133	0.00000E+00	0.0000
228	0.0106			9.91604E-03	0.2121	1.09579E-02	0.1633	0.00000E+00	0.0000
229	0.0097			9.04098E-03	0.2240	9.93999E-03	0.1720	0.00000E+00	0.0000
230	0.0044			4.08975E-03	0.3035	4.45517E-03	0.2301	0.00000E+00	0.0000
231	0.0040			3.74038E-03	0.3322	4.07118E-03	0.2438	0.00000E+00	0.0000
232	0.0037			3.42743E-03	0.3671	3.69472E-03	0.2619	0.00000E+00	0.0000
233	0.0020			1.85440E-03	0.4737	1.97741E-03	0.3398	0.00000E+00	0.0000
234	0.0012			1.08442E-03	0.5997	1.16144E-03	0.4313	0.00000E+00	0.0000
235	0.0013			1.20244E-03	0.6137	1.28618E-03	0.4443	0.00000E+00	0.0000
236	0.0010			9.73366E-04	0.6648	1.04518E-03	0.4876	0.00000E+00	0.0000
237	0.0011			1.00971E-03	0.7371	1.00469E-03	0.5261	0.00000E+00	0.0000
238	0.0001			5.55834E-05	3.0747	5.85196E-05	2.1709	0.00000E+00	0.0000
system total =				9.33175E-01	0.0866	1.00087E+00	0.0288	0.00000E+00	0.0000

elapsed time 5.91100 minutes

random number= 4A971B6F709A

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

frequency for generations 51 to 1000

```
0.8326 to 0.8359     *
0.8359 to 0.8392
0.8392 to 0.8425
0.8425 to 0.8458
0.8458 to 0.8491
0.8491 to 0.8524
0.8524 to 0.8557
0.8557 to 0.8590
0.8590 to 0.8623     *
0.8623 to 0.8656
0.8656 to 0.8689     *
0.8689 to 0.8722     *
0.8722 to 0.8755     ****
0.8755 to 0.8788     *****
0.8788 to 0.8821     ******
0.8821 to 0.8854     *******
0.8854 to 0.8887     ****
0.8887 to 0.8920     ****************
0.8920 to 0.8953     ************
0.8953 to 0.8986     ************************
0.8986 to 0.9019     *******************
0.9019 to 0.9052     ********************************
0.9052 to 0.9085     **********************************
0.9085 to 0.9118     ******************************
0.9118 to 0.9150     ************************************
0.9150 to 0.9183     ************************************
0.9183 to 0.9216     *********************************************
0.9216 to 0.9249     *********************************************
0.9249 to 0.9282     ************************************************************
0.9282 to 0.9315     ************************************************
0.9315 to 0.9348     ****************************************************
0.9348 to 0.9381     ************************************************
0.9381 to 0.9414     ************************************************
0.9414 to 0.9447     ********************************************************
0.9447 to 0.9480     ************************************************
0.9480 to 0.9513     ******************************************
0.9513 to 0.9546     ******************************
0.9546 to 0.9579     ********************************
0.9579 to 0.9612     ****************************
0.9612 to 0.9645     ****************************
0.9645 to 0.9678     ****************
0.9678 to 0.9711     ********************
0.9711 to 0.9744     **********
0.9744 to 0.9777     ************
0.9777 to 0.9810     ************
0.9810 to 0.9843     **********
0.9843 to 0.9876     **
0.9876 to 0.9909     ********
0.9909 to 0.9942     *
0.9942 to 0.9975     ****
0.9975 to 1.0008     *
1.0008 to 1.0041     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

frequency for generations 289 to 1000

```
0.8326 to 0.8359
0.8359 to 0.8392
0.8392 to 0.8425
0.8425 to 0.8458
0.8458 to 0.8491
0.8491 to 0.8524
0.8524 to 0.8557
0.8557 to 0.8590
0.8590 to 0.8623     *
0.8623 to 0.8656
0.8656 to 0.8689     *
0.8689 to 0.8722
0.8722 to 0.8755     **
0.8755 to 0.8788     ****
0.8788 to 0.8821     ****
0.8821 to 0.8854     ******
0.8854 to 0.8887     **
0.8887 to 0.8920     *************
0.8920 to 0.8953     ************
0.8953 to 0.8986     ****************
0.8986 to 0.9019     ****************
0.9019 to 0.9052     ****************************
0.9052 to 0.9085     ************************
0.9085 to 0.9118     *************************
0.9118 to 0.9150     ****************************
0.9150 to 0.9183     ****************************
0.9183 to 0.9216     *********************************
0.9216 to 0.9249     ************************************
0.9249 to 0.9282     ****************************************
0.9282 to 0.9315     ******************************************
0.9315 to 0.9348     ************************************
0.9348 to 0.9381     ***********************************
0.9381 to 0.9414     ****************************************
0.9414 to 0.9447     ************************************
0.9447 to 0.9480     ******************************
0.9480 to 0.9513     ****************************
0.9513 to 0.9546     ************************
0.9546 to 0.9579     ***************************
0.9579 to 0.9612     ************************
0.9612 to 0.9645     **********************
0.9645 to 0.9678     *************
0.9678 to 0.9711     **************
0.9711 to 0.9744     *******
0.9744 to 0.9777     ***********
0.9777 to 0.9810     **********
0.9810 to 0.9843     *******
0.9843 to 0.9876     **
0.9876 to 0.9909     ****
0.9909 to 0.9942     *
0.9942 to 0.9975     **
0.9975 to 1.0008
1.0008 to 1.0041
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

frequency for generations 526 to 1000

```
0.8326 to 0.8359
0.8359 to 0.8392
0.8392 to 0.8425
0.8425 to 0.8458
0.8458 to 0.8491
0.8491 to 0.8524
0.8524 to 0.8557
0.8557 to 0.8590
0.8590 to 0.8623     *
0.8623 to 0.8656
0.8656 to 0.8689     *
0.8689 to 0.8722
0.8722 to 0.8755     **
0.8755 to 0.8788     ***
0.8788 to 0.8821     ***
0.8821 to 0.8854     ****
0.8854 to 0.8887     **
0.8887 to 0.8920     ***********
0.8920 to 0.8953     ********
0.8953 to 0.8986     ************
0.8986 to 0.9019     **********
0.9019 to 0.9052     ************************
0.9052 to 0.9085     *****************
0.9085 to 0.9118     ******************
0.9118 to 0.9150     *****************
0.9150 to 0.9183     ****************
0.9183 to 0.9216     **********************
0.9216 to 0.9249     *********************
0.9249 to 0.9282     ******************************
0.9282 to 0.9315     ****************
0.9315 to 0.9348     **********************
0.9348 to 0.9381     *******************
0.9381 to 0.9414     ******************************
0.9414 to 0.9447     *****************
0.9447 to 0.9480     ************************
0.9480 to 0.9513     *******************
0.9513 to 0.9546     *****************
0.9546 to 0.9579     ****************
0.9579 to 0.9612     ****************
0.9612 to 0.9645     ***********
0.9645 to 0.9678     **********
0.9678 to 0.9711     *********
0.9711 to 0.9744     *****
0.9744 to 0.9777     *******
0.9777 to 0.9810     ********
0.9810 to 0.9843     *****
0.9843 to 0.9876     *
0.9876 to 0.9909     **
0.9909 to 0.9942     *
0.9942 to 0.9975     **
0.9975 to 1.0008
1.0008 to 1.0041
```

```
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1000

                                  frequency for generations  763 to 1000
0.8326 to 0.8359
0.8359 to 0.8392
0.8392 to 0.8425
0.8425 to 0.8458
0.8458 to 0.8491
0.8491 to 0.8524
0.8524 to 0.8557
0.8557 to 0.8590
0.8590 to 0.8623
0.8623 to 0.8656
0.8656 to 0.8689     *
0.8689 to 0.8722
0.8722 to 0.8755     *
0.8755 to 0.8788     **
0.8788 to 0.8821     **
0.8821 to 0.8854     **
0.8854 to 0.8887
0.8887 to 0.8920     ******
0.8920 to 0.8953     *****
0.8953 to 0.8986     *****
0.8986 to 0.9019     *****
0.9019 to 0.9052     ***************
0.9052 to 0.9085     **********
0.9085 to 0.9118     ***********
0.9118 to 0.9150     ***********
0.9150 to 0.9183     ***
0.9183 to 0.9216     ***********
0.9216 to 0.9249     ***********
0.9249 to 0.9282     ******************
0.9282 to 0.9315     **********
0.9315 to 0.9348     ************
0.9348 to 0.9381     *********
0.9381 to 0.9414     *************
0.9414 to 0.9447     *******
0.9447 to 0.9480     ************
0.9480 to 0.9513     *******
0.9513 to 0.9546     *******
0.9546 to 0.9579     ******
0.9579 to 0.9612     ********
0.9612 to 0.9645     ***
0.9645 to 0.9678     *****
0.9678 to 0.9711     ****
0.9711 to 0.9744     ***
0.9744 to 0.9777     ***
0.9777 to 0.9810     ***
0.9810 to 0.9843     **
0.9843 to 0.9876     *
0.9876 to 0.9909     **
0.9909 to 0.9942
0.9942 to 0.9975     **
0.9975 to 1.0008
1.0008 to 1.0041


*****************************************************************************************************************************

          congratulations!  you have  successfully traversed the perilous path through keno v in   5.91100 minutes

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

```
bbbbbbbbbbbb     oooooooooooo    nn          nn                    aaaaaaaaaa     mm          mm  iiiiiiiiiiii     22222222222
bbbbbbbbbbbbb    oooooooooooooo  nnnn        nn                   aaaaaaaaaaaa    mmmm        mmmm  iiiiiiiiiiii    2222222222222
bb          bb   oo          oo  nnnn        nn                  aa          aa   mmmmm      mmmmm       ii          22          22
bb          bb   oo          oo  nn nn       nn                  aa          aa   mm mm    mm mm       ii                      22
bb          bb   oo          oo  nn   nn     nn                  aa          aa   mm   mm mm   mm       ii                      22
bbbbbbbbbbbbb    oo          oo  nn    nn    nn  -------------   aaaaaaaaaaaaa    mm    mmm    mm       ii                    22
bbbbbbbbbbbbb    oo          oo  nn     nn   nn  -------------   aaaaaaaaaaaaa    mm     m     mm       ii                  22
bb          bb   oo          oo  nn      nn  nn                  aa          aa   mm           mm       ii                22
bb          bb   oo          oo  nn       nn nn                  aa          aa   mm           mm       ii              22
bb          bb   oo          oo  nn        nnnn                  aa          aa   mm           mm       ii            22
bbbbbbbbbbbbb    oooooooooooooo  nn         nnn                  aa          aa   mm           mm  iiiiiiiiiiii    2222222222222
bbbbbbbbbbbb     oooooooooooo    nn          nn                  aa          aa   mm           mm  iiiiiiiiiiii    2222222222222


 sssssssssss     cccccccccccc     aaaaaaaaa    ll                eeeeeeeeeeeeee                   pppppppppppp     cccccccccccc
ssssssssssssss   cccccccccccccc   aaaaaaaaaaa   ll                eeeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa ll                ee                               pp         pp    cc          cc
ss               cc               aa         aa ll                ee                               pp         pp    cc
ss               cc               aa         aa ll                ee                               pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa ll                eeeeeeeee        -------------   pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa ll                eeeeeeeee        -------------   pppppppppppp      cc
          ss     cc               aa         aa ll                ee                               pp                cc
          ss     cc               aa         aa ll                ee                               pp                cc
ss         ss    cc          cc   aa         aa ll                ee                               pp                cc          cc
ssssssssssssss   cccccccccccccc   aa         aa llllllllllllll    eeeeeeeeeeeeee                   pp                cccccccccccccc
 sssssssssss     cccccccccccc     aa         aa llllllllllllll    eeeeeeeeeeeeee                   pp                 cccccccccccc


   0000000       666666666666               //   22222222222       0000000                  //     0000000      5555555555555
  000000000     6666666666666              //   2222222222222    000000000                 //    000000000     5555555555555
 00       00    66                        //    22          22   00       00              //    00       00   55
00         00   66                       //                 22   00         00            //    00         00  55
00         00   66                      //                  22   00         00           //     00         00  55
00         00   666666666666           //                 22    00         00          //      00         00  555555555555
00         00   6666666666666         //               22       00         00         //       00         00  5555555555555
00         00   66          66       //             22          00         00        //        00         00            55
00         00   66          66      //            22           00         00       //         00         00            55
 00       00    66          66     //           22              00       00      //           00       00   55         55
  000000000     6666666666666    //            2222222222222     000000000     //             000000000    5555555555555
   0000000       66666666666    //             2222222222222      0000000     //               0000000      55555555555


   0000000      7777777777777                     0000000      22222222222                      0000000           11
  000000000     777777777777                     000000000    2222222222222                    000000000         111
 00       00    77         77          :::      00       00   22          22        :::       00       00       1111
00         00          77            :::      00         00              22        :::      00         00        11
00         00        77              :::      00         00              22        :::      00         00        11
00         00       77                        00         00            22                   00         00        11
00         00       77                        00         00         22                      00         00        11
00         00      77               :::      00         00       22                :::      00         00        11
00         00      77               :::      00         00     22                  :::      00         00        11
 00       00       77               :::       00       00    22                    :::       00       00         11
  000000000         77                          000000000    2222222222222                    000000000       11111111
   0000000          77                           0000000     2222222222222                     0000000        11111111
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa  ll              ee                              pp         pp    cc          cc
ss               cc               aa         aa  ll              ee                              pp         pp    cc
ss               cc               aa         aa  ll              ee                              pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll              eeeeeeeee       -------------   pppppppppppppp    cc
          ss     cc               aa         aa  ll              ee                              pp                cc
          ss     cc               aa         aa  ll              ee                              pp                cc
ss        ss     cc          cc   aa         aa  ll              ee                              pp                cc          cc
ssssssssssssss   cccccccccccccc   aa         aa  lllllllllllll   eeeeeeeeeeeee                   pp                cccccccccccccc
 ssssssssssss     ccccccccccc     aa         aa  lllllllllllll   eeeeeeeeeeeee                   pp                 ccccccccccc


*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                  program verification information                                      *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o008                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/11/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  bonami                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  07:02:01.30                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
-1q array has      1 entries.
 0q array has      4 entries.
 1q array has      6 entries.
 2q array has      2 entries.
```

logical assignments

master library 11
working library 0
scratch file 18
new library 1

p r o b l e m d e s c r i p t i o n

igr--geometry (0/1/2/3--inf med/slab/cyl/sphere 1

izm--number of zones or material regions 6

ms--mixing table length 18

ibl--shielded cross section edit option (0/1--no/yes) 0

ibr--bondarenko factor edit option (0/1--no/yes) 0

issopt--dancoff factor option 0

convergence criterion 1.00000E-03

geometry correction factor for wigner rational approximation 1.000E+00

3q array has 18 entries.

4q array has 18 entries.

5q array has 18 entries.

6q array has 6 entries.

7q array has 6 entries.

8q array has 6 entries.

9q array has 6 entries.

10q array has 18 entries.

11q array has 6 entries.

m i x i n g t a b l e

entry	mixture	isotope	number density	new identifier	explicit temperature
1	1	1001	7.84026E-02	1001001	293.0
2	2	1001	7.85246E-02	2001001	293.0
3	5	1001	6.67692E-02	5001001	293.0
4	1	4309	1.23442E-03	1004309	293.0
5	2	4309	1.23621E-03	2004309	293.0
6	1	6012	3.92054E-02	1006012	293.0
7	2	6012	3.92623E-02	2006012	293.0
8	4	6012	3.18772E-04	4006012	293.0
9	1	8016	0.00000E+00	1008016	293.0
10	5	8016	3.33846E-02	5008016	293.0
11	1	94239	7.12810E-05	1094239	293.0
12	4	14000	1.70252E-03	4014000	293.0
13	4	15031	6.94680E-05	4015031	293.0
14	4	24304	1.74726E-02	4024304	293.0
15	4	25055	1.74071E-03	4025055	293.0
16	4	26304	5.85446E-02	4026304	293.0
17	4	28304	7.74020E-03	4028304	293.0
18	6	82000	3.29690E-02	6082000	293.0

geometry and material description

zone	mixture	outer dimension	temperature	extra xs	type (0/1--fuel/mod)
1	1	1.00000E+00	2.93000E+02	0.00000E+00	0
2	2	6.00000E+00	2.93000E+02	0.00000E+00	0
3	3	1.10000E+01	-2.93000E+02	0.00000E+00	0
4	4	1.60000E+01	2.93000E+02	0.00000E+00	0
5	5	2.10000E+01	2.93000E+02	0.00000E+00	0
6	6	2.60000E+01	2.93000E+02	0.00000E+00	0

this calculation requires 36777 locations of 2000000 available to this module

power fitting for: 14000-- processes: 3-- sig0's: 8-- temperatures: 3-- max groups: 238

warning-nuclide: 14000 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
temperature 3.00000E+02 will be substituted.

power fitting for: 94239-- processes: 5-- sig0's: 7-- temperatures: 3-- max groups: 21

warning-nuclide: 94239 is requested at t: 2.93000E+02 which is below the range beginning at: 3.00000E+02
temperature 3.00000E+02 will be substituted.

zone	volume	outer radius
1	1.000E+00	1.000E+00
2	5.000E+00	6.000E+00
3	5.000E+00	1.100E+01
4	5.000E+00	1.600E+01
5	5.000E+00	2.100E+01
6	5.000E+00	2.600E+01

fuel region volume 2.60E+01
moderator region volume 0.00E+00
fuel region radius 2.60E+01
moderator region radius 2.60E+01

elapsed time 0.00 min.

infinite dilution macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.001E-01	1.061E-01	1.089E-01	1.073E-01	1.123E-01	1.201E-01	1.310E-01	1.483E-01	1.711E-01	2.055E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.494E-01	2.718E-01	2.704E-01	2.957E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.766E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.278E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.812E-01	4.986E-01	5.222E-01	5.374E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.250E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.871E-01	6.063E-01	6.291E-01	6.481E-01	6.654E-01	6.802E-01	7.181E-01	7.837E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.702E-01	2.774E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.690E-01	9.765E-01	1.062E+00	1.134E+00	1.210E+00	1.246E+00	1.267E+00	1.287E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.471E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.279E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.403E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.689E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

infinite dilution macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.791E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.798E+00	1.801E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.799E+00	1.803E+00	1.805E+00	1.798E+00	1.802E+00	1.803E+00	1.805E+00	1.800E+00	1.799E+00	1.815E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.815E+00	1.800E+00	1.809E+00	1.804E+00	1.827E+00	1.799E+00	1.809E+00	1.799E+00	1.803E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.799E+00	1.822E+00	1.798E+00	1.817E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.813E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.813E+00	1.800E+00	1.806E+00	1.840E+00	1.811E+00	1.800E+00	1.808E+00	1.825E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.821E+00	1.799E+00	1.800E+00	1.821E+00	1.800E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

infinite dilution macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.845E+00	1.836E+00	1.840E+00	1.843E+00	1.847E+00	1.850E+00	1.852E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.860E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.857E+00	1.866E+00	1.873E+00	1.872E+00	1.880E+00	1.892E+00	1.900E+00	1.911E+00	1.929E+00	1.935E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.956E+00	1.988E+00	2.031E+00	2.103E+00	2.183E+00	2.265E+00	2.384E+00	2.530E+00	2.591E+00	2.555E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

infinite dilution macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.504E+00	2.499E+00	2.534E+00	2.602E+00	2.697E+00	2.838E+00	2.953E+00	3.041E+00	3.148E+00	3.286E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.471E+00	3.720E+00	4.060E+00	4.382E+00	5.009E+00	5.887E+00	6.321E+00	6.786E+00	7.183E+00	7.634E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.654E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.051E+00	8.632E+00	9.385E+00	1.007E+01	1.096E+01	1.250E+01	1.722E+01	3.612E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.335E+00	2.534E+00	2.878E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

bondarenko iteration statistics

iteration	mt	max change	group	zone	new value	nuclide	sig0	first	last
1	1	-5.749E-02	50	4	6.492E+00	4014000	2.44454E+02	1	238
1	1	-2.464E-02	56	1	1.370E+01	1094239	2.32084E+04	55	75
2	all groups for nuclide		4014000 are converged to less than eps= 1.00E-03						
2	all groups for nuclide		1094239 are converged to less than eps= 1.00E-03						

elapsed time 0.00 min.

shielded macroscopic total cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	1.001E-01	1.061E-01	1.089E-01	1.073E-01	1.123E-01	1.201E-01	1.310E-01	1.483E-01	1.711E-01	2.055E-01
2	9.982E-02	1.059E-01	1.086E-01	1.070E-01	1.120E-01	1.199E-01	1.307E-01	1.481E-01	1.708E-01	2.053E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.958E-01	2.045E-01	2.141E-01	2.218E-01	2.300E-01	2.510E-01	2.797E-01	3.050E-01	3.189E-01	3.221E-01
5	8.939E-02	9.287E-02	9.906E-02	9.991E-02	1.023E-01	1.069E-01	1.111E-01	1.201E-01	1.467E-01	1.717E-01
6	1.941E-01	1.889E-01	1.829E-01	1.791E-01	1.748E-01	1.705E-01	1.729E-01	1.919E-01	2.317E-01	2.517E-01

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	2.494E-01	2.718E-01	2.704E-01	2.957E-01	3.309E-01	3.588E-01	3.693E-01	3.758E-01	3.844E-01	3.945E-01
2	2.492E-01	2.717E-01	2.703E-01	2.957E-01	3.309E-01	3.589E-01	3.694E-01	3.759E-01	3.845E-01	3.946E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.090E-01	3.015E-01	2.878E-01	2.765E-01	2.587E-01	2.677E-01	2.298E-01	2.995E-01	2.724E-01	2.443E-01
5	2.200E-01	1.992E-01	1.954E-01	2.394E-01	2.827E-01	3.063E-01	3.294E-01	3.966E-01	3.932E-01	3.468E-01
6	2.573E-01	2.433E-01	2.290E-01	2.057E-01	1.822E-01	1.713E-01	1.744E-01	1.596E-01	1.715E-01	1.697E-01

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	4.084E-01	4.278E-01	4.481E-01	4.619E-01	4.679E-01	4.733E-01	4.812E-01	4.986E-01	5.222E-01	5.374E-01
2	4.086E-01	4.279E-01	4.483E-01	4.621E-01	4.681E-01	4.735E-01	4.814E-01	4.988E-01	5.224E-01	5.376E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	2.077E-01	2.295E-01	2.211E-01	2.439E-01	2.221E-01	2.995E-01	2.397E-01	3.249E-01	2.563E-01	3.357E-01
5	3.663E-01	4.550E-01	4.944E-01	4.153E-01	4.072E-01	4.046E-01	4.054E-01	4.144E-01	4.326E-01	4.454E-01
6	1.688E-01	1.547E-01	1.603E-01	1.525E-01	1.589E-01	1.739E-01	1.985E-01	1.831E-01	1.838E-01	1.641E-01

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	5.557E-01	5.755E-01	5.871E-01	6.063E-01	6.291E-01	6.481E-01	6.654E-01	6.802E-01	7.181E-01	7.837E-01
2	5.560E-01	5.758E-01	5.874E-01	6.067E-01	6.295E-01	6.485E-01	6.658E-01	6.806E-01	7.185E-01	7.842E-01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.928E-01	2.320E-01	2.701E-01	2.773E-01	3.360E-01	2.869E-01	3.411E-01	4.179E-01	3.302E-01	2.882E-01
5	4.606E-01	4.825E-01	4.970E-01	5.284E-01	6.002E-01	7.948E-01	9.533E-01	7.624E-01	6.353E-01	6.515E-01
6	1.824E-01	1.779E-01	1.839E-01	1.729E-01	1.322E-01	1.493E-01	1.697E-01	1.929E-01	2.296E-01	2.423E-01

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	8.690E-01	9.765E-01	1.062E+00	1.134E+00	1.210E+00	1.246E+00	1.267E+00	1.287E+00	1.322E+00	1.376E+00
2	8.696E-01	9.772E-01	1.063E+00	1.135E+00	1.211E+00	1.247E+00	1.268E+00	1.288E+00	1.324E+00	1.377E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.151E-01	4.469E-01	2.945E-01	3.065E-01	5.418E-01	7.872E-01	2.928E-01	8.868E-01	3.568E-01	4.272E-01
5	7.164E-01	8.042E-01	8.749E-01	9.356E-01	9.988E-01	1.029E+00	1.047E+00	1.063E+00	1.094E+00	1.139E+00
6	2.676E-01	2.890E-01	3.050E-01	3.393E-01	3.426E-01	3.557E-01	4.861E-01	3.593E-01	3.668E-01	3.566E-01

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	1.403E+00	1.423E+00	1.489E+00	1.555E+00	1.607E+00	1.655E+00	1.689E+00	1.711E+00	1.728E+00	1.748E+00
2	1.404E+00	1.424E+00	1.490E+00	1.557E+00	1.608E+00	1.657E+00	1.690E+00	1.712E+00	1.729E+00	1.750E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.079E-01	3.783E-01	6.380E-01	1.451E+00	3.290E-01	7.630E-01	6.275E-01	1.117E+00	1.354E+00	1.096E+00
5	1.161E+00	1.179E+00	1.234E+00	1.290E+00	1.334E+00	1.375E+00	1.403E+00	1.422E+00	1.436E+00	1.454E+00
6	3.573E-01	3.860E-01	3.728E-01	3.454E-01	3.415E-01	3.670E-01	3.690E-01	3.768E-01	3.693E-01	3.693E-01

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	1.759E+00	1.764E+00	1.770E+00	1.773E+00	1.775E+00	1.778E+00	1.781E+00	1.783E+00	1.785E+00	1.788E+00
2	1.761E+00	1.765E+00	1.771E+00	1.775E+00	1.777E+00	1.779E+00	1.783E+00	1.784E+00	1.786E+00	1.789E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.083E+00	8.811E-01	1.003E+00	1.643E+00	1.499E+00	9.632E-01	7.795E-01	7.592E-01	7.605E-01	1.078E+00
5	1.463E+00	1.467E+00	1.471E+00	1.475E+00	1.476E+00	1.478E+00	1.481E+00	1.483E+00	1.484E+00	1.487E+00
6	3.693E-01	3.764E-01	3.693E-01	3.846E-01	3.693E-01	3.693E-01	3.869E-01	3.693E-01	3.693E-01	3.694E-01

shielded macroscopic total cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	1.791E+00	1.792E+00	1.794E+00	1.796E+00	1.797E+00	1.800E+00	1.798E+00	1.798E+00	1.801E+00	1.797E+00
2	1.792E+00	1.793E+00	1.794E+00	1.796E+00	1.797E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.052E-01	8.276E-01	8.400E-01	1.738E+00	1.229E+00	9.804E-01	9.150E-01	9.052E-01	9.024E-01	9.001E-01
5	1.489E+00	1.490E+00	1.491E+00	1.493E+00	1.494E+00	1.494E+00	1.494E+00	1.494E+00	1.495E+00	1.495E+00
6	3.693E-01	3.693E-01	3.693E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	1.799E+00	1.803E+00	1.805E+00	1.798E+00	1.802E+00	1.803E+00	1.805E+00	1.800E+00	1.799E+00	1.815E+00
2	1.799E+00	1.799E+00	1.799E+00	1.799E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.982E-01	8.964E-01	8.963E-01	8.960E-01	8.956E-01	8.953E-01	8.951E-01	8.951E-01	8.951E-01	8.950E-01
5	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.495E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	1.798E+00	1.815E+00	1.800E+00	1.809E+00	1.804E+00	1.827E+00	1.799E+00	1.809E+00	1.799E+00	1.803E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.950E-01	8.951E-01	8.951E-01	8.952E-01	8.953E-01	8.954E-01	8.955E-01	8.955E-01	8.956E-01	8.956E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	1.799E+00	1.822E+00	1.798E+00	1.817E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.798E+00	1.799E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.957E-01	8.958E-01	8.958E-01	8.959E-01	8.960E-01	8.961E-01	8.961E-01	8.962E-01	8.963E-01	8.964E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	1.798E+00	1.798E+00	1.799E+00	1.798E+00	1.798E+00	1.798E+00	1.804E+00	1.799E+00	1.813E+00	1.798E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.965E-01	8.966E-01	8.967E-01	8.968E-01	8.969E-01	8.971E-01	8.975E-01	8.979E-01	8.983E-01	8.985E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.692E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	1.798E+00	1.799E+00	1.813E+00	1.800E+00	1.806E+00	1.840E+00	1.811E+00	1.800E+00	1.808E+00	1.825E+00
2	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	8.988E-01	8.990E-01	8.992E-01	8.996E-01	8.999E-01	9.002E-01	9.004E-01	9.007E-01	9.012E-01	9.015E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.496E+00
6	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01	3.693E-01

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	1.821E+00	1.799E+00	1.800E+00	1.821E+00	1.800E+00	1.800E+00	1.799E+00	1.799E+00	1.799E+00	1.799E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.020E-01	9.028E-01	9.036E-01	9.044E-01	9.050E-01	9.052E-01	9.055E-01	9.058E-01	9.061E-01	9.068E-01
5	1.496E+00	1.496E+00	1.496E+00	1.496E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.694E-01	3.695E-01

shielded macroscopic total cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.800E+00	1.801E+00	1.801E+00
2	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.076E-01	9.082E-01	9.093E-01	9.105E-01	9.112E-01	9.122E-01	9.130E-01	9.133E-01	9.134E-01	9.137E-01
5	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00	1.497E+00
6	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.695E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.801E+00	1.802E+00	1.802E+00
2	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00	1.802E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.141E-01	9.146E-01	9.151E-01	9.156E-01	9.161E-01	9.166E-01	9.171E-01	9.177E-01	9.184E-01	9.191E-01
5	1.497E+00	1.497E+00	1.497E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00	1.498E+00
6	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.696E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01	3.697E-01

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	1.808E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.835E+00	1.829E+00
2	1.809E+00	1.797E+00	1.813E+00	1.811E+00	1.817E+00	1.822E+00	1.827E+00	1.821E+00	1.834E+00	1.828E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.196E-01	9.203E-01	9.211E-01	9.220E-01	9.229E-01	9.237E-01	9.243E-01	9.250E-01	9.256E-01	9.263E-01
5	1.503E+00	1.493E+00	1.507E+00	1.505E+00	1.510E+00	1.515E+00	1.519E+00	1.514E+00	1.525E+00	1.520E+00
6	3.697E-01	3.697E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.698E-01	3.699E-01	3.699E-01

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	1.836E+00	1.843E+00	1.845E+00	1.836E+00	1.840E+00	1.843E+00	1.847E+00	1.850E+00	1.852E+00	1.854E+00
2	1.835E+00	1.842E+00	1.845E+00	1.835E+00	1.839E+00	1.843E+00	1.846E+00	1.849E+00	1.851E+00	1.853E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.269E-01	9.273E-01	9.277E-01	9.281E-01	9.284E-01	9.286E-01	9.288E-01	9.289E-01	9.291E-01	9.293E-01
5	1.526E+00	1.532E+00	1.534E+00	1.525E+00	1.529E+00	1.532E+00	1.535E+00	1.537E+00	1.539E+00	1.541E+00
6	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01	3.699E-01

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	1.855E+00	1.854E+00	1.847E+00	1.846E+00	1.850E+00	1.854E+00	1.857E+00	1.860E+00	1.863E+00	1.864E+00
2	1.854E+00	1.853E+00	1.846E+00	1.844E+00	1.848E+00	1.852E+00	1.856E+00	1.859E+00	1.861E+00	1.862E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.295E-01	9.297E-01	9.299E-01	9.300E-01	9.303E-01	9.304E-01	9.307E-01	9.308E-01	9.311E-01	9.314E-01
5	1.541E+00	1.540E+00	1.535E+00	1.533E+00	1.537E+00	1.540E+00	1.543E+00	1.546E+00	1.548E+00	1.548E+00
6	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01	3.700E-01

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	1.857E+00	1.866E+00	1.873E+00	1.872E+00	1.880E+00	1.892E+00	1.900E+00	1.911E+00	1.929E+00	1.935E+00
2	1.856E+00	1.864E+00	1.871E+00	1.870E+00	1.878E+00	1.888E+00	1.895E+00	1.906E+00	1.922E+00	1.927E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.320E-01	9.325E-01	9.331E-01	9.341E-01	9.354E-01	9.369E-01	9.386E-01	9.403E-01	9.418E-01	9.429E-01
5	1.543E+00	1.550E+00	1.556E+00	1.555E+00	1.562E+00	1.570E+00	1.577E+00	1.585E+00	1.600E+00	1.603E+00
6	3.700E-01	3.700E-01	3.700E-01	3.701E-01	3.701E-01	3.701E-01	3.702E-01	3.702E-01	3.702E-01	3.703E-01

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	1.956E+00	1.988E+00	2.031E+00	2.103E+00	2.183E+00	2.265E+00	2.384E+00	2.530E+00	2.591E+00	2.555E+00
2	1.945E+00	1.972E+00	2.005E+00	2.055E+00	2.095E+00	2.124E+00	2.154E+00	2.192E+00	2.231E+00	2.275E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.447E-01	9.473E-01	9.503E-01	9.538E-01	9.568E-01	9.592E-01	9.617E-01	9.646E-01	9.679E-01	9.716E-01
5	1.619E+00	1.642E+00	1.670E+00	1.712E+00	1.746E+00	1.771E+00	1.796E+00	1.829E+00	1.862E+00	1.900E+00
6	3.703E-01	3.704E-01	3.704E-01	3.705E-01	3.706E-01	3.707E-01	3.707E-01	3.708E-01	3.709E-01	3.710E-01

shielded macroscopic total cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	2.504E+00	2.499E+00	2.534E+00	2.602E+00	2.697E+00	2.838E+00	2.953E+00	3.041E+00	3.148E+00	3.286E+00
2	2.323E+00	2.379E+00	2.449E+00	2.538E+00	2.644E+00	2.790E+00	2.907E+00	2.996E+00	3.103E+00	3.239E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	9.759E-01	9.809E-01	9.869E-01	9.943E-01	1.004E+00	1.017E+00	1.027E+00	1.035E+00	1.045E+00	1.057E+00
5	1.940E+00	1.988E+00	2.047E+00	2.123E+00	2.213E+00	2.337E+00	2.437E+00	2.512E+00	2.602E+00	2.719E+00
6	3.711E-01	3.712E-01	3.713E-01	3.715E-01	3.717E-01	3.721E-01	3.723E-01	3.725E-01	3.728E-01	3.731E-01

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	3.471E+00	3.720E+00	4.060E+00	4.382E+00	5.009E+00	5.887E+00	6.321E+00	6.786E+00	7.183E+00	7.634E+00
2	3.422E+00	3.668E+00	4.003E+00	4.319E+00	4.931E+00	5.777E+00	6.191E+00	6.633E+00	7.008E+00	7.436E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.072E+00	1.091E+00	1.119E+00	1.148E+00	1.220E+00	1.360E+00	1.451E+00	1.558E+00	1.655E+00	1.761E+00
5	2.873E+00	3.083E+00	3.367E+00	3.634E+00	4.154E+00	4.869E+00	5.221E+00	5.595E+00	5.910E+00	6.269E+00
6	3.734E-01	3.740E-01	3.747E-01	3.755E-01	3.775E-01	3.816E-01	3.846E-01	3.880E-01	3.914E-01	3.952E-01

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	8.051E+00	8.632E+00	9.385E+00	1.007E+01	1.096E+01	1.250E+01	1.722E+01	3.612E+01
2	7.832E+00	8.378E+00	9.092E+00	9.750E+00	1.060E+01	1.207E+01	1.653E+01	3.456E+01
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	1.862E+00	2.006E+00	2.179E+00	2.336E+00	2.534E+00	2.879E+00	3.873E+00	8.307E+00
5	6.602E+00	7.060E+00	7.660E+00	8.212E+00	8.923E+00	1.016E+01	1.391E+01	2.908E+01
6	3.989E-01	4.045E-01	4.114E-01	4.180E-01	4.268E-01	4.430E-01	4.995E-01	8.010E-01

number of separate processes to treat: 8
number treated (including multi-zone): 8
maximum number of sigma-0's: 8
maximum number of temperatures: 3
offset of origen for interpolation: 2.0E+01

macroscopic escape cross sections

zone	group 1	group 2	group 3	group 4	group 5	group 6	group 7	group 8	group 9	group 10
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 11	group 12	group 13	group 14	group 15	group 16	group 17	group 18	group 19	group 20
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 21	group 22	group 23	group 24	group 25	group 26	group 27	group 28	group 29	group 30
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 31	group 32	group 33	group 34	group 35	group 36	group 37	group 38	group 39	group 40
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 41	group 42	group 43	group 44	group 45	group 46	group 47	group 48	group 49	group 50
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 51	group 52	group 53	group 54	group 55	group 56	group 57	group 58	group 59	group 60
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 61	group 62	group 63	group 64	group 65	group 66	group 67	group 68	group 69	group 70
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 71	group 72	group 73	group 74	group 75	group 76	group 77	group 78	group 79	group 80
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 81	group 82	group 83	group 84	group 85	group 86	group 87	group 88	group 89	group 90
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 91	group 92	group 93	group 94	group 95	group 96	group 97	group 98	group 99	group 100
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 101	group 102	group 103	group 104	group 105	group 106	group 107	group 108	group 109	group 110
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 111	group 112	group 113	group 114	group 115	group 116	group 117	group 118	group 119	group 120
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 121	group 122	group 123	group 124	group 125	group 126	group 127	group 128	group 129	group 130
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 131	group 132	group 133	group 134	group 135	group 136	group 137	group 138	group 139	group 140
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 141	group 142	group 143	group 144	group 145	group 146	group 147	group 148	group 149	group 150
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 151	group 152	group 153	group 154	group 155	group 156	group 157	group 158	group 159	group 160
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 161	group 162	group 163	group 164	group 165	group 166	group 167	group 168	group 169	group 170
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 171	group 172	group 173	group 174	group 175	group 176	group 177	group 178	group 179	group 180
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 181	group 182	group 183	group 184	group 185	group 186	group 187	group 188	group 189	group 190
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 191	group 192	group 193	group 194	group 195	group 196	group 197	group 198	group 199	group 200
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 201	group 202	group 203	group 204	group 205	group 206	group 207	group 208	group 209	group 210
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

macroscopic escape cross sections

zone	group 211	group 212	group 213	group 214	group 215	group 216	group 217	group 218	group 219	group 220
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 221	group 222	group 223	group 224	group 225	group 226	group 227	group 228	group 229	group 230
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

zone	group 231	group 232	group 233	group 234	group 235	group 236	group 237	group 238
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

36777 locations of 36992 available are required to make a new master containing the self-shielded values

```
copy      4309   Be-metal (1304/ from log 11 to log 18    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy      4309   Be-metal (1304/ from log 18 to log  1    bondarenko trigger 0

copy     24304   24CR BNL EVALDE from log 11 to log  1    bondarenko trigger 0

copy     26304   26FE 0 ORNL EVA from log 11 to log  1    bondarenko trigger 0

copy     28304   28NI 0 BNL NNDC from log 11 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 11 to log 18    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy      6012  6c ornl evaldec7 from log 18 to log  1    bondarenko trigger 0

copy     14000   14si 0 ornl eva from log 11 to log  1    bondarenko trigger 1

copy     25055   25mn 55 bnl eva from log 11 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 11 to log 18    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      8016   8O 16 from vers from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 11 to log 18    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy      1001   hydrogen in wat from log 18 to log  1    bondarenko trigger 0

copy     15031   15p 31 lll eval from log 11 to log  1    bondarenko trigger 0

copy     82000   82pb ornl evalj from log 11 to log  1    bondarenko trigger 0

copy     94239   94pu239 lanl ju from log 11 to log  1    bondarenko trigger 1
```

```
scale - 238 neutron group library            based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94            last updated - 5/16/2002
      n.m.greene & l.m.petrie
        nuclear applications & methods analysis - ns&td - ornl
    tape id                          4321          number of nuclides                  18
    number of neutron groups          238          number of gamma groups               0
    first thermal group               149          logical unit                         1
                                table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.   (1/esigtSS304)  MOD2 11/18/91            id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31.111 evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you,               mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took   12.20 seconds
```

```
nn          nn  iiiiiiiiiiii    ttttttttttttt      aaaaaaaaa     ww          ww  ll
nnn         nn  iiiiiiiiiiii    ttttttttttttt     aaaaaaaaaaa    ww          ww  ll
nnnn        nn     ii               tt         aa         aa   ww          ww  ll
nn nn       nn     ii               tt         aa         aa   ww          ww  ll
nn   nn     nn     ii               tt         aa         aa   ww          ww  ll
nn    nn    nn     ii               tt         aaaaaaaaaaaaa   ww     w    ww  ll
nn     nn   nn     ii               tt         aaaaaaaaaaaaa   ww    www   ww  ll
nn      nn  nn     ii               tt         aa         aa   ww   ww ww  ww  ll
nn       nn nn     ii               tt         aa         aa   ww ww    ww ww  ll
nn        nnnn     ii               tt         aa         aa   wwww      wwww  ll
nn         nnn  iiiiiiiiiiii        tt         aa         aa   www        www  llllllllllll
nn          nn  iiiiiiiiiiii        tt         aa         aa   ww          ww  llllllllllll
```

```
 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                  ppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                  pppppppppppppp ccccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                             pp         pp  cc         cc
ss              cc              aa         aa ll            ee                             pp         pp  cc
ss              cc              aa         aa ll            ee                             pp         pp  cc
ssssssssssss    cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppppp cc
 ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee      -------------   pppppppppppp   cc
          ss    cc              aa         aa ll            ee                             pp             cc
          ss    cc              aa         aa ll            ee                             pp             cc
ss        ss    cc         cc   aa         aa ll            ee                             pp             cc         cc
ssssssssssssss  cccccccccccccc   aa         aa llllllllllll  eeeeeeeeeeeee                  pp             ccccccccccccc
 sssssssssss     ccccccccccc     aa         aa llllllllllll  eeeeeeeeeeeee                  pp              ccccccccccc
```

```
   0000000       666666666666              //   22222222222       0000000                //     0000000      5555555555555
  000000000     6666666666666             //   2222222222222    000000000               //     000000000     5555555555555
 00       00    66                       //    22          22   00       00            //     00       00   55
00         00   66                      //                22   00         00          //     00         00  55
00         00   66                     //                 22   00         00         //      00         00  55
00         00   666666666666          //                22     00         00        //       00         00  555555555555
00         00   6666666666666        //              22       00         00       //        00         00  5555555555555
00         00   66         66       //             22         00         00      //         00         00             55
00         00   66         66      //            22           00         00     //          00         00             55
 00       00    66         66     //            22            00       00      //           00       00   55         55
  000000000     6666666666666    //            2222222222222    000000000     //             000000000    5555555555555
   0000000       66666666666    //             2222222222222     0000000     //               0000000      55555555555
```

```
   0000000      7777777777777                     0000000      22222222222                        11                44
  000000000     777777777777                     000000000    2222222222222                      111               444
 00       00    77        77         :::        00       00   22         22        :::          1111             4444
00         00          77           :::       00         00            22        :::            11            44 44
00         00         77            :::       00         00            22        :::            11           44  44
00         00        77                       00         00          22                       11          44   44
00         00        77                       00         00        22                         11         44    44
00         00       77            :::        00         00      22              :::            11        444444444444
00         00       77            :::        00         00    22                :::            11       4444444444444
 00       00        77            :::         00       00   22                  :::            11                44
  000000000         77                          000000000    2222222222222                   11111111             44
   0000000          77                           0000000     2222222222222                   11111111             44
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll              eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssss   cccccccccccccc    aaaaaaaaaaa    ll              eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss   cc         cc   aa         aa   ll              ee                              pp     pp        cc         cc
ss              cc              aa         aa   ll              ee                              pp         pp    cc
ss              cc              aa         aa   ll              ee                              pp         pp    cc
ssssssssssss    cc              aaaaaaaaaaaaa   ll              eeeeeeeee       -------------   pppppppppppppp   cc
 ssssssssssss   cc              aaaaaaaaaaaaa   ll              eeeeeeeee       -------------   pppppppppppp     cc
           ss   cc              aa         aa   ll              ee                              pp               cc
           ss   cc              aa         aa   ll              ee                              pp               cc
ss         ss   cc         cc   aa         aa   ll              ee                              pp               cc         cc
ssssssssssss    cccccccccccccc   aa         aa   lllllllllllll   eeeeeeeeeeeee                   pp               cccccccccccccc
 sssssssssss     ccccccccccc     aa         aa   lllllllllllll   eeeeeeeeeeeee                   pp                ccccccccccc
```

```
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                program verification information                                        *****
*****                                                                                                       *****
*****                              code system:  scale-pc version:  4.4a                                    *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****                                                                                                       *****
*****                                                                                                       *****
*****              program:  o0o002                                                                         *****
*****                                                                                                       *****
*****        creation date:  11/11/1999                                                                     *****
*****                                                                                                       *****
*****              library:  c:\scale4.4a\bin                                                               *****
*****                                                                                                       *****
*****                                                                                                       *****
*****      production code:  nitawl                                                                         *****
*****                                                                                                       *****
*****              version:  4.4.0                                                                          *****
*****                                                                                                       *****
*****              jobname:  scale-pc                                                                       *****
*****                                                                                                       *****
*****         machine name:  NFA10385                                                                       *****
*****                                                                                                       *****
*****    date of execution:  20_jun_2005                                                                    *****
*****                                                                                                       *****
*****    time of execution:  07:02:14.77                                                                    *****
*****                                                                                                       *****
*****                                                                                                       *****
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
```

```
      -1q array has      1 entries.

       0q array has      9 entries.

       1q array has     12 entries.

select 18 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

        2 resonance calculations have been requested
       -1 output option for ampx formatted cross section data
     2001 maximum number of resonance mesh intervals
        2 order of resonance level processing

the storage allocated for this case is   2000000 words

        2q array has     18 entries.

        3q array has     30 entries.

        4q array has     18 entries.

 general information concerning cross section library
   tape identification number                4321
   number of nuclides on tape                  18
   number of neutron energy groups            238
   first thermal neutron energy group         149
   number of gamma energy groups                0

   direct access unit number  9 requires 280 blocks of length  8172 words
 xsdrn tape   4321
                        scale - 238 neutron group library            based on endf-b version 5 data
                          generated with a chi-1/e-maxwellian weight spectrum
                            compiled for doe - 8/18/94          last updated - 5/16/2002
                              n.m.greene & l.m.petrie
                                nuclear applications & methods analysis - ns&td - ornl

 nuclides from xsdrn tape
    1     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  1004309
    2     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                  2004309
    3     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91         4024304
    4     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91         4026304
    5     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91         4028304
    6    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               1006012
    7    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               2006012
    8    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas               4006012
    9     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88             4014000
   10     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88             4025055
   11     8O 16 from version 6 evaluation                                            1008016
   12     8O 16 from version 6 evaluation                                            5008016
   13     hydrogen in water 1301/1002    mod1   11/23/92                             1001001
   14     hydrogen in water 1301/1002    mod1   11/23/92                             2001001
   15     hydrogen in water 1301/1002    mod1   11/23/92                             5001001
   16     15p 31 lll evaloct77 howerton                   mod1 12/20/88              4015031
   17     82pb ornl evaljul71 c.y.fu and f.g.             mod2 01/04/89              6082000
   18     94pu239 lanl jun83 e.arthur p.you               mod2 02/28/89              1094239

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                1004309     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                2004309     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91       4024304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91       4026304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91       4028304     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            1006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            2006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas            4006012     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88            4014000     temperature=   293.00
                                                          process number 1007 is at temperature=   296.00

 25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88            4025055     temperature=   293.00

geometry has been set to homogeneous as lbar is  0.0000E+00

resonance data for this nuclide

mass number (a)          =    54.466              temperature(kelvin)       =   293.000

potential scatter sigma  =     3.801              lumped nuclear density    = 1.7407142E-03

spin factor (g)          =     0.000              lump dimension (a-bar)    = 0.0000000E+00

inner radius             = 0.0000000E+00          dancoff correction (c)    = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1    =    55.845              sigma(per absorber atom)= 3.4101929E+02
```

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 53.766 sigma(per absorber atom)= 1.2864024E+02

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res. scat
44	-2.573557E-05	0.000000E+00	-4.815655E-02
45	-1.291448E-04	0.000000E+00	-3.816337E-02
46	-1.606563E-04	0.000000E+00	-1.332381E-02
47	-1.056918E-04	0.000000E+00	-2.060706E-02
48	-4.179799E-05	0.000000E+00	-9.612578E-02
49	-1.779133E-04	0.000000E+00	-1.038285E-01
50	-2.606053E-04	0.000000E+00	-1.521462E-01
51	-6.117731E-05	0.000000E+00	-7.269186E-04
52	-2.276834E-04	0.000000E+00	-6.778821E-03
53	-4.136545E-04	0.000000E+00	-3.950535E-01
54	-9.016085E-04	0.000000E+00	-3.850810E-01
55	-1.889857E-03	0.000000E+00	-8.663202E-01
56	-1.682722E-04	0.000000E+00	-2.095040E-04
57	-8.006894E-04	0.000000E+00	-6.747544E-02
58	-5.832270E-03	0.000000E+00	-5.143185E+00
59	-6.111082E-03	0.000000E+00	-3.758587E+00
60	-3.959768E-03	0.000000E+00	-3.334263E-02
61	-1.836192E-06	0.000000E+00	-2.387732E-03
62	-4.381017E-04	0.000000E+00	-4.759451E-01
63	-9.039582E-03	0.000000E+00	-7.946639E+00
64	-1.435731E-02	0.000000E+00	-9.543545E+00
65	-4.290072E-03	0.000000E+00	-3.739039E+00
66	-1.355880E-02	0.000000E+00	-1.010358E+01
67	-2.306789E-04	0.000000E+00	-1.431424E-01
68	-3.245916E-06	0.000000E+00	-1.800902E-03
69	-3.050841E-03	0.000000E+00	-1.654186E-01
70	-2.155581E+00	0.000000E+00	-6.385146E+01
71	9.803476E-06	0.000000E+00	-9.597841E-04
72	-6.031858E-09	0.000000E+00	-1.791791E-06
73	-3.683254E-05	0.000000E+00	-4.341343E-03
74	-6.284016E+00	0.000000E+00	-3.027933E+02
75	-1.065459E-01	0.000000E+00	-4.692756E+00
76	-2.623990E-02	0.000000E+00	-1.060597E+00
77	-7.989248E-04	0.000000E+00	-2.867110E-02
78	-4.575271E-06	0.000000E+00	-1.544029E-04
79	-5.029187E-05	0.000000E+00	-1.677382E-03
80	-6.286984E-06	0.000000E+00	-2.025635E-04
81	-8.363011E-05	0.000000E+00	-2.566171E-03
82	-1.235011E-07	0.000000E+00	-2.377236E-06
83	-8.699079E-08	0.000000E+00	-1.242513E-06
84	6.870753E-08	0.000000E+00	3.754665E-06
85	7.176524E-07	0.000000E+00	1.973096E-06

excess resonance integrals

	resolved
absorption	3.13724E+00
fission	0.00000E+00

elapsed time 0.07 min.

process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 1008016 temperature= 293.00
process number 1007 is at temperature= 296.00

80 16 from version 6 evaluation 5008016 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 1001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 2001001 temperature= 293.00
process number 1007 is at temperature= 296.00

hydrogen in water 1301/1002 mod1 11/23/92 5001001 temperature= 293.00
process number 1007 is at temperature= 296.00

15p 31 111 evaloct77 howerton mod1 12/20/88 4015031 temperature= 293.00
process number 1007 is at temperature= 296.00

82pb ornl evaljul71 c.y.fu and f.g. mod2 01/04/89 6082000 temperature= 293.00
process number 1007 is at temperature= 296.00

94pu239 lanl jun83 e.arthur p.you mod2 02/28/89 1094239. temperature= 293.00

geometry has been set to homogeneous as 1bar is 0.0000E+00

resonance data for this nuclide

mass number (a) = 237.000 temperature(kelvin) = 293.000

potential scatter sigma = 10.200 lumped nuclear density = 7.1280971E-05

spin factor (g) = 0.000 lump dimension (a-bar) = 0.0000000E+00

inner radius = 0.0000000E+00 dancoff correction (c) = 0.0000000E+00

the absorber will be treated by the nordheim integral method.

mass of moderator-1 = 1.008 sigma(per absorber atom)= 2.2417098E+04

moderator-1 will be treated by the nordheim integral method.

mass of moderator-2 = 11.852 sigma(per absorber atom)= 2.7090425E+03

moderator-2 will be treated by the nordheim integral method.

this resonance material will be treated as a 0-dimensional object.

volume fraction of lump in cell used to account for spatial self-shielding=1.00000

group	res abs	res fiss	res scat
75	-2.385299E-02	-9.210398E-03	-3.956661E-03
76	-2.757302E-01	-9.470549E-02	-1.571738E-01
77	-8.647355E-02	-1.726685E-02	-1.625167E-02
78	-1.035638E-01	-1.542991E-02	-1.045283E-02
79	-2.814191E-01	-2.200259E-01	-4.226874E-02
80	-7.644377E-03	-2.721205E-03	-3.561559E-04
81	-1.954812E-01	-4.984603E-02	-7.936824E-02
82	-7.266368E-01	-3.556308E-01	-1.885321E-01
83	-1.357615E+00	-6.792760E-01	-3.380974E-01
84	-3.051483E-03	-1.151295E-03	-1.270129E-04
85	-5.397113E-01	-1.688279E-01	-8.081074E-02
86	-7.398949E-01	-1.464875E-01	-1.720813E-01
87	-5.618946E-01	-1.984001E-01	-7.074346E-02
88	-3.215428E-03	-3.065274E-03	-9.169931E-05
89	-2.515047E-03	-1.870335E-03	-1.015856E-03
90	-5.960176E+00	-4.104018E+00	-9.623337E-01
91	-3.866570E-04	-2.670601E-04	-6.159059E-05
92	-4.093186E+00	-1.968736E+00	-3.896473E-01
93	-1.690409E-02	-1.140151E-02	1.127611E-04
94	-9.292738E-01	-6.752577E-01	-2.540741E-02
95	-2.179727E-01	-1.539548E-01	-4.520857E-03
96	-9.457687E+00	-1.522997E+00	-1.760647E+00
97	-8.088687E-03	-3.139571E-03	-1.446857E-03
98	-1.180473E+00	-2.834633E-01	-6.742303E-02
99	-1.408010E-02	-1.207220E-02	-1.284424E-04
100	-1.281973E-01	-1.032700E-01	-2.454620E-03
101	-3.951828E-03	-2.269633E-03	-5.907824E-04
102	-6.813501E+00	-6.571039E-01	-9.486682E-01
103	-4.164883E-03	-6.612449E-04	-3.808783E-04
104	-3.510319E+00	-4.233526E-01	-2.575790E-01
105	-6.735827E-03	-9.182992E-04	4.868030E-04
106	-1.227202E-04	-2.682553E-05	6.888436E-05
107	-3.812539E-05	-9.758251E-06	2.652847E-05
108	-1.542921E-05	-3.522551E-06	5.205113E-06
109	-2.558850E-02	-2.479521E-03	5.321135E-04
110	4.844284E-03	4.661128E-04	-1.212829E-03
111	-8.723665E-05	-3.075578E-05	1.272329E-05
112	-2.390693E-04	-1.660179E-04	-2.135203E-05
113	-1.497920E-02	-1.063098E-02	-6.278454E-05
114	-1.137668E-03	-8.076322E-04	6.088832E-05
115	-7.077670E-05	-5.009154E-05	7.089067E-06
116	-1.550904E-03	-1.814805E-04	-1.048014E-04
117	-8.902971E-01	-4.510444E-01	-1.670160E-02
118	-6.326377E-02	-3.728315E-02	-3.634227E-03
119	-4.327128E+00	-2.589562E+00	-1.128338E-01
120	-3.729657E-04	-2.231434E-04	4.451532E-05
121	-1.672380E-04	-9.103662E-05	-2.051281E-05
122	-8.317231E-04	-4.041130E-04	-1.434298E-04
123	-4.313144E+00	-2.008188E+00	-1.001764E-01
124	-8.484269E-03	-7.347820E-03	2.678889E-05
125	-1.943815E-02	-1.507008E-02	-5.565911E-04
126	-1.206982E+01	-5.498854E+00	-3.041238E-01
127	-1.059545E+00	-6.769025E-01	-1.038757E-02
128	-2.038224E-03	-1.266752E-03	1.014989E-04
129	-3.008240E+00	-1.128384E+00	-5.801101E-02
130	-6.781765E+00	-2.548310E+00	-1.177365E-01
131	-6.176574E+00	-4.791058E+00	-6.526909E-02
132	-1.826639E-03	-1.389876E-03	8.353037E-05
133	-1.420803E-02	-7.612175E-03	-7.574783E-04
134	-7.797082E+00	-4.156498E+00	-8.421218E-02
135	-2.037278E-03	-1.090269E-03	1.021907E-04
136	-8.244347E-04	-4.430742E-04	5.462248E-05
137	-3.201010E-04	-1.735566E-04	2.750164E-05
138	-1.531423E-04	-8.404730E-05	1.600269E-05
139	-8.399432E-05	-4.668355E-05	1.024282E-05
140	-6.171209E-05	-3.420214E-05	1.136996E-05
141	-1.860887E-05	-1.082682E-05	3.299246E-06
142	-1.223359E-05	-7.267319E-06	2.289302E-06
143	-8.100013E-06	-4.901050E-06	1.728698E-06
144	-4.982776E-06	-3.107844E-06	1.056991E-06
145	-4.189451E-06	-2.639471E-06	8.998479E-07
146	-3.507428E-06	-2.232514E-06	7.618338E-07
147	-3.081022E-06	-1.976412E-06	6.680439E-07
148	-2.960772E-06	-1.903776E-06	6.415697E-07
149	-2.900121E-06	-1.867073E-06	6.281266E-07
150	-2.806715E-06	-1.810455E-06	6.073896E-07
151	-2.653508E-06	-1.718843E-06	5.725752E-07
152	-1.215307E-06	-9.429015E-07	2.136601E-07
153	-1.179816E-06	-9.153658E-07	2.061120E-07
154	-1.146856E-06	-8.897936E-07	1.989137E-07
155	-1.117799E-06	-8.672494E-07	1.923806E-07
156	-1.813600E-07	-1.407090E-07	3.117657E-08

excess resonance integrals

	resolved
absorption	3.13041E+02
fission	1.76207E+02

elapsed time 0.12 min.

process number 1007 is at temperature= 296.00

elapsed time 0.12 min.

```
this xsdrn working tape was created 06/20/05 at 07:02:15
the title of the parent case is as follows
scale - 238 neutron group library          based on endf-b version 5 data
  generated with a chi-1/e-maxwellian weight spectrum
    compiled for doe - 8/18/94          last updated - 5/16/2002
    tape id                            4321          number of nuclides                  18
    number of neutron groups            238          number of gamma groups               0
    first thermal group                 149          logical unit                         4
                                  table of contents
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   1004309
   Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002                    id   2004309
   24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91           id   4024304
   26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91           id   4026304
   28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91           id   4028304
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   1006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   2006012
  6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas                 id   4006012
   14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88                id   4014000
   25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88                id   4025055
   8O 16 from version 6 evaluation                                               id   1008016
   8O 16 from version 6 evaluation                                               id   5008016
   hydrogen in water 1301/1002    mod1   11/23/92                               id   1001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   2001001
   hydrogen in water 1301/1002    mod1   11/23/92                               id   5001001
   15p 31 lll evaloct77 howerton                    mod1 12/20/88                id   4015031
   82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89                id   6082000
   94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89                id   1094239

    tape copy used      0 i/o's, and took    3.65 seconds
```

```
kk          kk  eeeeeeeeeeeee  nn          nn  ooooooooooo                  vv          vv
kk        kk    eeeeeeeeeeeee  nnn         nn  oooooooooooo                 vv          vv
kk       kk     ee             nnnn        nn  oo         oo                vv          vv
kk      kk      ee             nn nn       nn  oo         oo                vv          vv
kk     kk       ee             nn   nn     nn  oo         oo                vv          vv
kkkkkkkk        eeeeeeeee      nn    nn    nn  oo         oo  -------------  vv          vv
kkkkkkkk        eeeeeeeee      nn     nn   nn  oo         oo  -------------   vv        vv
kk      kk      ee             nn      nn  nn  oo         oo                   vv     vv
kk       kk     ee             nn       nn nn  oo         oo                    vv   vv
kk        kk    ee             nn        nnnn  oo         oo                     vv vv
kk         kk   eeeeeeeeeeeee  nn         nnn  oooooooooooo                      vvv
kk          kk  eeeeeeeeeeeee  nn          nn  ooooooooooo                        v
```

```
 sssssssssss    ccccccccccc     aaaaaaaaa    ll            eeeeeeeeeeeee                 pppppppppppp    ccccccccccc
ssssssssssssss  cccccccccccccc   aaaaaaaaaaa  ll            eeeeeeeeeeeee                 pppppppppppppp  cccccccccccccc
ss         ss   cc         cc   aa         aa ll            ee                            pp        pp    cc         cc
ss              cc              aa         aa ll            ee                            pp        pp    cc
ss              cc              aa         aa ll            ee                            pp        pp    cc
ssssssssssss    cc              aaaaaaaaaaaaa ll            eeeeeeeee     -------------   pppppppppppppp  cc
 ssssssssssss   cc              aaaaaaaaaaaaa ll            eeeeeeeee     -------------   pppppppppppp    cc
          ss    cc              aa         aa ll            ee                            pp              cc
          ss    cc              aa         aa ll            ee                            pp              cc
ss        ss    cc         cc   aa         aa ll            ee                            pp              cc         cc
ssssssssssssss  cccccccccccccc   aa         aa llllllllllll  eeeeeeeeeeeee                 pp              cccccccccccccc
 ssssssssssss    ccccccccccc     aa         aa llllllllllll  eeeeeeeeeeeee                 pp               ccccccccccc
```

```
   0000000      666666666666            //   22222222222      0000000              //    0000000      5555555555555
  000000000    6666666666666            //   2222222222222    000000000           //    000000000    5555555555555
 00       00   66                      //    22          22   00       00        //    00       00   55
00         00  66                     //                22   00         00      //    00         00  55
00         00  66                    //                 22   00         00     //    00         00  55
00         00  666666666666         //                22    00         00    //    00         00  555555555555
00         00  6666666666666       //              22       00         00   //    00         00  5555555555555
00         00  66         66      //             22         00         00  //    00         00              55
00         00  66         66     //            22           00         00 //    00         00              55
 00       00   66         66    //            22             00       00  //     00       00   55          55
  000000000    6666666666666   //            2222222222222    000000000 //      000000000    5555555555555
   0000000      66666666666   //             2222222222222     0000000  //       0000000      55555555555
```

```
   0000000      7777777777777                  0000000      22222222222            22222222222   7777777777777
  000000000     777777777777                  000000000    2222222222222          2222222222222  777777777777
 00       00   77        77        :::       00       00  22         22    :::   22         22  77        77
00         00          77          :::      00         00           22   :::                22          77
00         00         77           :::      00         00           22   :::                22         77
00         00        77                     00         00          22                     22         77
00         00        77                     00         00         22                     22         77
00         00       77           :::       00         00       22          :::         22          77
00         00       77           :::       00         00     22            :::       22            77
 00       00       77            :::        00       00   22              :::     22              77
  000000000        77                        000000000   2222222222222              2222222222222  77
   0000000         77                         0000000    2222222222222              2222222222222  77
```

```
 sssssssssss     ccccccccccc      aaaaaaaaa     ll            eeeeeeeeeeeee                   pppppppppppp     ccccccccccc
ssssssssssssss   cccccccccccccc    aaaaaaaaaaa   ll            eeeeeeeeeeeee                   pppppppppppppp   cccccccccccccc
ss         ss    cc          cc   aa         aa  ll            ee                              pp         pp    cc          cc
ss               cc               aa         aa  ll            ee                              pp         pp    cc
ss               cc               aa         aa  ll            ee                              pp         pp    cc
ssssssssssss     cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------   pppppppppppppp    cc
 ssssssssssss    cc               aaaaaaaaaaaaa  ll            eeeeeeeee       -------------   pppppppppppp      cc
          ss     cc               aa         aa  ll            ee                              pp                cc
          ss     cc               aa         aa  ll            ee                              pp                cc
ss        ss     cc          cc   aa         aa  ll            ee                              pp                cc          cc
ssssssssssssss   cccccccccccccc   aa         aa  lllllllllllll eeeeeeeeeeeee                   pp                cccccccccccccc
 ssssssssssss     cccccccccccc    aa         aa  lllllllllllll eeeeeeeeeeeee                   pp                 cccccccccccc
```

program verification information

code system: scale-pc version: 4.4a

```
program:  o0o009
creation date:  11/18/1999
library:  c:\scale4.4a\bin
production code:  kenova
version:  4.4.0
jobname:  scale-pc
machine name:  NFA10385
date of execution:  20_jun_2005
time of execution:  07:02:27.60
```

```
*****************************************************************************************************
***                                                                                                 ***
***                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100      ***
***                                                                                                 ***
*****************************************************************************************************
***                        ******      numeric parameters      ******                               ***
***                                                                                                 ***
***                                                                                                 ***
***          tme     maximum problem time (min)                          120.00                     ***
***                                                                                                 ***
***          tba     time per generation (min)                             5.00                     ***
***                                                                                                 ***
***          gen     number of generations                                 1000                     ***
***                                                                                                 ***
***          npg     number per generation                                 1000                     ***
***                                                                                                 ***
***          nsk     number of generations to be skipped                     50                     ***
***                                                                                                 ***
***          beg     beginning generation number                              1                     ***
***                                                                                                 ***
***          res     generations between checkpoints                          0                     ***
***                                                                                                 ***
***          x1d     number of extra 1-d cross sections                       1                     ***
***                                                                                                 ***
***          nbk     neutron bank size                                     1025                     ***
***                                                                                                 ***
***          xnb     extra positions in neutron bank                          0                     ***
***                                                                                                 ***
***          nfb     fission bank size                                     1000                     ***
***                                                                                                 ***
***          xfb     extra positions in fission bank                          0                     ***
***                                                                                                 ***
***          wta     default value of weight average                     0.5000                     ***
***                                                                                                 ***
***          wth     weight high for splitting                           3.0000                     ***
***                                                                                                 ***
***          wtl     weight low for russian roulette                     0.3333                     ***
***                                                                                                 ***
***          rnd     starting random number                        BB827100001                      ***
***                                                                                                 ***
***          nb8     number of d.a. blocks on unit  8                      200                     ***
***                                                                                                 ***
***          nl8     length of d.a. blocks on unit  8                      512                     ***
***                                                                                                 ***
***          adj     mode of calculation                               forward                     ***
***                                                                                                 ***
***                  input data written on restart unit                     no                     ***
***                                                                                                 ***
***                  binary data interface                                 yes                     ***
***                                                                                                 ***
***                                                                                                 ***
*****************************************************************************************************
*****************************************************************************************************
```

```
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***                                case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100      ***
***                                                                                                           ***
*****************************************************************************************************************
***                                  ******      logical parameters        ******                             ***
***                                                                                                           ***
***  run  execute problem after checking data    yes          plt  plot picture map(s)                    yes ***
***                                                                                                           ***
***  flx  compute flux                            no          fdn  compute fission densities               no ***
***                                                                                                           ***
***  smu  compute avg unit self-multiplication    no          nub  compute nu-bar & avg fission group     yes ***
***                                                                                                           ***
***  mku  compute matrix k-eff by unit number     no          mkp  compute matrix k-eff by unit location   no ***
***                                                                                                           ***
***  cku  compute cofactor k-eff by unit number   no          ckp  compute cofactor k-eff by unit location  no ***
***                                                                                                           ***
***  fmu  print fiss prod matrix by unit number   no          fmp  print fiss prod matrix by unit location  no ***
***                                                                                                           ***
***  mkh  compute matrix k-eff by hole number     no          mka  compute matrix k-eff by array number    no ***
***                                                                                                           ***
***  ckh  compute cofactor k-eff by hole number   no          cka  compute cofactor k-eff by array number  no ***
***                                                                                                           ***
***  fmh  print fiss prod matrix by hole number   no          fma  print fiss prod matrix by array number  no ***
***                                                                                                           ***
***  hhl  collect matrix by highest hole level    no          hal  collect matrix by highest array level   no ***
***                                                                                                           ***
***  amx  print all mixed cross sections          no          far  print fis. and abs. by region           no ***
***                                                                                                           ***
***  xs1  print 1-d mixture x-sections            no          gas  print far by group                      no ***
***                                                                                                           ***
***  xs2  print 2-d mixture x-sections            no          pax  print xsec-albedo correlation tables    no ***
***                                                                                                           ***
***  xap  print mixture angles & probabilities    no          pwt  print weight average array              no ***
***                                                                                                           ***
***  pki  print fission spectrum                  no          pgm  print input geometry                    no ***
***                                                                                                           ***
***  p1d  print extra 1-d cross sections          no          bug  print debug information                 no ***
***                                                                                                           ***
***                                                           trk  print tracking information              no ***
***                                                                                                           ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
*****************************************************************************************************************
                                    parameter input completed

                        ........    0 io's were used reading the parameter data      ........

                        *************** data reading completed ***************
```

```
*****************************************************************************************************************
***                                                                                                           ***
***                          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100          ***
***                                                                                                           ***
*****************************************************************************************************************
*****************************************************************************************************************
***                                                                                                           ***
***          unit                                                   volume                                    ***
***         number              data set name                        name        unit function              ***
***         ------              -------------                        ----        -------------              ***
***                                                                                                           ***
***      xsc  14     C:\scale4.4a\tmpdir\ft14f001                                mixed cross sections       ***
***                                                                                                           ***
***      alb  79     C:\scale4.4a\data\ft79f001                                  input albedos              ***
***                                                                                                           ***
***      wts  80     C:\scale4.4a\data\ft80f001                                  input weights              ***
***                                                                                                           ***
***      skt  16      unknown                                                    write scratch data         ***
***                                                                                                           ***
***      bin  95     C:\scale4.4a\tmpdir\ft95f001                                binary input data          ***
***                                                                                                           ***
***      rst  95     C:\scale4.4a\tmpdir\ft95f001                                read restart data          ***
***                                                                                                           ***
***      lib   4     C:\scale4.4a\tmpdir\ft04f001                                input ampx working library ***
***                                                                                                           ***
***            8     C:\scale4.4a\tmpdir\ft08f001                                input data direct access   ***
***                                                                                                           ***
***            9      unknown                                                    super grouped direct access ***
***                                                                                                           ***
***           10      unknown                                                    xsec mixing direct access  ***
***                                                                                                           ***
*****************************************************************************************************************

                    ........    0 io's were used preparing input data    ........


                     cross sections read from the ampx working library on unit    4
```

```
                    case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

                                mixing table

                        number of scattering angles =  2
                    cross section message threshold =3.0E-05


mixture =     1          density(g/cc) = 0.95919
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   1001001  7.84026E-02  1.36769E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   1004309  1.23442E-03  1.92597E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   1006012  3.92054E-02  8.14472E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   1008016  0.00000E+00  0.00000E+00    8016    15.9904      8O 16 from version 6 evaluation
   1094239  7.12810E-05  2.94994E-02   94239   239.0526      94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

mixture =     2          density(g/cc) = 0.93226
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   2001001  7.85246E-02  1.40939E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   2004309  1.23621E-03  1.98448E-02    4009     9.0124      Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
   2006012  3.92623E-02  8.39216E-01    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas

mixture =     4          density(g/cc) =  7.9400
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   4006012  3.18772E-04  8.00006E-04    6000    12.0001     6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
   4014000  1.70252E-03  9.99998E-03   14000    28.0853      14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
   4015031  6.94680E-05  4.50000E-04   15031    30.9741      15p 31 lll evaloct77 howerton                    mod1 12/20/88
   4024304  1.74726E-02  1.90000E-01   24000    51.9957      24CR BNL EVALDEC77 A.PRINCE AND T.   (1/esigtSS304)  MOD2 11/18/91
   4025055  1.74071E-03  1.99999E-02   25055    54.9379      25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
   4026304  5.85446E-02  6.83750E-01   26000    55.8447      26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
   4028304  7.74020E-03  9.50001E-02   28000    58.6872      28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91

mixture =     5          density(g/cc) = 0.99817
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   5001001  6.67692E-02  1.11927E-01    1001     1.0077      hydrogen in water 1301/1002    mod1   11/23/92
   5008016  3.33846E-02  8.88074E-01    8016    15.9904      8O 16 from version 6 evaluation

mixture =     6          density(g/cc) =  11.344
   nuclide   atom-dens.   wgt. frac.     za      awt              nuclide title
   6082000  3.29690E-02  1.00000E+00   82000   207.2100      82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89


                        1004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                        2004309     Be-metal (1304/1064) w/o neg P0 thermal values 05/15/2002
                        4024304     24CR BNL EVALDEC77 A.PRINCE AND T.    (1/esigtSS304)  MOD2 11/18/91
                        4026304     26FE 0 ORNL EVALOCT77 C.Y.FU F.G.PE  (1/esigtSS304)   MOD3 11/18/91
                        4028304     28NI 0 BNL NNDC EVALMAR77 M.DIVADEENAM (1/esigtSS304) MOD2 11/18/91
                        1006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                        2006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                        4006012    6c ornl evaldec73 c.y.fu and f.g. perey mod2 12/11/92 free gas
                        4014000     14si 0 ornl evalfeb74 larson perey dr            mod3 12/20/88
                        4025055     25mn 55 bnl evalmar77 s.f. mughabghab            mod2 12/20/88
                        1008016     8O 16 from version 6 evaluation
                        5008016     8O 16 from version 6 evaluation
                        1001001     hydrogen in water 1301/1002    mod1   11/23/92
                        2001001     hydrogen in water 1301/1002    mod1   11/23/92
                        5001001     hydrogen in water 1301/1002    mod1   11/23/92
                        4015031     15p 31 lll evaloct77 howerton                    mod1 12/20/88
                        6082000     82pb ornl evaljul71 c.y.fu and f.g.              mod2 01/04/89
                        1094239     94pu239 lanl jun83 e.arthur p.you                mod2 02/28/89

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   51 to group   87
            2 moments were accepted
         the legendre expansion of the cross section (p0-pn) is
      1.360068E-04   5.585595E-06  -6.765928E-05  -8.354783E-06
         the moments corresponding to this distribution are
      4.106851E-02   1.686761E-03   6.943779E-05
         the moments corresponding to the generated distribution are
      4.106851E-02   1.686761E-03   6.939694E-05
         the legendre expansion corresponding to these moments is
      1.360068E-04   5.585595E-06  -6.765928E-05  -8.354797E-06
         the weights/angles for this distribution are
      9.999998E-01   2.107397E-07
      4.106833E-02   8.529458E-01
         the moments corresponding to this distribution are
      4.106851E-02   1.686761E-03   6.939694E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   61 to group  114
            2 moments were accepted. the p0 coefficient is  1.16534E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   64 to group  155
            2 moments were accepted. the p0 coefficient is  3.30005E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  136
            2 moments were accepted
         the legendre expansion of the cross section (p0-pn) is
      9.922943E-05   5.492181E-06  -4.915870E-05  -8.196132E-06
         the moments corresponding to this distribution are
      5.534830E-02   3.063697E-03   1.698665E-04
         the moments corresponding to the generated distribution are
      5.534830E-02   3.063697E-03   1.698280E-04
         the legendre expansion corresponding to these moments is
      9.922943E-05   5.492181E-06  -4.915870E-05  -8.196142E-06
         the weights/angles for this distribution are
      9.999997E-01   3.455747E-07
      5.534800E-02   9.265408E-01
         the moments corresponding to this distribution are
      5.534830E-02   3.063697E-03   1.698280E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   65 to group  139
            2 moments were accepted
         the legendre expansion of the cross section (p0-pn) is
      9.922987E-05   5.183944E-06  -4.920871E-05  -7.740550E-06
         the moments corresponding to this distribution are
```

```
5.224177E-02   2.729202E-03   1.425598E-04
     the moments corresponding to the generated distribution are
5.224177E-02   2.729202E-03   1.425784E-04
     the legendre expansion corresponding to these moments is
9.922987E-05   5.183944E-06  -4.920871E-05  -7.740546E-06
     the weights/angles for this distribution are
9.999999E-01   1.490331E-07
5.224177E-02  -7.807062E-09
     the moments corresponding to this distribution are
5.224177E-02   2.729202E-03   1.425784E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   68 to group  152
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
5.845354E-05   2.468909E-06  -2.907035E-05  -3.692360E-06
     the moments corresponding to this distribution are
4.223711E-02   1.784026E-03   7.529677E-05
     the moments corresponding to the generated distribution are
4.223711E-02   1.784026E-03   7.530574E-05
     the legendre expansion corresponding to these moments is
5.845354E-05   2.468909E-06  -2.907035E-05  -3.692358E-06
     the weights/angles for this distribution are
9.999999E-01   5.788208E-08
4.223716E-02  -9.155501E-01
     the moments corresponding to this distribution are
4.223711E-02   1.784026E-03   7.530574E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   72 to group  207
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
3.295472E-05   7.360612E-07  -1.645270E-05  -1.103169E-06
     the moments corresponding to this distribution are
2.233553E-02   4.989039E-04   1.120043E-05
     the moments corresponding to the generated distribution are
2.233553E-02   4.989039E-04   1.114391E-05
     the legendre expansion corresponding to these moments is
3.295472E-05   7.360612E-07  -1.645270E-05  -1.103174E-06
     the weights/angles for this distribution are
9.999440E-01   5.601687E-05
2.233678E-02  -1.251931E-06
     the moments corresponding to this distribution are
2.233553E-02   4.989039E-04   1.114391E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   72 to group  215
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
3.295472E-05   4.696815E-07  -1.646732E-05  -7.042802E-07
     the moments corresponding to this distribution are
1.425233E-02   2.031604E-04   2.937841E-06
     the moments corresponding to the generated distribution are
1.425233E-02   2.031604E-04   2.917117E-06
     the legendre expansion corresponding to these moments is
3.295472E-05   4.696815E-07  -1.646732E-05  -7.042819E-07
     the weights/angles for this distribution are
9.999999E-01   7.301952E-08
1.425228E-02   6.712740E-01
     the moments corresponding to this distribution are
1.425233E-02   2.031604E-04   2.917117E-06

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  193
          1 moments were accepted. the p0 coefficient is  7.56342E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  194
          1 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.512684E-04   8.242447E-06  -7.496051E-05  -1.230249E-05
     the moments corresponding to this distribution are
5.448889E-02   2.969032E-03   1.617688E-04
     the moments corresponding to the generated distribution are
5.448889E-02   2.969047E-03   1.617766E-04
     the legendre expansion corresponding to these moments is
1.512684E-04   8.242447E-06  -7.496051E-05  -1.230249E-05
     the weights/angles for this distribution are
1.000000E+00   2.507237E-08
5.448891E-02  -5.058179E-01
     the moments corresponding to this distribution are
5.448889E-02   2.969047E-03   1.617766E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  195
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.512688E-04   8.003475E-06  -7.499920E-05  -1.194916E-05
     the moments corresponding to this distribution are
5.290896E-02   2.799456E-03   1.482235E-04
     the moments corresponding to the generated distribution are
5.290896E-02   2.799456E-03   1.482169E-04
     the legendre expansion corresponding to these moments is
1.512688E-04   8.003475E-06  -7.499920E-05  -1.194916E-05
     the weights/angles for this distribution are
9.999999E-01   1.182015E-07
5.290885E-02   9.664681E-01
     the moments corresponding to this distribution are
5.290896E-02   2.799456E-03   1.482169E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  200
          1 moments were accepted. the p0 coefficient is  7.56346E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  201
          2 moments were accepted
     the legendre expansion of the cross section (p0-pn) is
1.512684E-04   6.681387E-06  -7.519150E-05  -9.989446E-06
     the moments corresponding to this distribution are
4.416909E-02   1.951018E-03   8.629500E-05
     the moments corresponding to the generated distribution are
4.416909E-02   1.951018E-03   8.628377E-05
```

```
        the legendre expansion corresponding to these moments is
    1.512684E-04   6.681387E-06  -7.519150E-05  -9.989451E-06
        the weights/angles for this distribution are
    9.999999E-01   1.341742E-07
    4.416897E-02   9.489016E-01
        the moments corresponding to this distribution are
    4.416909E-02   1.951018E-03   8.628377E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   75 to group  212
            1 moments were accepted. the p0 coefficient is  7.56342E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   77 to group  209
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    9.939643E-05   3.560023E-06  -4.950694E-05  -5.328585E-06
        the moments corresponding to this distribution are
    3.581641E-02   1.282928E-03   4.607525E-05
        the moments corresponding to the generated distribution are
    3.581641E-02   1.282928E-03   4.605795E-05
        the legendre expansion corresponding to these moments is
    9.939643E-05   3.560023E-06  -4.950694E-05  -5.328589E-06
        the weights/angles for this distribution are
    9.999999E-01   1.431058E-07
    3.581628E-02   9.232528E-01
        the moments corresponding to this distribution are
    3.581641E-02   1.282928E-03   4.605795E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   77 to group  213
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    9.939687E-05   2.874672E-06  -4.957373E-05  -4.305994E-06
        the moments corresponding to this distribution are
    2.892116E-02   8.364443E-04   2.420439E-05
        the moments corresponding to the generated distribution are
    2.892116E-02   8.364443E-04   2.420011E-05
        the legendre expansion corresponding to these moments is
    9.939687E-05   2.874672E-06  -4.957373E-05  -4.305995E-06
        the weights/angles for this distribution are
    1.000000E+00   1.824729E-08
    2.892114E-02   8.052593E-01
        the moments corresponding to this distribution are
    2.892116E-02   8.364443E-04   2.420011E-05

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   79 to group  185
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    4.462450E-05   3.227742E-06  -2.196205E-05  -4.799385E-06
        the moments corresponding to this distribution are
    7.233116E-02   5.231873E-03   3.785181E-04
        the moments corresponding to the generated distribution are
    7.233116E-02   5.231873E-03   3.784999E-04
        the legendre expansion corresponding to these moments is
    4.462450E-05   3.227742E-06  -2.196205E-05  -4.799387E-06
        the weights/angles for this distribution are
    9.999999E-01   1.165418E-07
    7.233107E-02   8.800397E-01
        the moments corresponding to this distribution are
    7.233116E-02   5.231873E-03   3.784999E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   80 to group  172
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    1.178681E-04   9.435706E-06  -5.780096E-05  -1.400233E-05
        the moments corresponding to this distribution are
    8.005312E-02   6.408672E-03   5.132314E-04
        the moments corresponding to the generated distribution are
    8.005312E-02   6.408672E-03   5.132039E-04
        the legendre expansion corresponding to these moments is
    1.178681E-04   9.435706E-06  -5.780096E-05  -1.400233E-05
        the weights/angles for this distribution are
    9.999998E-01   2.411108E-07
    8.005292E-02   9.192606E-01
        the moments corresponding to this distribution are
    8.005312E-02   6.408672E-03   5.132039E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   80 to group  206
            1 moments were accepted. the p0 coefficient is  1.17866E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   84 to group  160
            2 moments were accepted. the p0 coefficient is  4.80351E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   88 to group  218
            2 moments were accepted
        the legendre expansion of the cross section (p0-pn) is
    1.101527E-04   3.568054E-06  -5.490298E-05  -5.342704E-06
        the moments corresponding to this distribution are
    3.239189E-02   1.049280E-03   3.405093E-05
        the moments corresponding to the generated distribution are
    3.239189E-02   1.049280E-03   3.401919E-05
        the legendre expansion corresponding to these moments is
    1.101527E-04   3.568054E-06  -5.490298E-05  -5.342712E-06
        the weights/angles for this distribution are
    9.999999E-01   1.188209E-07
    3.239182E-02   6.507331E-01
        the moments corresponding to this distribution are
    3.239189E-02   1.049280E-03   3.401919E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   89 to group  148
            2 moments were accepted. the p0 coefficient is  5.72026E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   90 to group  169
            2 moments were accepted. the p0 coefficient is  6.02460E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group   96 to group  219
            2 moments were accepted
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            the legendre expansion of the cross section (p0-pn) is
      1.689041E-04   6.371202E-06  -8.409157E-05  -9.534129E-06
            the moments corresponding to this distribution are
      3.772082E-02   1.422877E-03   5.369711E-05
            the moments corresponding to the generated distribution are
      3.772082E-02   1.422877E-03   5.368079E-05
            the legendre expansion corresponding to these moments is
      1.689041E-04   6.371202E-06  -8.409157E-05  -9.534137E-06
            the weights/angles for this distribution are
      9.999999E-01   7.663119E-08
      3.772079E-02   4.983903E-01
            the moments corresponding to this distribution are
      3.772082E-02   1.422877E-03   5.368079E-05

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  103 to group  206
              2 moments were accepted. the p0 coefficient is  5.16455E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  103 to group  208
              1 moments were accepted. the p0 coefficient is  5.16455E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  104 to group  205
              1 moments were accepted. the p0 coefficient is  5.34615E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  114 to group  192
              2 moments were accepted. the p0 coefficient is  7.08104E-04

k5-64  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  130 to group  175
              1 moments were accepted. the p0 coefficient is  7.62512E-04

k5-60  the angular scattering distribution for mixture    1 has bad moments for the transfer from group  149 to group  149
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      3.407601E-02   3.271182E-02   3.028350E-02   2.744889E-02
            the moments corresponding to this distribution are
      9.599663E-01   9.258029E-01   8.981876E-01
            the moments corresponding to the generated distribution are
      9.599663E-01   9.258029E-01   8.951109E-01
            the legendre expansion corresponding to these moments is
      3.407601E-02   3.271182E-02   3.028350E-02   2.718679E-02
            the weights/angles for this distribution are
      9.781216E-01   2.187844E-02
      9.697366E-01   5.231625E-01
            the moments corresponding to this distribution are
      9.599663E-01   9.258029E-01   8.951109E-01

keno message number k5-222     142 transfers for mixture     1 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   17 to group   73
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
            the moments corresponding to this distribution are
      2.103383E-02   4.424545E-04   9.340116E-06
            the moments corresponding to the generated distribution are
      2.103383E-02   4.424545E-04   9.338884E-06
            the legendre expansion corresponding to these moments is
      6.652910E-05   1.399362E-06  -3.322040E-05  -2.097490E-06
            the weights/angles for this distribution are
      1.000000E+00   3.506203E-08
      2.103380E-02   9.809266E-01
            the moments corresponding to this distribution are
      2.103383E-02   4.424545E-04   9.338884E-06

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   31 to group   67
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      3.020880E-04   1.552948E-05  -1.498463E-04  -2.319124E-05
            the moments corresponding to this distribution are
      5.140713E-02   2.643117E-03   1.363483E-04
            the moments corresponding to the generated distribution are
      5.140713E-02   2.643117E-03   1.362936E-04
            the legendre expansion corresponding to these moments is
      3.020880E-04   1.552948E-05  -1.498463E-04  -2.319128E-05
            the weights/angles for this distribution are
      9.999995E-01   5.426291E-07
      5.140665E-02   9.355055E-01
            the moments corresponding to this distribution are
      5.140713E-02   2.643117E-03   1.362936E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   36 to group   75
              1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      3.436553E-05   8.753364E-07  -1.714932E-05  -1.311583E-06
            the moments corresponding to this distribution are
      2.547135E-02   6.487885E-04   1.654347E-05
            the moments corresponding to the generated distribution are
      2.547135E-02   6.487908E-04   1.652561E-05
            the legendre expansion corresponding to these moments is
      3.436553E-05   8.753364E-07  -1.714932E-05  -1.311585E-06
            the weights/angles for this distribution are
      9.999982E-01   1.759111E-06
      2.547139E-02  -4.483616E-08
            the moments corresponding to this distribution are
      2.547135E-02   6.487908E-04   1.652561E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   86
              1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.550883E-04   6.403348E-06  -7.714756E-05  -9.577728E-06
            the moments corresponding to this distribution are
      4.128841E-02   1.704733E-03   7.039822E-05
            the moments corresponding to the generated distribution are
      4.128841E-02   1.704733E-03   7.038573E-05
            the legendre expansion corresponding to these moments is
      1.550883E-04   6.403348E-06  -7.714756E-05  -9.577732E-06
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            the weights/angles for this distribution are
        9.999999E-01   1.260091E-07
        4.128842E-02  -5.211604E-09
            the moments corresponding to this distribution are
        4.128841E-02   1.704733E-03   7.038573E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   50 to group   91
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        6.978938E-05   2.469208E-06  -3.476364E-05  -3.696076E-06
            the moments corresponding to this distribution are
        3.538085E-02   1.251836E-03   4.433614E-05
            the moments corresponding to the generated distribution are
        3.538085E-02   1.251836E-03   4.431055E-05
            the legendre expansion corresponding to these moments is
        6.978938E-05   2.469208E-06  -3.476364E-05  -3.696081E-06
            the weights/angles for this distribution are
        9.999999E-01   1.014716E-07
        3.538080E-02   5.900701E-01
            the moments corresponding to this distribution are
        3.538085E-02   1.251836E-03   4.431055E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   51 to group   87
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.360841E-04   5.588769E-06  -6.769771E-05  -8.359530E-06
            the moments corresponding to this distribution are
        4.106850E-02   1.686766E-03   6.943713E-05
            the moments corresponding to the generated distribution are
        4.106850E-02   1.686766E-03   6.940783E-05
            the legendre expansion corresponding to these moments is
        1.360841E-04   5.588769E-06  -6.769771E-05  -8.359540E-06
            the weights/angles for this distribution are
        9.999998E-01   1.956027E-07
        4.106834E-02   8.979992E-01
            the moments corresponding to this distribution are
        4.106850E-02   1.686766E-03   6.940783E-05

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   65 to group  101
                1 moments were accepted. the p0 coefficient is  7.14843E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   68 to group  107
                2 moments were accepted. the p0 coefficient is  6.43298E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   75 to group  194
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.513644E-04   8.247675E-06  -7.500807E-05  -1.231030E-05
            the moments corresponding to this distribution are
        5.448889E-02   2.969040E-03   1.617684E-04
            the moments corresponding to the generated distribution are
        5.448889E-02   2.969040E-03   1.617797E-04
            the legendre expansion corresponding to these moments is
        1.513644E-04   8.247675E-06  -7.500807E-05  -1.231029E-05
            the weights/angles for this distribution are
        9.999997E-01   2.777653E-07
        5.448890E-02  -1.518020E-08
            the moments corresponding to this distribution are
        5.448889E-02   2.969040E-03   1.617797E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   77 to group  209
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        9.945100E-05   3.561977E-06  -4.953412E-05  -5.331510E-06
            the moments corresponding to this distribution are
        3.581641E-02   1.282931E-03   4.607786E-05
            the moments corresponding to the generated distribution are
        3.581641E-02   1.282931E-03   4.606247E-05
            the legendre expansion corresponding to these moments is
        9.945100E-05   3.561977E-06  -4.953412E-05  -5.331513E-06
            the weights/angles for this distribution are
        9.999999E-01   1.439254E-07
        3.581628E-02   9.337027E-01
            the moments corresponding to this distribution are
        3.581641E-02   1.282931E-03   4.606247E-05

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   80 to group  172
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
            the moments corresponding to this distribution are
        8.005312E-02   6.408680E-03   5.132358E-04
            the moments corresponding to the generated distribution are
        8.005312E-02   6.408680E-03   5.132162E-04
            the legendre expansion corresponding to these moments is
        1.179152E-04   9.439483E-06  -5.782409E-05  -1.400793E-05
            the weights/angles for this distribution are
        9.999998E-01   2.368696E-07
        8.005292E-02   9.445136E-01
            the moments corresponding to this distribution are
        8.005312E-02   6.408680E-03   5.132162E-04

k5-64  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   82 to group  162
                2 moments were accepted. the p0 coefficient is  6.66650E-04

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group   98 to group  214
                2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
        4.471841E-04   2.551503E-05  -2.214081E-04  -3.806459E-05
            the moments corresponding to this distribution are
        5.705712E-02   3.255749E-03   1.860170E-04
            the moments corresponding to the generated distribution are
        5.705712E-02   3.255749E-03   1.860059E-04
            the legendre expansion corresponding to these moments is
        4.471841E-04   2.551503E-05  -2.214081E-04  -3.806460E-05
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            the weights/angles for this distribution are
      9.999997E-01   2.774108E-07
      5.705686E-02   9.762922E-01
            the moments corresponding to this distribution are
      5.705712E-02   3.255749E-03   1.860059E-04

k5-64 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  100 to group  190
              2 moments were accepted. the p0 coefficient is  4.68299E-04

k5-64 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  104 to group  205
              1 moments were accepted. the p0 coefficient is  5.35149E-04

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  105 to group  210
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      5.537484E-04   4.469354E-05  -2.714633E-04  -6.631247E-05
            the moments corresponding to this distribution are
      8.071091E-02   6.514266E-03   5.257494E-04
            the moments corresponding to the generated distribution are
      8.071091E-02   6.514266E-03   5.257672E-04
            the legendre expansion corresponding to these moments is
      5.537484E-04   4.469354E-05  -2.714633E-04  -6.631245E-05
            the weights/angles for this distribution are
      9.999999E-01   6.184942E-08
      8.071094E-02  -4.163174E-01
            the moments corresponding to this distribution are
      8.071091E-02   6.514266E-03   5.257672E-04

k5-64 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  192
              2 moments were accepted. the p0 coefficient is  7.08334E-04

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  114 to group  207
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      7.083302E-04   7.331732E-05  -3.427817E-04  -1.080120E-04
            the moments corresponding to this distribution are
      1.035073E-01   1.071382E-02   1.109050E-03
            the moments corresponding to the generated distribution are
      1.035073E-01   1.071382E-02   1.109007E-03
            the legendre expansion corresponding to these moments is
      7.083302E-04   7.331732E-05  -3.427817E-04  -1.080121E-04
            the weights/angles for this distribution are
      9.999998E-01   2.029094E-07
      1.035072E-01   6.642933E-01
            the moments corresponding to this distribution are
      1.035073E-01   1.071382E-02   1.109007E-03

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  122 to group  229
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      4.760356E-05   6.498871E-07  -2.378847E-05  -9.745249E-07
            the moments corresponding to this distribution are
      1.365207E-02   1.863943E-04   2.568987E-06
            the moments corresponding to the generated distribution are
      1.365207E-02   1.863943E-04   2.551278E-06
            the legendre expansion corresponding to these moments is
      4.760356E-05   6.498871E-07  -2.378847E-05  -9.745271E-07
            the weights/angles for this distribution are
      9.999999E-01   9.257298E-08
      1.365203E-02   4.196166E-01
            the moments corresponding to this distribution are
      1.365207E-02   1.863943E-04   2.551278E-06

k5-64 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  130 to group  175
              2 moments were accepted. the p0 coefficient is  7.62811E-04

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  144 to group  230
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
            the moments corresponding to this distribution are
      2.667994E-02   7.118417E-04   1.901619E-05
            the moments corresponding to the generated distribution are
      2.667994E-02   7.118417E-04   1.901414E-05
            the legendre expansion corresponding to these moments is
      1.155486E-04   3.082828E-06  -5.765090E-05  -4.618749E-06
            the weights/angles for this distribution are
      1.000000E+00   2.632260E-08
      2.667991E-02   9.547741E-01
            the moments corresponding to this distribution are
      2.667994E-02   7.118417E-04   1.901414E-05

k5-64 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  147 to group  177
              2 moments were accepted. the p0 coefficient is  2.87948E-03

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  149 to group  149
              1 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      3.392408E-02   3.268915E-02   3.028554E-02   2.745581E-02
            the moments corresponding to this distribution are
      9.635975E-01   9.284965E-01   9.018909E-01
            the moments corresponding to the generated distribution are
      9.635975E-01   9.285436E-01   8.947650E-01
            the legendre expansion corresponding to these moments is
      3.392408E-02   3.268915E-02   3.028794E-02   2.685146E-02
            the weights/angles for this distribution are
      9.999746E-01   2.536909E-05
      9.636219E-01  -3.422353E-04
            the moments corresponding to this distribution are
      9.635975E-01   9.285436E-01   8.947650E-01

k5-60 the angular scattering distribution for mixture    2 has bad moments for the transfer from group  150 to group  150
              2 moments were accepted
            the legendre expansion of the cross section (p0-pn) is
      5.160285E-02   4.909516E-02   4.461168E-02   3.940127E-02
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          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.762618E-01
          the moments corresponding to the generated distribution are
     9.514041E-01   9.096799E-01   8.714495E-01
          the legendre expansion corresponding to these moments is
     5.160285E-02   4.909516E-02   4.461168E-02   3.878044E-02
          the weights/angles for this distribution are
     9.870113E-01   1.298868E-02
     9.591081E-01   3.659778E-01
          the moments corresponding to this distribution are
     9.514041E-01   9.096799E-01   8.714495E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  151 to group  151
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.254969E-02   4.995038E-02   4.532984E-02   3.997005E-02
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.745673E-01
          the moments corresponding to the generated distribution are
     9.505360E-01   9.084061E-01   8.704781E-01
          the legendre expansion corresponding to these moments is
     5.254969E-02   4.995038E-02   4.532984E-02   3.943283E-02
          the weights/angles for this distribution are
     9.790505E-01   2.094948E-02
     9.607624E-01   4.726190E-01
          the moments corresponding to this distribution are
     9.505360E-01   9.084061E-01   8.704781E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  152 to group  152
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.445168E-02   5.164695E-02   4.673397E-02   4.110458E-02
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.710476E-01
          the moments corresponding to the generated distribution are
     9.484915E-01   9.055100E-01   8.682405E-01
          the legendre expansion corresponding to these moments is
     5.445168E-02   5.164695E-02   4.673397E-02   4.072245E-02
          the weights/angles for this distribution are
     9.456984E-01   5.430165E-02
     9.668567E-01   6.286492E-01
          the moments corresponding to this distribution are
     9.484915E-01   9.055100E-01   8.682405E-01

k5-60  the angular scattering distribution for mixture    2 has bad moments for the transfer from group  153 to group  153
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     5.650781E-02   5.348388E-02   4.824280E-02   4.225094E-02
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.669722E-01
          the moments corresponding to the generated distribution are
     9.464864E-01   9.024911E-01   8.656703E-01
          the legendre expansion corresponding to these moments is
     5.650781E-02   5.348388E-02   4.824280E-02   4.206703E-02
          the weights/angles for this distribution are
     8.593679E-01   1.406321E-01
     9.794865E-01   7.448307E-01
          the moments corresponding to this distribution are
     9.464864E-01   9.024911E-01   8.656703E-01

keno message number k5-222     149 transfers for mixture     2 were corrected for bad moments.

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   25 to group   63
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947598E-05
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764563E-04
          the moments corresponding to the generated distribution are
     5.606000E-02   3.142957E-03   1.764250E-04
          the legendre expansion corresponding to these moments is
     3.523775E-04   1.975428E-05  -1.745275E-04  -2.947601E-05
          the weights/angles for this distribution are
     9.999997E-01   3.036038E-07
     5.605973E-02   9.328158E-01
          the moments corresponding to this distribution are
     5.606000E-02   3.142957E-03   1.764250E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   46 to group   75
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867983E-05
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.099896E-04
          the moments corresponding to the generated distribution are
     5.944100E-02   3.533259E-03   2.100019E-04
          the legendre expansion corresponding to these moments is
     2.107464E-04   1.252698E-05  -1.042563E-04  -1.867982E-05
          the weights/angles for this distribution are
     1.000000E+00   3.845905E-08
     5.944103E-02  -7.662296E-01
          the moments corresponding to this distribution are
     5.944100E-02   3.533259E-03   2.100019E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   50 to group   91
            2 moments were accepted
          the legendre expansion of the cross section (p0-pn) is
     7.176521E-05   2.539114E-06  -3.574785E-05  -3.800717E-06
          the moments corresponding to this distribution are
     3.538085E-02   1.251842E-03   4.433718E-05
          the moments corresponding to the generated distribution are
     3.538085E-02   1.251842E-03   4.432188E-05
          the legendre expansion corresponding to these moments is
     7.176521E-05   2.539114E-06  -3.574785E-05  -3.800719E-06
          the weights/angles for this distribution are
```

```
          9.999999E-01   6.443804E-08
          3.538080E-02   7.931237E-01
               the moments corresponding to this distribution are
          3.538085E-02   1.251842E-03   4.432188E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   65 to group  101
                 2 moments were accepted. the p0 coefficient is  7.31570E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  209
                 2 moments were accepted
               the legendre expansion of the cross section (p0-pn) is
          1.017605E-04   3.644696E-06  -5.068443E-05  -5.455322E-06
               the moments corresponding to this distribution are
          3.581641E-02   1.282915E-03   4.607288E-05
               the moments corresponding to the generated distribution are
          3.581641E-02   1.282915E-03   4.603329E-05
               the legendre expansion corresponding to these moments is
          1.017605E-04   3.644696E-06  -5.068443E-05  -5.455332E-06
               the weights/angles for this distribution are
          9.999998E-01   1.703986E-07
          3.581627E-02   8.022606E-01
               the moments corresponding to this distribution are
          3.581641E-02   1.282915E-03   4.603329E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   77 to group  213
                 2 moments were accepted
               the legendre expansion of the cross section (p0-pn) is
          1.017610E-04   2.943045E-06  -5.075281E-05  -4.408409E-06
               the moments corresponding to this distribution are
          2.892116E-02   8.364365E-04   2.420515E-05
               the moments corresponding to the generated distribution are
          2.892116E-02   8.364365E-04   2.419080E-05
               the legendre expansion corresponding to these moments is
          1.017610E-04   2.943045E-06  -5.075281E-05  -4.408413E-06
               the weights/angles for this distribution are
          9.999962E-01   3.840111E-06
          2.892127E-02  -1.111543E-07
               the moments corresponding to this distribution are
          2.892116E-02   8.364365E-04   2.419080E-05

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  171
                 2 moments were accepted. the p0 coefficient is  1.20653E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  206
                 1 moments were accepted
               the legendre expansion of the cross section (p0-pn) is
          1.206511E-04   5.280875E-06  -5.997885E-05  -7.896021E-06
               the moments corresponding to this distribution are
          4.376979E-02   1.915793E-03   8.384988E-05
               the moments corresponding to the generated distribution are
          4.376979E-02   1.915796E-03   8.385408E-05
               the legendre expansion corresponding to these moments is
          1.206511E-04   5.280875E-06  -5.997885E-05  -7.896020E-06
               the weights/angles for this distribution are
          9.999992E-01   8.131593E-07
          4.376983E-02  -3.566019E-08
               the moments corresponding to this distribution are
          4.376979E-02   1.915796E-03   8.385408E-05

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   80 to group  222
                 2 moments were accepted
               the legendre expansion of the cross section (p0-pn) is
          4.826018E-05   7.438963E-07  -2.411289E-05  -1.115404E-06
               the moments corresponding to this distribution are
          1.541429E-02   2.376060E-04   3.652759E-06
               the moments corresponding to the generated distribution are
          1.541429E-02   2.376060E-04   3.660935E-06
               the legendre expansion corresponding to these moments is
          4.826018E-05   7.438963E-07  -2.411289E-05  -1.115403E-06
               the weights/angles for this distribution are
          9.999999E-01   6.128777E-08
          1.541431E-02  -2.913944E-01
               the moments corresponding to this distribution are
          1.541429E-02   2.376060E-04   3.660935E-06

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   83 to group  161
                 2 moments were accepted. the p0 coefficient is  6.24506E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   84 to group  160
                 2 moments were accepted. the p0 coefficient is  4.91713E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   89 to group  148
                 2 moments were accepted. the p0 coefficient is  5.85610E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   90 to group  169
                 2 moments were accepted. the p0 coefficient is  6.17329E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   93 to group  181
                 2 moments were accepted. the p0 coefficient is  1.45037E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   94 to group  112
                 2 moments were accepted. the p0 coefficient is  7.61129E-03

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   97 to group  189
                 1 moments were accepted. the p0 coefficient is  1.78001E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group   99 to group  176
                 1 moments were accepted. the p0 coefficient is  1.87371E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  104 to group  205
                 1 moments were accepted. the p0 coefficient is  5.47573E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  105 to group  210
                 2 moments were accepted
               the legendre expansion of the cross section (p0-pn) is
```

```
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785186E-05
             the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257461E-04
             the moments corresponding to the generated distribution are
        8.071091E-02   6.514271E-03   5.257637E-04
             the legendre expansion corresponding to these moments is
        5.666031E-04   4.573105E-05  -2.777650E-04  -6.785183E-05
             the weights/angles for this distribution are
        1.000000E+00   4.936485E-08
        8.071094E-02  -5.467504E-01
             the moments corresponding to this distribution are
        8.071091E-02   6.514271E-03   5.257637E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  106 to group  177
                2 moments were accepted. the p0 coefficient is  2.32080E-04

k5-64  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  114 to group  192
                2 moments were accepted. the p0 coefficient is  7.24779E-04

k5-60  the angular scattering distribution for mixture    5 has bad moments for the transfer from group  144 to group  230
                2 moments were accepted
             the legendre expansion of the cross section (p0-pn) is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725976E-06
             the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.901552E-05
             the moments corresponding to the generated distribution are
        2.667994E-02   7.118348E-04   1.900025E-05
             the legendre expansion corresponding to these moments is
        1.182311E-04   3.154398E-06  -5.898930E-05  -4.725981E-06
             the weights/angles for this distribution are
        9.999999E-01   6.598613E-08
        2.667990E-02   5.153067E-01
             the moments corresponding to this distribution are
        2.667994E-02   7.118348E-04   1.900025E-05

keno message number k5-222     129 transfers for mixture     5 were corrected for bad moments.

                              ........    0 io's were used mixing cross-sections       ........

                               1-d cross section array id numbers
                                  1  2002  1452    27    18  1018

*****************************************************************************************************************************

                           the number of direct access blocks for unit  8 has been increased to 1079.

*****************************************************************************************************************************

                              ........    0 io's were used preparing the cross sections    ........
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                              ****** additional information ******                 ***
***                                                                                   ***
***  number of energy groups              238       use lattice geometry                no  ***
***                                                                                   ***
***  no. of fission spectrum source group  1        global array number                  0  ***
***                                                                                   ***
***  no. of scattering angles in xsecs     2        number of units in the global x dir.  0  ***
***                                                                                   ***
***  entries/neutron in the neutron bank  17        number of units in the global y dir.  0  ***
***                                                                                   ***
***  entries/neutron in the fission bank  10        number of units in the global z dir.  0  ***
***                                                                                   ***
***  number of mixtures used               5        use a global reflector            yes  ***
***                                                                                   ***
***  number of bias id's used              1        use nested holes                    no  ***
***                                                                                   ***
***  number of differential albedos used   0        number of holes                     1  ***
***                                                                                   ***
***  total input geometry regions          7        maximum hole nesting level          1  ***
***                                                                                   ***
***  number of geometry regions used       7        use nested arrays                   no  ***
***                                                                                   ***
***  largest geometry unit number         10        number of arrays used               0  ***
***                                                                                   ***
***  largest array number                  1        maximum array nesting level         0  ***
***                                                                                   ***
***                                                                                   ***
***  +x boundary condition            mirror        -x boundary condition          mirror  ***
***                                                                                   ***
***  +y boundary condition            mirror        -y boundary condition          mirror  ***
***                                                                                   ***
***  +z boundary condition            mirror        -z boundary condition          mirror  ***
***                                                                                   ***
*****************************************************************************************
```

```
*****************************************************************************************
***                                                                                   ***
***          case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    ****** space and supergroup information ******                 ***
***                                                                                   ***
***      2000000 words is the total space available.                                  ***
***                                                                                   ***
***        30661 words were used for non-supergroup storage.                          ***
***                                                                                   ***
***      1969339 words of storage are available for supergrouped data.                ***
***                                                                                   ***
***      1999416 words of storage are available for constructing the supergroups.     ***
***                                                                                   ***
***      1968857 words of storage are available to each supergroup.                   ***
***                                                                                   ***
***         5835 words are needed for the largest group.                              ***
***                                                                                   ***
***        38400 words of storage is sufficient to run this problem.                  ***
***                                                                                   ***
***       469323 words of storage will allow the problem to run with one supergroup.  ***
***                                                                                   ***
***       469632 words of storage will be used to run this problem.                   ***
***                                                                                   ***
*****************************************************************************************
*****************************************************************************************
***                                                                                   ***
***                    starting      ending       xsec       albedo      total        ***
***   supergroup        group        group       length      length      length       ***
***                                                                                   ***
***                                                                                   ***
***          1            1           238        105618          0        438180       ***
***                                                                                   ***
*****************************************************************************************

            ........    0 io's were used in supergrouping    ........

            ........    0 io's were used loading the data    ........
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

```
                    media bias      geometry description for those units utilized in this problem
region               num   id

                                                  -----   unit     1   -----

pu sphere

  1 sphere           1  1  radius =  12.738     the center is located at ( 0.00000    , 0.00000    , 0.00000    ).

                                        ******************   global   ******************
                                                  -----   unit    10   -----

ru-tru 72-b package w/ pu sphere

  1 cylinder         2  1  radius =  39.688    +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

    hole number      1        at x = 0.00000     y =  26.940      z =  141.57     is unit number      1

  2 cylinder         4  1  radius =  43.180    +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  3 cylinder         6  1  radius =  47.943    +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  4 cylinder         4  1  radius =  52.070    +z =  154.31     -z = -154.31     centerline is at  x = 0.00000      y = 0.00000

  5 cylinder         4  1  radius =  52.070    +z =  187.33     -z = -170.82     centerline is at  x = 0.00000      y = 0.00000

  6 cuboid           5  1      +x =  72.390    -x = -72.390     +y =  72.390     -y = -72.390     +z =  216.54     -z = -200.03
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100
volumes for those units utilized in this problem

unit	region	geometry region	volume	cumulative volume
1	1	1	8.65811E+03 cm**3	8.65811E+03 cm**3
10	1	2	1.51849E+06 cm**3	1.52715E+06 cm**3
	2	3	2.80605E+05 cm**3	1.80775E+06 cm**3
	3	4	4.20760E+05 cm**3	2.22851E+06 cm**3
	4	5	4.00235E+05 cm**3	2.62875E+06 cm**3
	5	6	4.21884E+05 cm**3	3.05063E+06 cm**3
	6	7	5.68119E+06 cm**3	8.73183E+06 cm**3

unit	uses	region	mixture	total volume
1	1	1	1	8.65811E+03 cm**3
10	1	1	2	1.51849E+06 cm**3
		2	4	2.80605E+05 cm**3
		3	6	4.20760E+05 cm**3
		4	4	4.00235E+05 cm**3
		5	4	4.21884E+05 cm**3
		6	5	5.68119E+06 cm**3

total mixture volumes

mixture	total volume	mass(g)
1	8.65811E+03 cm**3	8.30475E+03
2	1.51849E+06 cm**3	1.41562E+06
4	1.10272E+06 cm**3	8.75563E+06
5	5.68119E+06 cm**3	5.67080E+06
6	4.20760E+05 cm**3	4.77310E+06

```
*****************************************************************************************************
***                                                                                               ***
***                                    biasing information                                        ***
***                                                                                               ***
***     a default weight of    0.500 will be used for all bias id's.                              ***
***                                                                                               ***
*****************************************************************************************************
```

..... 0 io's were used in keno-v before tracking .....

..... 0.08333 minutes were used processing data. .....

volume fraction of fissile material in the core= 9.91558E-04

start type 0 was used.

the neutrons were started uniformly throughout the entire volume defined by the outermost geometry card.
the flag to start neutrons in the reflector was turned off

0.03633 minutes were required for starting. total elapsed time is 0.12167 minutes.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

generation	generation k-effective	elapsed time minutes	average k-effective	avg k-eff deviation	matrix k-effective	matrix k-eff deviation
keno message number k5-132		warning....only	969 independent fission points were generated			
1	8.83443E-01	1.33333E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
2	9.01953E-01	1.39167E-01	1.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
keno message number k5-132		warning....only	975 independent fission points were generated			
3	8.96605E-01	1.46667E-01	8.96605E-01	0.00000E+00	0.00000E+00	0.00000E+00
4	9.28494E-01	1.52667E-01	9.12549E-01	1.59447E-02	0.00000E+00	0.00000E+00
5	8.85715E-01	1.61000E-01	9.03605E-01	1.28357E-02	0.00000E+00	0.00000E+00
6	9.35098E-01	1.66500E-01	9.11478E-01	1.20153E-02	0.00000E+00	0.00000E+00
7	9.51232E-01	1.72167E-01	9.19429E-01	1.22407E-02	0.00000E+00	0.00000E+00
8	9.08685E-01	1.81000E-01	9.17638E-01	1.01536E-02	0.00000E+00	0.00000E+00
9	9.31656E-01	1.86667E-01	9.19641E-01	8.81193E-03	0.00000E+00	0.00000E+00
10	9.36430E-01	1.95000E-01	9.21739E-01	7.91468E-03	0.00000E+00	0.00000E+00
11	9.60183E-01	2.00500E-01	9.26011E-01	8.18339E-03	0.00000E+00	0.00000E+00
12	9.35886E-01	2.06333E-01	9.26998E-01	7.38576E-03	0.00000E+00	0.00000E+00
13	9.56937E-01	2.14667E-01	9.29720E-01	7.21380E-03	0.00000E+00	0.00000E+00
14	9.51177E-01	2.20667E-01	9.31508E-01	6.82370E-03	0.00000E+00	0.00000E+00
15	9.02524E-01	2.29000E-01	9.29279E-01	6.66110E-03	0.00000E+00	0.00000E+00
16	8.92132E-01	2.34667E-01	9.26625E-01	6.71356E-03	0.00000E+00	0.00000E+00
17	9.18594E-01	2.40833E-01	9.26090E-01	6.27287E-03	0.00000E+00	0.00000E+00
18	9.20143E-01	2.48500E-01	9.25718E-01	5.87949E-03	0.00000E+00	0.00000E+00
19	9.22660E-01	2.54167E-01	9.25538E-01	5.52575E-03	0.00000E+00	0.00000E+00
20	9.44394E-01	2.61500E-01	9.26586E-01	5.31400E-03	0.00000E+00	0.00000E+00
21	9.06897E-01	2.67667E-01	9.25550E-01	5.13225E-03	0.00000E+00	0.00000E+00
22	9.13111E-01	2.74000E-01	9.24928E-01	4.90844E-03	0.00000E+00	0.00000E+00
23	9.09152E-01	2.81000E-01	9.24176E-01	4.72891E-03	0.00000E+00	0.00000E+00
24	9.42340E-01	2.86667E-01	9.25002E-01	4.58381E-03	0.00000E+00	0.00000E+00
25	9.37654E-01	2.93500E-01	9.25552E-01	4.41439E-03	0.00000E+00	0.00000E+00
26	9.35834E-01	2.99500E-01	9.25981E-01	4.24811E-03	0.00000E+00	0.00000E+00
27	9.39472E-01	3.05167E-01	9.26520E-01	4.11023E-03	0.00000E+00	0.00000E+00
28	9.87390E-01	3.11667E-01	9.28861E-01	4.59080E-03	0.00000E+00	0.00000E+00
29	8.95130E-01	3.17500E-01	9.27612E-01	4.59075E-03	0.00000E+00	0.00000E+00
30	9.55340E-01	3.23000E-01	9.28602E-01	4.53324E-03	0.00000E+00	0.00000E+00
31	9.06916E-01	3.29167E-01	9.27855E-01	4.43759E-03	0.00000E+00	0.00000E+00
32	9.89276E-01	3.34667E-01	9.29902E-01	4.75091E-03	0.00000E+00	0.00000E+00
33	9.18214E-01	3.40167E-01	9.29525E-01	4.61054E-03	0.00000E+00	0.00000E+00
34	9.53793E-01	3.46333E-01	9.30283E-01	4.52810E-03	0.00000E+00	0.00000E+00
35	9.44607E-01	3.52167E-01	9.30717E-01	4.41015E-03	0.00000E+00	0.00000E+00
36	9.24680E-01	3.57500E-01	9.30540E-01	4.28216E-03	0.00000E+00	0.00000E+00
37	9.43165E-01	3.63833E-01	9.30900E-01	4.17362E-03	0.00000E+00	0.00000E+00
38	9.68335E-01	3.69000E-01	9.31940E-01	4.18721E-03	0.00000E+00	0.00000E+00
39	9.89586E-01	3.75333E-01	9.33498E-01	4.36031E-03	0.00000E+00	0.00000E+00
40	9.48152E-01	3.81000E-01	9.33884E-01	4.26150E-03	0.00000E+00	0.00000E+00
41	9.37720E-01	3.86500E-01	9.33982E-01	4.15196E-03	0.00000E+00	0.00000E+00
42	9.01824E-01	3.92500E-01	9.33178E-01	4.12591E-03	0.00000E+00	0.00000E+00
43	9.39516E-01	3.98000E-01	9.33333E-01	4.02699E-03	0.00000E+00	0.00000E+00
44	9.23301E-01	4.03667E-01	9.33094E-01	3.93719E-03	0.00000E+00	0.00000E+00
45	9.02317E-01	4.09333E-01	9.32378E-01	3.91060E-03	0.00000E+00	0.00000E+00
46	9.43792E-01	4.14833E-01	9.32638E-01	3.82948E-03	0.00000E+00	0.00000E+00
47	9.28464E-01	4.20333E-01	9.32545E-01	3.74456E-03	0.00000E+00	0.00000E+00
48	8.85061E-01	4.26500E-01	9.31513E-01	3.80496E-03	0.00000E+00	0.00000E+00
49	9.59986E-01	4.32333E-01	9.32118E-01	3.77209E-03	0.00000E+00	0.00000E+00
50	9.30334E-01	4.38333E-01	9.32081E-01	3.69285E-03	0.00000E+00	0.00000E+00
51	9.09744E-01	4.44833E-01	9.31625E-01	3.64532E-03	0.00000E+00	0.00000E+00
52	9.24643E-01	4.50333E-01	9.31486E-01	3.57440E-03	0.00000E+00	0.00000E+00
53	8.78604E-01	4.56000E-01	9.30449E-01	3.65383E-03	0.00000E+00	0.00000E+00
54	9.45490E-01	4.61667E-01	9.30738E-01	3.59453E-03	0.00000E+00	0.00000E+00
55	9.09378E-01	4.67667E-01	9.30335E-01	3.54901E-03	0.00000E+00	0.00000E+00
56	9.30776E-01	4.73167E-01	9.30343E-01	3.48268E-03	0.00000E+00	0.00000E+00
57	9.77069E-01	4.78667E-01	9.31193E-01	3.52275E-03	0.00000E+00	0.00000E+00
58	9.23647E-01	4.84333E-01	9.31058E-01	3.46190E-03	0.00000E+00	0.00000E+00
59	8.77163E-01	4.90167E-01	9.30113E-01	3.52962E-03	0.00000E+00	0.00000E+00
60	9.35962E-01	4.95667E-01	9.30213E-01	3.46970E-03	0.00000E+00	0.00000E+00
61	8.93858E-01	5.01500E-01	9.29597E-01	3.46560E-03	0.00000E+00	0.00000E+00
62	9.31179E-01	5.07333E-01	9.29624E-01	3.40746E-03	0.00000E+00	0.00000E+00
63	9.31011E-01	5.13333E-01	9.29646E-01	3.35121E-03	0.00000E+00	0.00000E+00
64	9.25595E-01	5.19000E-01	9.29581E-01	3.29736E-03	0.00000E+00	0.00000E+00
65	9.48023E-01	5.25000E-01	9.29874E-01	3.25778E-03	0.00000E+00	0.00000E+00
66	9.14283E-01	5.32833E-01	9.29630E-01	3.21571E-03	0.00000E+00	0.00000E+00
67	9.55024E-01	5.38833E-01	9.30021E-01	3.18987E-03	0.00000E+00	0.00000E+00
68	9.71069E-01	5.44333E-01	9.30643E-01	3.20214E-03	0.00000E+00	0.00000E+00
69	9.00355E-01	5.50333E-01	9.30191E-01	3.18622E-03	0.00000E+00	0.00000E+00
70	9.54989E-01	5.56500E-01	9.30555E-01	3.16012E-03	0.00000E+00	0.00000E+00
71	9.27042E-01	5.62500E-01	9.30504E-01	3.11440E-03	0.00000E+00	0.00000E+00
72	9.64718E-01	5.68167E-01	9.30993E-01	3.10826E-03	0.00000E+00	0.00000E+00
73	9.32489E-01	5.74000E-01	9.31014E-01	3.06424E-03	0.00000E+00	0.00000E+00
74	9.63349E-01	5.80000E-01	9.31463E-01	3.05458E-03	0.00000E+00	0.00000E+00
75	9.27669E-01	5.86000E-01	9.31411E-01	3.01289E-03	0.00000E+00	0.00000E+00
76	9.55731E-01	5.91667E-01	9.31740E-01	2.99001E-03	0.00000E+00	0.00000E+00
77	9.57769E-01	5.97333E-01	9.32087E-01	2.97022E-03	0.00000E+00	0.00000E+00
78	9.25710E-01	6.02833E-01	9.32003E-01	2.93208E-03	0.00000E+00	0.00000E+00
79	9.35460E-01	6.09167E-01	9.32048E-01	2.89410E-03	0.00000E+00	0.00000E+00
80	8.95120E-01	6.14833E-01	9.31575E-01	2.89572E-03	0.00000E+00	0.00000E+00
81	9.16904E-01	6.20667E-01	9.31389E-01	2.86485E-03	0.00000E+00	0.00000E+00
82	9.51868E-01	6.27667E-01	9.31645E-01	2.84038E-03	0.00000E+00	0.00000E+00
83	9.40616E-01	6.33333E-01	9.31756E-01	2.80728E-03	0.00000E+00	0.00000E+00
84	9.38962E-01	6.38500E-01	9.31844E-01	2.77422E-03	0.00000E+00	0.00000E+00
85	8.97403E-01	6.44500E-01	9.31429E-01	2.77183E-03	0.00000E+00	0.00000E+00
86	9.63286E-01	6.50333E-01	9.31808E-01	2.76477E-03	0.00000E+00	0.00000E+00
87	8.71898E-01	6.56000E-01	9.31103E-01	2.82150E-03	0.00000E+00	0.00000E+00
88	9.32852E-01	6.61667E-01	9.31123E-01	2.78857E-03	0.00000E+00	0.00000E+00
89	9.48320E-01	6.67167E-01	9.31321E-01	2.76341E-03	0.00000E+00	0.00000E+00
90	9.01621E-01	6.73000E-01	9.30984E-01	2.75260E-03	0.00000E+00	0.00000E+00
91	9.43261E-01	6.78333E-01	9.31122E-01	2.72499E-03	0.00000E+00	0.00000E+00
92	9.58975E-01	6.84167E-01	9.31431E-01	2.71226E-03	0.00000E+00	0.00000E+00
93	9.54520E-01	6.90167E-01	9.31685E-01	2.69426E-03	0.00000E+00	0.00000E+00
94	9.54272E-01	6.96333E-01	9.31930E-01	2.67610E-03	0.00000E+00	0.00000E+00
95	9.40189E-01	7.02833E-01	9.32019E-01	2.64866E-03	0.00000E+00	0.00000E+00
96	8.96605E-01	7.09333E-01	9.31642E-01	2.64727E-03	0.00000E+00	0.00000E+00
97	9.15687E-01	7.16167E-01	9.31474E-01	2.62464E-03	0.00000E+00	0.00000E+00
98	9.33001E-01	7.22667E-01	9.31490E-01	2.59720E-03	0.00000E+00	0.00000E+00
99	9.62845E-01	7.28333E-01	9.31813E-01	2.59053E-03	0.00000E+00	0.00000E+00

100	9.72722E-01	7.34333E-01	9.32231E-01	2.59772E-03	0.00000E+00	0.00000E+00
101	9.24027E-01	7.40833E-01	9.32148E-01	2.57268E-03	0.00000E+00	0.00000E+00
102	9.21481E-01	7.47333E-01	9.32041E-01	2.54906E-03	0.00000E+00	0.00000E+00
103	9.10526E-01	7.53833E-01	9.31828E-01	2.53267E-03	0.00000E+00	0.00000E+00
104	8.88022E-01	7.60500E-01	9.31399E-01	2.54423E-03	0.00000E+00	0.00000E+00
105	9.49334E-01	7.66333E-01	9.31573E-01	2.52541E-03	0.00000E+00	0.00000E+00
106	9.33583E-01	7.72333E-01	9.31592E-01	2.50109E-03	0.00000E+00	0.00000E+00
107	9.57714E-01	7.78333E-01	9.31841E-01	2.48961E-03	0.00000E+00	0.00000E+00
108	9.35001E-01	7.84333E-01	9.31871E-01	2.46619E-03	0.00000E+00	0.00000E+00
109	9.08779E-01	7.90667E-01	9.31655E-01	2.45255E-03	0.00000E+00	0.00000E+00
110	8.88295E-01	7.97167E-01	9.31254E-01	2.46268E-03	0.00000E+00	0.00000E+00
111	9.34345E-01	8.03333E-01	9.31282E-01	2.44015E-03	0.00000E+00	0.00000E+00
112	9.25286E-01	8.09667E-01	9.31227E-01	2.41848E-03	0.00000E+00	0.00000E+00
113	9.34725E-01	8.15833E-01	9.31259E-01	2.39680E-03	0.00000E+00	0.00000E+00
114	8.91201E-01	8.21833E-01	9.30901E-01	2.40208E-03	0.00000E+00	0.00000E+00
115	9.51598E-01	8.27333E-01	9.31084E-01	2.38776E-03	0.00000E+00	0.00000E+00
116	9.13690E-01	8.33000E-01	9.30932E-01	2.37164E-03	0.00000E+00	0.00000E+00
117	8.74500E-01	8.38833E-01	9.30441E-01	2.40159E-03	0.00000E+00	0.00000E+00
118	9.26559E-01	8.44500E-01	9.30408E-01	2.38103E-03	0.00000E+00	0.00000E+00
119	9.50151E-01	8.50000E-01	9.30576E-01	2.36662E-03	0.00000E+00	0.00000E+00
120	9.60043E-01	8.55500E-01	9.30826E-01	2.35973E-03	0.00000E+00	0.00000E+00
121	8.99204E-01	8.62000E-01	9.30560E-01	2.35485E-03	0.00000E+00	0.00000E+00
122	9.77273E-01	8.68000E-01	9.30950E-01	2.36737E-03	0.00000E+00	0.00000E+00
123	9.47110E-01	8.74000E-01	9.31083E-01	2.35152E-03	0.00000E+00	0.00000E+00
124	8.89297E-01	8.79667E-01	9.30741E-01	2.35718E-03	0.00000E+00	0.00000E+00
125	8.94046E-01	8.85500E-01	9.30442E-01	2.35690E-03	0.00000E+00	0.00000E+00
126	8.89013E-01	8.92000E-01	9.30108E-01	2.36157E-03	0.00000E+00	0.00000E+00
127	9.42797E-01	8.97667E-01	9.30210E-01	2.34480E-03	0.00000E+00	0.00000E+00
128	9.12851E-01	9.03667E-01	9.30072E-01	2.33019E-03	0.00000E+00	0.00000E+00
129	9.20846E-01	9.09167E-01	9.29999E-01	2.31291E-03	0.00000E+00	0.00000E+00
130	8.99059E-01	9.15167E-01	9.29758E-01	2.30747E-03	0.00000E+00	0.00000E+00
131	9.22048E-01	9.20833E-01	9.29698E-01	2.29029E-03	0.00000E+00	0.00000E+00
132	9.63840E-01	9.26333E-01	9.29961E-01	2.28773E-03	0.00000E+00	0.00000E+00
133	9.55144E-01	9.32333E-01	9.30153E-01	2.27832E-03	0.00000E+00	0.00000E+00
134	9.37523E-01	9.38000E-01	9.30209E-01	2.26168E-03	0.00000E+00	0.00000E+00
135	9.37869E-01	9.43500E-01	9.30266E-01	2.24535E-03	0.00000E+00	0.00000E+00
136	9.11734E-01	9.49167E-01	9.30128E-01	2.23282E-03	0.00000E+00	0.00000E+00
137	9.08967E-01	9.55167E-01	9.29971E-01	2.22176E-03	0.00000E+00	0.00000E+00
138	9.38793E-01	9.61500E-01	9.30036E-01	2.20631E-03	0.00000E+00	0.00000E+00
139	9.01144E-01	9.67667E-01	9.29825E-01	2.20028E-03	0.00000E+00	0.00000E+00
140	9.26276E-01	9.74167E-01	9.29799E-01	2.18443E-03	0.00000E+00	0.00000E+00
141	9.30129E-01	9.80167E-01	9.29802E-01	2.16866E-03	0.00000E+00	0.00000E+00
142	8.81695E-01	9.86167E-01	9.29458E-01	2.18036E-03	0.00000E+00	0.00000E+00
143	9.52656E-01	9.92167E-01	9.29623E-01	2.17108E-03	0.00000E+00	0.00000E+00
144	9.49397E-01	9.98000E-01	9.29762E-01	2.16023E-03	0.00000E+00	0.00000E+00
145	9.64558E-01	1.00367E+00	9.30005E-01	2.15883E-03	0.00000E+00	0.00000E+00
146	9.58410E-01	1.00933E+00	9.30203E-01	2.15284E-03	0.00000E+00	0.00000E+00
147	9.52190E-01	1.01567E+00	9.30354E-01	2.14331E-03	0.00000E+00	0.00000E+00
148	9.31620E-01	1.02167E+00	9.30363E-01	2.12860E-03	0.00000E+00	0.00000E+00
149	9.05740E-01	1.02783E+00	9.30195E-01	2.12070E-03	0.00000E+00	0.00000E+00
150	9.01742E-01	1.03383E+00	9.30003E-01	2.11507E-03	0.00000E+00	0.00000E+00
151	9.50962E-01	1.03983E+00	9.30144E-01	2.10553E-03	0.00000E+00	0.00000E+00
152	9.09814E-01	1.04550E+00	9.30008E-01	2.09584E-03	0.00000E+00	0.00000E+00
153	9.33207E-01	1.05133E+00	9.30029E-01	2.08202E-03	0.00000E+00	0.00000E+00
154	9.57457E-01	1.05683E+00	9.30210E-01	2.07613E-03	0.00000E+00	0.00000E+00
155	9.14808E-01	1.06250E+00	9.30109E-01	2.06497E-03	0.00000E+00	0.00000E+00
156	8.99504E-01	1.06883E+00	9.29910E-01	2.06113E-03	0.00000E+00	0.00000E+00
157	8.69101E-01	1.07500E+00	9.29518E-01	2.08503E-03	0.00000E+00	0.00000E+00
158	9.19243E-01	1.08117E+00	9.29452E-01	2.07266E-03	0.00000E+00	0.00000E+00
159	9.46816E-01	1.08700E+00	9.29563E-01	2.06239E-03	0.00000E+00	0.00000E+00
160	9.55742E-01	1.09267E+00	9.29729E-01	2.05598E-03	0.00000E+00	0.00000E+00
161	9.22625E-01	1.09850E+00	9.29684E-01	2.04350E-03	0.00000E+00	0.00000E+00
162	9.28209E-01	1.10417E+00	9.29675E-01	2.03071E-03	0.00000E+00	0.00000E+00
163	9.17425E-01	1.11017E+00	9.29599E-01	2.01949E-03	0.00000E+00	0.00000E+00
164	9.39766E-01	1.11583E+00	9.29661E-01	2.00796E-03	0.00000E+00	0.00000E+00
165	9.34624E-01	1.12183E+00	9.29692E-01	1.99584E-03	0.00000E+00	0.00000E+00
166	9.65153E-01	1.12767E+00	9.29908E-01	1.99538E-03	0.00000E+00	0.00000E+00
167	9.48812E-01	1.13367E+00	9.30023E-01	1.98656E-03	0.00000E+00	0.00000E+00
168	8.98606E-01	1.13950E+00	9.29833E-01	1.98360E-03	0.00000E+00	0.00000E+00
169	9.19907E-01	1.14500E+00	9.29774E-01	1.97259E-03	0.00000E+00	0.00000E+00
170	9.25141E-01	1.15050E+00	9.29746E-01	1.96100E-03	0.00000E+00	0.00000E+00
171	9.87706E-01	1.15617E+00	9.30089E-01	1.97930E-03	0.00000E+00	0.00000E+00
172	9.00994E-01	1.16200E+00	9.29918E-01	1.97506E-03	0.00000E+00	0.00000E+00
173	9.17918E-01	1.16817E+00	9.29848E-01	1.96473E-03	0.00000E+00	0.00000E+00
174	9.57912E-01	1.17400E+00	9.30011E-01	1.96007E-03	0.00000E+00	0.00000E+00
175	8.99785E-01	1.18000E+00	9.29836E-01	1.95653E-03	0.00000E+00	0.00000E+00
176	9.14501E-01	1.18567E+00	9.29748E-01	1.94725E-03	0.00000E+00	0.00000E+00
177	8.91471E-01	1.19133E+00	9.29530E-01	1.94840E-03	0.00000E+00	0.00000E+00
178	9.22791E-01	1.19683E+00	9.29491E-01	1.93768E-03	0.00000E+00	0.00000E+00
179	9.27553E-01	1.20267E+00	9.29480E-01	1.92673E-03	0.00000E+00	0.00000E+00
180	9.20458E-01	1.20833E+00	9.29430E-01	1.91655E-03	0.00000E+00	0.00000E+00
181	9.12625E-01	1.21400E+00	9.29336E-01	1.90812E-03	0.00000E+00	0.00000E+00
182	9.46615E-01	1.22033E+00	9.29432E-01	1.89992E-03	0.00000E+00	0.00000E+00
183	9.27330E-01	1.22600E+00	9.29420E-01	1.88943E-03	0.00000E+00	0.00000E+00
184	9.41418E-01	1.23150E+00	9.29486E-01	1.88017E-03	0.00000E+00	0.00000E+00
185	9.15041E-01	1.23717E+00	9.29407E-01	1.87154E-03	0.00000E+00	0.00000E+00
186	9.07203E-01	1.24300E+00	9.29286E-01	1.86524E-03	0.00000E+00	0.00000E+00
187	9.26503E-01	1.24867E+00	9.29271E-01	1.85520E-03	0.00000E+00	0.00000E+00
188	9.36351E-01	1.25450E+00	9.29309E-01	1.84559E-03	0.00000E+00	0.00000E+00
189	9.05675E-01	1.26017E+00	9.29183E-01	1.84004E-03	0.00000E+00	0.00000E+00
190	9.23924E-01	1.26533E+00	9.29155E-01	1.83044E-03	0.00000E+00	0.00000E+00
191	9.41617E-01	1.27133E+00	9.29221E-01	1.82192E-03	0.00000E+00	0.00000E+00
192	9.91950E-01	1.27733E+00	9.29551E-01	1.84213E-03	0.00000E+00	0.00000E+00
193	8.87786E-01	1.28333E+00	9.29333E-01	1.84546E-03	0.00000E+00	0.00000E+00
194	9.46709E-01	1.28950E+00	9.29423E-01	1.83805E-03	0.00000E+00	0.00000E+00
195	9.13813E-01	1.29633E+00	9.29342E-01	1.83029E-03	0.00000E+00	0.00000E+00
196	9.08408E-01	1.30233E+00	9.29234E-01	1.82403E-03	0.00000E+00	0.00000E+00
197	8.79579E-01	1.30833E+00	9.28980E-01	1.83243E-03	0.00000E+00	0.00000E+00
198	9.42212E-01	1.31383E+00	9.29047E-01	1.82431E-03	0.00000E+00	0.00000E+00
199	9.58427E-01	1.31933E+00	9.29196E-01	1.82114E-03	0.00000E+00	0.00000E+00
200	9.92406E-01	1.32467E+00	9.29515E-01	1.83983E-03	0.00000E+00	0.00000E+00
201	9.32615E-01	1.33017E+00	9.29531E-01	1.83062E-03	0.00000E+00	0.00000E+00
202	9.20618E-01	1.33600E+00	9.29486E-01	1.82199E-03	0.00000E+00	0.00000E+00
203	9.42984E-01	1.34167E+00	9.29554E-01	1.81415E-03	0.00000E+00	0.00000E+00
204	8.97259E-01	1.34733E+00	9.29394E-01	1.81221E-03	0.00000E+00	0.00000E+00

205	9.60406E-01	1.35317E+00	9.29547E-01	1.80972E-03	0.00000E+00	0.00000E+00
206	9.16852E-01	1.35933E+00	9.29484E-01	1.80190E-03	0.00000E+00	0.00000E+00
207	9.37887E-01	1.36483E+00	9.29525E-01	1.79356E-03	0.00000E+00	0.00000E+00
208	9.64473E-01	1.37033E+00	9.29695E-01	1.79288E-03	0.00000E+00	0.00000E+00
209	9.13694E-01	1.37600E+00	9.29618E-01	1.78587E-03	0.00000E+00	0.00000E+00
210	9.17448E-01	1.38200E+00	9.29559E-01	1.77823E-03	0.00000E+00	0.00000E+00
211	9.29800E-01	1.38750E+00	9.29560E-01	1.76970E-03	0.00000E+00	0.00000E+00
212	9.38407E-01	1.39300E+00	9.29602E-01	1.76175E-03	0.00000E+00	0.00000E+00
213	9.37702E-01	1.39867E+00	9.29641E-01	1.75380E-03	0.00000E+00	0.00000E+00
214	9.19739E-01	1.40417E+00	9.29594E-01	1.74614E-03	0.00000E+00	0.00000E+00
215	9.18878E-01	1.40983E+00	9.29544E-01	1.73865E-03	0.00000E+00	0.00000E+00
216	9.54168E-01	1.41533E+00	9.29659E-01	1.73433E-03	0.00000E+00	0.00000E+00
217	9.17670E-01	1.42183E+00	9.29603E-01	1.72714E-03	0.00000E+00	0.00000E+00
218	8.96161E-01	1.42833E+00	9.29448E-01	1.72608E-03	0.00000E+00	0.00000E+00
219	9.22913E-01	1.43467E+00	9.29418E-01	1.71837E-03	0.00000E+00	0.00000E+00
220	9.12157E-01	1.44083E+00	9.29339E-01	1.71231E-03	0.00000E+00	0.00000E+00
221	8.95484E-01	1.44717E+00	9.29184E-01	1.71146E-03	0.00000E+00	0.00000E+00
222	8.94526E-01	1.45383E+00	9.29027E-01	1.71094E-03	0.00000E+00	0.00000E+00
223	9.23378E-01	1.45967E+00	9.29001E-01	1.70337E-03	0.00000E+00	0.00000E+00
224	9.49233E-01	1.46617E+00	9.29092E-01	1.69813E-03	0.00000E+00	0.00000E+00
225	8.81171E-01	1.47267E+00	9.28878E-01	1.70410E-03	0.00000E+00	0.00000E+00
226	9.33451E-01	1.47817E+00	9.28898E-01	1.69659E-03	0.00000E+00	0.00000E+00
227	9.52245E-01	1.48433E+00	9.29002E-01	1.69222E-03	0.00000E+00	0.00000E+00
228	9.00654E-01	1.48983E+00	9.28876E-01	1.68938E-03	0.00000E+00	0.00000E+00
229	9.40928E-01	1.49583E+00	9.28929E-01	1.68276E-03	0.00000E+00	0.00000E+00
230	9.30652E-01	1.50150E+00	9.28937E-01	1.67538E-03	0.00000E+00	0.00000E+00
231	9.06172E-01	1.50700E+00	9.28838E-01	1.67101E-03	0.00000E+00	0.00000E+00
232	9.65425E-01	1.51250E+00	9.28997E-01	1.67131E-03	0.00000E+00	0.00000E+00
233	9.10056E-01	1.51817E+00	9.28915E-01	1.66608E-03	0.00000E+00	0.00000E+00
234	9.35649E-01	1.52367E+00	9.28944E-01	1.65914E-03	0.00000E+00	0.00000E+00
235	9.51660E-01	1.52917E+00	9.29041E-01	1.65488E-03	0.00000E+00	0.00000E+00
236	9.58750E-01	1.53467E+00	9.29168E-01	1.65267E-03	0.00000E+00	0.00000E+00
237	9.20704E-01	1.54033E+00	9.29132E-01	1.64602E-03	0.00000E+00	0.00000E+00
238	9.01652E-01	1.54600E+00	9.29016E-01	1.64316E-03	0.00000E+00	0.00000E+00
239	9.11085E-01	1.55233E+00	9.28940E-01	1.63796E-03	0.00000E+00	0.00000E+00
240	9.52720E-01	1.55800E+00	9.29040E-01	1.63412E-03	0.00000E+00	0.00000E+00
241	9.21148E-01	1.56383E+00	9.29007E-01	1.62761E-03	0.00000E+00	0.00000E+00
242	9.07461E-01	1.56983E+00	9.28917E-01	1.62330E-03	0.00000E+00	0.00000E+00
243	9.27365E-01	1.57600E+00	9.28911E-01	1.61656E-03	0.00000E+00	0.00000E+00
244	9.43086E-01	1.58200E+00	9.28969E-01	1.61093E-03	0.00000E+00	0.00000E+00
245	9.35845E-01	1.58800E+00	9.28998E-01	1.60454E-03	0.00000E+00	0.00000E+00
246	8.99264E-01	1.59433E+00	9.28876E-01	1.60259E-03	0.00000E+00	0.00000E+00
247	9.36783E-01	1.60017E+00	9.28908E-01	1.59636E-03	0.00000E+00	0.00000E+00
248	9.11922E-01	1.60683E+00	9.28839E-01	1.59135E-03	0.00000E+00	0.00000E+00
249	9.50118E-01	1.61250E+00	9.28925E-01	1.58724E-03	0.00000E+00	0.00000E+00
250	9.30009E-01	1.61817E+00	9.28929E-01	1.58083E-03	0.00000E+00	0.00000E+00
251	9.62303E-01	1.62400E+00	9.29063E-01	1.58016E-03	0.00000E+00	0.00000E+00
252	8.88110E-01	1.63000E+00	9.28900E-01	1.58233E-03	0.00000E+00	0.00000E+00
253	9.34129E-01	1.63567E+00	9.28920E-01	1.57615E-03	0.00000E+00	0.00000E+00
254	9.29578E-01	1.64133E+00	9.28923E-01	1.56989E-03	0.00000E+00	0.00000E+00
255	9.51567E-01	1.64717E+00	9.29013E-01	1.56623E-03	0.00000E+00	0.00000E+00
256	9.18811E-01	1.65317E+00	9.28972E-01	1.56057E-03	0.00000E+00	0.00000E+00
257	9.59481E-01	1.65850E+00	9.29092E-01	1.55904E-03	0.00000E+00	0.00000E+00
258	9.58657E-01	1.66450E+00	9.29208E-01	1.55722E-03	0.00000E+00	0.00000E+00
259	9.56529E-01	1.67033E+00	9.29314E-01	1.55479E-03	0.00000E+00	0.00000E+00
260	9.22087E-01	1.67633E+00	9.29286E-01	1.54900E-03	0.00000E+00	0.00000E+00
261	9.73934E-01	1.68233E+00	9.29458E-01	1.55261E-03	0.00000E+00	0.00000E+00
262	8.78479E-01	1.68883E+00	9.29262E-01	1.55901E-03	0.00000E+00	0.00000E+00
263	9.32819E-01	1.69500E+00	9.29276E-01	1.55308E-03	0.00000E+00	0.00000E+00
264	9.17941E-01	1.70100E+00	9.29232E-01	1.54775E-03	0.00000E+00	0.00000E+00
265	9.37587E-01	1.70650E+00	9.29264E-01	1.54218E-03	0.00000E+00	0.00000E+00
266	9.59718E-01	1.71217E+00	9.29380E-01	1.54065E-03	0.00000E+00	0.00000E+00
267	9.36131E-01	1.71800E+00	9.29405E-01	1.53504E-03	0.00000E+00	0.00000E+00
268	9.39263E-01	1.72367E+00	9.29442E-01	1.52971E-03	0.00000E+00	0.00000E+00
269	9.44990E-01	1.72917E+00	9.29500E-01	1.52508E-03	0.00000E+00	0.00000E+00
270	9.31214E-01	1.73483E+00	9.29507E-01	1.51939E-03	0.00000E+00	0.00000E+00
271	9.33231E-01	1.74033E+00	9.29521E-01	1.51379E-03	0.00000E+00	0.00000E+00
272	8.78541E-01	1.74600E+00	9.29332E-01	1.51995E-03	0.00000E+00	0.00000E+00
273	9.68705E-01	1.75150E+00	9.29477E-01	1.52129E-03	0.00000E+00	0.00000E+00
274	9.17427E-01	1.75750E+00	9.29433E-01	1.51633E-03	0.00000E+00	0.00000E+00
275	9.66763E-01	1.76333E+00	9.29570E-01	1.51694E-03	0.00000E+00	0.00000E+00
276	9.38812E-01	1.76917E+00	9.29603E-01	1.51177E-03	0.00000E+00	0.00000E+00
277	9.24173E-01	1.77517E+00	9.29584E-01	1.50639E-03	0.00000E+00	0.00000E+00
278	9.45691E-01	1.78167E+00	9.29642E-01	1.50206E-03	0.00000E+00	0.00000E+00
279	9.78891E-01	1.78750E+00	9.29820E-01	1.50715E-03	0.00000E+00	0.00000E+00
280	1.00577E+00	1.79350E+00	9.30093E-01	1.52637E-03	0.00000E+00	0.00000E+00
281	9.39919E-01	1.79900E+00	9.30128E-01	1.52130E-03	0.00000E+00	0.00000E+00
282	9.49632E-01	1.80467E+00	9.30198E-01	1.51745E-03	0.00000E+00	0.00000E+00
283	9.35830E-01	1.81033E+00	9.30218E-01	1.51218E-03	0.00000E+00	0.00000E+00
284	9.31674E-01	1.81567E+00	9.30223E-01	1.50681E-03	0.00000E+00	0.00000E+00
285	8.86561E-01	1.82133E+00	9.30069E-01	1.50939E-03	0.00000E+00	0.00000E+00
286	9.51863E-01	1.82683E+00	9.30145E-01	1.50602E-03	0.00000E+00	0.00000E+00
287	9.22199E-01	1.83250E+00	9.30118E-01	1.50098E-03	0.00000E+00	0.00000E+00
288	9.06686E-01	1.83800E+00	9.30036E-01	1.49797E-03	0.00000E+00	0.00000E+00
289	9.01221E-01	1.84367E+00	9.29935E-01	1.49611E-03	0.00000E+00	0.00000E+00
290	9.27740E-01	1.84917E+00	9.29928E-01	1.49093E-03	0.00000E+00	0.00000E+00
291	9.32711E-01	1.85500E+00	9.29937E-01	1.48579E-03	0.00000E+00	0.00000E+00
292	9.26789E-01	1.86017E+00	9.29926E-01	1.48070E-03	0.00000E+00	0.00000E+00
293	9.29403E-01	1.86617E+00	9.29925E-01	1.47560E-03	0.00000E+00	0.00000E+00
294	8.72736E-01	1.87167E+00	9.29729E-01	1.48353E-03	0.00000E+00	0.00000E+00
295	9.15046E-01	1.87733E+00	9.29679E-01	1.47930E-03	0.00000E+00	0.00000E+00
296	9.16599E-01	1.88300E+00	9.29634E-01	1.47493E-03	0.00000E+00	0.00000E+00
297	8.98625E-01	1.88883E+00	9.29529E-01	1.47368E-03	0.00000E+00	0.00000E+00
298	8.95831E-01	1.89450E+00	9.29415E-01	1.47310E-03	0.00000E+00	0.00000E+00
299	9.13815E-01	1.90017E+00	9.29363E-01	1.46907E-03	0.00000E+00	0.00000E+00
300	9.73405E-01	1.90600E+00	9.29510E-01	1.47157E-03	0.00000E+00	0.00000E+00
301	9.12033E-01	1.91150E+00	9.29452E-01	1.46781E-03	0.00000E+00	0.00000E+00
302	9.16371E-01	1.91683E+00	9.29408E-01	1.46355E-03	0.00000E+00	0.00000E+00
303	9.25679E-01	1.92233E+00	9.29396E-01	1.45874E-03	0.00000E+00	0.00000E+00
304	8.91616E-01	1.92783E+00	9.29271E-01	1.45927E-03	0.00000E+00	0.00000E+00
305	9.86271E-01	1.93350E+00	9.29459E-01	1.46656E-03	0.00000E+00	0.00000E+00
306	9.39257E-01	1.93950E+00	9.29491E-01	1.46208E-03	0.00000E+00	0.00000E+00
307	9.46458E-01	1.94500E+00	9.29547E-01	1.45834E-03	0.00000E+00	0.00000E+00
308	9.67383E-01	1.95050E+00	9.29671E-01	1.45882E-03	0.00000E+00	0.00000E+00
309	9.32850E-01	1.95617E+00	9.29681E-01	1.45410E-03	0.00000E+00	0.00000E+00

310	9.52645E-01	1.96167E+00	9.29755E-01	1.45129E-03	0.00000E+00	0.00000E+00
311	9.16414E-01	1.96717E+00	9.29712E-01	1.44722E-03	0.00000E+00	0.00000E+00
312	9.36056E-01	1.97283E+00	9.29733E-01	1.44269E-03	0.00000E+00	0.00000E+00
313	9.13630E-01	1.97833E+00	9.29681E-01	1.43898E-03	0.00000E+00	0.00000E+00
314	9.28756E-01	1.98383E+00	9.29678E-01	1.43436E-03	0.00000E+00	0.00000E+00
315	9.61317E-01	1.98933E+00	9.29779E-01	1.43334E-03	0.00000E+00	0.00000E+00
316	9.16287E-01	1.99500E+00	9.29736E-01	1.42942E-03	0.00000E+00	0.00000E+00
317	9.46660E-01	2.00050E+00	9.29790E-01	1.42588E-03	0.00000E+00	0.00000E+00
318	9.09297E-01	2.00650E+00	9.29725E-01	1.42284E-03	0.00000E+00	0.00000E+00
319	9.36405E-01	2.01250E+00	9.29746E-01	1.41850E-03	0.00000E+00	0.00000E+00
320	9.31244E-01	2.01850E+00	9.29751E-01	1.41404E-03	0.00000E+00	0.00000E+00
321	9.25010E-01	2.02400E+00	9.29736E-01	1.40968E-03	0.00000E+00	0.00000E+00
322	9.23233E-01	2.03000E+00	9.29716E-01	1.40542E-03	0.00000E+00	0.00000E+00
323	9.23849E-01	2.03617E+00	9.29697E-01	1.40115E-03	0.00000E+00	0.00000E+00
324	9.28240E-01	2.04250E+00	9.29693E-01	1.39680E-03	0.00000E+00	0.00000E+00
325	9.70144E-01	2.04817E+00	9.29818E-01	1.39809E-03	0.00000E+00	0.00000E+00
326	8.82571E-01	2.05383E+00	9.29672E-01	1.40138E-03	0.00000E+00	0.00000E+00
327	9.42124E-01	2.05933E+00	9.29710E-01	1.39758E-03	0.00000E+00	0.00000E+00
328	9.33649E-01	2.06500E+00	9.29723E-01	1.39334E-03	0.00000E+00	0.00000E+00
329	9.49409E-01	2.07100E+00	9.29783E-01	1.39038E-03	0.00000E+00	0.00000E+00
330	8.90313E-01	2.07683E+00	9.29662E-01	1.39135E-03	0.00000E+00	0.00000E+00
331	9.22197E-01	2.08250E+00	9.29640E-01	1.38730E-03	0.00000E+00	0.00000E+00
332	9.41547E-01	2.08817E+00	9.29676E-01	1.38356E-03	0.00000E+00	0.00000E+00
333	9.25565E-01	2.09367E+00	9.29663E-01	1.37943E-03	0.00000E+00	0.00000E+00
334	9.29104E-01	2.09917E+00	9.29662E-01	1.37527E-03	0.00000E+00	0.00000E+00
335	9.02138E-01	2.10483E+00	9.29579E-01	1.37362E-03	0.00000E+00	0.00000E+00
336	9.29592E-01	2.11033E+00	9.29579E-01	1.36950E-03	0.00000E+00	0.00000E+00
337	8.84957E-01	2.11617E+00	9.29446E-01	1.37189E-03	0.00000E+00	0.00000E+00
338	8.88817E-01	2.12150E+00	9.29325E-01	1.37313E-03	0.00000E+00	0.00000E+00
339	9.29255E-01	2.12750E+00	9.29325E-01	1.36905E-03	0.00000E+00	0.00000E+00
340	9.32465E-01	2.13283E+00	9.29334E-01	1.36503E-03	0.00000E+00	0.00000E+00
341	9.63477E-01	2.13817E+00	9.29435E-01	1.36472E-03	0.00000E+00	0.00000E+00
342	9.32202E-01	2.14400E+00	9.29443E-01	1.36072E-03	0.00000E+00	0.00000E+00
343	9.24054E-01	2.14950E+00	9.29427E-01	1.35682E-03	0.00000E+00	0.00000E+00
344	9.22895E-01	2.15517E+00	9.29408E-01	1.35298E-03	0.00000E+00	0.00000E+00
345	8.82946E-01	2.16067E+00	9.29273E-01	1.35581E-03	0.00000E+00	0.00000E+00
346	9.66312E-01	2.16633E+00	9.29380E-01	1.35615E-03	0.00000E+00	0.00000E+00
347	9.91684E-01	2.17217E+00	9.29561E-01	1.36421E-03	0.00000E+00	0.00000E+00
348	9.59623E-01	2.17817E+00	9.29648E-01	1.36304E-03	0.00000E+00	0.00000E+00
349	9.17842E-01	2.18400E+00	9.29614E-01	1.35953E-03	0.00000E+00	0.00000E+00
350	9.53409E-01	2.18983E+00	9.29682E-01	1.35734E-03	0.00000E+00	0.00000E+00
351	9.36948E-01	2.19583E+00	9.29703E-01	1.35361E-03	0.00000E+00	0.00000E+00
352	9.49436E-01	2.20150E+00	9.29759E-01	1.35091E-03	0.00000E+00	0.00000E+00
353	9.78832E-01	2.20667E+00	9.29899E-01	1.35429E-03	0.00000E+00	0.00000E+00
354	9.11878E-01	2.21217E+00	9.29848E-01	1.35141E-03	0.00000E+00	0.00000E+00
355	9.44764E-01	2.21767E+00	9.29890E-01	1.34824E-03	0.00000E+00	0.00000E+00
356	9.04941E-01	2.22317E+00	9.29820E-01	1.34627E-03	0.00000E+00	0.00000E+00
357	9.47822E-01	2.22883E+00	9.29870E-01	1.34343E-03	0.00000E+00	0.00000E+00
358	9.32764E-01	2.23517E+00	9.29879E-01	1.33968E-03	0.00000E+00	0.00000E+00
359	9.02597E-01	2.24133E+00	9.29802E-01	1.33810E-03	0.00000E+00	0.00000E+00
360	9.60536E-01	2.24717E+00	9.29888E-01	1.33712E-03	0.00000E+00	0.00000E+00
361	9.32267E-01	2.25283E+00	9.29895E-01	1.33340E-03	0.00000E+00	0.00000E+00
362	9.05612E-01	2.25850E+00	9.29827E-01	1.33140E-03	0.00000E+00	0.00000E+00
363	9.08588E-01	2.26433E+00	9.29768E-01	1.32901E-03	0.00000E+00	0.00000E+00
364	9.07471E-01	2.27000E+00	9.29707E-01	1.32677E-03	0.00000E+00	0.00000E+00
365	9.42698E-01	2.27550E+00	9.29742E-01	1.32359E-03	0.00000E+00	0.00000E+00
366	9.50245E-01	2.28100E+00	9.29799E-01	1.32115E-03	0.00000E+00	0.00000E+00
367	9.23469E-01	2.28650E+00	9.29781E-01	1.31764E-03	0.00000E+00	0.00000E+00
368	9.09932E-01	2.29217E+00	9.29727E-01	1.31516E-03	0.00000E+00	0.00000E+00
369	9.28395E-01	2.29783E+00	9.29724E-01	1.31157E-03	0.00000E+00	0.00000E+00
370	9.31164E-01	2.30333E+00	9.29728E-01	1.30801E-03	0.00000E+00	0.00000E+00
371	9.39548E-01	2.30967E+00	9.29754E-01	1.30473E-03	0.00000E+00	0.00000E+00
372	9.16206E-01	2.31583E+00	9.29718E-01	1.30172E-03	0.00000E+00	0.00000E+00
373	9.33598E-01	2.32217E+00	9.29728E-01	1.29824E-03	0.00000E+00	0.00000E+00
374	8.86007E-01	2.32783E+00	9.29610E-01	1.30007E-03	0.00000E+00	0.00000E+00
375	9.43092E-01	2.33383E+00	9.29647E-01	1.29709E-03	0.00000E+00	0.00000E+00
376	9.26382E-01	2.34067E+00	9.29638E-01	1.29364E-03	0.00000E+00	0.00000E+00
377	9.01160E-01	2.34650E+00	9.29562E-01	1.29242E-03	0.00000E+00	0.00000E+00
378	9.54312E-01	2.35233E+00	9.29628E-01	1.29066E-03	0.00000E+00	0.00000E+00
379	9.76082E-01	2.35850E+00	9.29751E-01	1.29312E-03	0.00000E+00	0.00000E+00
380	9.22818E-01	2.36450E+00	9.29733E-01	1.28982E-03	0.00000E+00	0.00000E+00
381	9.81960E-01	2.37050E+00	9.29870E-01	1.29377E-03	0.00000E+00	0.00000E+00
382	9.82559E-01	2.37600E+00	9.30009E-01	1.29779E-03	0.00000E+00	0.00000E+00
383	9.52859E-01	2.38167E+00	9.30069E-01	1.29577E-03	0.00000E+00	0.00000E+00
384	9.40701E-01	2.38767E+00	9.30097E-01	1.29267E-03	0.00000E+00	0.00000E+00
385	9.19340E-01	2.39350E+00	9.30069E-01	1.28960E-03	0.00000E+00	0.00000E+00
386	9.48564E-01	2.39883E+00	9.30117E-01	1.28714E-03	0.00000E+00	0.00000E+00
387	8.78850E-01	2.40483E+00	9.29984E-01	1.29068E-03	0.00000E+00	0.00000E+00
388	9.12320E-01	2.41117E+00	9.29938E-01	1.28814E-03	0.00000E+00	0.00000E+00
389	9.04809E-01	2.41683E+00	9.29873E-01	1.28645E-03	0.00000E+00	0.00000E+00
390	9.23810E-01	2.42317E+00	9.29857E-01	1.28322E-03	0.00000E+00	0.00000E+00
391	9.31363E-01	2.42967E+00	9.29861E-01	1.27993E-03	0.00000E+00	0.00000E+00
392	9.32227E-01	2.43583E+00	9.29867E-01	1.27666E-03	0.00000E+00	0.00000E+00
393	9.04570E-01	2.44183E+00	9.29803E-01	1.27503E-03	0.00000E+00	0.00000E+00
394	8.88460E-01	2.44867E+00	9.29697E-01	1.27614E-03	0.00000E+00	0.00000E+00
395	9.72270E-01	2.45467E+00	9.29806E-01	1.27749E-03	0.00000E+00	0.00000E+00
396	9.06416E-01	2.46083E+00	9.29746E-01	1.27562E-03	0.00000E+00	0.00000E+00
397	9.31112E-01	2.46683E+00	9.29750E-01	1.27239E-03	0.00000E+00	0.00000E+00
398	9.13007E-01	2.47283E+00	9.29707E-01	1.26988E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 975 independent fission points were generated

399	8.47210E-01	2.47933E+00	9.29500E-01	1.28361E-03	0.00000E+00	0.00000E+00
400	9.41334E-01	2.48533E+00	9.29529E-01	1.28073E-03	0.00000E+00	0.00000E+00
401	9.14158E-01	2.49133E+00	9.29491E-01	1.27809E-03	0.00000E+00	0.00000E+00
402	9.23752E-01	2.49783E+00	9.29476E-01	1.27498E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 977 independent fission points were generated

403	8.83090E-01	2.50433E+00	9.29361E-01	1.27704E-03	0.00000E+00	0.00000E+00
404	9.64222E-01	2.51017E+00	9.29447E-01	1.27681E-03	0.00000E+00	0.00000E+00
405	9.38525E-01	2.51617E+00	9.29470E-01	1.27384E-03	0.00000E+00	0.00000E+00
406	9.32761E-01	2.52217E+00	9.29478E-01	1.27071E-03	0.00000E+00	0.00000E+00
407	9.34429E-01	2.52783E+00	9.29490E-01	1.26762E-03	0.00000E+00	0.00000E+00
408	9.42893E-01	2.53350E+00	9.29523E-01	1.26493E-03	0.00000E+00	0.00000E+00
409	9.03529E-01	2.53933E+00	9.29460E-01	1.26343E-03	0.00000E+00	0.00000E+00
410	9.30189E-01	2.54467E+00	9.29461E-01	1.26033E-03	0.00000E+00	0.00000E+00
411	9.32247E-01	2.55000E+00	9.29468E-01	1.25727E-03	0.00000E+00	0.00000E+00
412	9.14543E-01	2.55600E+00	9.29432E-01	1.25472E-03	0.00000E+00	0.00000E+00

413	9.34767E-01	2.56217E+00	9.29445E-01	1.25173E-03	0.00000E+00	0.00000E+00
414	9.31808E-01	2.56800E+00	9.29450E-01	1.24871E-03	0.00000E+00	0.00000E+00
415	9.37921E-01	2.57333E+00	9.29471E-01	1.24585E-03	0.00000E+00	0.00000E+00
416	9.34874E-01	2.57917E+00	9.29484E-01	1.24290E-03	0.00000E+00	0.00000E+00
417	9.28018E-01	2.58483E+00	9.29480E-01	1.23991E-03	0.00000E+00	0.00000E+00
418	9.40571E-01	2.59033E+00	9.29507E-01	1.23721E-03	0.00000E+00	0.00000E+00
419	8.95462E-01	2.59600E+00	9.29425E-01	1.23694E-03	0.00000E+00	0.00000E+00
420	9.04861E-01	2.60233E+00	9.29367E-01	1.23537E-03	0.00000E+00	0.00000E+00
421	9.35146E-01	2.60833E+00	9.29381E-01	1.23250E-03	0.00000E+00	0.00000E+00
422	8.97697E-01	2.61433E+00	9.29305E-01	1.23187E-03	0.00000E+00	0.00000E+00
423	9.36250E-01	2.61967E+00	9.29322E-01	1.22905E-03	0.00000E+00	0.00000E+00
424	9.24637E-01	2.62517E+00	9.29310E-01	1.22619E-03	0.00000E+00	0.00000E+00
425	9.59979E-01	2.63100E+00	9.29383E-01	1.22543E-03	0.00000E+00	0.00000E+00
426	8.96128E-01	2.63700E+00	9.29305E-01	1.22505E-03	0.00000E+00	0.00000E+00
427	9.15773E-01	2.64300E+00	9.29273E-01	1.22258E-03	0.00000E+00	0.00000E+00
428	9.56658E-01	2.64883E+00	9.29337E-01	1.22140E-03	0.00000E+00	0.00000E+00
429	9.10975E-01	2.65433E+00	9.29294E-01	1.21930E-03	0.00000E+00	0.00000E+00
430	9.24030E-01	2.66017E+00	9.29282E-01	1.21651E-03	0.00000E+00	0.00000E+00
431	9.14509E-01	2.66583E+00	9.29247E-01	1.21416E-03	0.00000E+00	0.00000E+00
432	9.56241E-01	2.67133E+00	9.29310E-01	1.21295E-03	0.00000E+00	0.00000E+00
433	9.47351E-01	2.67683E+00	9.29352E-01	1.21086E-03	0.00000E+00	0.00000E+00
434	9.29235E-01	2.68217E+00	9.29352E-01	1.20805E-03	0.00000E+00	0.00000E+00
435	9.30165E-01	2.68817E+00	9.29353E-01	1.20526E-03	0.00000E+00	0.00000E+00
436	9.46677E-01	2.69400E+00	9.29393E-01	1.20314E-03	0.00000E+00	0.00000E+00
437	9.05449E-01	2.69967E+00	9.29338E-01	1.20164E-03	0.00000E+00	0.00000E+00
438	9.35740E-01	2.70517E+00	9.29353E-01	1.19897E-03	0.00000E+00	0.00000E+00
439	9.23854E-01	2.71133E+00	9.29340E-01	1.19629E-03	0.00000E+00	0.00000E+00
440	9.12522E-01	2.71733E+00	9.29302E-01	1.19417E-03	0.00000E+00	0.00000E+00
441	9.39313E-01	2.72317E+00	9.29325E-01	1.19167E-03	0.00000E+00	0.00000E+00
442	9.30264E-01	2.72883E+00	9.29327E-01	1.18896E-03	0.00000E+00	0.00000E+00
443	9.16415E-01	2.73483E+00	9.29298E-01	1.18662E-03	0.00000E+00	0.00000E+00
444	8.98195E-01	2.74050E+00	9.29227E-01	1.18602E-03	0.00000E+00	0.00000E+00
445	9.67115E-01	2.74600E+00	9.29313E-01	1.18643E-03	0.00000E+00	0.00000E+00
446	9.35291E-01	2.75183E+00	9.29326E-01	1.18383E-03	0.00000E+00	0.00000E+00
447	9.27538E-01	2.75750E+00	9.29322E-01	1.18117E-03	0.00000E+00	0.00000E+00
448	9.06561E-01	2.76367E+00	9.29271E-01	1.17962E-03	0.00000E+00	0.00000E+00
449	9.26448E-01	2.76950E+00	9.29265E-01	1.17700E-03	0.00000E+00	0.00000E+00
450	9.64444E-01	2.77517E+00	9.29343E-01	1.17699E-03	0.00000E+00	0.00000E+00
451	9.19652E-01	2.78100E+00	9.29322E-01	1.17457E-03	0.00000E+00	0.00000E+00
452	9.55470E-01	2.78667E+00	9.29380E-01	1.17339E-03	0.00000E+00	0.00000E+00
453	9.46488E-01	2.79267E+00	9.29418E-01	1.17140E-03	0.00000E+00	0.00000E+00
454	9.37687E-01	2.79833E+00	9.29436E-01	1.16895E-03	0.00000E+00	0.00000E+00
455	8.96417E-01	2.80417E+00	9.29363E-01	1.16864E-03	0.00000E+00	0.00000E+00
456	9.61746E-01	2.80983E+00	9.29435E-01	1.16824E-03	0.00000E+00	0.00000E+00
457	9.79179E-01	2.81533E+00	9.29544E-01	1.17079E-03	0.00000E+00	0.00000E+00
458	8.59350E-01	2.82133E+00	9.29390E-01	1.17832E-03	0.00000E+00	0.00000E+00
459	9.66155E-01	2.82700E+00	9.29471E-01	1.17849E-03	0.00000E+00	0.00000E+00
460	9.71151E-01	2.83283E+00	9.29562E-01	1.17943E-03	0.00000E+00	0.00000E+00
461	9.40956E-01	2.83867E+00	9.29586E-01	1.17712E-03	0.00000E+00	0.00000E+00
462	9.46454E-01	2.84500E+00	9.29623E-01	1.17513E-03	0.00000E+00	0.00000E+00
463	9.55472E-01	2.85050E+00	9.29679E-01	1.17391E-03	0.00000E+00	0.00000E+00
464	9.85358E-01	2.85567E+00	9.29800E-01	1.17755E-03	0.00000E+00	0.00000E+00
465	9.31368E-01	2.86133E+00	9.29803E-01	1.17501E-03	0.00000E+00	0.00000E+00
466	9.35724E-01	2.86717E+00	9.29816E-01	1.17255E-03	0.00000E+00	0.00000E+00
467	9.15217E-01	2.87283E+00	9.29784E-01	1.17044E-03	0.00000E+00	0.00000E+00
468	9.39037E-01	2.87883E+00	9.29804E-01	1.16810E-03	0.00000E+00	0.00000E+00
469	9.24496E-01	2.88483E+00	9.29793E-01	1.16565E-03	0.00000E+00	0.00000E+00
470	9.23233E-01	2.89083E+00	9.29779E-01	1.16324E-03	0.00000E+00	0.00000E+00
471	9.35215E-01	2.89700E+00	9.29790E-01	1.16082E-03	0.00000E+00	0.00000E+00
472	9.49501E-01	2.90300E+00	9.29832E-01	1.15910E-03	0.00000E+00	0.00000E+00
473	8.93405E-01	2.90900E+00	9.29755E-01	1.15922E-03	0.00000E+00	0.00000E+00
474	9.72012E-01	2.91450E+00	9.29845E-01	1.16022E-03	0.00000E+00	0.00000E+00
475	9.13986E-01	2.92033E+00	9.29811E-01	1.15825E-03	0.00000E+00	0.00000E+00
476	8.90477E-01	2.92617E+00	9.29728E-01	1.15878E-03	0.00000E+00	0.00000E+00
477	9.17581E-01	2.93200E+00	9.29702E-01	1.15662E-03	0.00000E+00	0.00000E+00
478	8.91369E-01	2.93767E+00	9.29622E-01	1.15700E-03	0.00000E+00	0.00000E+00
479	9.17479E-01	2.94350E+00	9.29596E-01	1.15485E-03	0.00000E+00	0.00000E+00
480	8.70562E-01	2.94883E+00	9.29473E-01	1.15903E-03	0.00000E+00	0.00000E+00
481	9.05658E-01	2.95467E+00	9.29423E-01	1.15767E-03	0.00000E+00	0.00000E+00
482	9.64886E-01	2.96083E+00	9.29497E-01	1.15762E-03	0.00000E+00	0.00000E+00
483	9.39777E-01	2.96733E+00	9.29519E-01	1.15541E-03	0.00000E+00	0.00000E+00
484	9.31846E-01	2.97367E+00	9.29523E-01	1.15302E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 998 independent fission points were generated

485	8.88958E-01	2.97983E+00	9.29439E-01	1.15369E-03	0.00000E+00	0.00000E+00
486	9.10710E-01	2.98667E+00	9.29401E-01	1.15195E-03	0.00000E+00	0.00000E+00
487	9.17047E-01	2.99267E+00	9.29375E-01	1.14986E-03	0.00000E+00	0.00000E+00
488	9.35989E-01	2.99833E+00	9.29389E-01	1.14757E-03	0.00000E+00	0.00000E+00
489	9.42005E-01	3.00433E+00	9.29415E-01	1.14551E-03	0.00000E+00	0.00000E+00
490	9.15503E-01	3.01083E+00	9.29386E-01	1.14351E-03	0.00000E+00	0.00000E+00
491	9.30228E-01	3.01717E+00	9.29388E-01	1.14117E-03	0.00000E+00	0.00000E+00
492	9.48413E-01	3.02333E+00	9.29427E-01	1.13950E-03	0.00000E+00	0.00000E+00
493	9.37153E-01	3.02917E+00	9.29442E-01	1.13729E-03	0.00000E+00	0.00000E+00
494	9.49336E-01	3.03483E+00	9.29483E-01	1.13569E-03	0.00000E+00	0.00000E+00
495	8.99107E-01	3.04100E+00	9.29421E-01	1.13506E-03	0.00000E+00	0.00000E+00
496	9.42861E-01	3.04733E+00	9.29449E-01	1.13309E-03	0.00000E+00	0.00000E+00
497	9.06778E-01	3.05350E+00	9.29403E-01	1.13172E-03	0.00000E+00	0.00000E+00
498	9.12851E-01	3.05983E+00	9.29369E-01	1.12993E-03	0.00000E+00	0.00000E+00
499	9.05971E-01	3.06550E+00	9.29322E-01	1.12864E-03	0.00000E+00	0.00000E+00
500	9.03065E-01	3.07133E+00	9.29270E-01	1.12760E-03	0.00000E+00	0.00000E+00
501	9.55019E-01	3.07733E+00	9.29321E-01	1.12652E-03	0.00000E+00	0.00000E+00
502	9.04435E-01	3.08333E+00	9.29271E-01	1.12537E-03	0.00000E+00	0.00000E+00
503	9.04789E-01	3.08983E+00	9.29222E-01	1.12418E-03	0.00000E+00	0.00000E+00
504	9.42125E-01	3.09550E+00	9.29248E-01	1.12224E-03	0.00000E+00	0.00000E+00
505	8.81689E-01	3.10183E+00	9.29154E-01	1.12399E-03	0.00000E+00	0.00000E+00
506	9.22543E-01	3.10800E+00	9.29141E-01	1.12183E-03	0.00000E+00	0.00000E+00
507	8.90004E-01	3.11367E+00	9.29063E-01	1.12229E-03	0.00000E+00	0.00000E+00
508	9.42157E-01	3.12000E+00	9.29089E-01	1.12037E-03	0.00000E+00	0.00000E+00
509	9.66061E-01	3.12550E+00	9.29162E-01	1.12053E-03	0.00000E+00	0.00000E+00
510	9.11094E-01	3.13150E+00	9.29126E-01	1.11889E-03	0.00000E+00	0.00000E+00
511	9.48390E-01	3.13683E+00	9.29164E-01	1.11733E-03	0.00000E+00	0.00000E+00
512	9.38174E-01	3.14233E+00	9.29182E-01	1.11527E-03	0.00000E+00	0.00000E+00
513	8.78744E-01	3.14817E+00	9.29083E-01	1.11746E-03	0.00000E+00	0.00000E+00
514	9.18956E-01	3.15433E+00	9.29063E-01	1.11545E-03	0.00000E+00	0.00000E+00
515	8.95396E-01	3.16017E+00	9.28998E-01	1.11520E-03	0.00000E+00	0.00000E+00
516	9.22568E-01	3.16633E+00	9.28985E-01	1.11310E-03	0.00000E+00	0.00000E+00

517	9.26101E-01	3.17200E+00	9.28980E-01	1.11095E-03	0.00000E+00	0.00000E+00
518	9.40734E-01	3.17800E+00	9.29002E-01	1.10903E-03	0.00000E+00	0.00000E+00
519	9.39458E-01	3.18383E+00	9.29023E-01	1.10707E-03	0.00000E+00	0.00000E+00
520	9.35954E-01	3.18983E+00	9.29036E-01	1.10501E-03	0.00000E+00	0.00000E+00
521	9.59636E-01	3.19583E+00	9.29095E-01	1.10446E-03	0.00000E+00	0.00000E+00
522	9.03887E-01	3.20117E+00	9.29046E-01	1.10339E-03	0.00000E+00	0.00000E+00
523	9.17497E-01	3.20717E+00	9.29024E-01	1.10150E-03	0.00000E+00	0.00000E+00
524	9.32818E-01	3.21300E+00	9.29032E-01	1.09941E-03	0.00000E+00	0.00000E+00
525	8.86256E-01	3.21900E+00	9.28950E-01	1.10035E-03	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 994 independent fission points were generated

526	8.88876E-01	3.22500E+00	9.28873E-01	1.10091E-03	0.00000E+00	0.00000E+00
527	9.26042E-01	3.23100E+00	9.28868E-01	1.09882E-03	0.00000E+00	0.00000E+00
528	9.56915E-01	3.23683E+00	9.28921E-01	1.09803E-03	0.00000E+00	0.00000E+00
529	9.23842E-01	3.24283E+00	9.28912E-01	1.09598E-03	0.00000E+00	0.00000E+00
530	8.90430E-01	3.24917E+00	9.28839E-01	1.09633E-03	0.00000E+00	0.00000E+00
531	9.29723E-01	3.25467E+00	9.28840E-01	1.09426E-03	0.00000E+00	0.00000E+00
532	9.51017E-01	3.26067E+00	9.28882E-01	1.09299E-03	0.00000E+00	0.00000E+00
533	9.12922E-01	3.26600E+00	9.28852E-01	1.09135E-03	0.00000E+00	0.00000E+00
534	9.32930E-01	3.27183E+00	9.28860E-01	1.08932E-03	0.00000E+00	0.00000E+00
535	8.89798E-01	3.27783E+00	9.28787E-01	1.08974E-03	0.00000E+00	0.00000E+00
536	9.63837E-01	3.28383E+00	9.28852E-01	1.08968E-03	0.00000E+00	0.00000E+00
537	9.13565E-01	3.28950E+00	9.28824E-01	1.08801E-03	0.00000E+00	0.00000E+00
538	8.81320E-01	3.29633E+00	9.28735E-01	1.08959E-03	0.00000E+00	0.00000E+00
539	9.26051E-01	3.30200E+00	9.28730E-01	1.08757E-03	0.00000E+00	0.00000E+00
540	9.32903E-01	3.30800E+00	9.28738E-01	1.08558E-03	0.00000E+00	0.00000E+00
541	9.42214E-01	3.31350E+00	9.28763E-01	1.08385E-03	0.00000E+00	0.00000E+00
542	9.46508E-01	3.31967E+00	9.28796E-01	1.08234E-03	0.00000E+00	0.00000E+00
543	8.96553E-01	3.32567E+00	9.28736E-01	1.08198E-03	0.00000E+00	0.00000E+00
544	9.33748E-01	3.33167E+00	9.28745E-01	1.08002E-03	0.00000E+00	0.00000E+00
545	1.01259E+00	3.33683E+00	9.28900E-01	1.08903E-03	0.00000E+00	0.00000E+00
546	9.08848E-01	3.34233E+00	9.28863E-01	1.08765E-03	0.00000E+00	0.00000E+00
547	9.58954E-01	3.34817E+00	9.28918E-01	1.08706E-03	0.00000E+00	0.00000E+00
548	9.34774E-01	3.35333E+00	9.28929E-01	1.08512E-03	0.00000E+00	0.00000E+00
549	9.40970E-01	3.35883E+00	9.28951E-01	1.08336E-03	0.00000E+00	0.00000E+00
550	9.24568E-01	3.36450E+00	9.28943E-01	1.08141E-03	0.00000E+00	0.00000E+00
551	9.56389E-01	3.37050E+00	9.28993E-01	1.08059E-03	0.00000E+00	0.00000E+00
552	8.99676E-01	3.37617E+00	9.28939E-01	1.07994E-03	0.00000E+00	0.00000E+00
553	8.99745E-01	3.38167E+00	9.28886E-01	1.07928E-03	0.00000E+00	0.00000E+00
554	9.58484E-01	3.38750E+00	9.28940E-01	1.07866E-03	0.00000E+00	0.00000E+00
555	9.01169E-01	3.39283E+00	9.28890E-01	1.07788E-03	0.00000E+00	0.00000E+00
556	8.83897E-01	3.39867E+00	9.28809E-01	1.07899E-03	0.00000E+00	0.00000E+00
557	9.26540E-01	3.40417E+00	9.28805E-01	1.07705E-03	0.00000E+00	0.00000E+00
558	9.24307E-01	3.40983E+00	9.28796E-01	1.07514E-03	0.00000E+00	0.00000E+00
559	9.21245E-01	3.41533E+00	9.28783E-01	1.07330E-03	0.00000E+00	0.00000E+00
560	9.59859E-01	3.42100E+00	9.28839E-01	1.07282E-03	0.00000E+00	0.00000E+00
561	9.88329E-01	3.42667E+00	9.28945E-01	1.07617E-03	0.00000E+00	0.00000E+00
562	9.43981E-01	3.43217E+00	9.28972E-01	1.07459E-03	0.00000E+00	0.00000E+00
563	9.17723E-01	3.43767E+00	9.28952E-01	1.07286E-03	0.00000E+00	0.00000E+00
564	9.51418E-01	3.44333E+00	9.28992E-01	1.07169E-03	0.00000E+00	0.00000E+00
565	9.47411E-01	3.44883E+00	9.29024E-01	1.07029E-03	0.00000E+00	0.00000E+00
566	9.59153E-01	3.45433E+00	9.29078E-01	1.06972E-03	0.00000E+00	0.00000E+00
567	9.22860E-01	3.46000E+00	9.29067E-01	1.06788E-03	0.00000E+00	0.00000E+00
568	9.03835E-01	3.46583E+00	9.29022E-01	1.06693E-03	0.00000E+00	0.00000E+00
569	8.48081E-01	3.47200E+00	9.28880E-01	1.07457E-03	0.00000E+00	0.00000E+00
570	9.36523E-01	3.47800E+00	9.28893E-01	1.07276E-03	0.00000E+00	0.00000E+00
571	9.16068E-01	3.48383E+00	9.28870E-01	1.07111E-03	0.00000E+00	0.00000E+00
572	9.38349E-01	3.48950E+00	9.28887E-01	1.06936E-03	0.00000E+00	0.00000E+00
573	9.16080E-01	3.49550E+00	9.28865E-01	1.06772E-03	0.00000E+00	0.00000E+00
574	9.71901E-01	3.50117E+00	9.28940E-01	1.06850E-03	0.00000E+00	0.00000E+00
575	9.17687E-01	3.50667E+00	9.28920E-01	1.06682E-03	0.00000E+00	0.00000E+00
576	8.99127E-01	3.51267E+00	9.28868E-01	1.06622E-03	0.00000E+00	0.00000E+00
577	9.48842E-01	3.51833E+00	9.28903E-01	1.06493E-03	0.00000E+00	0.00000E+00
578	9.30057E-01	3.52383E+00	9.28905E-01	1.06308E-03	0.00000E+00	0.00000E+00
579	9.69708E-01	3.52967E+00	9.28976E-01	1.06359E-03	0.00000E+00	0.00000E+00
580	9.06352E-01	3.53533E+00	9.28937E-01	1.06247E-03	0.00000E+00	0.00000E+00
581	8.96594E-01	3.54183E+00	9.28881E-01	1.06210E-03	0.00000E+00	0.00000E+00
582	9.10658E-01	3.54783E+00	9.28849E-01	1.06074E-03	0.00000E+00	0.00000E+00
583	9.40137E-01	3.55383E+00	9.28869E-01	1.05909E-03	0.00000E+00	0.00000E+00
584	9.22030E-01	3.56067E+00	9.28857E-01	1.05733E-03	0.00000E+00	0.00000E+00
585	9.27594E-01	3.56667E+00	9.28855E-01	1.05552E-03	0.00000E+00	0.00000E+00
586	8.91442E-01	3.57317E+00	9.28791E-01	1.05566E-03	0.00000E+00	0.00000E+00
587	8.98914E-01	3.57883E+00	9.28740E-01	1.05509E-03	0.00000E+00	0.00000E+00
588	9.17246E-01	3.58567E+00	9.28720E-01	1.05347E-03	0.00000E+00	0.00000E+00
589	9.03488E-01	3.59217E+00	9.28677E-01	1.05255E-03	0.00000E+00	0.00000E+00
590	9.10332E-01	3.59867E+00	9.28646E-01	1.05122E-03	0.00000E+00	0.00000E+00
591	9.61728E-01	3.60483E+00	9.28702E-01	1.05094E-03	0.00000E+00	0.00000E+00
592	9.08631E-01	3.61033E+00	9.28668E-01	1.04970E-03	0.00000E+00	0.00000E+00
593	8.82725E-01	3.61600E+00	9.28590E-01	1.05081E-03	0.00000E+00	0.00000E+00
594	9.30716E-01	3.62200E+00	9.28594E-01	1.04904E-03	0.00000E+00	0.00000E+00
595	1.00746E+00	3.62800E+00	9.28727E-01	1.05568E-03	0.00000E+00	0.00000E+00
596	9.05505E-01	3.63400E+00	9.28688E-01	1.05462E-03	0.00000E+00	0.00000E+00
597	9.59467E-01	3.64033E+00	9.28740E-01	1.05412E-03	0.00000E+00	0.00000E+00
598	9.68110E-01	3.64650E+00	9.28806E-01	1.05442E-03	0.00000E+00	0.00000E+00
599	9.04915E-01	3.65283E+00	9.28766E-01	1.05341E-03	0.00000E+00	0.00000E+00
600	9.00259E-01	3.65883E+00	9.28718E-01	1.05273E-03	0.00000E+00	0.00000E+00
601	9.31500E-01	3.66450E+00	9.28723E-01	1.05098E-03	0.00000E+00	0.00000E+00
602	9.30966E-01	3.67050E+00	9.28726E-01	1.04923E-03	0.00000E+00	0.00000E+00
603	9.23881E-01	3.67617E+00	9.28718E-01	1.04752E-03	0.00000E+00	0.00000E+00
604	9.30883E-01	3.68200E+00	9.28722E-01	1.04578E-03	0.00000E+00	0.00000E+00
605	9.23317E-01	3.68800E+00	9.28713E-01	1.04409E-03	0.00000E+00	0.00000E+00
606	9.09306E-01	3.69400E+00	9.28681E-01	1.04285E-03	0.00000E+00	0.00000E+00
607	9.32390E-01	3.69933E+00	9.28687E-01	1.04114E-03	0.00000E+00	0.00000E+00
608	9.54142E-01	3.70483E+00	9.28729E-01	1.04027E-03	0.00000E+00	0.00000E+00
609	8.97166E-01	3.71217E+00	9.28677E-01	1.03986E-03	0.00000E+00	0.00000E+00
610	9.51201E-01	3.71783E+00	9.28714E-01	1.03881E-03	0.00000E+00	0.00000E+00
611	9.26162E-01	3.72317E+00	9.28710E-01	1.03711E-03	0.00000E+00	0.00000E+00
612	9.20296E-01	3.72933E+00	9.28696E-01	1.03550E-03	0.00000E+00	0.00000E+00
613	9.54627E-01	3.73533E+00	9.28738E-01	1.03467E-03	0.00000E+00	0.00000E+00
614	8.95745E-01	3.74100E+00	9.28685E-01	1.03439E-03	0.00000E+00	0.00000E+00
615	9.06273E-01	3.74633E+00	9.28648E-01	1.03335E-03	0.00000E+00	0.00000E+00
616	9.02208E-01	3.75167E+00	9.28605E-01	1.03256E-03	0.00000E+00	0.00000E+00
617	9.10995E-01	3.75717E+00	9.28576E-01	1.03128E-03	0.00000E+00	0.00000E+00
618	9.46255E-01	3.76300E+00	9.28605E-01	1.03000E-03	0.00000E+00	0.00000E+00
619	9.30310E-01	3.76833E+00	9.28608E-01	1.02833E-03	0.00000E+00	0.00000E+00
620	9.60687E-01	3.77417E+00	9.28660E-01	1.02798E-03	0.00000E+00	0.00000E+00

621	9.13293E-01	3.77983E+00	9.28635E-01	1.02662E-03	0.00000E+00	0.00000E+00
622	9.32037E-01	3.78583E+00	9.28640E-01	1.02498E-03	0.00000E+00	0.00000E+00
623	9.47640E-01	3.79183E+00	9.28671E-01	1.02378E-03	0.00000E+00	0.00000E+00
624	9.03022E-01	3.79733E+00	9.28630E-01	1.02296E-03	0.00000E+00	0.00000E+00
625	9.09362E-01	3.80300E+00	9.28599E-01	1.02179E-03	0.00000E+00	0.00000E+00
626	9.64910E-01	3.80900E+00	9.28657E-01	1.02181E-03	0.00000E+00	0.00000E+00
627	9.21988E-01	3.81483E+00	9.28646E-01	1.02023E-03	0.00000E+00	0.00000E+00
628	9.03714E-01	3.82050E+00	9.28606E-01	1.01938E-03	0.00000E+00	0.00000E+00
629	9.41124E-01	3.82617E+00	9.28626E-01	1.01794E-03	0.00000E+00	0.00000E+00
630	9.28883E-01	3.83217E+00	9.28627E-01	1.01632E-03	0.00000E+00	0.00000E+00
631	9.50181E-01	3.83800E+00	9.28661E-01	1.01528E-03	0.00000E+00	0.00000E+00
632	9.71311E-01	3.84367E+00	9.28729E-01	1.01593E-03	0.00000E+00	0.00000E+00
633	9.28997E-01	3.84917E+00	9.28729E-01	1.01432E-03	0.00000E+00	0.00000E+00
634	9.48903E-01	3.85433E+00	9.28761E-01	1.01321E-03	0.00000E+00	0.00000E+00
635	9.51565E-01	3.86000E+00	9.28797E-01	1.01225E-03	0.00000E+00	0.00000E+00
636	8.95134E-01	3.86550E+00	9.28744E-01	1.01205E-03	0.00000E+00	0.00000E+00
637	9.25807E-01	3.87100E+00	9.28739E-01	1.01047E-03	0.00000E+00	0.00000E+00
638	9.30809E-01	3.87650E+00	9.28743E-01	1.00888E-03	0.00000E+00	0.00000E+00
639	9.29289E-01	3.88200E+00	9.28744E-01	1.00730E-03	0.00000E+00	0.00000E+00
640	8.96369E-01	3.88767E+00	9.28693E-01	1.00700E-03	0.00000E+00	0.00000E+00
641	9.46447E-01	3.89333E+00	9.28721E-01	1.00580E-03	0.00000E+00	0.00000E+00
642	9.06809E-01	3.89933E+00	9.28686E-01	1.00481E-03	0.00000E+00	0.00000E+00
643	8.94546E-01	3.90517E+00	9.28633E-01	1.00466E-03	0.00000E+00	0.00000E+00
644	9.00045E-01	3.91083E+00	9.28589E-01	1.00408E-03	0.00000E+00	0.00000E+00
645	9.63393E-01	3.91683E+00	9.28643E-01	1.00398E-03	0.00000E+00	0.00000E+00
646	9.43169E-01	3.92250E+00	9.28665E-01	1.00267E-03	0.00000E+00	0.00000E+00
647	8.99156E-01	3.92883E+00	9.28619E-01	1.00216E-03	0.00000E+00	0.00000E+00
648	9.35683E-01	3.93533E+00	9.28630E-01	1.00067E-03	0.00000E+00	0.00000E+00
649	9.36882E-01	3.94183E+00	9.28643E-01	9.99200E-04	0.00000E+00	0.00000E+00
650	9.26746E-01	3.94833E+00	9.28640E-01	9.97661E-04	0.00000E+00	0.00000E+00
651	8.85490E-01	3.95483E+00	9.28574E-01	9.98339E-04	0.00000E+00	0.00000E+00
652	9.29139E-01	3.96117E+00	9.28575E-01	9.96802E-04	0.00000E+00	0.00000E+00
653	9.55448E-01	3.96683E+00	9.28616E-01	9.96125E-04	0.00000E+00	0.00000E+00
654	8.95276E-01	3.97283E+00	9.28565E-01	9.95910E-04	0.00000E+00	0.00000E+00
655	8.79336E-01	3.97967E+00	9.28489E-01	9.97237E-04	0.00000E+00	0.00000E+00
656	9.74971E-01	3.98567E+00	9.28560E-01	9.98245E-04	0.00000E+00	0.00000E+00
657	9.36186E-01	3.99150E+00	9.28572E-01	9.96788E-04	0.00000E+00	0.00000E+00
658	9.58531E-01	3.99783E+00	9.28618E-01	9.96314E-04	0.00000E+00	0.00000E+00
659	9.03967E-01	4.00433E+00	9.28580E-01	9.95504E-04	0.00000E+00	0.00000E+00
660	9.27393E-01	4.01050E+00	9.28578E-01	9.93991E-04	0.00000E+00	0.00000E+00
661	9.23009E-01	4.01683E+00	9.28570E-01	9.92518E-04	0.00000E+00	0.00000E+00
662	8.97166E-01	4.02300E+00	9.28522E-01	9.92155E-04	0.00000E+00	0.00000E+00
663	9.32502E-01	4.02967E+00	9.28528E-01	9.90671E-04	0.00000E+00	0.00000E+00
664	9.25118E-01	4.03550E+00	9.28523E-01	9.89187E-04	0.00000E+00	0.00000E+00
665	9.64872E-01	4.04133E+00	9.28578E-01	9.89214E-04	0.00000E+00	0.00000E+00
666	9.70806E-01	4.04733E+00	9.28642E-01	9.89768E-04	0.00000E+00	0.00000E+00
667	9.21479E-01	4.05300E+00	9.28631E-01	9.88337E-04	0.00000E+00	0.00000E+00
668	8.89617E-01	4.05883E+00	9.28572E-01	9.88589E-04	0.00000E+00	0.00000E+00
669	9.10370E-01	4.06417E+00	9.28545E-01	9.87483E-04	0.00000E+00	0.00000E+00
670	9.41551E-01	4.07000E+00	9.28565E-01	9.86196E-04	0.00000E+00	0.00000E+00
671	9.62655E-01	4.07567E+00	9.28615E-01	9.86038E-04	0.00000E+00	0.00000E+00
672	9.85840E-01	4.08167E+00	9.28701E-01	9.88263E-04	0.00000E+00	0.00000E+00
673	9.75550E-01	4.08733E+00	9.28771E-01	9.89256E-04	0.00000E+00	0.00000E+00
674	9.66003E-01	4.09317E+00	9.28826E-01	9.89336E-04	0.00000E+00	0.00000E+00
675	9.52553E-01	4.09867E+00	9.28861E-01	9.88494E-04	0.00000E+00	0.00000E+00
676	9.36394E-01	4.10433E+00	9.28873E-01	9.87089E-04	0.00000E+00	0.00000E+00
677	8.98983E-01	4.11033E+00	9.28828E-01	9.86620E-04	0.00000E+00	0.00000E+00
678	9.25776E-01	4.11600E+00	9.28824E-01	9.85170E-04	0.00000E+00	0.00000E+00
679	9.22881E-01	4.12150E+00	9.28815E-01	9.83753E-04	0.00000E+00	0.00000E+00
680	9.46792E-01	4.12700E+00	9.28841E-01	9.82658E-04	0.00000E+00	0.00000E+00
681	9.24494E-01	4.13267E+00	9.28835E-01	9.81231E-04	0.00000E+00	0.00000E+00
682	9.11198E-01	4.13850E+00	9.28809E-01	9.80130E-04	0.00000E+00	0.00000E+00
683	9.17692E-01	4.14467E+00	9.28793E-01	9.78826E-04	0.00000E+00	0.00000E+00
684	9.43022E-01	4.15067E+00	9.28814E-01	9.77612E-04	0.00000E+00	0.00000E+00
685	8.98123E-01	4.15667E+00	9.28769E-01	9.77214E-04	0.00000E+00	0.00000E+00
686	9.62211E-01	4.16233E+00	9.28818E-01	9.77008E-04	0.00000E+00	0.00000E+00
687	9.53813E-01	4.16817E+00	9.28854E-01	9.76263E-04	0.00000E+00	0.00000E+00
688	9.58737E-01	4.17417E+00	9.28898E-01	9.75811E-04	0.00000E+00	0.00000E+00
689	8.98294E-01	4.18033E+00	9.28853E-01	9.75408E-04	0.00000E+00	0.00000E+00
690	8.97592E-01	4.18683E+00	9.28808E-01	9.75048E-04	0.00000E+00	0.00000E+00
691	9.25206E-01	4.19283E+00	9.28802E-01	9.73646E-04	0.00000E+00	0.00000E+00
692	9.65708E-01	4.19917E+00	9.28856E-01	9.73704E-04	0.00000E+00	0.00000E+00
693	8.94327E-01	4.20567E+00	9.28806E-01	9.73577E-04	0.00000E+00	0.00000E+00
694	9.36770E-01	4.21167E+00	9.28818E-01	9.72237E-04	0.00000E+00	0.00000E+00
695	9.32610E-01	4.21767E+00	9.28823E-01	9.70849E-04	0.00000E+00	0.00000E+00
696	9.37066E-01	4.22333E+00	9.28835E-01	9.69522E-04	0.00000E+00	0.00000E+00
697	9.59917E-01	4.22933E+00	9.28880E-01	9.69158E-04	0.00000E+00	0.00000E+00
698	9.26815E-01	4.23550E+00	9.28877E-01	9.67769E-04	0.00000E+00	0.00000E+00
699	9.87460E-01	4.24150E+00	9.28961E-01	9.70028E-04	0.00000E+00	0.00000E+00
700	9.47595E-01	4.24783E+00	9.28987E-01	9.69005E-04	0.00000E+00	0.00000E+00
701	9.28213E-01	4.25400E+00	9.28986E-01	9.67619E-04	0.00000E+00	0.00000E+00
702	9.54956E-01	4.25983E+00	9.29023E-01	9.66947E-04	0.00000E+00	0.00000E+00
703	9.21967E-01	4.26600E+00	9.29013E-01	9.65619E-04	0.00000E+00	0.00000E+00
704	9.72362E-01	4.27233E+00	9.29075E-01	9.66218E-04	0.00000E+00	0.00000E+00
705	9.12048E-01	4.27783E+00	9.29051E-01	9.65147E-04	0.00000E+00	0.00000E+00
706	9.50100E-01	4.28383E+00	9.29081E-01	9.64238E-04	0.00000E+00	0.00000E+00
707	9.55186E-01	4.28967E+00	9.29118E-01	9.63581E-04	0.00000E+00	0.00000E+00
708	9.08805E-01	4.29550E+00	9.29089E-01	9.62646E-04	0.00000E+00	0.00000E+00
709	9.39964E-01	4.30150E+00	9.29104E-01	9.61406E-04	0.00000E+00	0.00000E+00
710	9.58010E-01	4.30767E+00	9.29145E-01	9.60915E-04	0.00000E+00	0.00000E+00
711	8.96810E-01	4.31367E+00	9.29100E-01	9.60642E-04	0.00000E+00	0.00000E+00
712	9.37220E-01	4.31950E+00	9.29111E-01	9.59356E-04	0.00000E+00	0.00000E+00
713	9.52979E-01	4.32483E+00	9.29145E-01	9.58594E-04	0.00000E+00	0.00000E+00
714	9.06613E-01	4.33083E+00	9.29113E-01	9.57770E-04	0.00000E+00	0.00000E+00
715	9.15488E-01	4.33633E+00	9.29094E-01	9.56616E-04	0.00000E+00	0.00000E+00
716	9.49148E-01	4.34200E+00	9.29122E-01	9.55688E-04	0.00000E+00	0.00000E+00
717	9.43729E-01	4.34783E+00	9.29142E-01	9.54569E-04	0.00000E+00	0.00000E+00
718	9.54488E-01	4.35383E+00	9.29178E-01	9.53892E-04	0.00000E+00	0.00000E+00
719	9.13031E-01	4.35933E+00	9.29155E-01	9.52827E-04	0.00000E+00	0.00000E+00
720	9.13543E-01	4.36500E+00	9.29133E-01	9.51748E-04	0.00000E+00	0.00000E+00
721	9.66655E-01	4.37067E+00	9.29186E-01	9.51855E-04	0.00000E+00	0.00000E+00
722	9.05438E-01	4.37667E+00	9.29153E-01	9.51104E-04	0.00000E+00	0.00000E+00
723	8.95411E-01	4.38300E+00	9.29106E-01	9.50936E-04	0.00000E+00	0.00000E+00
724	9.23353E-01	4.38850E+00	9.29098E-01	9.49651E-04	0.00000E+00	0.00000E+00
725	9.60618E-01	4.39417E+00	9.29142E-01	9.49339E-04	0.00000E+00	0.00000E+00

726	9.11382E-01	4.39983E+00	9.29117E-01	9.48344E-04	0.00000E+00	0.00000E+00
727	9.07483E-01	4.40567E+00	9.29087E-01	9.47505E-04	0.00000E+00	0.00000E+00
728	9.19509E-01	4.41167E+00	9.29074E-01	9.46291E-04	0.00000E+00	0.00000E+00
729	9.33035E-01	4.41700E+00	9.29079E-01	9.45004E-04	0.00000E+00	0.00000E+00
730	9.35633E-01	4.42333E+00	9.29088E-01	9.43748E-04	0.00000E+00	0.00000E+00
731	9.69075E-01	4.42900E+00	9.29143E-01	9.44047E-04	0.00000E+00	0.00000E+00
732	9.33637E-01	4.43500E+00	9.29149E-01	9.42773E-04	0.00000E+00	0.00000E+00
733	9.77083E-01	4.44100E+00	9.29215E-01	9.43763E-04	0.00000E+00	0.00000E+00
734	9.14963E-01	4.44733E+00	9.29196E-01	9.42674E-04	0.00000E+00	0.00000E+00
735	9.64299E-01	4.45383E+00	9.29243E-01	9.42605E-04	0.00000E+00	0.00000E+00
736	8.96513E-01	4.46000E+00	9.29199E-01	9.42375E-04	0.00000E+00	0.00000E+00
737	9.38455E-01	4.46633E+00	9.29211E-01	9.41176E-04	0.00000E+00	0.00000E+00
738	9.28989E-01	4.47300E+00	9.29211E-01	9.39897E-04	0.00000E+00	0.00000E+00
739	9.39308E-01	4.47900E+00	9.29225E-01	9.38721E-04	0.00000E+00	0.00000E+00
740	9.46467E-01	4.48550E+00	9.29248E-01	9.37739E-04	0.00000E+00	0.00000E+00
741	9.23880E-01	4.49233E+00	9.29241E-01	9.36497E-04	0.00000E+00	0.00000E+00
742	9.33962E-01	4.49800E+00	9.29247E-01	9.35253E-04	0.00000E+00	0.00000E+00
743	9.53486E-01	4.50433E+00	9.29280E-01	9.34562E-04	0.00000E+00	0.00000E+00
744	9.35345E-01	4.51050E+00	9.29288E-01	9.33338E-04	0.00000E+00	0.00000E+00
745	9.07480E-01	4.51650E+00	9.29259E-01	9.32543E-04	0.00000E+00	0.00000E+00
746	9.58877E-01	4.52200E+00	9.29299E-01	9.32139E-04	0.00000E+00	0.00000E+00
747	9.19669E-01	4.52800E+00	9.29286E-01	9.30977E-04	0.00000E+00	0.00000E+00
748	9.33449E-01	4.53367E+00	9.29291E-01	9.29745E-04	0.00000E+00	0.00000E+00
749	9.52629E-01	4.53967E+00	9.29323E-01	9.29025E-04	0.00000E+00	0.00000E+00
750	9.24795E-01	4.54517E+00	9.29316E-01	9.27801E-04	0.00000E+00	0.00000E+00
751	9.65906E-01	4.55067E+00	9.29365E-01	9.27849E-04	0.00000E+00	0.00000E+00
752	9.43707E-01	4.55633E+00	9.29384E-01	9.26808E-04	0.00000E+00	0.00000E+00
753	9.42214E-01	4.56233E+00	9.29402E-01	9.25731E-04	0.00000E+00	0.00000E+00
754	9.51891E-01	4.56817E+00	9.29431E-01	9.24983E-04	0.00000E+00	0.00000E+00
755	9.14322E-01	4.57433E+00	9.29411E-01	9.23971E-04	0.00000E+00	0.00000E+00
756	9.20880E-01	4.58033E+00	9.29400E-01	9.22814E-04	0.00000E+00	0.00000E+00
757	9.19416E-01	4.58583E+00	9.29387E-01	9.21686E-04	0.00000E+00	0.00000E+00
758	8.83515E-01	4.59133E+00	9.29326E-01	9.22464E-04	0.00000E+00	0.00000E+00
759	9.67711E-01	4.59700E+00	9.29377E-01	9.22639E-04	0.00000E+00	0.00000E+00
760	9.17888E-01	4.60250E+00	9.29362E-01	9.21546E-04	0.00000E+00	0.00000E+00
761	9.26264E-01	4.60817E+00	9.29358E-01	9.20340E-04	0.00000E+00	0.00000E+00
762	8.90581E-01	4.61367E+00	9.29307E-01	9.20543E-04	0.00000E+00	0.00000E+00
763	9.65415E-01	4.61917E+00	9.29354E-01	9.20556E-04	0.00000E+00	0.00000E+00
764	9.41692E-01	4.62433E+00	9.29370E-01	9.19490E-04	0.00000E+00	0.00000E+00
765	9.44256E-01	4.62950E+00	9.29390E-01	9.18491E-04	0.00000E+00	0.00000E+00
766	9.40534E-01	4.63500E+00	9.29404E-01	9.17404E-04	0.00000E+00	0.00000E+00
767	9.01345E-01	4.64083E+00	9.29368E-01	9.16938E-04	0.00000E+00	0.00000E+00
768	9.09079E-01	4.64650E+00	9.29341E-01	9.16123E-04	0.00000E+00	0.00000E+00
769	8.84193E-01	4.65200E+00	9.29282E-01	9.16820E-04	0.00000E+00	0.00000E+00
770	9.18050E-01	4.65750E+00	9.29268E-01	9.15742E-04	0.00000E+00	0.00000E+00
771	9.34327E-01	4.66317E+00	9.29274E-01	9.14574E-04	0.00000E+00	0.00000E+00
772	9.22603E-01	4.66833E+00	9.29266E-01	9.13426E-04	0.00000E+00	0.00000E+00
773	9.39753E-01	4.67417E+00	9.29279E-01	9.12342E-04	0.00000E+00	0.00000E+00
774	9.13004E-01	4.67983E+00	9.29258E-01	9.11404E-04	0.00000E+00	0.00000E+00
775	9.21434E-01	4.68550E+00	9.29248E-01	9.10280E-04	0.00000E+00	0.00000E+00
776	9.20165E-01	4.69100E+00	9.29236E-01	9.09179E-04	0.00000E+00	0.00000E+00
777	9.31173E-01	4.69683E+00	9.29239E-01	9.08009E-04	0.00000E+00	0.00000E+00
778	9.50479E-01	4.70217E+00	9.29266E-01	9.07251E-04	0.00000E+00	0.00000E+00
779	9.43238E-01	4.70767E+00	9.29284E-01	9.06261E-04	0.00000E+00	0.00000E+00

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780	9.03515E-01	4.71317E+00	9.29251E-01	9.05701E-04	0.00000E+00	0.00000E+00
781	9.09639E-01	4.71883E+00	9.29226E-01	9.04888E-04	0.00000E+00	0.00000E+00
782	9.11576E-01	4.72467E+00	9.29203E-01	9.04010E-04	0.00000E+00	0.00000E+00
783	9.19355E-01	4.73033E+00	9.29191E-01	9.02940E-04	0.00000E+00	0.00000E+00
784	9.02060E-01	4.73600E+00	9.29156E-01	9.02452E-04	0.00000E+00	0.00000E+00
785	9.20572E-01	4.74183E+00	9.29145E-01	9.01365E-04	0.00000E+00	0.00000E+00
786	9.51587E-01	4.74733E+00	9.29174E-01	9.00670E-04	0.00000E+00	0.00000E+00
787	9.14127E-01	4.75300E+00	9.29154E-01	8.99726E-04	0.00000E+00	0.00000E+00
788	9.66590E-01	4.75867E+00	9.29202E-01	8.99842E-04	0.00000E+00	0.00000E+00
789	9.29821E-01	4.76417E+00	9.29203E-01	8.98698E-04	0.00000E+00	0.00000E+00
790	9.21642E-01	4.76967E+00	9.29193E-01	8.97608E-04	0.00000E+00	0.00000E+00
791	9.36042E-01	4.77533E+00	9.29202E-01	8.96512E-04	0.00000E+00	0.00000E+00
792	9.20344E-01	4.78083E+00	9.29191E-01	8.95446E-04	0.00000E+00	0.00000E+00
793	8.94142E-01	4.78667E+00	9.29146E-01	8.95411E-04	0.00000E+00	0.00000E+00
794	9.44060E-01	4.79200E+00	9.29165E-01	8.94478E-04	0.00000E+00	0.00000E+00
795	8.89658E-01	4.79783E+00	9.29115E-01	8.94737E-04	0.00000E+00	0.00000E+00
796	9.48934E-01	4.80333E+00	9.29140E-01	8.93958E-04	0.00000E+00	0.00000E+00
797	9.25458E-01	4.80900E+00	9.29136E-01	8.92845E-04	0.00000E+00	0.00000E+00
798	9.28574E-01	4.81467E+00	9.29135E-01	8.91723E-04	0.00000E+00	0.00000E+00
799	9.32631E-01	4.82050E+00	9.29139E-01	8.90614E-04	0.00000E+00	0.00000E+00
800	9.11949E-01	4.82617E+00	9.29118E-01	8.89758E-04	0.00000E+00	0.00000E+00
801	8.86626E-01	4.83183E+00	9.29065E-01	8.90234E-04	0.00000E+00	0.00000E+00
802	9.23147E-01	4.83733E+00	9.29057E-01	8.89151E-04	0.00000E+00	0.00000E+00
803	9.23817E-01	4.84283E+00	9.29051E-01	8.88064E-04	0.00000E+00	0.00000E+00
804	9.59702E-01	4.84850E+00	9.29089E-01	8.87779E-04	0.00000E+00	0.00000E+00
805	9.29965E-01	4.85433E+00	9.29090E-01	8.86674E-04	0.00000E+00	0.00000E+00
806	9.26511E-01	4.86000E+00	9.29087E-01	8.85576E-04	0.00000E+00	0.00000E+00
807	9.38096E-01	4.86550E+00	9.29098E-01	8.84546E-04	0.00000E+00	0.00000E+00
808	9.54871E-01	4.87117E+00	9.29130E-01	8.84026E-04	0.00000E+00	0.00000E+00
809	9.37151E-01	4.87700E+00	9.29140E-01	8.82986E-04	0.00000E+00	0.00000E+00
810	9.63559E-01	4.88250E+00	9.29183E-01	8.82921E-04	0.00000E+00	0.00000E+00
811	9.36464E-01	4.88783E+00	9.29192E-01	8.81875E-04	0.00000E+00	0.00000E+00
812	9.17065E-01	4.89383E+00	9.29177E-01	8.80913E-04	0.00000E+00	0.00000E+00
813	9.26139E-01	4.89933E+00	9.29173E-01	8.79834E-04	0.00000E+00	0.00000E+00
814	9.63676E-01	4.90533E+00	9.29215E-01	8.79776E-04	0.00000E+00	0.00000E+00
815	9.17232E-01	4.91133E+00	9.29201E-01	8.78817E-04	0.00000E+00	0.00000E+00
816	9.39507E-01	4.91683E+00	9.29213E-01	8.77828E-04	0.00000E+00	0.00000E+00
817	9.62852E-01	4.92233E+00	9.29255E-01	8.77721E-04	0.00000E+00	0.00000E+00
818	9.37405E-01	4.92767E+00	9.29264E-01	8.76702E-04	0.00000E+00	0.00000E+00
819	9.44967E-01	4.93483E+00	9.29284E-01	8.75839E-04	0.00000E+00	0.00000E+00
820	9.20958E-01	4.94050E+00	9.29274E-01	8.74827E-04	0.00000E+00	0.00000E+00
821	9.33196E-01	4.94650E+00	9.29278E-01	8.73771E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 983 independent fission points were generated

822	8.76992E-01	4.95217E+00	9.29215E-01	8.75031E-04	0.00000E+00	0.00000E+00
823	8.96834E-01	4.95800E+00	9.29175E-01	8.74854E-04	0.00000E+00	0.00000E+00
824	8.93664E-01	4.96367E+00	9.29132E-01	8.74857E-04	0.00000E+00	0.00000E+00
825	9.55550E-01	4.96933E+00	9.29164E-01	8.74383E-04	0.00000E+00	0.00000E+00
826	9.05218E-01	4.97600E+00	9.29135E-01	8.73804E-04	0.00000E+00	0.00000E+00
827	9.34181E-01	4.98167E+00	9.29141E-01	8.72766E-04	0.00000E+00	0.00000E+00
828	9.60150E-01	4.98733E+00	9.29179E-01	8.72516E-04	0.00000E+00	0.00000E+00

829	8.85746E-01	4.99333E+00	9.29126E-01	8.73042E-04	0.00000E+00	0.00000E+00
830	9.16674E-01	4.99917E+00	9.29111E-01	8.72116E-04	0.00000E+00	0.00000E+00
831	9.15605E-01	5.00500E+00	9.29095E-01	8.71216E-04	0.00000E+00	0.00000E+00
832	9.53455E-01	5.01033E+00	9.29124E-01	8.70661E-04	0.00000E+00	0.00000E+00
833	9.46496E-01	5.01600E+00	9.29145E-01	8.69864E-04	0.00000E+00	0.00000E+00
834	9.52762E-01	5.02117E+00	9.29173E-01	8.69281E-04	0.00000E+00	0.00000E+00
835	9.19233E-01	5.02700E+00	9.29161E-01	8.68319E-04	0.00000E+00	0.00000E+00
836	9.39068E-01	5.03250E+00	9.29173E-01	8.67358E-04	0.00000E+00	0.00000E+00
837	9.15824E-01	5.03817E+00	9.29157E-01	8.66467E-04	0.00000E+00	0.00000E+00
838	9.21313E-01	5.04367E+00	9.29148E-01	8.65480E-04	0.00000E+00	0.00000E+00
839	9.37575E-01	5.04933E+00	9.29158E-01	8.64504E-04	0.00000E+00	0.00000E+00
840	9.42904E-01	5.05483E+00	9.29174E-01	8.63628E-04	0.00000E+00	0.00000E+00
841	9.16210E-01	5.06050E+00	9.29159E-01	8.62736E-04	0.00000E+00	0.00000E+00
842	9.17343E-01	5.06583E+00	9.29145E-01	8.61823E-04	0.00000E+00	0.00000E+00
843	9.54003E-01	5.07117E+00	9.29174E-01	8.61305E-04	0.00000E+00	0.00000E+00
844	9.30957E-01	5.07700E+00	9.29177E-01	8.60284E-04	0.00000E+00	0.00000E+00
845	9.35608E-01	5.08250E+00	9.29184E-01	8.59297E-04	0.00000E+00	0.00000E+00
846	9.15395E-01	5.08783E+00	9.29168E-01	8.58434E-04	0.00000E+00	0.00000E+00
847	9.49134E-01	5.09333E+00	9.29192E-01	8.57743E-04	0.00000E+00	0.00000E+00
848	9.50242E-01	5.09883E+00	9.29216E-01	8.57090E-04	0.00000E+00	0.00000E+00
849	9.51105E-01	5.10433E+00	9.29242E-01	8.56467E-04	0.00000E+00	0.00000E+00
850	9.67503E-01	5.11000E+00	9.29287E-01	8.56646E-04	0.00000E+00	0.00000E+00
851	9.24843E-01	5.11600E+00	9.29282E-01	8.55652E-04	0.00000E+00	0.00000E+00
852	9.18909E-01	5.12150E+00	9.29270E-01	8.54732E-04	0.00000E+00	0.00000E+00
853	9.20474E-01	5.12717E+00	9.29260E-01	8.53790E-04	0.00000E+00	0.00000E+00
854	9.53680E-01	5.13267E+00	9.29288E-01	8.53268E-04	0.00000E+00	0.00000E+00
855	9.28053E-01	5.13817E+00	9.29287E-01	8.52269E-04	0.00000E+00	0.00000E+00
856	9.43166E-01	5.14383E+00	9.29303E-01	8.51425E-04	0.00000E+00	0.00000E+00
857	9.06316E-01	5.14967E+00	9.29276E-01	8.50854E-04	0.00000E+00	0.00000E+00
858	9.62374E-01	5.15533E+00	9.29315E-01	8.50738E-04	0.00000E+00	0.00000E+00

keno message number k5-132 warning....only 978 independent fission points were generated

859	8.21220E-01	5.16133E+00	9.29189E-01	8.59055E-04	0.00000E+00	0.00000E+00
860	9.31840E-01	5.16683E+00	9.29192E-01	8.58059E-04	0.00000E+00	0.00000E+00
861	9.22134E-01	5.17250E+00	9.29184E-01	8.57099E-04	0.00000E+00	0.00000E+00
862	9.39604E-01	5.17767E+00	9.29196E-01	8.56187E-04	0.00000E+00	0.00000E+00
863	9.09225E-01	5.18367E+00	9.29173E-01	8.55507E-04	0.00000E+00	0.00000E+00
864	9.47671E-01	5.18900E+00	9.29194E-01	8.54783E-04	0.00000E+00	0.00000E+00
865	9.55417E-01	5.19433E+00	9.29224E-01	8.54333E-04	0.00000E+00	0.00000E+00
866	1.00935E+00	5.19933E+00	9.29317E-01	8.58367E-04	0.00000E+00	0.00000E+00
867	9.66369E-01	5.20483E+00	9.29360E-01	8.58444E-04	0.00000E+00	0.00000E+00
868	9.72170E-01	5.21033E+00	9.29409E-01	8.58876E-04	0.00000E+00	0.00000E+00
869	9.53873E-01	5.21583E+00	9.29438E-01	8.58349E-04	0.00000E+00	0.00000E+00
870	9.21276E-01	5.22150E+00	9.29428E-01	8.57411E-04	0.00000E+00	0.00000E+00
871	9.58993E-01	5.22700E+00	9.29462E-01	8.57099E-04	0.00000E+00	0.00000E+00
872	9.56743E-01	5.23250E+00	9.29494E-01	8.56687E-04	0.00000E+00	0.00000E+00
873	9.77659E-01	5.23783E+00	9.29549E-01	8.57488E-04	0.00000E+00	0.00000E+00
874	9.98381E-01	5.24383E+00	9.29628E-01	8.60134E-04	0.00000E+00	0.00000E+00
875	9.14789E-01	5.24933E+00	9.29611E-01	8.59316E-04	0.00000E+00	0.00000E+00
876	9.14473E-01	5.25483E+00	9.29593E-01	8.58507E-04	0.00000E+00	0.00000E+00
877	9.31043E-01	5.26033E+00	9.29595E-01	8.57527E-04	0.00000E+00	0.00000E+00
878	8.96289E-01	5.26583E+00	9.29557E-01	8.57391E-04	0.00000E+00	0.00000E+00
879	9.64548E-01	5.27150E+00	9.29597E-01	8.57342E-04	0.00000E+00	0.00000E+00
880	9.35940E-01	5.27700E+00	9.29604E-01	8.56395E-04	0.00000E+00	0.00000E+00
881	8.98674E-01	5.28267E+00	9.29569E-01	8.56144E-04	0.00000E+00	0.00000E+00
882	9.56530E-01	5.28833E+00	9.29600E-01	8.55719E-04	0.00000E+00	0.00000E+00
883	9.45140E-01	5.29383E+00	9.29617E-01	8.54929E-04	0.00000E+00	0.00000E+00
884	9.28619E-01	5.29967E+00	9.29616E-01	8.53960E-04	0.00000E+00	0.00000E+00
885	9.13400E-01	5.30500E+00	9.29598E-01	8.53190E-04	0.00000E+00	0.00000E+00
886	9.64761E-01	5.31100E+00	9.29638E-01	8.53152E-04	0.00000E+00	0.00000E+00
887	9.01973E-01	5.31683E+00	9.29606E-01	8.52761E-04	0.00000E+00	0.00000E+00
888	9.27997E-01	5.32250E+00	9.29605E-01	8.51800E-04	0.00000E+00	0.00000E+00
889	9.58950E-01	5.32800E+00	9.29638E-01	8.51482E-04	0.00000E+00	0.00000E+00
890	9.25563E-01	5.33350E+00	9.29633E-01	8.50535E-04	0.00000E+00	0.00000E+00
891	9.53665E-01	5.33917E+00	9.29660E-01	8.50007E-04	0.00000E+00	0.00000E+00
892	8.95548E-01	5.34483E+00	9.29622E-01	8.49916E-04	0.00000E+00	0.00000E+00
893	9.76575E-01	5.35033E+00	9.29674E-01	8.50596E-04	0.00000E+00	0.00000E+00
894	9.43843E-01	5.35617E+00	9.29690E-01	8.49790E-04	0.00000E+00	0.00000E+00
895	9.01213E-01	5.36183E+00	9.29658E-01	8.49437E-04	0.00000E+00	0.00000E+00
896	9.48099E-01	5.36750E+00	9.29679E-01	8.48737E-04	0.00000E+00	0.00000E+00
897	9.07633E-01	5.37300E+00	9.29654E-01	8.48146E-04	0.00000E+00	0.00000E+00
898	9.27497E-01	5.37883E+00	9.29652E-01	8.47202E-04	0.00000E+00	0.00000E+00
899	9.57263E-01	5.38417E+00	9.29683E-01	8.46817E-04	0.00000E+00	0.00000E+00
900	9.23556E-01	5.39000E+00	9.29676E-01	8.45901E-04	0.00000E+00	0.00000E+00
901	8.97150E-01	5.39567E+00	9.29640E-01	8.45734E-04	0.00000E+00	0.00000E+00
902	9.20141E-01	5.40117E+00	9.29629E-01	8.44859E-04	0.00000E+00	0.00000E+00
903	9.29587E-01	5.40667E+00	9.29629E-01	8.43921E-04	0.00000E+00	0.00000E+00
904	9.66285E-01	5.41217E+00	9.29670E-01	8.43964E-04	0.00000E+00	0.00000E+00
905	9.39171E-01	5.41817E+00	9.29680E-01	8.43094E-04	0.00000E+00	0.00000E+00
906	9.24445E-01	5.42400E+00	9.29675E-01	8.42181E-04	0.00000E+00	0.00000E+00
907	9.44939E-01	5.42933E+00	9.29691E-01	8.41419E-04	0.00000E+00	0.00000E+00
908	9.78975E-01	5.43483E+00	9.29746E-01	8.42248E-04	0.00000E+00	0.00000E+00
909	9.20103E-01	5.44017E+00	9.29735E-01	8.41386E-04	0.00000E+00	0.00000E+00
910	9.38605E-01	5.44567E+00	9.29745E-01	8.40516E-04	0.00000E+00	0.00000E+00
911	9.42851E-01	5.45150E+00	9.29759E-01	8.39715E-04	0.00000E+00	0.00000E+00
912	9.42578E-01	5.45683E+00	9.29773E-01	8.38910E-04	0.00000E+00	0.00000E+00
913	9.56419E-01	5.46233E+00	9.29803E-01	8.38499E-04	0.00000E+00	0.00000E+00
914	9.46686E-01	5.46783E+00	9.29821E-01	8.37783E-04	0.00000E+00	0.00000E+00
915	9.43864E-01	5.47350E+00	9.29837E-01	8.37007E-04	0.00000E+00	0.00000E+00
916	8.88415E-01	5.47983E+00	9.29791E-01	8.37318E-04	0.00000E+00	0.00000E+00
917	9.30325E-01	5.48533E+00	9.29792E-01	8.36402E-04	0.00000E+00	0.00000E+00
918	9.29264E-01	5.49100E+00	9.29791E-01	8.35489E-04	0.00000E+00	0.00000E+00
919	8.89067E-01	5.49650E+00	9.29747E-01	8.35758E-04	0.00000E+00	0.00000E+00
920	9.94733E-01	5.50200E+00	9.29818E-01	8.37843E-04	0.00000E+00	0.00000E+00
921	9.31603E-01	5.50767E+00	9.29820E-01	8.36933E-04	0.00000E+00	0.00000E+00
922	9.43140E-01	5.51317E+00	9.29834E-01	8.36148E-04	0.00000E+00	0.00000E+00
923	9.38564E-01	5.51883E+00	9.29844E-01	8.35294E-04	0.00000E+00	0.00000E+00
924	9.23204E-01	5.52467E+00	9.29836E-01	8.34418E-04	0.00000E+00	0.00000E+00
925	8.85018E-01	5.53033E+00	9.29788E-01	8.34927E-04	0.00000E+00	0.00000E+00
926	9.21794E-01	5.53600E+00	9.29779E-01	8.34068E-04	0.00000E+00	0.00000E+00
927	9.12598E-01	5.54183E+00	9.29761E-01	8.33373E-04	0.00000E+00	0.00000E+00
928	8.98789E-01	5.54700E+00	9.29727E-01	8.33144E-04	0.00000E+00	0.00000E+00
929	9.55857E-01	5.55267E+00	9.29755E-01	8.32722E-04	0.00000E+00	0.00000E+00
930	9.60630E-01	5.55817E+00	9.29789E-01	8.32489E-04	0.00000E+00	0.00000E+00
931	9.08137E-01	5.56400E+00	9.29765E-01	8.31919E-04	0.00000E+00	0.00000E+00
932	9.08076E-01	5.56967E+00	9.29742E-01	8.31351E-04	0.00000E+00	0.00000E+00

933	9.53084E-01	5.57483E+00	9.29767E-01	8.30836E-04	0.00000E+00	0.00000E+00
934	9.57875E-01	5.58067E+00	9.29797E-01	8.30492E-04	0.00000E+00	0.00000E+00
935	9.08873E-01	5.58633E+00	9.29775E-01	8.29904E-04	0.00000E+00	0.00000E+00
936	9.45664E-01	5.59183E+00	9.29792E-01	8.29190E-04	0.00000E+00	0.00000E+00
937	9.28491E-01	5.59750E+00	9.29790E-01	8.28304E-04	0.00000E+00	0.00000E+00
938	9.35791E-01	5.60300E+00	9.29797E-01	8.27443E-04	0.00000E+00	0.00000E+00
939	9.05450E-01	5.60900E+00	9.29771E-01	8.26968E-04	0.00000E+00	0.00000E+00
940	9.01753E-01	5.61450E+00	9.29741E-01	8.26626E-04	0.00000E+00	0.00000E+00
941	9.12665E-01	5.61983E+00	9.29723E-01	8.25945E-04	0.00000E+00	0.00000E+00
942	9.74735E-01	5.62533E+00	9.29771E-01	8.26454E-04	0.00000E+00	0.00000E+00
943	9.17580E-01	5.63083E+00	9.29758E-01	8.25677E-04	0.00000E+00	0.00000E+00
944	9.66346E-01	5.63633E+00	9.29797E-01	8.25714E-04	0.00000E+00	0.00000E+00
945	9.33128E-01	5.64200E+00	9.29800E-01	8.24846E-04	0.00000E+00	0.00000E+00
946	9.55308E-01	5.64717E+00	9.29827E-01	8.24415E-04	0.00000E+00	0.00000E+00
947	9.44454E-01	5.65317E+00	9.29843E-01	8.23687E-04	0.00000E+00	0.00000E+00
948	9.19328E-01	5.65867E+00	9.29831E-01	8.22891E-04	0.00000E+00	0.00000E+00
949	9.49680E-01	5.66417E+00	9.29852E-01	8.22289E-04	0.00000E+00	0.00000E+00
950	9.61821E-01	5.66967E+00	9.29886E-01	8.22113E-04	0.00000E+00	0.00000E+00
951	9.26772E-01	5.67517E+00	9.29883E-01	8.21253E-04	0.00000E+00	0.00000E+00
952	9.83977E-01	5.68033E+00	9.29940E-01	8.22362E-04	0.00000E+00	0.00000E+00
953	9.67681E-01	5.68550E+00	9.29979E-01	8.22454E-04	0.00000E+00	0.00000E+00
954	8.94745E-01	5.69100E+00	9.29942E-01	8.22423E-04	0.00000E+00	0.00000E+00
955	9.41326E-01	5.69650E+00	9.29954E-01	8.21647E-04	0.00000E+00	0.00000E+00
956	9.17352E-01	5.70200E+00	9.29941E-01	8.20891E-04	0.00000E+00	0.00000E+00
957	9.15398E-01	5.70767E+00	9.29926E-01	8.20172E-04	0.00000E+00	0.00000E+00
958	9.43405E-01	5.71317E+00	9.29940E-01	8.19435E-04	0.00000E+00	0.00000E+00
959	9.09753E-01	5.71867E+00	9.29919E-01	8.18850E-04	0.00000E+00	0.00000E+00
960	8.76588E-01	5.72433E+00	9.29863E-01	8.19887E-04	0.00000E+00	0.00000E+00
961	8.97380E-01	5.73000E+00	9.29829E-01	8.19732E-04	0.00000E+00	0.00000E+00
962	8.95873E-01	5.73583E+00	9.29794E-01	8.19641E-04	0.00000E+00	0.00000E+00
963	9.34910E-01	5.74133E+00	9.29799E-01	8.18805E-04	0.00000E+00	0.00000E+00
964	9.07891E-01	5.74667E+00	9.29777E-01	8.18271E-04	0.00000E+00	0.00000E+00
965	9.29808E-01	5.75217E+00	9.29777E-01	8.17421E-04	0.00000E+00	0.00000E+00
966	9.39492E-01	5.75800E+00	9.29787E-01	8.16634E-04	0.00000E+00	0.00000E+00
967	9.39747E-01	5.76367E+00	9.29797E-01	8.15853E-04	0.00000E+00	0.00000E+00
968	9.41812E-01	5.76883E+00	9.29809E-01	8.15103E-04	0.00000E+00	0.00000E+00
969	9.84499E-01	5.77433E+00	9.29866E-01	8.16221E-04	0.00000E+00	0.00000E+00
970	9.35679E-01	5.78000E+00	9.29872E-01	8.15400E-04	0.00000E+00	0.00000E+00
971	9.85590E-01	5.78533E+00	9.29930E-01	8.16585E-04	0.00000E+00	0.00000E+00
972	9.52555E-01	5.79100E+00	9.29953E-01	8.16076E-04	0.00000E+00	0.00000E+00
973	9.15169E-01	5.79667E+00	9.29938E-01	8.15377E-04	0.00000E+00	0.00000E+00
974	9.71596E-01	5.80200E+00	9.29981E-01	8.15665E-04	0.00000E+00	0.00000E+00
975	9.21578E-01	5.80767E+00	9.29972E-01	8.14872E-04	0.00000E+00	0.00000E+00
976	9.36013E-01	5.81317E+00	9.29978E-01	8.14058E-04	0.00000E+00	0.00000E+00
977	8.64598E-01	5.81867E+00	9.29911E-01	8.15983E-04	0.00000E+00	0.00000E+00
978	9.57347E-01	5.82433E+00	9.29939E-01	8.15631E-04	0.00000E+00	0.00000E+00
979	9.07940E-01	5.83000E+00	9.29917E-01	8.15107E-04	0.00000E+00	0.00000E+00
980	9.33855E-01	5.83550E+00	9.29921E-01	8.14283E-04	0.00000E+00	0.00000E+00
981	8.77523E-01	5.84133E+00	9.29867E-01	8.15210E-04	0.00000E+00	0.00000E+00
982	9.04560E-01	5.84700E+00	9.29841E-01	8.14787E-04	0.00000E+00	0.00000E+00
983	9.10088E-01	5.85250E+00	9.29821E-01	8.14205E-04	0.00000E+00	0.00000E+00
984	9.39882E-01	5.85800E+00	9.29831E-01	8.13440E-04	0.00000E+00	0.00000E+00
985	9.42261E-01	5.86367E+00	9.29844E-01	8.12710E-04	0.00000E+00	0.00000E+00
986	8.94452E-01	5.86917E+00	9.29808E-01	8.12680E-04	0.00000E+00	0.00000E+00
987	9.49772E-01	5.87483E+00	9.29828E-01	8.12107E-04	0.00000E+00	0.00000E+00
988	9.16926E-01	5.88033E+00	9.29815E-01	8.11389E-04	0.00000E+00	0.00000E+00
989	9.31067E-01	5.88600E+00	9.29817E-01	8.10567E-04	0.00000E+00	0.00000E+00
990	9.66613E-01	5.89133E+00	9.29854E-01	8.10603E-04	0.00000E+00	0.00000E+00
991	9.72179E-01	5.89667E+00	9.29897E-01	8.10913E-04	0.00000E+00	0.00000E+00
992	9.34630E-01	5.90217E+00	9.29901E-01	8.10107E-04	0.00000E+00	0.00000E+00
993	9.34822E-01	5.90767E+00	9.29906E-01	8.09305E-04	0.00000E+00	0.00000E+00
994	9.74489E-01	5.91317E+00	9.29951E-01	8.09737E-04	0.00000E+00	0.00000E+00
995	9.42396E-01	5.91867E+00	9.29964E-01	8.09018E-04	0.00000E+00	0.00000E+00
996	9.67519E-01	5.92400E+00	9.30002E-01	8.09086E-04	0.00000E+00	0.00000E+00
997	9.53031E-01	5.92933E+00	9.30025E-01	8.08604E-04	0.00000E+00	0.00000E+00
998	9.63646E-01	5.93467E+00	9.30058E-01	8.08497E-04	0.00000E+00	0.00000E+00
999	9.16934E-01	5.94050E+00	9.30045E-01	8.07793E-04	0.00000E+00	0.00000E+00
1000	9.71255E-01	5.94600E+00	9.30087E-01	8.08038E-04	0.00000E+00	0.00000E+00

keno message number k5-123 execution terminated due to completion of the specified number of generations.

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

lifetime = 7.83555E-05 + or - 1.08371E-07 generation time = 4.58847E-05 + or - 5.84557E-08
nu bar = 2.89155E+00 + or - 3.02804E-06 average fission group = 2.18028E+02 + or - 3.86684E-03
energy(ev) of the average lethargy causing fission = 4.97322E-02 + or - 2.90900E-05

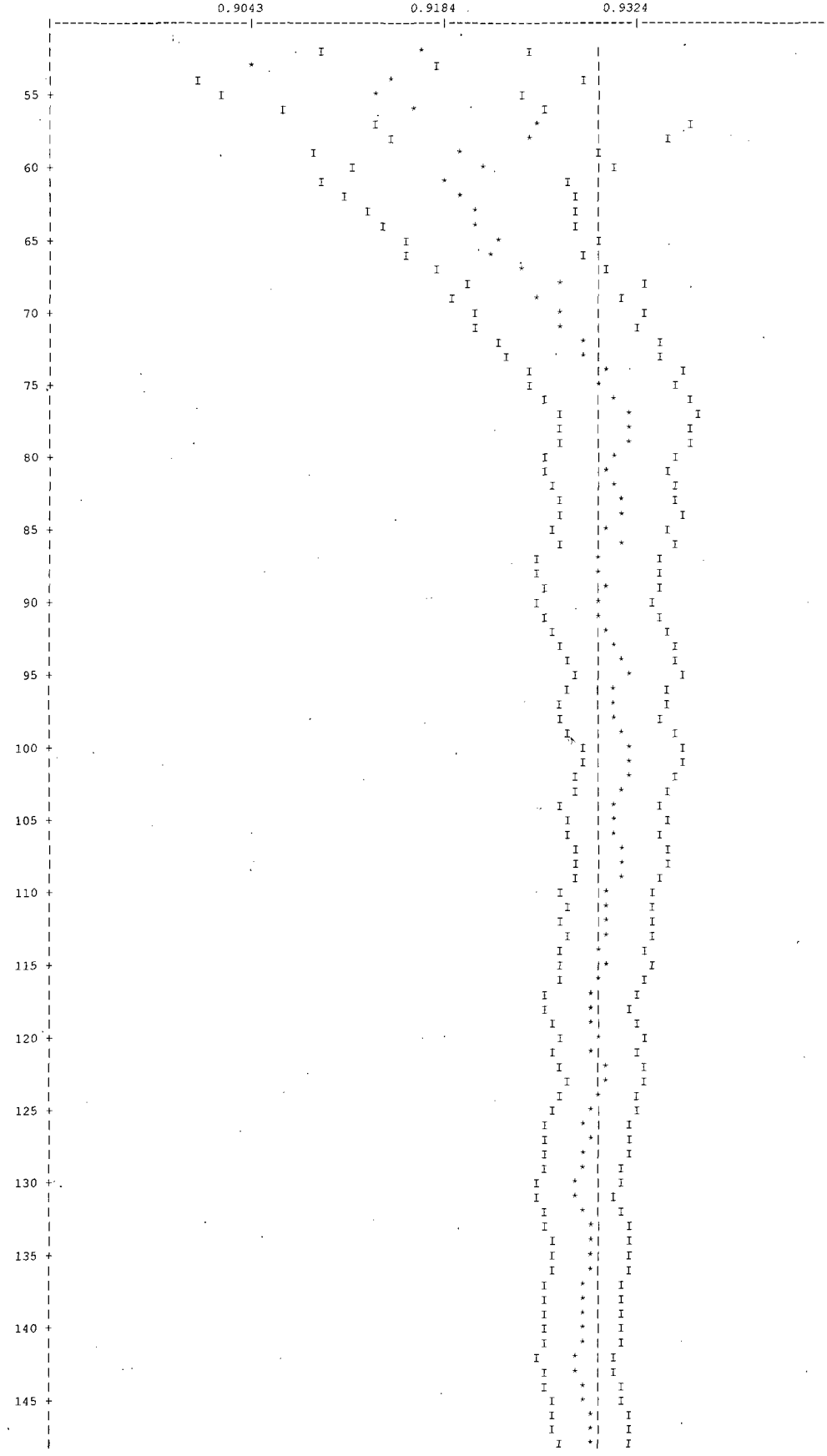
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
50	0.92999	+ or - 0.00096	0.92903 to 0.93095	0.92807 to 0.93191	0.92710 to 0.93287	950000
51	0.93001	+ or - 0.00097	0.92904 to 0.93098	0.92807 to 0.93194	0.92710 to 0.93291	949000
52	0.93001	+ or - 0.00099	0.92902 to 0.93101	0.92803 to 0.93200	0.92704 to 0.93299	948000
53	0.93007	+ or - 0.00097	0.92910 to 0.93104	0.92812 to 0.93201	0.92715 to 0.93298	947000
54	0.93005	+ or - 0.00102	0.92903 to 0.93107	0.92802 to 0.93209	0.92700 to 0.93310	946000
55	0.93007	+ or - 0.00096	0.92911 to 0.93103	0.92815 to 0.93200	0.92719 to 0.93296	945000
56	0.93007	+ or - 0.00093	0.92914 to 0.93100	0.92822 to 0.93193	0.92729 to 0.93286	944000
57	0.93002	+ or - 0.00098	0.92905 to 0.93100	0.92807 to 0.93197	0.92709 to 0.93295	943000
58	0.93003	+ or - 0.00096	0.92907 to 0.93099	0.92810 to 0.93196	0.92714 to 0.93292	942000
59	0.93009	+ or - 0.00095	0.92914 to 0.93103	0.92819 to 0.93198	0.92724 to 0.93293	941000
81	0.92997	+ or - 0.00097	0.92901 to 0.93094	0.92804 to 0.93191	0.92707 to 0.93288	919000
103	0.92989	+ or - 0.00102	0.92887 to 0.93091	0.92785 to 0.93193	0.92683 to 0.93295	897000
125	0.93004	+ or - 0.00103	0.92901 to 0.93107	0.92797 to 0.93210	0.92694 to 0.93313	875000
147	0.93004	+ or - 0.00106	0.92898 to 0.93110	0.92793 to 0.93216	0.92687 to 0.93321	853000
169	0.93015	+ or - 0.00106	0.92909 to 0.93121	0.92803 to 0.93227	0.92696 to 0.93334	831000
191	0.93029	+ or - 0.00106	0.92923 to 0.93135	0.92817 to 0.93241	0.92711 to 0.93347	809000
213	0.93021	+ or - 0.00113	0.92908 to 0.93134	0.92795 to 0.93247	0.92682 to 0.93360	787000
235	0.93041	+ or - 0.00114	0.92926 to 0.93155	0.92812 to 0.93269	0.92698 to 0.93383	765000
257	0.93043	+ or - 0.00117	0.92926 to 0.93159	0.92810 to 0.93276	0.92693 to 0.93393	743000
279	0.93019	+ or - 0.00117	0.92902 to 0.93136	0.92784 to 0.93254	0.92667 to 0.93371	721000
301	0.93036	+ or - 0.00117	0.92918 to 0.93153	0.92801 to 0.93271	0.92684 to 0.93388	699000
323	0.93027	+ or - 0.00121	0.92906 to 0.93148	0.92784 to 0.93270	0.92663 to 0.93391	677000
345	0.93051	+ or - 0.00127	0.92925 to 0.93178	0.92798 to 0.93305	0.92671 to 0.93432	655000
367	0.93026	+ or - 0.00119	0.92907 to 0.93145	0.92788 to 0.93264	0.92669 to 0.93383	633000
389	0.93022	+ or - 0.00127	0.92896 to 0.93149	0.92769 to 0.93275	0.92642 to 0.93402	611000
411	0.93052	+ or - 0.00130	0.92922 to 0.93181	0.92792 to 0.93311	0.92663 to 0.93441	589000

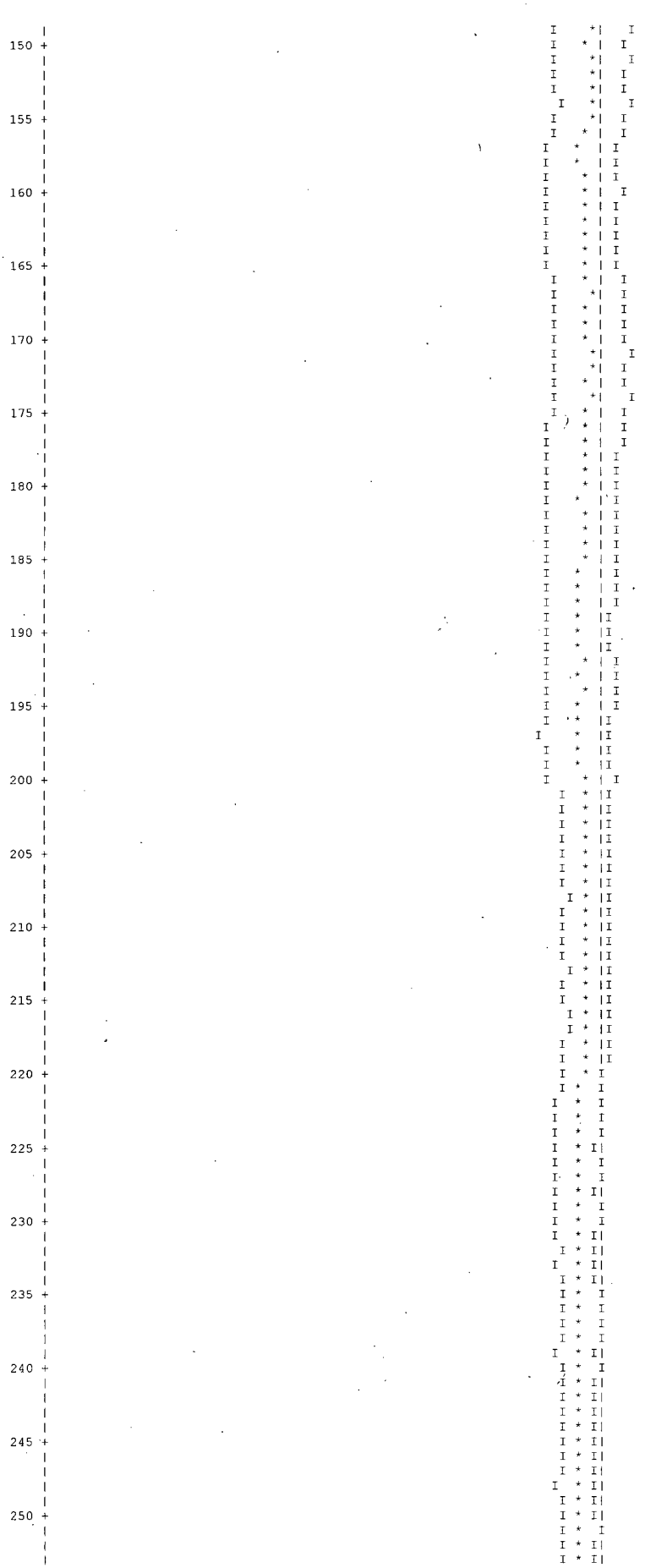
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

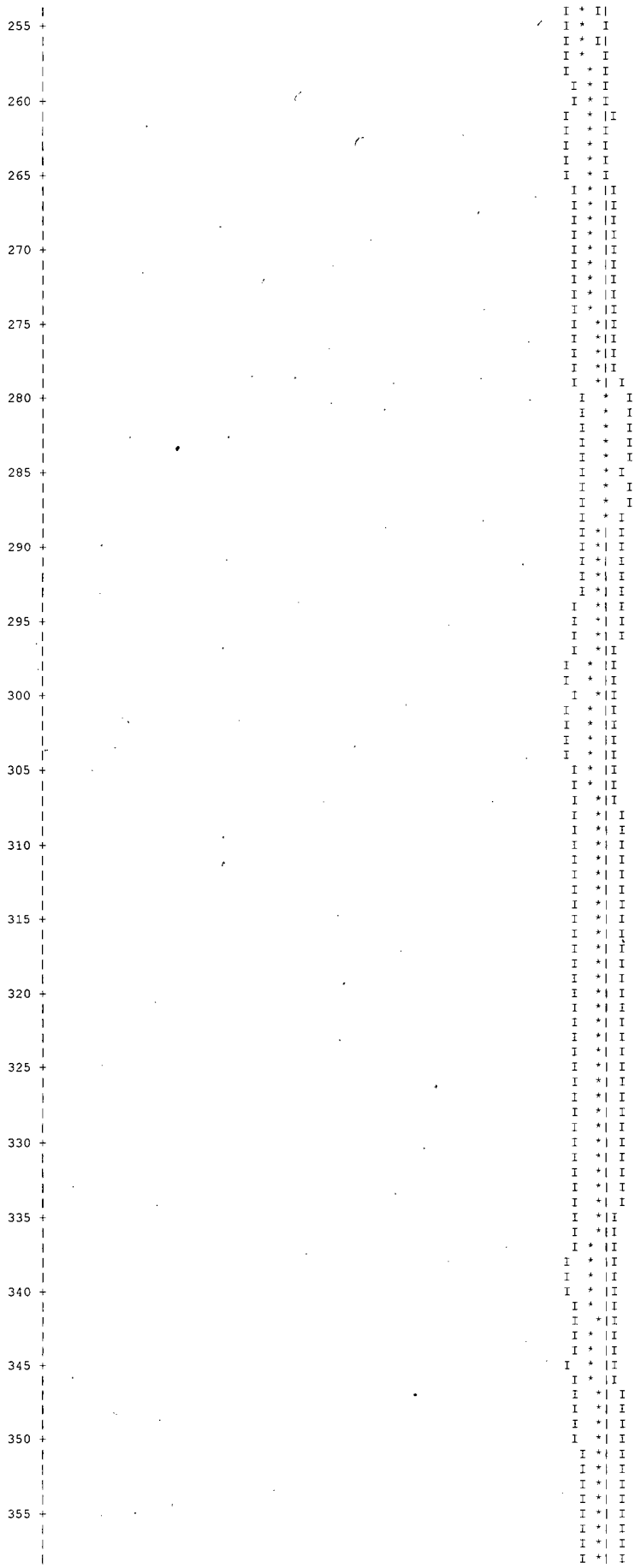
no. of initial generations skipped	average k-effective	deviation	67 per cent confidence interval	95 per cent confidence interval	99 per cent confidence interval	number of histories
433	0.93065	+ or - 0.00130	0.92934 to 0.93195	0.92804 to 0.93325	0.92674 to 0.93455	567000
455	0.93069	+ or - 0.00140	0.92929 to 0.93209	0.92789 to 0.93349	0.92649 to 0.93489	545000
477	0.93044	+ or - 0.00137	0.92906 to 0.93181	0.92769 to 0.93319	0.92631 to 0.93456	523000
499	0.93084	+ or - 0.00149	0.92936 to 0.93233	0.92787 to 0.93382	0.92638 to 0.93531	501000
521	0.93116	+ or - 0.00146	0.92970 to 0.93262	0.92824 to 0.93409	0.92677 to 0.93555	479000
543	0.93169	+ or - 0.00148	0.93021 to 0.93316	0.92873 to 0.93464	0.92725 to 0.93612	457000
565	0.93146	+ or - 0.00157	0.92989 to 0.93303	0.92832 to 0.93460	0.92675 to 0.93617	435000
587	0.93199	+ or - 0.00150	0.93050 to 0.93349	0.92900 to 0.93499	0.92750 to 0.93649	413000
609	0.93227	+ or - 0.00157	0.93071 to 0.93384	0.92914 to 0.93541	0.92757 to 0.93698	391000
631	0.93252	+ or - 0.00168	0.93084 to 0.93420	0.92916 to 0.93587	0.92748 to 0.93755	369000
653	0.93285	+ or - 0.00179	0.93105 to 0.93464	0.92926 to 0.93644	0.92746 to 0.93823	347000
675	0.93262	+ or - 0.00183	0.93079 to 0.93446	0.92896 to 0.93629	0.92713 to 0.93812	325000
697	0.93286	+ or - 0.00185	0.93101 to 0.93471	0.92916 to 0.93655	0.92731 to 0.93840	303000
719	0.93246	+ or - 0.00205	0.93041 to 0.93451	0.92837 to 0.93656	0.92632 to 0.93861	281000
741	0.93250	+ or - 0.00202	0.93047 to 0.93452	0.92845 to 0.93655	0.92643 to 0.93857	259000
763	0.93244	+ or - 0.00245	0.92999 to 0.93489	0.92755 to 0.93733	0.92510 to 0.93978	237000
785	0.93352	+ or - 0.00264	0.93088 to 0.93615	0.92824 to 0.93879	0.92561 to 0.94143	215000
807	0.93421	+ or - 0.00276	0.93145 to 0.93697	0.92869 to 0.93973	0.92593 to 0.94248	193000
829	0.93473	+ or - 0.00293	0.93180 to 0.93766	0.92887 to 0.94060	0.92593 to 0.94353	171000
851	0.93467	+ or - 0.00317	0.93150 to 0.93784	0.92834 to 0.94100	0.92517 to 0.94417	149000
873	0.93377	+ or - 0.00345	0.93033 to 0.93722	0.92688 to 0.94067	0.92343 to 0.94412	127000
895	0.93373	+ or - 0.00392	0.92981 to 0.93765	0.92589 to 0.94157	0.92197 to 0.94549	105000
917	0.93334	+ or - 0.00569	0.92764 to 0.93903	0.92195 to 0.94472	0.91625 to 0.95042	83000
939	0.93494	+ or - 0.00616	0.92878 to 0.94109	0.92262 to 0.94725	0.91647 to 0.95341	61000
961	0.93641	+ or - 0.01066	0.92575 to 0.94707	0.91509 to 0.95773	0.90443 to 0.96839	39000
983	0.94540	+ or - 0.02585	0.91955 to 0.97125	0.89370 to 0.99711	0.86785 to 1.02296	17000

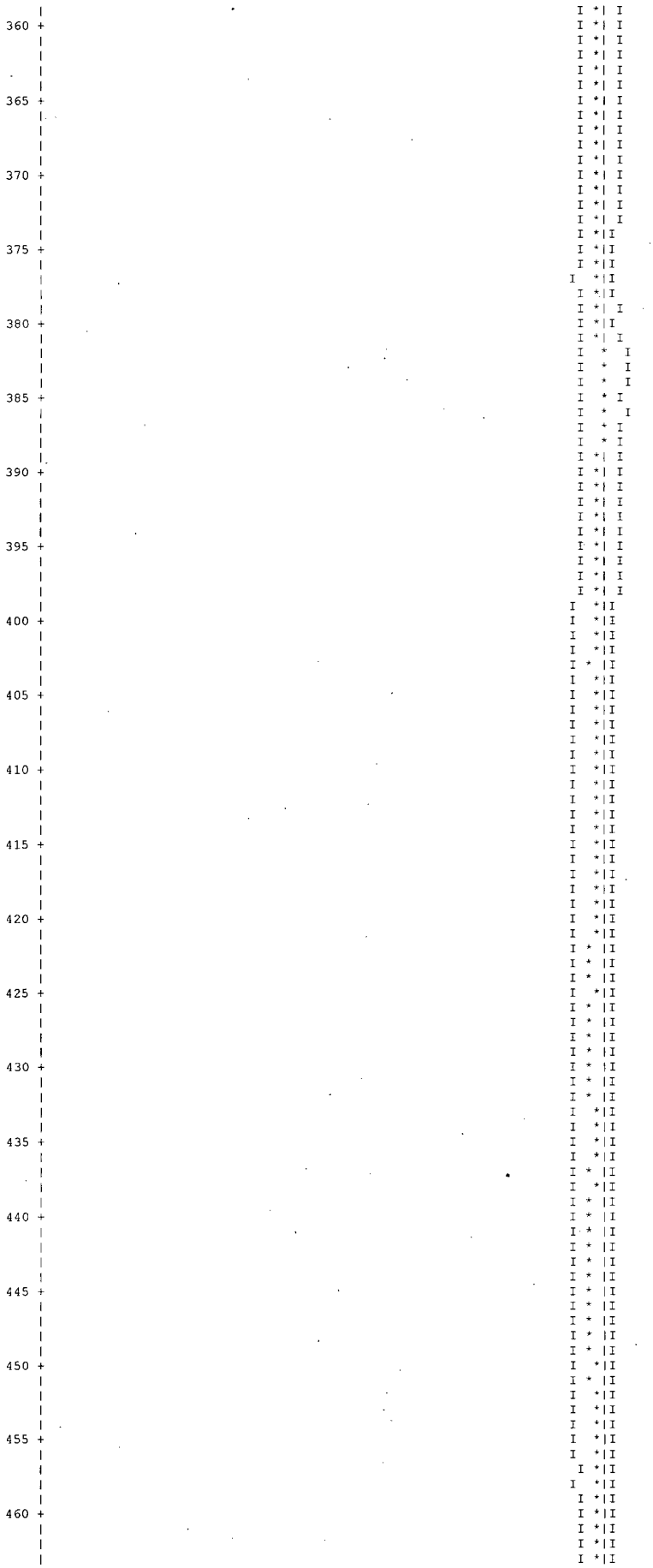
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

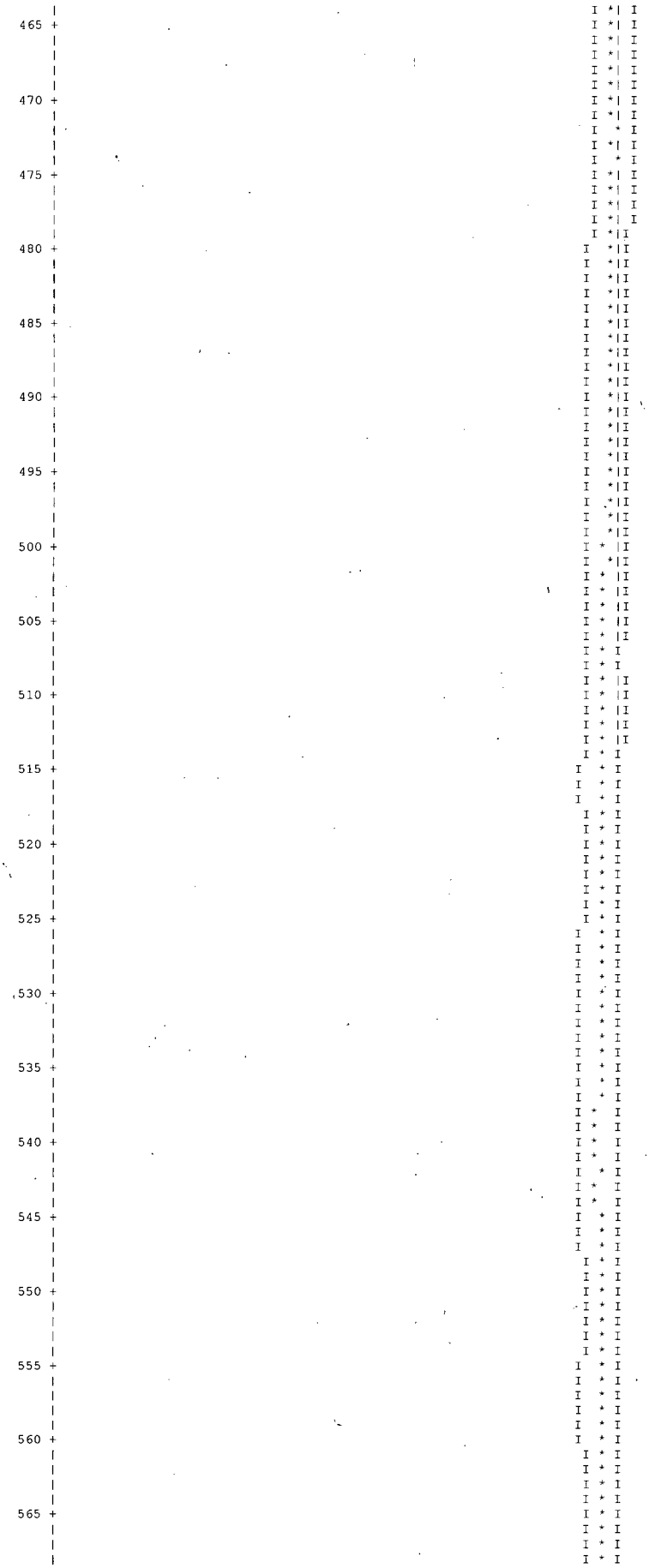
plot of average k-effective by generation run.
the line represents k-eff = 0.9297 + or - 0.0009 which occurs for 990 generations run.

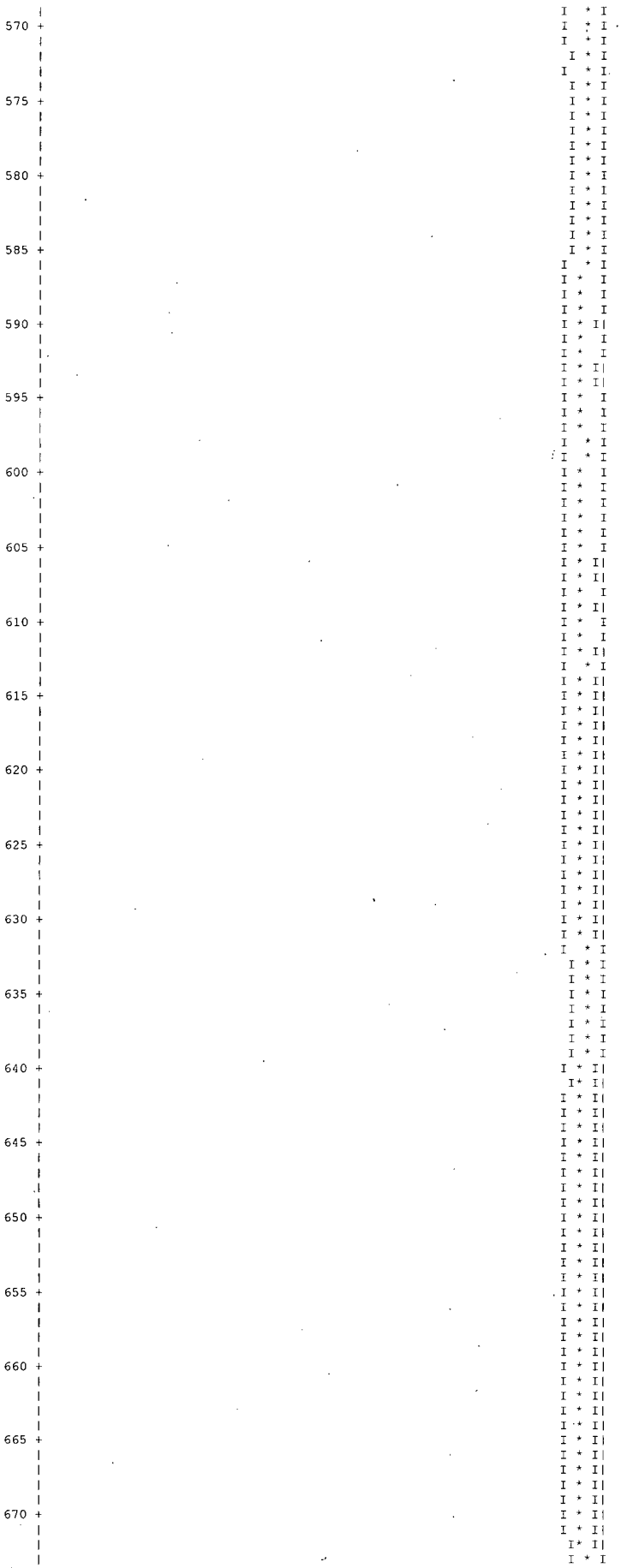








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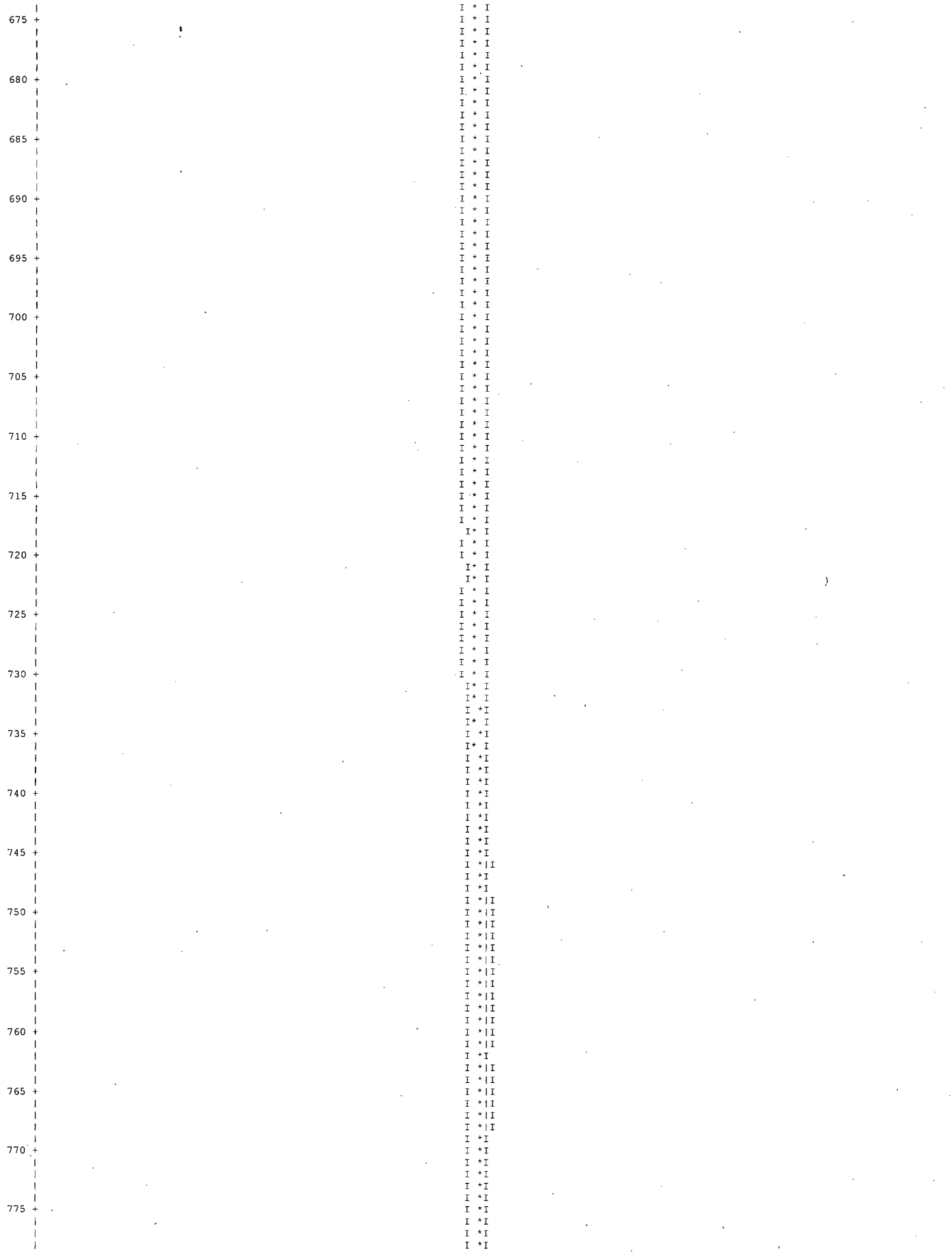
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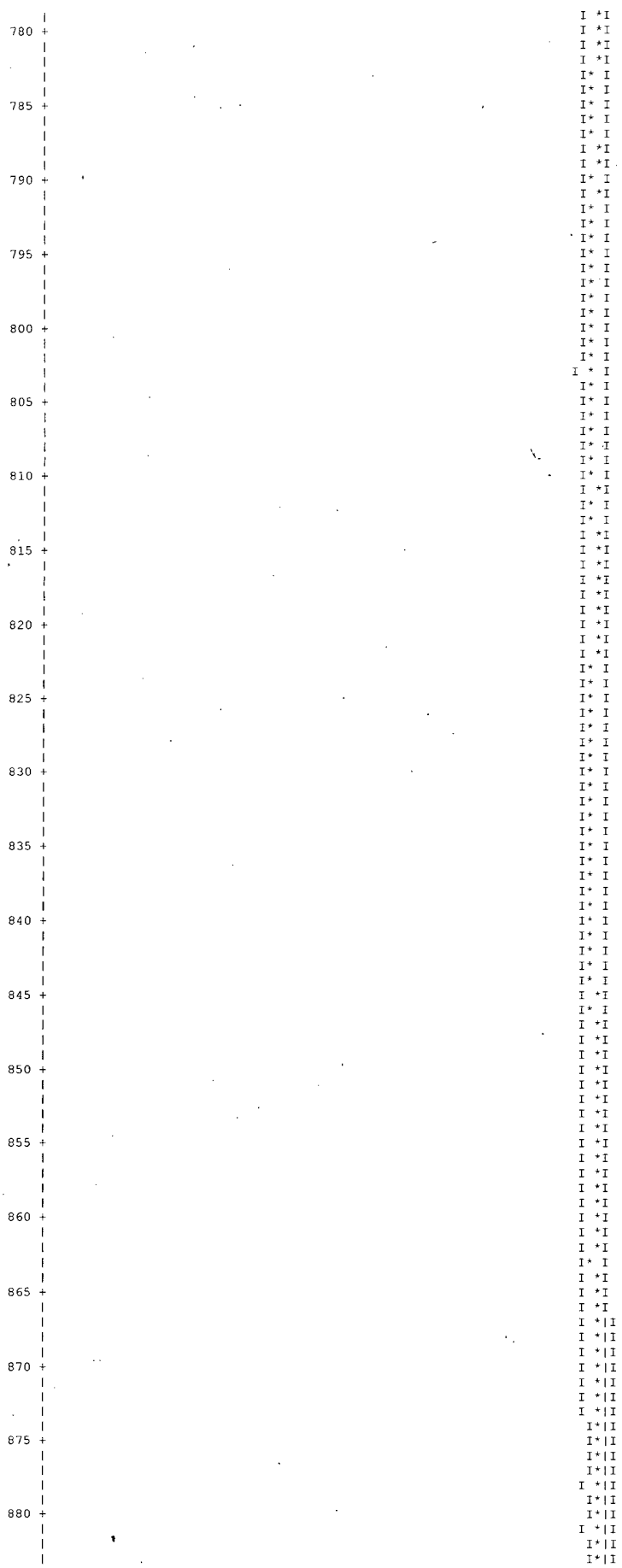
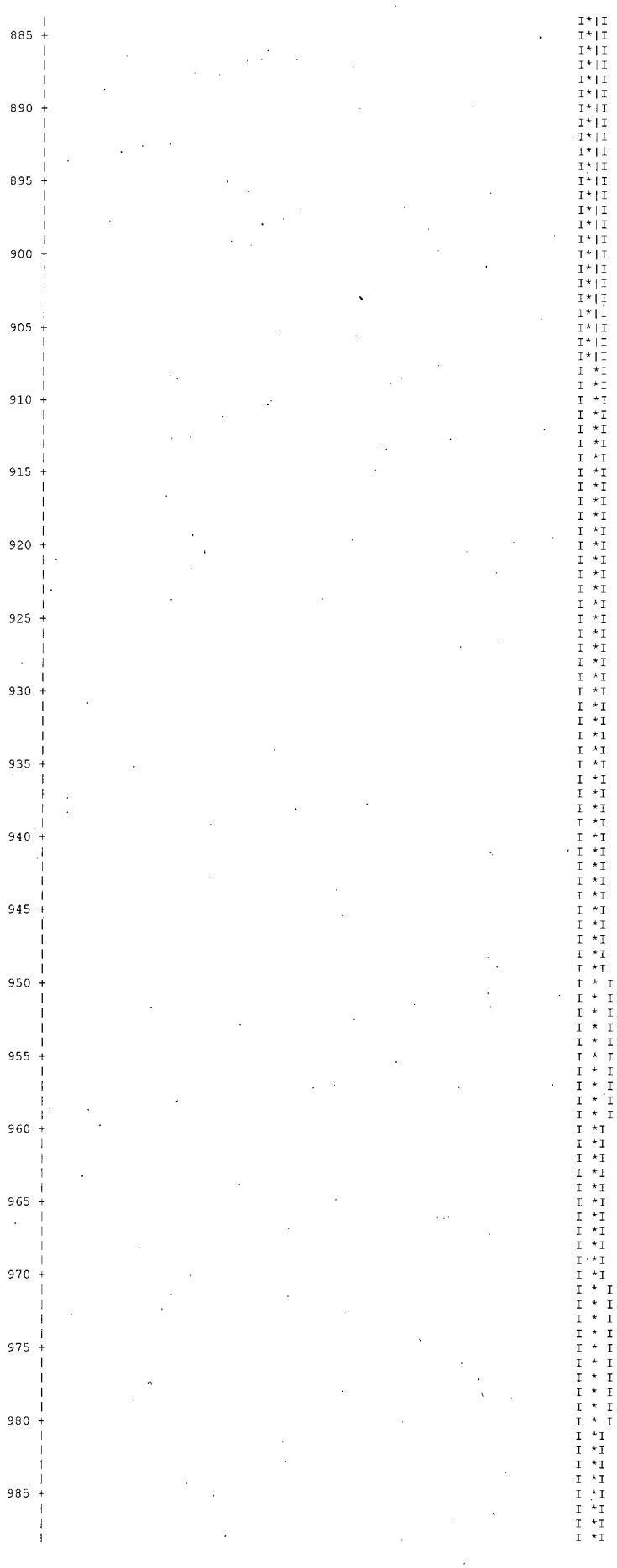
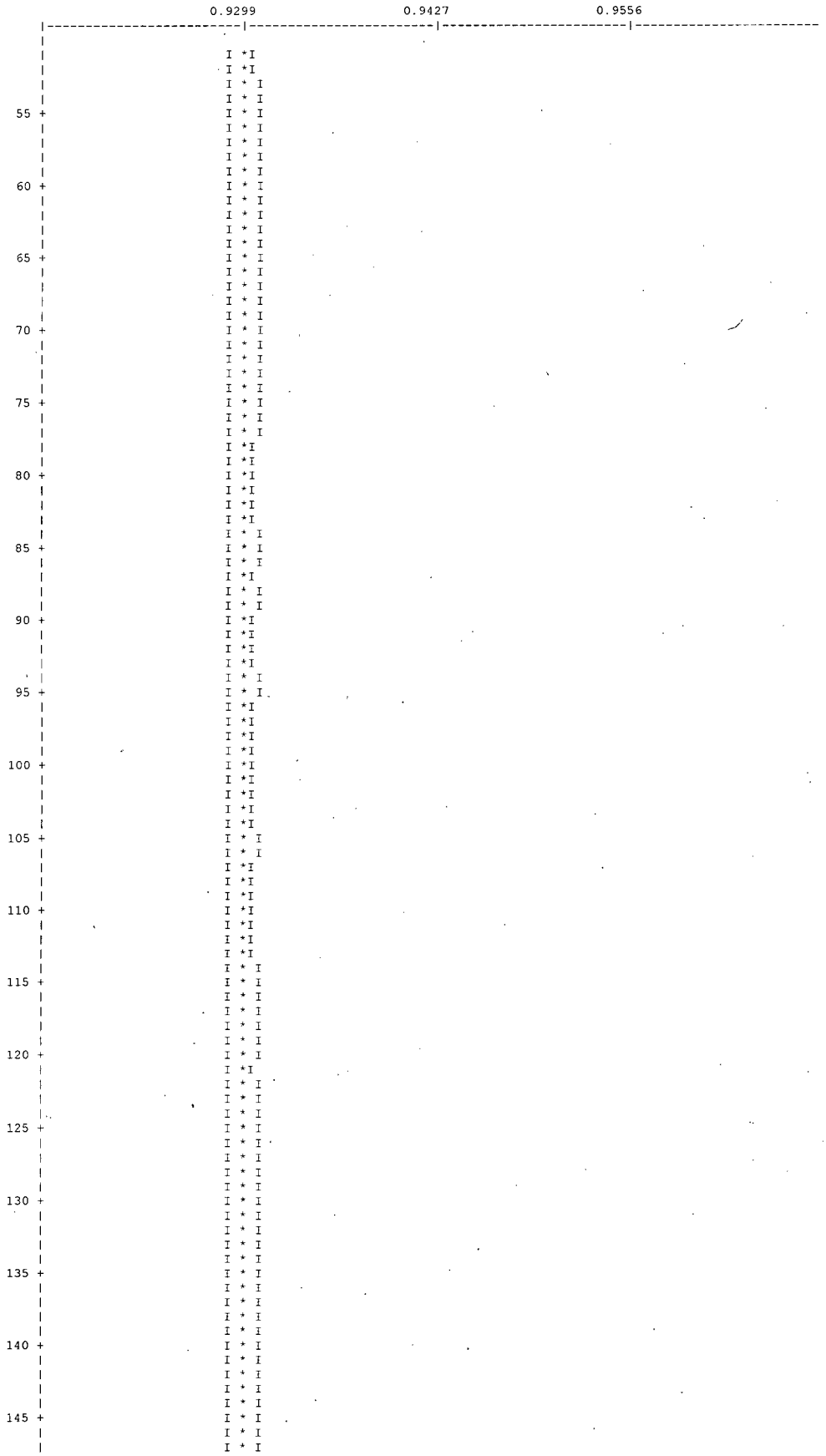




```
     |                                                                I *I
 990 +                                                                I *I
     |                                                                I * I
     |                                                                I * I
     |                                                                I * I
     |                                                                I * I
 995 +                                                                I * I
     |                                                                I * I
     |                                                                I * I
     |                                                                I * I
     |                                                                I * I
1000 +                                                                 I* I
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

plot of average k-effective by generation skipped.
the line represents k-eff = 0.9301 + or - 0.0009 which occurs for 56 generations skipped.



case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

frequency for generations 763 to 1000

```
0.8203 to 0.8237     *
0.8237 to 0.8270
0.8270 to 0.8304
0.8304 to 0.8338
0.8338 to 0.8372
0.8372 to 0.8405
0.8405 to 0.8439
0.8439 to 0.8473
0.8473 to 0.8507
0.8507 to 0.8541
0.8541 to 0.8574
0.8574 to 0.8608
0.8608 to 0.8642
0.8642 to 0.8676     *
0.8676 to 0.8709
0.8709 to 0.8743
0.8743 to 0.8777     ***
0.8777 to 0.8811
0.8811 to 0.8845     *
0.8845 to 0.8878     ***
0.8878 to 0.8912     ***
0.8912 to 0.8946     ***
0.8946 to 0.8980     *******
0.8980 to 0.9014     ****
0.9014 to 0.9047     *****
0.9047 to 0.9081     *******
0.9081 to 0.9115     *******
0.9115 to 0.9149     *********
0.9149 to 0.9182     ***************
0.9182 to 0.9216     ***************
0.9216 to 0.9250     **********
0.9250 to 0.9284     ********
0.9284 to 0.9318     **************
0.9318 to 0.9351     **********
0.9351 to 0.9385     ***********
0.9385 to 0.9419     **************
0.9419 to 0.9453     *****************
0.9453 to 0.9487     *****
0.9487 to 0.9520     ********
0.9520 to 0.9554     ***********
0.9554 to 0.9588     *********
0.9588 to 0.9622     ******
0.9622 to 0.9655     ********
0.9655 to 0.9689     ********
0.9689 to 0.9723     ****
0.9723 to 0.9757     **
0.9757 to 0.9791     ***
0.9791 to 0.9824
0.9824 to 0.9858     ***
0.9858 to 0.9892
0.9892 to 0.9926
0.9926 to 0.9960     *
0.9960 to 0.9993     *
0.9993 to 1.0027
1.0027 to 1.0061
1.0061 to 1.0095     *
1.0095 to 1.0128
```

****

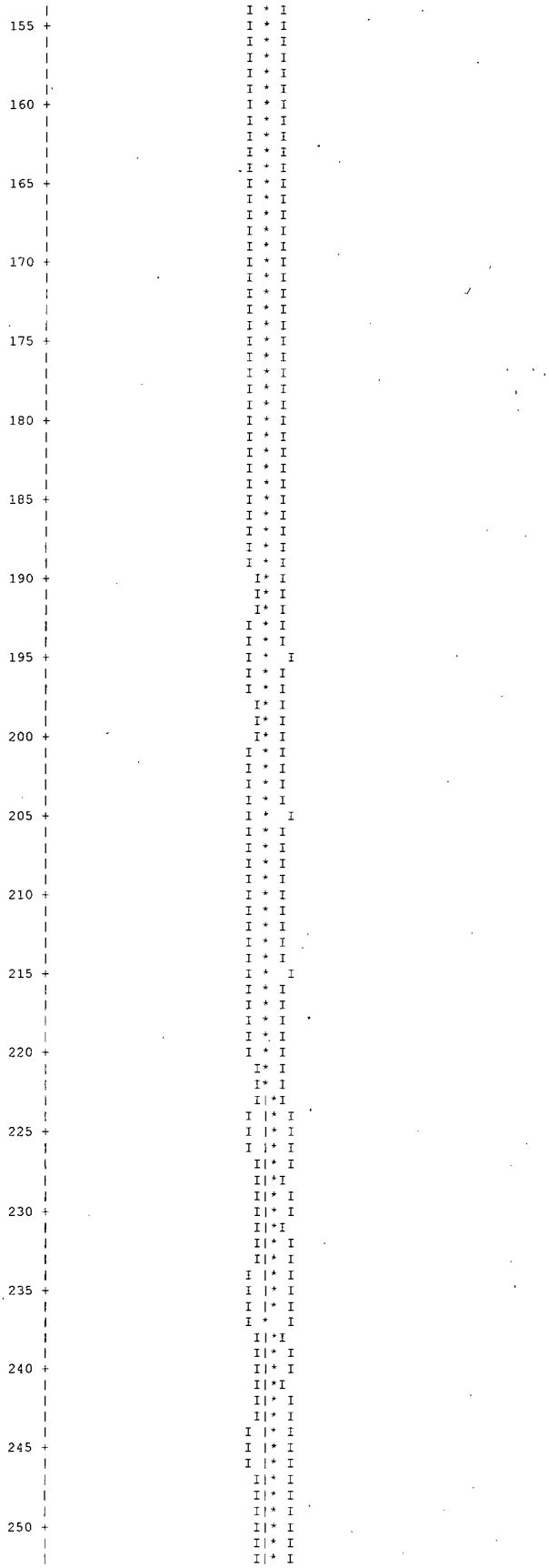
congratulations! you have successfully traversed the perilous path through keno v in 5.94933 minutes

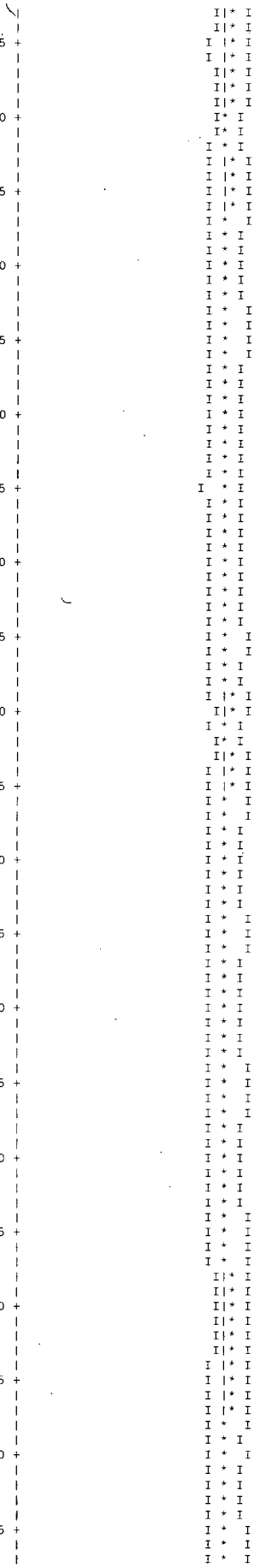
****

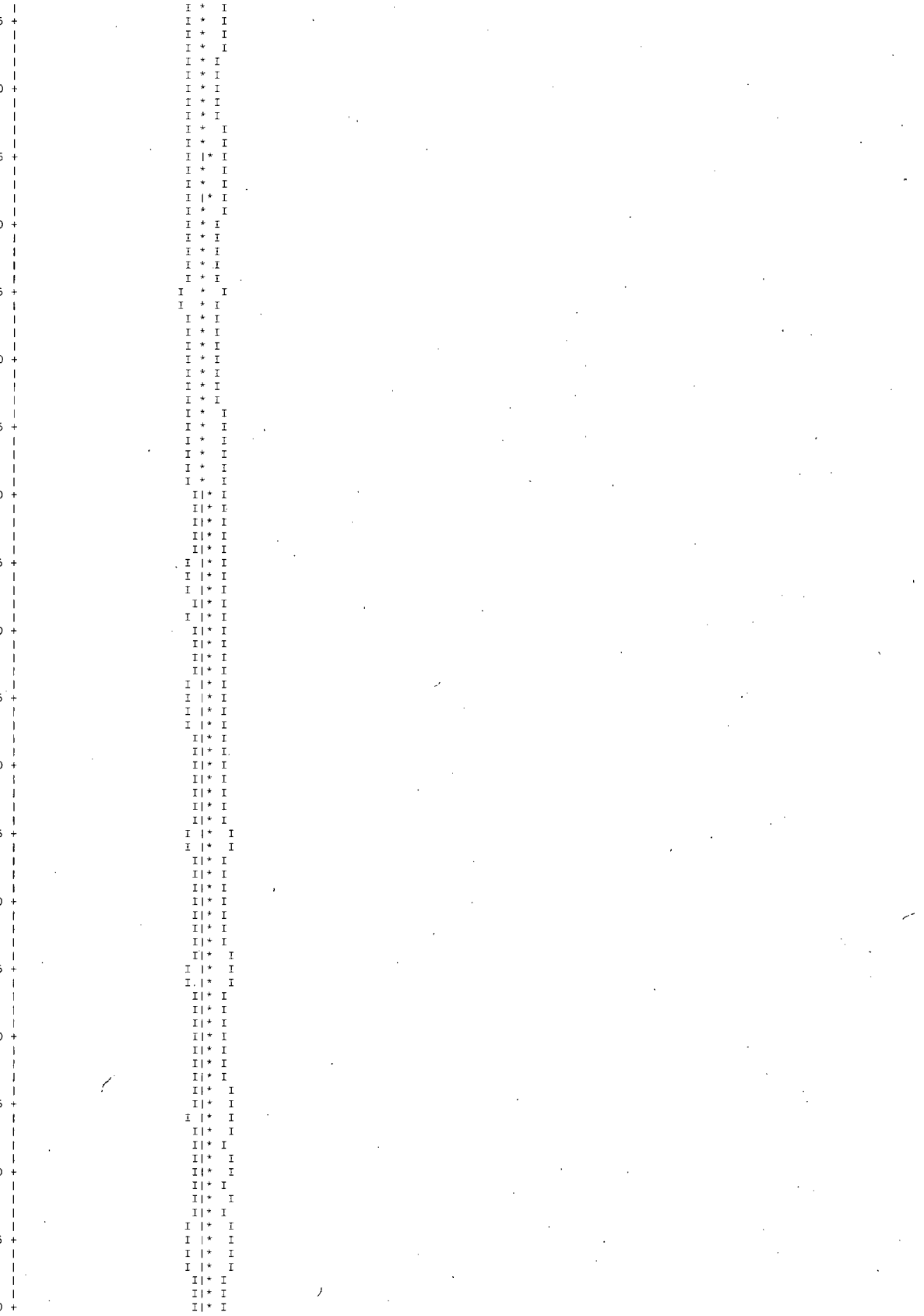
case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

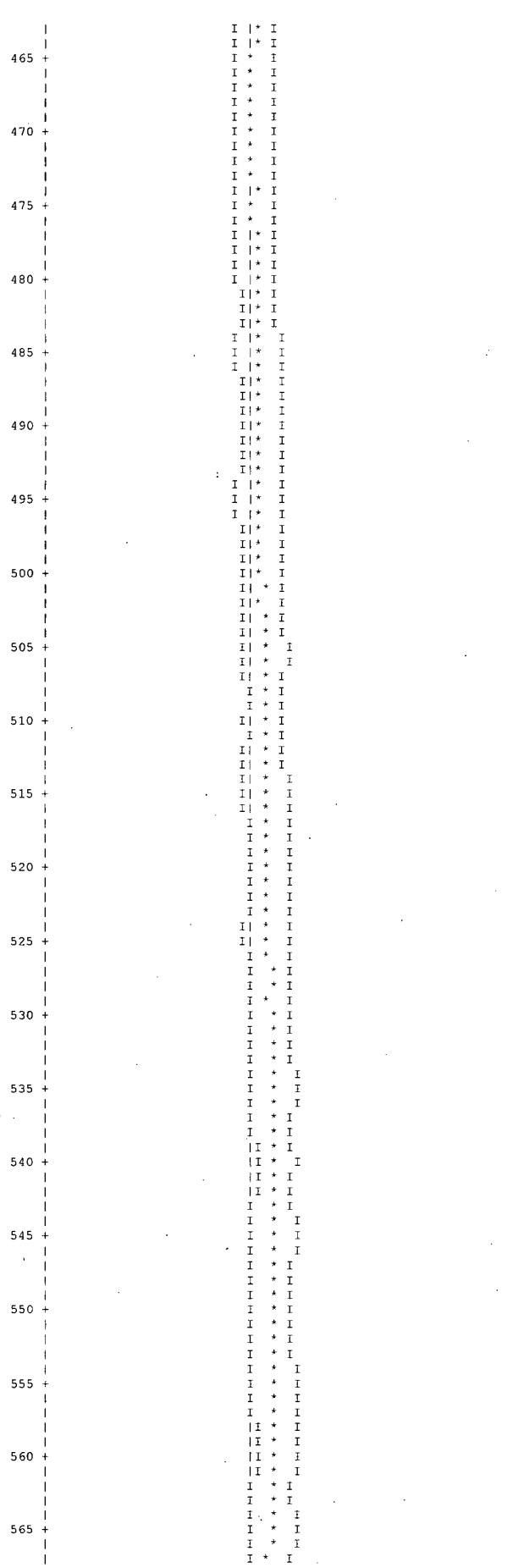
frequency for generations 526 to 1000

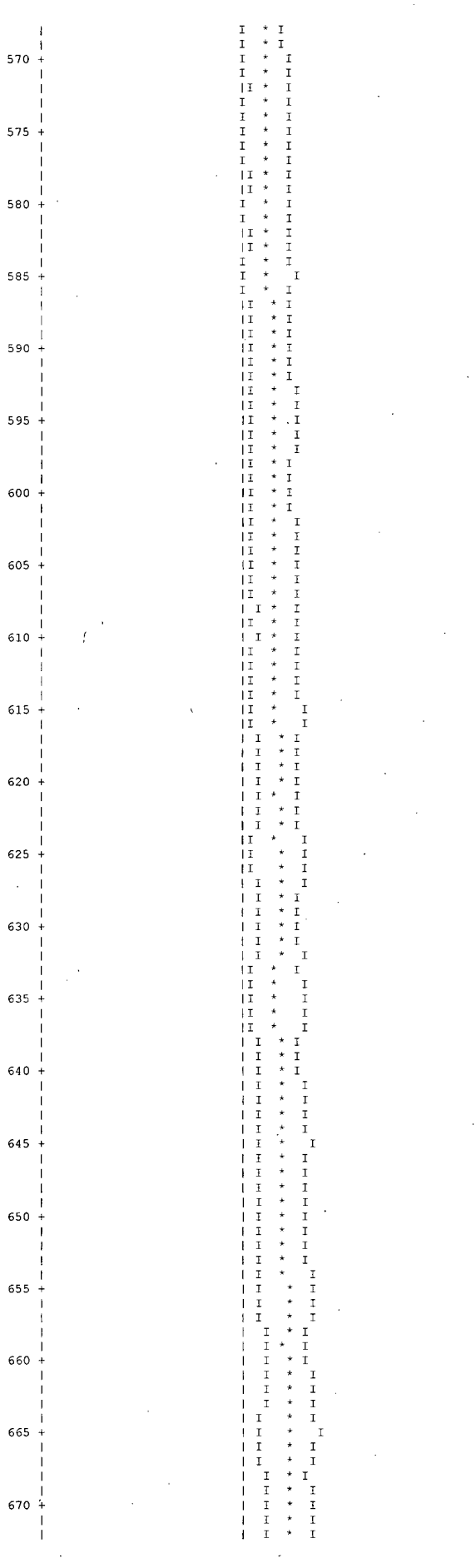
```
0.8203 to 0.8237     *
0.8237 to 0.8270
0.8270 to 0.8304
0.8304 to 0.8338
0.8338 to 0.8372
0.8372 to 0.8405
0.8405 to 0.8439
0.8439 to 0.8473
0.8473 to 0.8507     *
0.8507 to 0.8541
0.8541 to 0.8574
0.8574 to 0.8608
0.8608 to 0.8642
0.8642 to 0.8676     *
0.8676 to 0.8709
0.8709 to 0.8743
0.8743 to 0.8777     ***
0.8777 to 0.8811     *
0.8811 to 0.8845     *****
0.8845 to 0.8878     ****
0.8878 to 0.8912     ********
0.8912 to 0.8946     ******
0.8946 to 0.8980     *******************
0.8980 to 0.9014     ***************
0.9014 to 0.9047     ***********
0.9047 to 0.9081     ****************
0.9081 to 0.9115     ******************
0.9115 to 0.9149     ****************
0.9149 to 0.9182     ************************
0.9182 to 0.9216     **********************
0.9216 to 0.9250     *************************
0.9250 to 0.9284     **********************
0.9284 to 0.9318     ****************************
0.9318 to 0.9351     **********************
0.9351 to 0.9385     **********************
0.9385 to 0.9419     *******************
0.9419 to 0.9453     ************************
0.9453 to 0.9487     *************
0.9487 to 0.9520     ******************
0.9520 to 0.9554     *******************
0.9554 to 0.9588     ****************
0.9588 to 0.9622     ***************
0.9622 to 0.9655     ***************
0.9655 to 0.9689     **************
0.9689 to 0.9723     *********
0.9723 to 0.9757     *****
0.9757 to 0.9791     ****
0.9791 to 0.9824
0.9824 to 0.9858     ***
0.9858 to 0.9892     ***
0.9892 to 0.9926
0.9926 to 0.9960     *
0.9960 to 0.9993     *
0.9993 to 1.0027
1.0027 to 1.0061
1.0061 to 1.0095     **
1.0095 to 1.0128     *
```

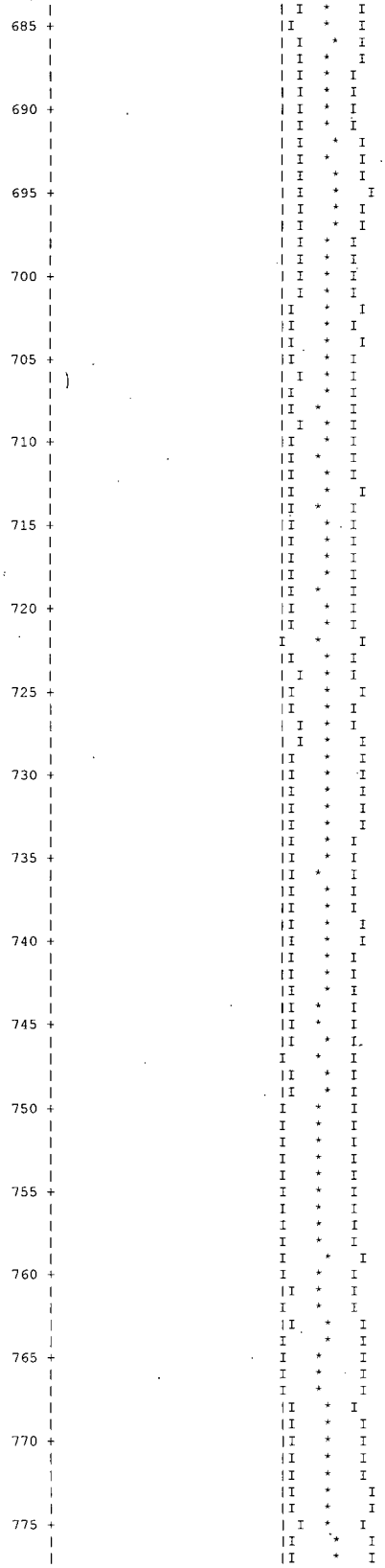


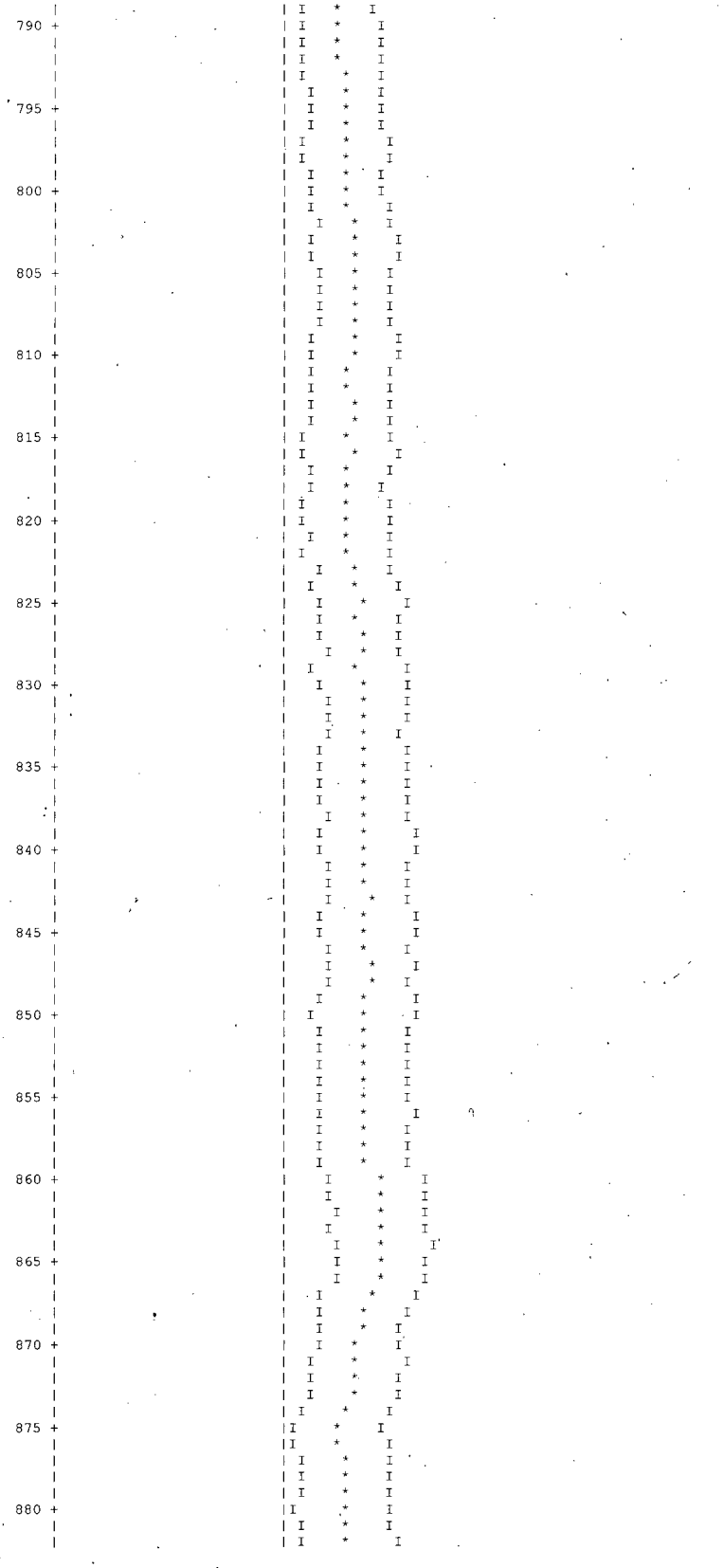











780
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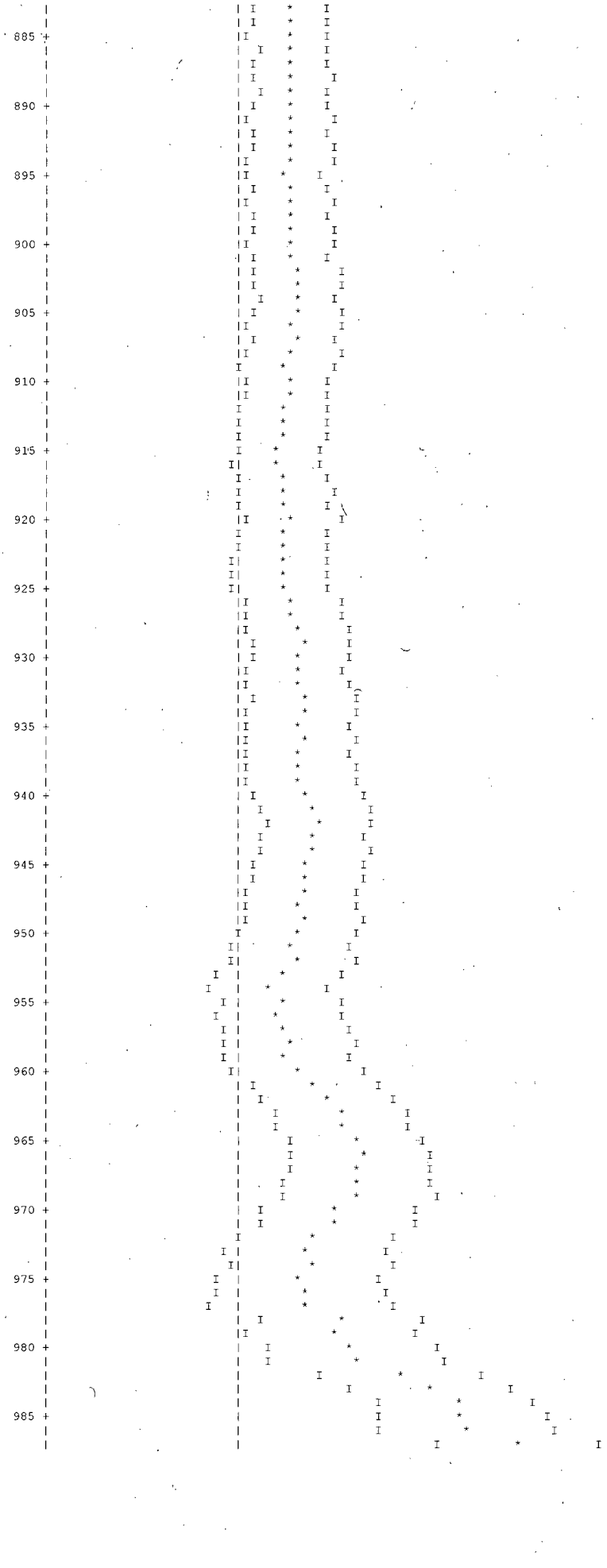
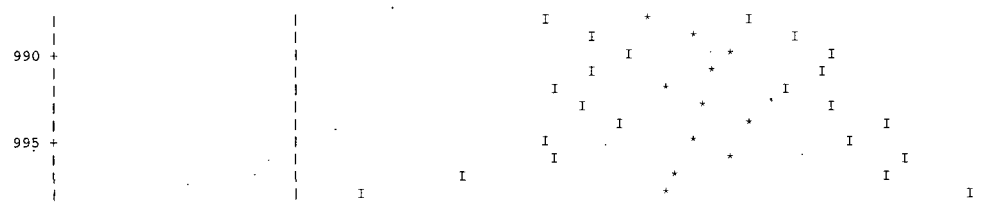
870
875
880





k-effective satisfies the chi**2 test for normality at the 95 % level

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
1	0.0000			5.05047E-08	52.6413	6.82908E-07	40.5691	0.00000E+00	0.0000
2	0.0000			7.84956E-08	39.1961	8.54742E-07	26.9214	0.00000E+00	0.0000
3	0.0000			1.44906E-07	30.3206	1.29579E-06	24.5661	0.00000E+00	0.0000
4	0.0000			2.55546E-07	20.1152	3.07767E-06	23.4010	0.00000E+00	0.0000
5	0.0000			4.51006E-07	14.6461	5.65166E-06	12.7203	0.00000E+00	0.0000
6	0.0000			6.46222E-06	3.5013	8.78992E-05	3.4568	0.00000E+00	0.0000
7	0.0000			1.78266E-05	1.9705	3.02027E-04	1.7094	0.00000E+00	0.0000
8	0.0001			5.11908E-05	1.0442	3.26769E-04	1.3189	0.00000E+00	0.0000
9	0.0001			1.14284E-04	0.5641	2.75064E-04	1.2649	0.00000E+00	0.0000
10	0.0001			6.30058E-05	0.6586	1.18199E-04	1.4471	0.00000E+00	0.0000
11	0.0003			2.78525E-04	0.2912	4.11729E-04	0.6176	0.00000E+00	0.0000
12	0.0002			1.96655E-04	0.3186	2.25863E-04	0.5179	0.00000E+00	0.0000
13	0.0001			5.83756E-05	0.5546	5.66398E-05	0.7280	0.00000E+00	0.0000
14	0.0003			2.76663E-04	0.2566	2.12589E-04	0.3650	0.00000E+00	0.0000
15	0.0002			2.25248E-04	0.2634	1.43807E-04	0.3818	0.00000E+00	0.0000
16	0.0001			7.04164E-05	0.4130	4.32220E-05	0.5770	0.00000E+00	0.0000
17	0.0000			3.14163E-05	0.6098	2.12573E-05	0.8873	0.00000E+00	0.0000
18	0.0000			2.79681E-05	0.6466	1.84215E-05	0.8539	0.00000E+00	0.0000
19	0.0001			4.83931E-05	0.4801	3.44716E-05	0.7575	0.00000E+00	0.0000
20	0.0000			3.60447E-05	0.5289	2.88696E-05	0.8596	0.00000E+00	0.0000
21	0.0001			7.28566E-05	0.3863	7.25708E-05	0.7819	0.00000E+00	0.0000
22	0.0001			6.64010E-05	0.3969	6.90981E-05	0.8539	0.00000E+00	0.0000
23	0.0001			6.84207E-05	0.3700	8.90497E-05	0.9473	0.00000E+00	0.0000
24	0.0000			1.54366E-05	0.7177	2.22199E-05	1.3915	0.00000E+00	0.0000
25	0.0000			1.96690E-05	0.6288	3.23146E-05	1.2939	0.00000E+00	0.0000
26	0.0000			1.09989E-05	0.8628	1.61936E-05	1.4177	0.00000E+00	0.0000
27	0.0000			3.31086E-05	0.5109	6.30947E-05	1.0740	0.00000E+00	0.0000
28	0.0001			5.80325E-05	0.3767	1.19400E-04	0.9667	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
29	0.0001			5.85356E-05	0.3767	1.53479E-04	0.9669	0.00000E+00	0.0000
30	0.0000			7.54459E-06	0.9292	1.80582E-05	1.3036	0.00000E+00	0.0000
31	0.0001			5.96272E-05	0.3398	1.28518E-04	0.9178	0.00000E+00	0.0000
32	0.0000			2.36087E-05	0.5448	4.19488E-05	0.9982	0.00000E+00	0.0000
33	0.0000			2.04625E-05	0.5441	3.18622E-05	0.9269	0.00000E+00	0.0000
34	0.0000			4.57182E-05	0.3633	7.04919E-05	0.8399	0.00000E+00	0.0000
35	0.0000			2.75314E-05	0.4494	3.72497E-05	0.8171	0.00000E+00	0.0000
36	0.0000			2.87743E-05	0.4496	5.02042E-05	0.8808	0.00000E+00	0.0000
37	0.0000			1.94031E-05	0.5385	2.89015E-05	0.8626	0.00000E+00	0.0000
38	0.0000			1.98608E-05	0.5187	2.52514E-05	0.7832	0.00000E+00	0.0000
39	0.0001			7.26841E-05	0.2739	1.92018E-04	0.9521	0.00000E+00	0.0000
40	0.0001			6.71004E-05	0.2627	1.25248E-04	0.8701	0.00000E+00	0.0000
41	0.0001			8.68733E-05	0.2381	2.06444E-04	0.8633	0.00000E+00	0.0000
42	0.0001			7.14401E-05	0.2436	2.45378E-04	0.9992	0.00000E+00	0.0000
43	0.0000			3.58110E-05	0.3106	8.47495E-05	0.9073	0.00000E+00	0.0000
44	0.0001			5.40969E-05	0.2720	2.37705E-04	1.0756	0.00000E+00	0.0000
45	0.0000			3.11120E-05	0.3215	4.52302E-05	0.8094	0.00000E+00	0.0000
46	0.0000			6.62654E-06	0.6533	1.75236E-05	1.1054	0.00000E+00	0.0000
47	0.0000			1.66386E-05	0.4296	1.17984E-04	1.1706	0.00000E+00	0.0000
48	0.0000			5.23784E-06	0.7412	1.28945E-05	1.1527	0.00000E+00	0.0000
49	0.0000			3.62185E-05	0.2897	1.17949E-04	1.0567	0.00000E+00	0.0000
50	0.0000			2.59803E-05	0.3382	1.38857E-04	1.1784	0.00000E+00	0.0000
51	0.0000			6.80562E-06	0.6099	1.12007E-05	0.9606	0.00000E+00	0.0000
52	0.0000			1.69275E-05	0.3856	5.60963E-05	1.0282	0.00000E+00	0.0000
53	0.0001			6.36586E-05	0.2076	1.97108E-04	0.9796	0.00000E+00	0.0000
54	0.0000			2.77602E-05	0.3035	2.30109E-04	1.2319	0.00000E+00	0.0000
55	0.0001			5.91444E-05	0.2291	2.67299E-04	1.0744	0.00000E+00	0.0000
56	0.0000			4.15169E-05	0.2620	2.17894E-04	1.1650	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
57	0.0001			4.99189E-05	0.2467	2.40520E-04	1.1373	0.00000E+00	0.0000
58	0.0000			2.99567E-05	0.3227	9.83362E-05	1.0673	0.00000E+00	0.0000
59	0.0001			5.04157E-05	0.2499	2.23714E-04	1.0638	0.00000E+00	0.0000
60	0.0001			8.19068E-05	0.2173	2.47715E-04	0.9035	0.00000E+00	0.0000
61	0.0000			9.04037E-06	0.6037	2.45687E-05	0.8891	0.00000E+00	0.0000
62	0.0001			5.57173E-05	0.2817	1.06344E-04	0.7857	0.00000E+00	0.0000
63	0.0000			4.36288E-05	0.3386	6.86767E-05	0.6169	0.00000E+00	0.0000
64	0.0000			3.28234E-05	0.3719	6.37901E-05	0.7090	0.00000E+00	0.0000
65	0.0000			9.11402E-06	0.6322	4.08209E-05	0.9867	0.00000E+00	0.0000
66	0.0001			4.82711E-05	0.2987	1.11140E-04	0.7224	0.00000E+00	0.0000
67	0.0000			3.72036E-05	0.3407	2.14852E-04	1.0294	0.00000E+00	0.0000
68	0.0000			7.40733E-06	0.6967	1.70182E-05	0.7606	0.00000E+00	0.0000
69	0.0001			1.11417E-04	0.2602	4.12235E-04	0.9804	0.00000E+00	0.0000
70	0.0001			1.05738E-04	0.3128	1.70245E-03	1.1739	0.00000E+00	0.0000
71	0.0001			1.33993E-04	0.2550	2.16305E-04	0.5897	0.00000E+00	0.0000
72	0.0000			6.21155E-06	0.8929	1.31817E-05	0.8618	0.00000E+00	0.0000
73	0.0001			1.20726E-04	0.2979	1.81983E-04	0.5345	0.00000E+00	0.0000
74	0.0005			4.66366E-04	0.1960	1.18129E-03	0.8192	0.00000E+00	0.0000
75	0.0001			5.26126E-05	0.4945	1.72198E-04	0.9211	0.00000E+00	0.0000
76	0.0003			2.90494E-04	0.3228	4.17679E-04	0.6174	0.00000E+00	0.0000
77	0.0001			9.88965E-05	0.3660	2.53649E-04	0.6759	0.00000E+00	0.0000
78	0.0000			2.31536E-06	1.1472	1.54754E-05	1.3097	0.00000E+00	0.0000
79	0.0002			2.26159E-04	0.4811	1.83380E-04	0.5336	0.00000E+00	0.0000
80	0.0000			1.16461E-05	0.6694	4.27874E-05	0.8687	0.00000E+00	0.0000
81	0.0005			4.69059E-04	0.2221	7.56069E-04	0.5934	0.00000E+00	0.0000
82	0.0001			5.46565E-05	0.8033	6.49244E-05	0.7292	0.00000E+00	0.0000
83	0.0002			1.41524E-04	0.6636	1.22148E-04	0.5756	0.00000E+00	0.0000
84	0.0000			1.64452E-05	0.5197	8.13049E-05	0.8827	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
85	0.0001			1.31916E-04	0.4754	2.11675E-04	0.5101	0.00000E+00	0.0000
86	0.0003			2.37620E-04	0.4056	3.05068E-04	0.4929	0.00000E+00	0.0000
87	0.0006			5.18456E-04	0.4184	3.62350E-04	0.4494	0.00000E+00	0.0000
88	0.0001			5.40663E-05	0.8004	5.18095E-05	0.8094	0.00000E+00	0.0000
89	0.0000			2.73535E-05	0.5683	8.09882E-05	0.8023	0.00000E+00	0.0000
90	0.0006			5.54169E-04	0.5503	3.62897E-04	0.4987	0.00000E+00	0.0000
91	0.0001			5.23141E-05	0.5010	1.07878E-04	0.8031	0.00000E+00	0.0000
92	0.0004			3.33660E-04	0.6635	2.62737E-04	0.5778	0.00000E+00	0.0000
93	0.0002			1.65014E-04	0.5129	1.56235E-04	0.5886	0.00000E+00	0.0000
94	0.0003			2.92942E-04	0.7167	1.76122E-04	0.6215	0.00000E+00	0.0000
95	0.0006			5.13255E-04	0.4110	3.69967E-04	0.4955	0.00000E+00	0.0000
96	0.0001			1.11860E-04	0.8323	2.67429E-04	0.7385	0.00000E+00	0.0000
97	0.0000			1.55716E-05	0.7619	5.22429E-05	0.9525	0.00000E+00	0.0000
98	0.0001			1.29772E-04	0.7496	1.59059E-04	0.6435	0.00000E+00	0.0000
99	0.0000			2.32491E-05	0.9527	4.02701E-05	1.0198	0.00000E+00	0.0000
100	0.0001			1.22575E-04	0.7515	9.83829E-05	0.6731	0.00000E+00	0.0000
101	0.0000			1.92608E-05	0.6354	7.52565E-05	0.8797	0.00000E+00	0.0000
102	0.0001			6.01198E-05	0.7633	2.43362E-04	0.6919	0.00000E+00	0.0000
103	0.0000			5.37503E-06	0.6813	7.17225E-05	0.9801	0.00000E+00	0.0000
104	0.0001			1.13910E-04	0.7114	2.70484E-04	0.6222	0.00000E+00	0.0000
105	0.0000			4.20319E-06	0.7018	6.66043E-05	1.0099	0.00000E+00	0.0000
106	0.0000			1.40324E-06	1.1716	2.32498E-05	1.4027	0.00000E+00	0.0000
107	0.0000			3.24248E-06	0.7749	5.21634E-05	1.1400	0.00000E+00	0.0000
108	0.0000			2.86148E-06	0.7853	5.01707E-05	1.1407	0.00000E+00	0.0000
109	0.0000			5.79190E-06	0.6610	8.27550E-05	0.9792	0.00000E+00	0.0000
110	0.0000			5.40339E-06	0.7861	5.82040E-05	0.9880	0.00000E+00	0.0000
111	0.0000			2.91594E-06	0.8155	4.79016E-05	1.1851	0.00000E+00	0.0000
112	0.0000			2.00358E-06	1.0602	3.00806E-05	1.4504	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
113	0.0000			4.37183E-05	0.6062	1.09226E-04	0.8565	0.00000E+00	0.0000
114	0.0000			2.51554E-06	0.9732	3.21580E-05	1.4134	0.00000E+00	0.0000
115	0.0000			4.03238E-06	0.6398	8.24008E-05	1.0355	0.00000E+00	0.0000
116	0.0000			1.22721E-05	0.4398	1.83986E-04	0.9894	0.00000E+00	0.0000
117	0.0003			2.61467E-04	0.4327	3.85855E-04	0.5592	0.00000E+00	0.0000
118	0.0001			8.60504E-05	0.3968	2.85455E-04	0.8342	0.00000E+00	0.0000
119	0.0007			6.17647E-04	0.4938	5.12437E-04	0.4751	0.00000E+00	0.0000
120	0.0000			1.38080E-05	0.5824	1.18630E-04	0.9317	0.00000E+00	0.0000
121	0.0000			1.76537E-05	0.5831	1.29193E-04	0.9346	0.00000E+00	0.0000
122	0.0000			1.40312E-05	0.7823	6.89846E-05	1.1197	0.00000E+00	0.0000
123	0.0006			5.74811E-04	0.4557	6.15361E-04	0.4459	0.00000E+00	0.0000
124	0.0001			1.05936E-04	0.5305	1.98956E-04	0.7775	0.00000E+00	0.0000
125	0.0004			3.89509E-04	0.5559	3.09058E-04	0.5798	0.00000E+00	0.0000
126	0.0010			9.16293E-04	0.6028	7.76866E-04	0.5405	0.00000E+00	0.0000
127	0.0004			3.86433E-04	0.6100	3.36989E-04	0.5627	0.00000E+00	0.0000
128	0.0001			6.46387E-05	0.5237	2.11270E-04	0.8328	0.00000E+00	0.0000
129	0.0004			3.30088E-04	0.4843	4.97087E-04	0.5370	0.00000E+00	0.0000
130	0.0004			3.73595E-04	0.6663	4.08546E-04	0.5826	0.00000E+00	0.0000
131	0.0026			2.42487E-03	0.3784	1.49807E-03	0.3921	0.00000E+00	0.0000
132	0.0001			6.57100E-05	0.4104	3.26974E-04	0.8993	0.00000E+00	0.0000
133	0.0001			8.02212E-05	0.3917	4.25439E-04	0.9190	0.00000E+00	0.0000
134	0.0016			1.45391E-03	0.3876	1.36620E-03	0.4236	0.00000E+00	0.0000
135	0.0000			1.54991E-05	0.8782	8.10757E-05	1.1419	0.00000E+00	0.0000
136	0.0000			2.33598E-05	0.6632	1.38720E-04	0.9977	0.00000E+00	0.0000
137	0.0000			2.26015E-05	0.6723	1.43506E-04	0.9889	0.00000E+00	0.0000
138	0.0000			2.30508E-05	0.6617	1.48665E-04	1.0067	0.00000E+00	0.0000
139	0.0000			2.38582E-05	0.6403	1.57352E-04	1.0069	0.00000E+00	0.0000
140	0.0001			6.04181E-05	0.4067	4.16701E-04	0.9527	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
141	0.0000			4.42787E-05	0.4776	3.16818E-04	0.9706	0.00000E+00	0.0000
142	0.0000			2.99262E-05	0.5772	2.15160E-04	0.9339	0.00000E+00	0.0000
143	0.0001			1.03666E-04	0.3210	7.38002E-04	0.9447	0.00000E+00	0.0000
144	0.0000			4.46111E-05	0.5052	3.13817E-04	0.9217	0.00000E+00	0.0000
145	0.0000			4.26054E-05	0.5088	2.91831E-04	0.9233	0.00000E+00	0.0000
146	0.0001			7.62285E-05	0.4004	4.99178E-04	0.9528	0.00000E+00	0.0000
147	0.0000			2.47286E-05	0.7352	1.56423E-04	1.0774	0.00000E+00	0.0000
148	0.0000			1.30528E-05	1.0145	8.11168E-05	1.3396	0.00000E+00	0.0000
149	0.0000			8.30471E-06	1.3250	5.70167E-05	1.7655	0.00000E+00	0.0000
150	0.0000			2.88524E-05	0.7093	1.86692E-04	1.0861	0.00000E+00	0.0000
151	0.0000			3.12774E-05	0.7314	1.85417E-04	1.0793	0.00000E+00	0.0000
152	0.0000			3.34489E-05	0.6711	1.87165E-04	1.0963	0.00000E+00	0.0000
153	0.0000			3.65737E-05	0.6778	2.02728E-04	1.0648	0.00000E+00	0.0000
154	0.0000			3.91359E-05	0.6841	2.11840E-04	1.1257	0.00000E+00	0.0000
155	0.0000			3.80513E-05	0.6921	2.01285E-04	1.1355	0.00000E+00	0.0000
156	0.0000			3.65882E-05	0.7095	1.87234E-04	1.1294	0.00000E+00	0.0000
157	0.0000			4.35174E-05	0.6909	2.24680E-04	1.0405	0.00000E+00	0.0000
158	0.0001			4.70617E-05	0.6304	2.39740E-04	1.0713	0.00000E+00	0.0000
159	0.0001			6.95023E-05	0.5576	3.44500E-04	0.9971	0.00000E+00	0.0000
160	0.0000			3.85500E-05	0.7822	1.80870E-04	1.1623	0.00000E+00	0.0000
161	0.0001			5.51790E-05	0.6299	2.53849E-04	1.0669	0.00000E+00	0.0000
162	0.0001			6.95929E-05	0.5883	3.11374E-04	1.0400	0.00000E+00	0.0000
163	0.0001			7.79173E-05	0.5788	3.33671E-04	0.9701	0.00000E+00	0.0000
164	0.0001			8.71378E-05	0.5747	3.64536E-04	0.9957	0.00000E+00	0.0000
165	0.0001			9.78948E-05	0.5561	3.89151E-04	0.9179	0.00000E+00	0.0000
166	0.0001			6.02340E-05	0.6857	2.35790E-04	1.1749	0.00000E+00	0.0000
167	0.0001			6.49513E-05	0.7224	2.43092E-04	1.1320	0.00000E+00	0.0000
168	0.0001			7.11017E-05	0.6635	2.64709E-04	1.0885	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
169	0.0001			7.54138E-05	0.6893	2.70076E-04	1.0724	0.00000E+00	0.0000
170	0.0001			8.40869E-05	0.6801	2.91110E-04	0.9879	0.00000E+00	0.0000
171	0.0000			4.42974E-05	0.8662	1.49429E-04	1.2148	0.00000E+00	0.0000
172	0.0000			4.52389E-05	0.9059	1.51578E-04	1.2105	0.00000E+00	0.0000
173	0.0001			4.83603E-05	0.8747	1.65262E-04	1.2445	0.00000E+00	0.0000
174	0.0001			5.00992E-05	0.8781	1.64794E-04	1.2476	0.00000E+00	0.0000
175	0.0000			2.10348E-05	1.3643	6.76792E-05	1.7339	0.00000E+00	0.0000
176	0.0000			2.13586E-05	1.3135	6.97042E-05	1.7510	0.00000E+00	0.0000
177	0.0000			2.18163E-05	1.3091	7.10737E-05	1.7091	0.00000E+00	0.0000
178	0.0000			2.24418E-05	1.2886	7.18012E-05	1.7053	0.00000E+00	0.0000
179	0.0000			2.31254E-05	1.2957	7.40353E-05	1.6832	0.00000E+00	0.0000
180	0.0000			2.32030E-05	1.2785	7.40131E-05	1.6434	0.00000E+00	0.0000
181	0.0000			2.34151E-05	1.3553	7.38363E-05	1.7600	0.00000E+00	0.0000
182	0.0000			2.43009E-05	1.2907	7.73021E-05	1.6590	0.00000E+00	0.0000
183	0.0000			2.48367E-05	1.3018	7.61223E-05	1.6641	0.00000E+00	0.0000
184	0.0000			2.59627E-05	1.2764	7.72661E-05	1.6914	0.00000E+00	0.0000
185	0.0000			2.59279E-05	1.2696	7.87985E-05	1.6291	0.00000E+00	0.0000
186	0.0000			2.61764E-05	1.2690	7.99033E-05	1.6214	0.00000E+00	0.0000
187	0.0000			2.77374E-05	1.2950	8.10913E-05	1.5754	0.00000E+00	0.0000
188	0.0000			2.80525E-05	1.2931	8.22270E-05	1.6217	0.00000E+00	0.0000
189	0.0000			2.87181E-05	1.2450	8.31527E-05	1.5698	0.00000E+00	0.0000
190	0.0001			7.49712E-05	0.7855	2.13391E-04	1.0980	0.00000E+00	0.0000
191	0.0001			8.18086E-05	0.7737	2.26931E-04	1.1279	0.00000E+00	0.0000
192	0.0001			8.72074E-05	0.7830	2.30657E-04	1.0912	0.00000E+00	0.0000
193	0.0001			9.33141E-05	0.7314	2.45216E-04	1.0718	0.00000E+00	0.0000
194	0.0002			2.12778E-04	0.5223	5.24568E-04	0.8587	0.00000E+00	0.0000
195	0.0003			2.51441E-04	0.5088	5.83130E-04	0.8914	0.00000E+00	0.0000
196	0.0003			3.01530E-04	0.5083	6.47537E-04	0.8323	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
197	0.0004			3.79967E-04	0.4956	7.35029E-04	0.7300	0.00000E+00	0.0000
198	0.0005			4.82651E-04	0.4679	8.55515E-04	0.7661	0.00000E+00	0.0000
199	0.0003			2.93576E-04	0.6712	4.81893E-04	0.8789	0.00000E+00	0.0000
200	0.0004			3.47415E-04	0.6187	5.24264E-04	0.7844	0.00000E+00	0.0000
201	0.0010			9.19080E-04	0.4421	1.24015E-03	0.6255	0.00000E+00	0.0000
202	0.0015			1.38494E-03	0.4198	1.58334E-03	0.5631	0.00000E+00	0.0000
203	0.0025			2.33367E-03	0.3878	2.23506E-03	0.4871	0.00000E+00	0.0000
204	0.0050			4.60738E-03	0.3821	3.64366E-03	0.4075	0.00000E+00	0.0000
205	0.0046			4.30063E-03	0.4718	3.05583E-03	0.4538	0.00000E+00	0.0000
206	0.0073			6.81633E-03	0.4571	4.66980E-03	0.4263	0.00000E+00	0.0000
207	0.0121			1.12852E-02	0.4170	7.40333E-03	0.3940	0.00000E+00	0.0000
208	0.0182			1.68808E-02	0.4121	1.07416E-02	0.3945	0.00000E+00	0.0000
209	0.0212			1.97128E-02	0.4010	1.25132E-02	0.3833	0.00000E+00	0.0000
210	0.0193			1.79908E-02	0.3630	1.17061E-02	0.3445	0.00000E+00	0.0000
211	0.0158			1.46749E-02	0.3297	1.00710E-02	0.3160	0.00000E+00	0.0000
212	0.0139			1.29301E-02	0.2942	9.54483E-03	0.2818	0.00000E+00	0.0000
213	0.0141			1.30716E-02	0.2467	1.05586E-02	0.2330	0.00000E+00	0.0000
214	0.0169			1.56763E-02	0.2011	1.40094E-02	0.1935	0.00000E+00	0.0000
215	0.0243			2.25671E-02	0.1731	2.19201E-02	0.1594	0.00000E+00	0.0000
216	0.0403			3.75137E-02	0.1423	3.91124E-02	0.1169	0.00000E+00	0.0000
217	0.0241			2.23663E-02	0.1514	2.40713E-02	0.1184	0.00000E+00	0.0000
218	0.0308			2.86070E-02	0.1374	3.14182E-02	0.1031	0.00000E+00	0.0000
219	0.0396			3.67954E-02	0.1275	4.10080E-02	0.0941	0.00000E+00	0.0000
220	0.0508			4.72758E-02	0.1246	5.33020E-02	0.0850	0.00000E+00	0.0000
221	0.0651			6.05134E-02	0.1175	6.88445E-02	0.0774	0.00000E+00	0.0000
222	0.0824			7.66735E-02	0.1128	8.75882E-02	0.0701	0.00000E+00	0.0000
223	0.1024			9.52070E-02	0.1108	1.08756E-01	0.0645	0.00000E+00	0.0000
224	0.0550			5.11628E-02	0.1151	5.82471E-02	0.0735	0.00000E+00	0.0000

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

skipping 50 generations

group	fission fraction	unit	region	fissions	percent deviation	absorptions	percent deviation	leakage	percent deviation
225	0.2054			1.91049E-01	0.1058	2.16609E-01	0.0593	0.00000E+00	0.0000
226	0.0328			3.04996E-02	0.1387	3.41598E-02	0.1010	0.00000E+00	0.0000
227	0.0301			2.79666E-02	0.1500	3.11066E-02	0.1063	0.00000E+00	0.0000
228	0.0108			1.00379E-02	0.2018	1.10806E-02	0.1519	0.00000E+00	0.0000
229	0.0099			9.18887E-03	0.2145	1.00783E-02	0.1601	0.00000E+00	0.0000
230	0.0045			4.14817E-03	0.2905	4.53185E-03	0.2232	0.00000E+00	0.0000
231	0.0041			3.79692E-03	0.3092	4.12879E-03	0.2361	0.00000E+00	0.0000
232	0.0037			3.46209E-03	0.3446	3.72819E-03	0.2671	0.00000E+00	0.0000
233	0.0020			1.89361E-03	0.4505	2.01929E-03	0.3610	0.00000E+00	0.0000
234	0.0012			1.09470E-03	0.5812	1.18095E-03	0.4371	0.00000E+00	0.0000
235	0.0013			1.21501E-03	0.5851	1.29990E-03	0.4298	0.00000E+00	0.0000
236	0.0011			9.87028E-04	0.6669	1.05442E-03	0.4808	0.00000E+00	0.0000
237	0.0011			1.02265E-03	0.7164	1.01694E-03	0.5102	0.00000E+00	0.0000
238	0.0001			5.40116E-05	2.8934	5.73796E-05	1.9999	0.00000E+00	0.0000
system total =				9.29986E-01	0.0891	1.00160E+00	0.0296	0.00000E+00	0.0000

elapsed time 5.94933 minutes

random number= 6E6A2275002E

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

frequency for generations 51 to 1000

```
0.8203 to 0.8237     *
0.8237 to 0.8270
0.8270 to 0.8304
0.8304 to 0.8338
0.8338 to 0.8372
0.8372 to 0.8405
0.8405 to 0.8439
0.8439 to 0.8473     *
0.8473 to 0.8507     *
0.8507 to 0.8541
0.8541 to 0.8574
0.8574 to 0.8608     *
0.8608 to 0.8642
0.8642 to 0.8676     *
0.8676 to 0.8709     **
0.8709 to 0.8743     **
0.8743 to 0.8777     *****
0.8777 to 0.8811     *******
0.8811 to 0.8845     ***********
0.8845 to 0.8878     *********
0.8878 to 0.8912     ********************
0.8912 to 0.8946     *************
0.8946 to 0.8980     ********************************
0.8980 to 0.9014     ******************************
0.9014 to 0.9047     *********************
0.9047 to 0.9081     ************************************
0.9081 to 0.9115     *********************************
0.9115 to 0.9149     ****************************************
0.9149 to 0.9182     ****************************************************
0.9182 to 0.9216     ************************************
0.9216 to 0.9250     *********************************************************
0.9250 to 0.9284     ************************************************
0.9284 to 0.9318     ********************************************************
0.9318 to 0.9351     ***********************************************************
0.9351 to 0.9385     *******************************************************
0.9385 to 0.9419     ***********************************************
0.9419 to 0.9453     ****************************************
0.9453 to 0.9487     ******************************
0.9487 to 0.9520     *************************************
0.9520 to 0.9554     ************************************
0.9554 to 0.9588     ******************************
0.9588 to 0.9622     **************************
0.9622 to 0.9655     ******************************
0.9655 to 0.9689     *********************
0.9689 to 0.9723     **************
0.9723 to 0.9757     ********
0.9757 to 0.9791     *********
0.9791 to 0.9824     **
0.9824 to 0.9858     *****
0.9858 to 0.9892     *****
0.9892 to 0.9926     ***
0.9926 to 0.9960     *
0.9960 to 0.9993     *
0.9993 to 1.0027
1.0027 to 1.0061     *
1.0061 to 1.0095     **
1.0095 to 1.0128     *
```

case c, 6.4-9,99%p/0%w/1%be/245gpu-top-sid;99%p/0%w/1%be-refl;h/pu=1100

frequency for generations 289 to 1000

```
0.8203 to 0.8237     *
0.8237 to 0.8270
0.8270 to 0.8304
0.8304 to 0.8338
0.8338 to 0.8372
0.8372 to 0.8405
0.8405 to 0.8439
0.8439 to 0.8473     *
0.8473 to 0.8507     *
0.8507 to 0.8541
0.8541 to 0.8574
0.8574 to 0.8608     *
0.8608 to 0.8642
0.8642 to 0.8676     *
0.8676 to 0.8709     *
0.8709 to 0.8743     *
0.8743 to 0.8777     ***
0.8777 to 0.8811     ***
0.8811 to 0.8845     *********
0.8845 to 0.8878     *******
0.8878 to 0.8912     **************
0.8912 to 0.8946     *********
0.8946 to 0.8980     ***************************
0.8980 to 0.9014     ********************
0.9014 to 0.9047     ******************
0.9047 to 0.9081     ******************************
0.9081 to 0.9115     *************************
0.9115 to 0.9149     ****************************
0.9149 to 0.9182     ****************************************
0.9182 to 0.9216     *************************
0.9216 to 0.9250     *****************************************
0.9250 to 0.9284     *********************************
0.9284 to 0.9318     ********************************************
0.9318 to 0.9351     ****************************************
0.9351 to 0.9385     ***************************************
0.9385 to 0.9419     ***********************************
0.9419 to 0.9453     **********************************
0.9453 to 0.9487     **********************
0.9487 to 0.9520     **********************
0.9520 to 0.9554     **************************
0.9554 to 0.9588     *******************
0.9588 to 0.9622     **********************
0.9622 to 0.9655     *******************
0.9655 to 0.9689     *******************
0.9689 to 0.9723     *************
0.9723 to 0.9757     ******
0.9757 to 0.9791     ******
0.9791 to 0.9824     **
0.9824 to 0.9858     *****
0.9858 to 0.9892     ****
0.9892 to 0.9926     *
0.9926 to 0.9960     *
0.9960 to 0.9993     *
0.9993 to 1.0027
1.0027 to 1.0061
1.0061 to 1.0095     **
1.0095 to 1.0128     *
```