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JOB STREAM OF CASES FOR THE COMPUTER CODE CITATION

D. R. Vondy and T. B. Fowler

OAK RIDGE NATIONAL LABORATORY

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ABSTRACT

A series of cases is described, input data requirements given and results reported, for the CITATION computer code which applies finite-difference diffusion theory in up to three space dimensions.

These are reference problems which collectively exercise many different options programmed in this code, and therefore serve to verify proper implementation of it. Included are non-dimensional, one-, two-, and three-dimensional eigenvalue problems of various kinds, fixed source problems, and sophisticated fuel management problems carried through several fuelings. Not only is the capability for criticality search exploited, but for several cases the adjoint eigenvalue problem is also solved and first-order perturbation results obtained and reported.

Key Words: mathematics, computer code, reactor calculations, ones

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INTRODUCTION

Contacts with individuals implementing the CITATION code on a variety of computers have shown us the critical need for a set of reference problems. Only by running a series of problems of great variety, exercising various options, can the integrity of a complicated computer code be established. After major code changes we have run such a job stream of cases. (Indeed the set of cases included would have proven superior for testing to the set which we have used in the past).

Of critical importance is checking integrity when there are differences from the normal operation employed by the originators. Errors in each compiler have to be programmed around, for example. Certain changes in the source language are necessary in converting to operation on a different type of computer. Operating systems behave differently. Taking these factors together, the implementor of a code in an environment foreign to that of the originators is faced with some of the same problems as the originators: obtaining correct results in spite of the facility, and tailoring the program to his environment. For any code transmitted, a sample problem is of course essential. A variety of problems with reliable solutions is also deemed essential when they exercise various combinations of the major programmed options in such a way as to provide a reasonable test of the integrity of an implementation.

These cases were set up to serve a specific function. They do indeed indicate capability of the CITATION code. They are designed to test the code and may not represent realistic analysis of specific nuclear reactors. They do not replace the sample problem reported, but extend it.

The input data and results reported are compatible with the most recent release of the CITATION code and its reference document, ORNL-TM-2496 dated (as revised) March 1972.

In this report, each individual case, or series of related cases, is discussed. The problem description is brief and refers both to the input

data presented in Table 1 and the edit associated with the input data in Table 2. Special features of the individual cases are given attention. Then the results are discussed as appropriate. This stream of cases required 10 minutes CPU time on the IBM 360/91 computer.

Given below is a list of the cases, often sets of cases, covered by memorandum.

1. Three cases: one-dimensional slab, cylinder and sphere.
2. Three cases: a two-dimensional perturbation calculation with results of perturbed cases for comparison.
3. Two-dimensional fixed source without fission source.
4. Two-dimensional fixed source problem with fission source.
5. Two-dimensional search on absorber.
6. Two-dimensional fast reactor dimension search.
7. Three cases: a reference case with reflected boundaries and then two cases with the periodic boundary condition.
8. Two cases: R-Z geometry followed by a Theta-R-Z case.
9. Two cases: triangular three-dimensional case followed by a similar Theta-R-Z case.
10. Hexagonal three-dimensional case.
11. Three-dimensional FFTF case in reduced form.
12. Three-dimensional case called CLAG.
13. Three-dimensional buckling search.
14. Two cases: treatment of 90 degree rotational symmetry followed by the same problem run with 180 degree rotational symmetry.
15. Fictitious plutonium exposure given a fixed source.
16. Multi-cycle breeder fuel management case.

1. THREE CASES: ONE DIMENSIONAL SLAB, CYLINDER AND SPHERE

These one-dimensional traverses are for systems which are similar in a nuclear sense. The same seven group cross sections are used for the cases and each has 24 mesh points in the core and 10 mesh points in the inactive blanket. In each case both the forward and adjoint neutron flux problems are solved and results of the usual forward-adjoint integrals for a first-order perturbation theory analysis are reported.

Regarding the input data, the first case has a full set of data, the title cards followed by the sections in order 001, 003, 004, 005, 008 giving macroscopic data, 012 identifying zones, 024 buckling, and 040 perturbation data, with a 999 card closure. The second case has only sections 001 changing the edit options, 003 changing the geometry, and 004 changing the mesh spacing. The third case replaces only the data in sections 003 and 004.

Note that the macroscopic data supplied in section 008 is edited for the first case. The data actually used for the calculation is slightly different. Total loss cross sections are calculated (sum of the outscattering, absorption and buckling loss) for each zone. From this is subtracted the sum of everything except absorption; this leaves an effective absorption cross section consistent with short word precision use of the data, a little "hanky panky" usually having no significant effect on the data used.

Examination of the iterative process in resolution of the neutron flux eigenvalue problems shows that overrelaxation is not done for one-dimensional problems (the overrelaxation coefficient BETA is unity) since at each energy each successive estimate of the fluxes is a simultaneous solution along the line. The extrapolation procedure is seen to be effective. Note the vast improvement in the estimate of the multiplication factor, K after extrapolation in each case and the decrease in the error bounding maximum relative FLUX CHANGE between iterations. Estimates of the eigenvalue of the predominating error mode from point flux value changes are MU-1 and MU-2, while MU-3 is an independent value from an integral quantity which has not proven useful. The estimate of K from the forward problem is used for the adjoint problem and not reevaluated. Upon termination of the iterative process when convergence criteria have been satisfied, an independent estimate of K and also the value of a multiplier on all absorption cross sections are determined, values which each would minimize the sum of the squares of the residues of the point neutron balance equations. Thus three estimates of K are available here:

<u>Method</u>	<u>Slab</u>	<u>Cylinder</u>	<u>Sphere</u>
Neutron Balance	0.893908	0.870168	0.859577
Residues	0.893935	0.870179	0.859585
Adjoint Residues	<u>0.893941</u>	<u>0.870213</u>	<u>0.859615</u>
Averages	0.893928	0.870187	0.859592

The values are seen to be in agreement in each case to less than the specified maximum relative point flux change (CITATION code default value) of 0.0001.

The GROSS NEUTRON BALANCE obtained by input option for each case is for the forward problem. Individual contributions to an overall neutron balance are shown by energy group in a general table which is arranged for up to three space dimensions. There is no buckling nor $1/v$ loss, and we have not advanced to the stage of obtaining a XENON LOSS. OUT-SCATTER is from that group to all others, IN-SCATTER is from all other groups to that one (no in-group scatter considered), the SOURCE values are the TOTAL PRODUCTIONS divided by K distributed by CHI. If fully converged, TOTAL LOSSES would equal TOTAL GAINS by energy group. The PROD/ABSORP is a "macroscopic average eta" indicating the ratio of neutrons produced to neutrons absorbed.

The reader may also note that at the start of the edited results, the version of the CITATION program in use is identified, the date is given and the computer model is shown. Following the information about the iterative process for each eigenvalue problem, the computer central processor unit (CPU) time required for solving the problem (not including processing input data nor setting up the problem) is given. At the end of each case a normal termination is indicated along with both the CPU time and total clock (real) time. This computer run used only a small amount of the fast memory of the computer, 100,000 short words of the available 393,216. Under multi-tasking, other jobs were also being processed, so the CPU time is naturally much less than the total time and the CPU efficiency can not be determined from the available information.

2. THREE CASES: A TWO-DIMENSIONAL PERTURBATION CALCULATION WITH RESULTS OF PERTURBED CASES FOR COMPARISON

This small problem is one we have used for years to check out perturbation calculations. The two-dimensional problem is first solved, then the adjoint problem is solved, and first-order perturbation results obtained as requested. Note that a neutron balance by energy group is also reported for each of the three zones along with average neutron flux values and volumes, and the power density map is edited. For the next case the

diffusion constant for the first group and first zone is changed from 0.500028 to 0.450028, and in the last case it is specified as 0.250014.

A comparison of the results follows.

<u>Case</u>	<u>k_{eff}</u>	<u>$\partial k/k \partial D$</u>
Reference, Perturbation	0.18592	-0.08499
D (1, 1) Changed -0.05	0.18683	-0.098
D (1, 1) Changed -0.250014	0.19111	-0.110

As the perturbation is increased, the change in the multiplication factor deviates more from the first-order perturbation result which is precise only in the limit of no change.

3. TWO-DIMENSIONAL FIXED SOURCE WITHOUT FISSION SOURCE

This little one-group fixed source problem was extracted from one presented in the literature.¹ During the iterative process the level of the fixed source is adjusted at each iteration to satisfy an overall neutron balance, and on termination the neutron flux values are renormalized to the original source strength. Contained with the iterative information is an overall neutron balance which shows how the imbalance is reduced. One of the few edits of point neutron flux values was obtained for this problem.

4. TWO-DIMENSIONAL FIXED SOURCE PROBLEM WITH FISSION SOURCE

This is another one-group fixed source problem, but here there is a value for $\nu \Sigma_f$ providing a flux-dependent fission source. The flux edit indicates that the diagonal symmetry presented no difficulty; only slight disagreement is found in the fourth digit of the flux values at points of symmetry.

5. TWO-DIMENSIONAL SEARCH ON ABSORBER

This problem treats seven groups with upscattering, a two-dimensional bare slab. The calculation is a direct criticality search, iteration toward a desired multiplication factor by adjusting the absorption cross sections. The search factor obtained must be subtracted from unity to give the value of relative absorption cross section because of the way the actual cross sections were used as $1/\nu$ data: $1.0 - 0.256956 = 0.743044$. This result compares with a precise value of 0.7376078371 for a continuum.²

An interesting aspect is how well this problem is accelerated by extrapolation; significant reduction from the error mode predominating asymptotically is achieved by extrapolation.

6. TWO-DIMENSIONAL FAST REACTOR DIMENSION SEARCH

This case is the first to use microscopic cross sections; they are supplied in input section 000, an 012 section is necessary for assignments (and applies names to sets of zones), and nuclide concentrations (DENSITIES) must be provided by zone (or series of zones) in an 020 section. A section 028 of input data is also included to direct the search on dimensions.

In the edit is information about the generation of a cross section library. Following the DESCRIPTION OF REACTOR ZONES is a DESCRIPTION OF MICROSCOPIC CROSS SECTIONS which presents such reference information as needed to document the data (15 nuclides, 5 energy groups, group energies, $1/v$ data and the source distribution function).

According to the input data specifications, the spacings associated with the first 19 mesh points along the X coordinate are to have unit changes while those of the last 9 mesh points along the Y coordinate are to be changed half as much in satisfying a desired multiplication factor of 0.95. The solution of the initial eigenvalue problem gave a $k_{\text{eff}} = 1.01137$. Then a change was made in the mesh, a decrease to reduce k_{eff} , and the result obtained after a single iteration of the problem was used to adjust the first change, to effect a reasonable step out in the space dimension variable. Then the outer-iteration procedure was applied to bring the problem to an acceptable solution. An edit of the final spacial mesh is presented, and also certain damage rate data, a summary of neutron losses, and fissile conversion and power and fissile loading distributions.

7. THREE CASES: A REFERENCE CASE WITH REFLECTED BOUNDARIES AND THEN TWO CASES WITH THE PERIODIC BOUNDARY CONDITION

These cases provide a check of the treatment of the periodic boundary condition applied to zones of black absorption. We have heard of some difficulty in understanding the layout of Theta-R geometry. The center of the circle goes to the top. The left boundary is along a radius, there is a false (nonexisting) boundary at the top (must be reflecting), the

right boundary is along another radius, and closure is along the bottom boundary. Fictitious regions or points required by several older codes have been entirely eliminated in CITATION so that only real boundaries need be considered.

Comparison of the results of the perturbation calculations for the first and third problems in this set shows three digit agreement.

8. TWO CASES: R-Z GEOMETRY FOLLOWED BY A THETA-R-Z CASE

These cases provide a direct, coarse check of the treatment of three-dimensional geometry involving the Theta dimension with the periodic boundary condition. The third dimension (Theta) is simply added so that a flat flux along it results. A comparison of the cases may be informative about mocking up problems involving the Theta dimension. Most of the first order perturbation results (integrals) show three digit significance, but two significant figures are not guaranteed by the level of convergence specified.

9. TWO CASES: TRIAGONAL THREE-DIMENSIONAL CASE FOLLOWED BY A SIMILAR THETA-R-Z CASE

Triagonal geometry is of special interest for treating hexagonal assemblies of fuel pins. This case also demonstrates a usefulness of the black absorber approximation: a suitable boundary condition may be placed inside a geometric mesh by defining a zone to be a black absorber which has an extrapolated flux boundary condition extending into the absorber. This use of the black absorber condition in all energy groups has application even in fast reactor analysis.

When the black absorber condition is applied in all groups in a zone, all cross sections for this zone are set to zero, and at all points internal to this zone the neutron flux values are set to zero. Absorption within the black absorber region is determined from interface leakage.

To provide some additional information, results from several cases which have been run but are not included here are reported below.

<u>Spacial Meshpoints</u>			
<u>Triagonal</u>	<u>Z</u>	<u>Total</u>	<u>k_{eff}</u>
32	4	128	0.7273
128	4	512	0.7209
288	4	1152	0.7197
128	12	1536	0.6766
128	20	2560	0.6731
288	20	5760	0.6720

Clearly it takes more than four points along one dimension for a reliable representation of the neutron flux.

The second case of this set is a mock up of the problem in Theta-R-Z geometry with 128 points on a plane. However, these points are used to represent only one-twelfth of the system compared with one-sixth treated by the triagonal representation. Thus the result of $k_{eff} = 0.7218$ for four points along Z is considered to be in reasonable agreement with the results shown above. The perturbation results are not much different for the two cases in spite of the different representations.

10. HEXAGONAL THREE-DIMENSIONAL CASE

This little case is included as a reference calculation in hexagonal geometry. It should be noted that a single mesh point is located at the center of each hexagon. Generally a finer mesh can not be used, and there are serious constraints on application of this geometry because of the way points are located off boundaries. Refer to the drawing in the code report for a visual display of points and boundaries.

There are, however, special applications where this geometry is useful. A coarse mock up of hexagonal assemblies is possible (one point per hexagon compared with a minimum of six with triagonal geometry). It has also been used for representing mixed systems, as cylinders in slabs.

11. THREE-DIMENSIONAL FFTF CASE IN REDUCED FORM

This case is a coarse representation of a reactor core under design.

12. THREE-DIMENSIONAL CASE CALLED CLAG

This three-dimensional case was adopted by us for test purposes from a Knolls Atomic Power Laboratory Report.³ The case has diagonal symmetry,

unknown to the code. The degree of symmetry in the results is a measure of convergence of the problem.

Of interest in this problem is the handling of the finite-difference neutron balance equation constants. When feasible, these are all stored in the fast memory. For the larger problems those constants representing leakage coupling and total loss are input from disk by energy group during the iterative process. For this case 38460 words storage are required with data input; without input the requirement for this four-energy group problem is 64070 words based on the edited information.

13. THREE-DIMENSIONAL BUCKLING SEARCH

The direct search procedure is used for this old WHIRLAWAY case to satisfy a desired multiplication factor by adjusting the buckling. A $DB^2\phi$ loss is allowed in all geometries, even three-dimensional (such may be useful for any problem, although occasionally a tenderfoot incorrectly puts in the system buckling when the whole geometry is treated as a 1-D sphere, 2-D cylinder or in 3-D).

To demonstrate user control, an overrelaxation factor is specified for this case and the iterative process is done by the Direct Alternating-Direction Line Overrelaxation (DALOR) sweeping along rows, then columns, then fore and aft at each energy. Each point neutron flux value is determined three times each outer iteration.

It is interesting to note that given a good flux shape, the adjoint problem quickly converges.

14. TWO CASES: TREATMENT OF 90 DEGREE ROTATIONAL SYMMETRY FOLLOWED BY THE SAME PROBLEM RUN WITH 180 DEGREE ROTATIONAL SYMMETRY

These three-dimensional cases are used for a test of two special boundary conditions. The 90 degree rotational symmetry condition involves coupling the right column of points with the bottom row on each plane. The 180 degree rotational symmetry case is twice as large and involves coupling the right column of points with itself but inverted. These special boundary conditions are useful for two situations:

- (1) treating a core with a minimum number of points, especially important when depletion is considered, and

- (2) the cell problem where explicit representation of a symmetry condition causes much faster iteration and a significant savings in computation time.

The heat deposition in the coolant, per unit total cross sectional area, is edited for the last case.

15. FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

This is a rather peculiar case. It is complicated because microscopic cross sections for ^{240}Pu are correlated against concentration. It is simple because the first "cycle" of exposure involves fixed source problems (with fission source). It demonstrates great flexibility because a second "cycle" of exposure is done solving eigenvalue problems. We include it here without elaborate explanation as a test of several features of the CITATION code.

This case does illustrate a recent addition to the code: the ability to change microscopic cross section data during an exposure calculation. As specified, an original set of data is replaced by another set, and considerable flexibility during a cycle is allowed.

16. MULTI-CYCLE BREEDER FUEL MANAGEMENT CASE

Remarks

This case is a fairly involved treatment of a fast reactor breeder. It is included here to supplement the sample problem distributed with the CITATION code; the two cases are similar physically. The capability demonstrated represents a significant investment in methods development.

Please note that the fuel management capability is available in all geometries through three dimensions in the finite-difference representation of diffusion theory.

Included below is a discussion about the fuel management treatment and data requirements which follow this problem and supplement the discussion in the code report.

General Description

This calculation simulates the operation of the reactor⁴ with refueling intervals of specified length. Initial parameters are adjusted at the beginning of each interval to achieve specified conditions during the cycle. The parameter to be varied, in order to achieve the desired condition of a minimum fractional loss to control poison, is the fraction of fuel available for recycle which can actually be used each fueling, the recycled fuel being distributed proportionately in each of the three enrichment zones. After recycle, each fueling period (cycle) was recalculated with adjustment of this "recycle fraction" until the specified condition was met. The refueling interval was held fixed at 150 full-power days. Information generated as the calculation proceeded, namely the dependence of the fractional loss to control poison on the amount of fuel recycled, permitted desired results to be achieved within a reasonable amount of calculation time.

The neutronics problems considered three energy groups and 96 space points, while there were two nondepleting and 20 depleting zones each sub-divided into four subzones. Figure 1 shows the zone layout for this problem. Exposure calculations were done for 80 fuel batches (1600 nuclide concentrations). The exposure history between fuelings was done with solution of three eigenvalue problems, i.e., at the start, mid-point, and end of each refueling interval.

A criticality search was done on the smeared control poison, which displaced sodium coolant, and the minimum fractional loss to this control poison during each cycle was specified as 0.0025 ± 0.000025 .

Results of this calculation for 25 fuelings are shown in Table 1, with the effectiveness of the programmed procedure demonstrated. The code permits restart at any cycle of such cases provided the mesh, energy groups, and zone description are not changed. The input data for the job stream case included carries this calculation through only 5 fuelings.

Detailed Description of Fuel Management and Input

A detailed description of the fuel management carried out by the code is given here along with a description of the input data that

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FOUR SUBZONES: FOUR SETS OF CONCENTRATIONS (SUB-ZONES) ARE
SPECIFIED FOR EACH ZONE 1 THROUGH 20

INNER CORE - CLASS 1 ZONE 1	ZONE 2	AXIAL BLANKET 1 - CLASS 4 ZONE 7	ZONE 8	REFLECTOR - CLASS 10, ZONE 22
MIDDLE CORE - CLASS 2 ZONE 3	ZONE 4	AXIAL BLANKET 2 - CLASS 5 ZONE 9	ZONE 10	
OUTER CORE - CLASS 3 ZONE 5	ZONE 6	AXIAL BLANKET 3 - CLASS 6 ZONE 11	ZONE 12	
ZONE 13	INNER RADIAL BLANKET - CLASS 7 ZONE 14	ZONE 15	ZONE 16	
ZONE 17	OUTER RADIAL BLANKET - CLASS 8 ZONE 18	ZONE 19	ZONE 20	
REFLECTOR - CLASS 9, ZONE 21				

Figure 1. Zone Layout for Fuel Management Problems.

Table 1. Results for 25 Fuelings

Fueling (Cycle)	Fraction of Available Plutonium Recycled	Minimum Fraction Absorption in Control Poison	End of Exposure Fissile Loading (kg)
1	--	--	3322
2	--	--	3443
3	1.0000	0.02248	3552
	0.9000	0.00587	3488
	0.8797	0.00239	3476
	0.8803	0.00250	3476
4	0.8803	-0.00538	3513
	0.9264	0.00289	3543
	0.9242	0.00251	3541
5	0.9242	0.00761	3604
	0.8958	0.00244	3585
	0.8961	0.00250	3585
6	0.8961	0.00708	3634
	0.8709	0.00236	3617
	0.8717	0.00250	3617
7	0.8717	0.01358	3684
	0.8126	0.00248	3642
8	0.8126	-0.01194	3604
	0.8844	0.00151	3653
	0.8896	0.00248	3656
9	0.8896	0.01146	3695
	0.8415	0.00227	3660
	0.8427	0.00250	3661
10	0.8427	0.00416	3671
	0.8340	0.00246	3665
	0.8342	0.00250	3665
11	0.8342	0.00786	3691
	0.8067	0.00252	3671
12	0.8067	-0.00651	3640
	0.8514	0.00210	3671
	0.8535	0.00249	3673

Table 1. Continued

Fueling (Cycle)	Fraction of Available Plutonium Recycled	Minimum Fraction Absorption in Control Poison	End of Exposure Fissile Loading (kg)
13	0.8535	0.00628	3690
	0.8338	0.00247	3676
	0.8340	0.00250	3676
14	0.8340	0.00267	3674
	0.8331	0.00250	3678
15	0.8331	0.00557	3693
	0.8173	0.00249	3681
16	0.8173	-0.00258	3664
	0.8430	0.00238	3683
	0.8436	0.00250	3683
17	0.8436	0.00452	3692
	0.8332	0.00249	3684
18	0.8332	0.00250	3686
19	0.8332	0.00432	3695
	0.8238	0.00251	3688
20	0.8238	-0.00039	3678
	0.8384	0.00245	3689
	0.8387	0.00250	3689
21	0.8387	0.00364	3694
	0.8328	0.00250	3690
22	0.8328	0.00248	3691
23	0.8328	0.00345	3696
	0.8280	0.00251	3692
24	0.8280	0.00094	3687
	0.8359	0.00248	3693
	0.8360	0.00250	3693
25	0.8360	0.00309	3696
	0.8330	0.00251	3694

specifies this management. Refer to Figure 1, the input sections 091 and 093 of the CITATION code report, and the printout of the input data of these sections.

As an overview of the fuel management specifications for the problem, the core was initially zoned and recycle feed handled such that three fuel enrichments were used at each fueling. At each fueling, one-fourth of the contents of an inner radial blanket zone was moved to an outer radial blanket zone, and the replaced material removed and processed. After one cycle delay, recycle feed was used to replace one-fourth of the contents of the core, the replaced material removed and processed along with that from the outer radial blanket. The axial blanket was considered as an integral extension of the core fuel assemblies. With this scheme, some material initially located in the inner radial blanket remains there through the history up to the fifth fueling; and is finally discharged from the reactor only at the ninth fueling; the bred plutonium in these fuel assemblies is recycled to the core at the tenth fueling, is finally discharged from it on the fourteenth fueling, and again recycled to the core at the fifteenth fueling. Excess bred plutonium is not recycled.

Input section 093, card 2 instructs the code that additional data on fraction of material recycled is to be included in the input (MAC13), and each cycle is to be repeated a maximum of 5 times (MAC15) to attain a specified minimum fraction loss to the search nuclide during each cycle (MAC16), and that the recycle fractions are the parameters to be adjusted to attain this desired condition (MAC17).

Cards 3, 4 and 5 give the desired minimum fraction loss to the search nuclide as 0.0025 (FMC2), the convergence criteria to be satisfied for the repeat cycle (FMC9), and the fractions (of discharge material) that are to be adjusted (FDM). Note that these numbers, FDM, are 1.0 for this case since they will be adjusted by the code to attain the desired condition. If the repeat cycle option were not being exercised, these numbers could still be used to control the fraction of recycle material that is recycled without iteration to a desired solution.

Cards 6 through 12 describe the fuel management to be carried out for this entire history. The first number on these cards is a sequence

number. The second number, NFM2, identifies the fresh fuel feed stream that is to be used prior to the availability of recycle material, fresh fuel feed stream number 1 in all five specifications. Since there is 1 cycle delay in recycle (MST7, card 2 section 091), no recycle feed will be available until the end of the second cycle and therefore the feed to the zones to be refueled at the end of the first cycle will be the initial loading of the zones as specified by NFFFS2=0 in the description of fresh fuel feed stream number 1.

The next number, NFM3, identifies a fresh fuel feed stream to which assignment of initial loading of material is to be made for mass balance accounting. NFM4 and NFM8 identify a makeup stream and a discharge stream respectively for each of the seven separate specifications. A different makeup stream is identified for each specification while material is discharged from the reactor to discharge stream number 1 for all specifications.

Consider the first specification, card 6. NFM4 identifies makeup stream number 1 which is described in input section 091. Referring to makeup stream 1, section 091, NFRFS3 identifies discharge stream number 1 as the source of recycle material, NFRFS6 identifies fresh fuel feed stream number 2 as the source of fresh feed to be mixed with recycle feed, and this fresh feed stream in turn specifies that the fresh feed concentrations are specified since NFFFS2=1. (If NFFFS2 had been 0, initial loading concentration would have been used).

Continuing with makeup stream 1, QMTAR is a fraction applied to the numbers FDM in addition to the calculated fraction determined by the code when repeating cycles, as is done in this case. QMTAR is used primarily to distribute recycle feed to account for different zone enrichments or volumes. Three different enrichments are used for this problem in makeup stream 1, 2, and 3. Note the sum of QMTAR for the three streams is 1.0. DLTMR=0 specifies no decay, DPQR1=0 is recommended at present since more work needs to be done in this area, and DPQR2 gives the gross fabrication loss, 0.996 for this stream. The recycle fractions specified for this makeup stream 1 are applied prior to those given by the fractions FDM and are primarily intended to be used to control what

material is to be recycled with entries of 1.0 or 0.0. For this stream only the last four nuclides (14, 15, 16, 17, see NIS1-NISA, cards 2+, section 091) will be recycled.

Makeup streams 2 and 3, identified for specifications 2 and 3, are similar to makeup stream 1. Makeup streams 4 through 7, which are identified to be used with specifications 4 through 7, specify no discharge stream and therefore no recycle material will be fed to the zones (NFM13+) associated with these specifications. Also these makeup streams identify fresh fuel feed stream 1 as source of fresh feed which will be the initial concentrations (NFFTS2=0) of the zones involved.

The data given for discharge stream 1 is NFDFS1=1 which is a sequence number, DLTMD=200 which instructs the code to decay all nuclides identified on cards 3+ (only nuclide 16 for this case with a transition (decay) constant of 1.7×10^{-9}) with $\Delta t = 200$ days, and a gross recovery fraction DPQD2=0.995.

Back to cards 6+ of section 093, NFM12=1, NFM11=1, and NFM10=0, for all seven specifications, say that all are to be applied to each cycle, and they are to start from cycle number 1.

The numbers NFM13+ describe fuel management to be carried out for each specification. With reference to Figure 1, NFM13 of the first specification instructs the code to unload (to discharge stream 1) and refuel all zones of class 1, the two inner core zones 1 and 2. Since there are four sub-zones specified (input section 012) for each of the zones, 1 through 20, involved in the fuel management for this problem, only one sub-zone will be unloaded and refueled, or moved from one zone to another, at each refueling (end of cycle), i.e., sub-zone 1,2,3, and 4, at the end of cycles 1,2,3, and 4 respectively, and back to sub-zone 1 at the end of the fifth cycle, etc.

Specifications 2 through 6 instruct the code to unload and refuel the appropriate sub-zone in all zones of class 2 through 6, respectively. These include zones 3 through 12.

Specification 7 says that the appropriate sub-zones of zones 20, 19, 18, and 17, are to be unloaded, material moved from zones 16 to 20, 15 to 19, 14 to 18, and 13 to 17, and zones 16, 15, 14, and 13 refueled.

Computer Edits

The edits of input data and results of calculations follow.

TABLE 2

[illegible]

[illegible]

2-D PERTURBATION (OLD EXTERMINATOR CASE)					CJ02-	1
9X24X4 GROUP, 864 POINTS					CJ02-	2
STREAM OF CITATION CASES ORNL 72					CJ02-	3
001					CJ02-	4
	1	1	1	1	CJ02-	5
100					CJ02-	6
10.0		0.001			CJ02-	7
003					CJ02-	8
	1	0	7	1 0 0 1 0 0 2	CJ02-	9
	0.0001		0.0001		CJ02-	10
	1.0	E+30	-4.0		CJ02-	11
	0.2	0.2	0.2	0.0	CJ02-	12
004					CJ02-	13
	2 6.0	2 4.0	3 12.0	2 8.0	CJ02-	14
	4 8.0	7 14.0	13 25.0		CJ02-	15
005					CJ02-	16
	3 2 3 3				CJ02-	17
	1 2 1 3				CJ02-	18
	1 1 1 3				CJ02-	19
008					CJ02-	20
	4 3 3				CJ02-	21
	1	1 0.500028	0.028	0.004	CJ02-	22
		0.011	0.0005	0.00025	CJ02-	23
	1	2 0.500028	0.036	0.008	CJ02-	24
	0.0002		0.016	0.0005	CJ02-	25
	1	3 0.500025	0.06	0.01	CJ02-	26
	0.0001	0.0002		0.022	CJ02-	27
	1	4 0.500028	0.09	0.04	CJ02-	28
	0.0				CJ02-	29
	2	4 1.0	0.0001		CJ02-	30
	0.0				CJ02-	31
	3	1 0.999002	0.000125		CJ02-	32
		0.0005	0.0003	0.0002	CJ02-	33
	3	2 0.999002	0.00023		CJ02-	34
	0.0004		0.0013	0.0004	CJ02-	35
	3	3 0.999002	0.00305		CJ02-	36
	0.0003	0.0006		0.0021	CJ02-	37
	3	4 0.999002	0.00406		CJ02-	38
	0.0002	0.0008	0.001		CJ02-	39
	0				CJ02-	40
	0.6	0.2	0.1	0.1	CJ02-	41
024					CJ02-	42
	1 0.001				CJ02-	43
040					CJ02-	44
					CJ02-	45
999					CJ02-	46
2-D CASE PERTURBED TO CHECK PERTURBATION RESULT, D(1,1) CHANGED -.05					CJ02-	47
9X24X4 GROUP, 864 POINTS					CJ02-	48
STREAM OF CITATION CASES ORNL 72					CJ02-	49
001					CJ02-	50
	1	1	1	1	CJ02-	51
100					CJ02-	52
10.0		0.001			CJ02-	53
008					CJ02-	54
	4 3 3				CJ02-	55
	1	1 0.450028	0.028	0.004	CJ02-	56
		0.011	0.0005	0.00025	CJ02-	57
	0.6	0.2	0.1	0.1	CJ02-	58
024					CJ02-	59
	1 0.001				CJ02-	60
999					CJ02-	61
2-D CASE PERTURBED TO CHECK PERTURBATION RESULT, D(1,1) CHANGED -.25					CJ03-	1
9X24X4 GROUP, 864 POINTS					CJ03-	2
STREAM OF CITATION CASES ORNL 72					CJ03-	2

008				
4	3	3		
1			1	0.250014
				0.011
				0.028
				0.0005
0.6				0.004
024		0.2		0.00025
1	0.001		0.1	
999			0.1	

CJ03-	3
CJ03-	4
CJ03-	5
CJ03-	6
CJ03-	7
CJ03-	8
CJ03-	9
CJ03-	10
CJ03-	11

[illegible]

2-D FIXED SOURCE PROBLEM WITH FISSION SOURCE										CJ04-	1		
20X20X1 GROUP, 400 POINTS										CJ04-	2		
STREAM OF CITATION CASES ORNL 72										CJ04-	3		
001											CJ04-	4	
	1	0	1	1	1	1	0	0	0	1	0	CJ04-	5
50											CJ04-	6	
	10.0		1.0		-30					CJ04-	7		
003											CJ04-	8	
	6										CJ04-	9	
											CJ04-	10	
	1.0										CJ04-	11	
	1.0										CJ04-	12	
	1.0										CJ04-	13	
004											CJ04-	14	
8	4.0	12		6.0						CJ04-	15		
12	6.0	8		4.0						CJ04-	16		
005											CJ04-	17	
1	1										CJ04-	18	
2	1										CJ04-	19	
008											CJ04-	20	
1	1	12.20022		0.0622		0.216					CJ04-	21	
0.0	2	12.20022		0.1365		0.0362822					CJ04-	22	
0.0	0										CJ04-	23	
1.0											CJ04-	24	
012											CJ04-	25	
1	1									CJ04-	26		
2	2									CJ04-	27		
	MATERIAL 1										CJ04-	28	
	MATERIAL 2										CJ04-	29	
024											CJ04-	30	
1											CJ04-	31	
026											CJ04-	32	
0	0										CJ04-	33	
	1.0										CJ04-	34	
	1	20	1	12						CJ04-	35		
	9	20	13	20						CJ04-	36		
	0										CJ04-	37	
999											CJ04-	38	

[illegible]

2-D FAST REACTOR DIMENSION SEARCH										CJ06-	1	
27X18X5 GROUP, 2430 POINTS										STREAM OF CITATION CASES ORNL 72	CJ06-	2
000											CJ06-	3
8											CJ06-	4
HOMOGENEOUS DESIGN 2 REACTOR											CJ06-	5
1	15	5	4	0	0						CJ06-	6
7.55037E-01	2.38025E-01	6.93800E-03	0.0			0.0					CJ06-	7
1.49182E 07	8.20850E 05	6.73795E 04	9.11882E 03	7.48519E 02							CJ06-	8
3.49938E 06	2.35177E 05	2.47875E 04	2.61259E 03	2.73591E-01							CJ06-	9
3.87608E-04	1.12193E-03	3.08163E-03	9.14266E-03	2.39397E-02							CJ06-	10
0.0	0.0	0.0	0.0	0.0		0.0					CJ06-	11
0.0	0.0	0.0	0.0	0.0		0.0					CJ06-	12
0.0	0.0	0.0	0.0	0.0		0.0	0.0				CJ06-	13
0.0	0.0	0.0	0.0	0.0		0.0					CJ06-	14
10	1922351	0	0	0	URANIUM-235						CJ06-	15
2.33025E 02	0.0	3.14810E-11	0.0	0.0		0.0		0.0			CJ06-	16
0.0	0.0	0.0	0.0	0.0		0.0		1.25000E 01			CJ06-	17
1.25000E 01	0.0	0.0	6.89000E 02	0.0		0.0		0.0			CJ06-	18
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	19
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	20
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	21
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	22
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	23
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	24
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	25
1.34394E 00	1.27641E 00	4.76050E 00	2.66786E 00	2.12545E 00							CJ06-	26
1.71811E 00	1.42277E 00	8.22255E 00	2.45788E 00	1.83163E 00							CJ06-	27
3.22984E 00	2.39754E 00	1.35953E 01	2.43338E 00	3.25994E 00							CJ06-	28
7.69040E 00	5.34966E 00	1.91432E 01	2.43038E 00	7.70954E 00							CJ06-	29
2.04477E 01	1.43335E 01	3.18023E 01	2.43007E 00	2.04477E 01							CJ06-	30
4.85697E 00	7.74981E-01	6.26208E-03	0.0	0.0		0.0		0.0			CJ06-	31
7.98367E 00	1.12862E-01	6.01938E-04	0.0	0.0		0.0		0.0			CJ06-	32
1.06198E 01	3.00615E-02	2.07655E-05	0.0	0.0		0.0		0.0			CJ06-	33
1.13563E 01	1.91125E-02	0.0	0.0	0.0		0.0		0.0			CJ06-	34
1.17291E 01											CJ06-	35
12	1922380	0	0	0	URANIUM-238-RESONANCE						CJ06-	36
2.36006E 02	0.0	3.16250E-11	0.0	0.0		0.0		0.0			CJ06-	37
0.0	0.0	0.0	0.0	0.0		0.0		9.00000E 00			CJ06-	38
9.00000E 00	0.0	0.0	2.71000E 00	0.0		0.0		0.0			CJ06-	39
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	40
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	41
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	42
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	43
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	44
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	45
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	46
4.19178E-01	3.34602E-01	4.84676E 00	2.78652E 00	2.28274E 00							CJ06-	47
1.70455E-01	2.37652E-04	8.57104E 00	2.46644E 00	3.06751E-01							CJ06-	48
4.80453E-01	0.0	1.34497E 01	0.0	5.21955E-01							CJ06-	49
9.73565E-01	0.0	1.76815E 01	0.0	9.92554E-01							CJ06-	50
1.38154E 00	0.0	1.89023E 01	0.0	1.38158E 00							CJ06-	51
4.98891E 00	1.81843E 00	4.47019E-02	2.06266E-04	0.0		0.0		0.0			CJ06-	52
1.00252E 01	1.35757E-01	5.15200E-04	0.0	0.0		0.0		0.0			CJ06-	53
1.32567E 01	4.11079E-02	3.89715E-04	0.0	0.0		0.0		0.0			CJ06-	54
1.69806E 01	1.89744E-02	0.0	0.0	0.0		0.0		0.0			CJ06-	55
1.83838E 01											CJ06-	56
14	1942390	0	0	0	PLUTONIUM-239-RESONANCE						CJ06-	57
2.36999E 02	0.0	3.25860E-11	0.0	0.0		0.0		0.0			CJ06-	58
0.0	0.0	0.0	0.0	0.0		0.0		1.20000E 01			CJ06-	59
1.20000E 01	0.0	0.0	1.02600E 03	0.0		0.0		0.0			CJ06-	60
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	61
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	62
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	63
0.0	0.0	0.0	0.0	0.0		0.0		0.0			CJ06-	64

0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 65
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 66
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 67
1.90177E 00	1.88307E 00	4.95431E 00	3.15967E 00	2.61377E 00		CJ06- 68
1.71497E 00	1.54463E 00	8.71818E 00	2.90893E 00	1.83486E 00		CJ06- 69
2.34121E 00	1.79365E 00	1.41793E 01	2.87413E 00	2.99514E 00		CJ06- 70
5.27930E 00	3.52047E 00	1.94812E 01	2.87049E 00	7.18991E 00		CJ06- 71
1.44821E 01	9.37629E 00	3.27196E 01	2.87006E 00	2.03058E 01		CJ06- 72
4.75510E 00	6.97744E-01	1.40389E-02	0.0	0.0	0.0	CJ06- 73
8.66060E 00	5.93833E-02	1.39365E-04	0.0	0.0	0.0	CJ06- 74
1.15208E 01	5.99654E-02	0.0	0.0	0.0	0.0	CJ06- 75
1.22811E 01	2.24764E-02	0.0	0.0	0.0	0.0	CJ06- 76
1.32171E 01						CJ06- 77
15 1942400	0	0	0	PLUTONIUM-240-RESONANCE		CJ06- 78
2.37990E 02	0.0	3.28270E-11	0.0	0.0	0.0	CJ06- 79
0.0	0.0	0.0	0.0	0.0	9.00000E 00	CJ06- 80
9.00000E 00	0.0	0.0	2.95000E 02	0.0	0.0	CJ06- 81
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 82
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 83
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 84
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 85
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 86
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 87
0.0	0.0	0.0	0.0	0.0	0.0	CJ06- 88
1.63837E 00	1.54346E 00	5.05447E 00	3.14653E 00	2.57008E 00		CJ06- 89
4.42722E-01	2.32784E-01	8.60467E 00	2.93594E 00	5.40205E-01		CJ06- 90
6.83494E-01	1.00823E-01	1.37142E 01	2.87426E 00	7.21229E-01		CJ06- 91
1.84819E 00	8.24824E-02	1.88817E 01	2.87065E 00	1.88953E 00		CJ06- 92
5.59367E 00	5.78690E-02	2.41849E 01	2.87007E 00	5.59729E 00		CJ06- 93
4.94411E 00	9.15225E-01	1.61792E-02	1.09132E-04	0.0	0.0	CJ06- 94
1.00410E 01	9.74159E-02	4.50826E-05	0.0	0.0	0.0	CJ06- 95
1.33242E 01	3.65712E-02	1.64276E-05	0.0	0.0	0.0	CJ06- 96
1.69670E 01	3.23776E-02	0.0	0.0	0.0	0.0	CJ06- 97
1.92114E 01						CJ06- 98
16 1942410	0	0	0	PLUTONIUM-241		CJ06- 99
2.38978E 02	0.0	3.30510E-11	0.0	0.0	0.0	CJ06-100
0.0	0.0	0.0	0.0	0.0	1.20000E 01	CJ06-101
1.20000E 01	0.0	0.0	1.40000E 03	0.0	0.0	CJ06-102
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-103
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-104
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-105
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-106
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-107
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-108
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-109
1.73034E 00	1.70365E 00	5.10423E 00	3.25694E 00	2.96749E 00		CJ06-110
2.08726E 00	1.86996E 00	8.64385E 00	3.00562E 00	2.41178E 00		CJ06-111
3.64327E 00	3.03686E 00	1.26963E 01	2.97328E 00	3.68609E 00		CJ06-112
8.32294E 00	6.65395E 00	1.97646E 01	2.96949E 00	8.34371E 00		CJ06-113
2.55728E 01	1.99586E 01	3.76709E 01	2.96906E 00	2.55728E 01		CJ06-114
4.52967E 00	1.16545E 00	7.12295E-02	2.55066E-04	0.0	0.0	CJ06-115
7.87382E 00	3.18804E-01	5.65700E-03	0.0	0.0	0.0	CJ06-116
9.11399E 00	4.14153E-02	1.39103E-03	0.0	0.0	0.0	CJ06-117
1.12719E 01	2.07750E-02	0.0	0.0	0.0	0.0	CJ06-118
1.29990E 01						CJ06-119
17 1942420	0	0	0	PLUTONIUM-242-RESONANCE		CJ06-120
2.40145E 02	0.0	3.27620E-11	0.0	0.0	0.0	CJ06-121
0.0	0.0	0.0	0.0	0.0	9.00000E 00	CJ06-122
9.00000E 00	0.0	0.0	3.00000E 01	0.0	0.0	CJ06-123
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-124
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-125
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-126
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-127
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-128
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-129
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-130

1.49519E 00	1.45354E 00	4.49378E 00	3.12280E 00	2.11010E 00		CJ06-131
2.75670E-01	1.39823E-01	7.72116E 00	2.88563E 00	4.04855E-01		CJ06-132
4.97940E-01	4.63232E-02	1.41695E 01	2.81229E 00	5.43908E-01		CJ06-133
1.53506E 00	0.0	2.09338E 01	0.0	1.57030E 00		CJ06-134
5.90011E 00	0.0	2.86612E 01	0.0	5.90016E 00		CJ06-135
5.05170E 00	6.03765E-01	1.09224E-02	0.0	0.0	0.0	CJ06-136
9.35694E 00	1.29158E-01	0.0	0.0	0.0	0.0	CJ06-137
1.43358E 01	4.58951E-02	6.62437E-05	0.0	0.0	0.0	CJ06-138
1.93521E 01	3.52235E-02	0.0	0.0	0.0	0.0	CJ06-139
2.43176E 01						CJ06-140
23 180160	0	0	0	OXYGEN-16		CJ06-141
1.58620E 01	0.0	0.0	0.0	0.0	0.0	CJ06-142
0.0	0.0	0.0	0.0	0.0	3.80000E 00	CJ06-143
3.80000E 00	0.0	0.0	2.00000E-04	0.0	0.0	CJ06-144
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-145
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-146
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-147
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-148
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-149
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-150
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-151
6.05866E-03	0.0	2.00142E 00	0.0	4.33363E-01		CJ06-152
0.0	0.0	3.53819E 00	0.0	1.75945E-01		CJ06-153
0.0	0.0	3.53090E 00	0.0	1.30428E-01		CJ06-154
0.0	0.0	3.58648E 00	0.0	8.49276E-02		CJ06-155
4.38849E-16	0.0	3.80244E 00	0.0	4.76837E-06		CJ06-156
2.16647E 00	4.27287E-01	1.12223E-07	0.0	0.0	0.0	CJ06-157
3.64760E 00	1.75933E-01	0.0	0.0	0.0	0.0	CJ06-158
3.46312E 00	1.30423E-01	0.0	0.0	0.0	0.0	CJ06-159
3.56288E 00	8.49259E-02	0.0	0.0	0.0	0.0	CJ06-160
3.67759E 00						CJ06-161
25 1110230	0	0	0	SODIUM-23-RESONANCE (CD		CJ06-162
2.27860E 01	0.0	0.0	0.0	0.0	0.0	CJ06-163
0.0	0.0	0.0	0.0	0.0	3.20000E 00	CJ06-164
3.20000E 00	0.0	0.0	5.05000E-01	0.0	0.0	CJ06-165
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-166
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-167
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-168
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-169
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-170
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-171
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-172
1.78801E-03	1.54163E-06	2.03697E 00	2.00000E 00	4.20644E-01		CJ06-173
5.14649E-04	0.0	3.53875E 00	0.0	1.32972E-01		CJ06-174
1.09420E-03	0.0	4.97071E 00	0.0	1.42107E-01		CJ06-175
1.20711E-02	0.0	1.15406E 01	0.0	5.68542E-02		CJ06-176
5.81622E-03	0.0	3.19254E 00	0.0	5.81741E-03		CJ06-177
2.62221E 00	4.18648E-01	1.45260E-04	0.0	0.0	0.0	CJ06-178
3.74360E 00	1.32443E-01	0.0	0.0	0.0	0.0	CJ06-179
4.85728E 00	1.41484E-01	0.0	0.0	0.0	0.0	CJ06-180
1.60931E 01	5.44974E-02	0.0	0.0	0.0	0.0	CJ06-181
3.05423E 00						CJ06-182
31 1240000	0	0	0	CHROMIUM		CJ06-183
5.20100E 01	0.0	0.0	0.0	0.0	0.0	CJ06-184
0.0	0.0	0.0	0.0	0.0	4.30000E 00	CJ06-185
4.30000E 00	0.0	0.0	3.10000E 00	0.0	0.0	CJ06-186
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-187
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-188
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-189
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-190
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-191
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-192
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-193
3.48259E-03	0.0	1.89596E 00	0.0	2.50637E-01		CJ06-194
4.59469E-03	0.0	2.84770E 00	0.0	4.35820E-02		CJ06-195
7.54855E-03	0.0	4.09954E 00	0.0	1.16981E-01		CJ06-196

1.37470E-01	0.0	1.25856E 01	0.0	1.68724E-01		CJ06-197
1.25782E-01	0.0	4.48506E 00	0.0	1.25800E-01		CJ06-198
2.65461E 00	2.40518E-01	6.12858E-03	4.78308E-04	2.78596E-05	0.0	CJ06-199
3.67238E 00	3.89839E-02	0.0	0.0	0.0	0.0	CJ06-200
4.26836E 00	1.09429E-01	0.0	0.0	0.0	0.0	CJ06-201
1.24319E 01	3.12290E-02	0.0	0.0	0.0	0.0	CJ06-202
4.29634E 00						CJ06-203
32 1250551	0 0 0	MANGANESE-55				CJ06-204
5.44660E 01	0.0	0.0	0.0	0.0	0.0	CJ06-205
0.0	0.0	0.0	0.0	0.0	2.30000E 00	CJ06-206
2.30000E 00	0.0	0.0	1.32000E 01	0.0	0.0	CJ06-207
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-208
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-209
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-210
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-211
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-212
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-213
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-214
4.44172E-03	1.07310E-04	2.59165E 00	2.00000E 00	4.50593E-01		CJ06-215
1.13489E-02	0.0	5.23553E 00	0.0	2.02457E-01		CJ06-216
5.44821E-02	0.0	1.45641E 01	0.0	4.87324E-01		CJ06-217
3.65287E-01	0.0	6.23116E 01	0.0	4.66461E-01		CJ06-218
3.20907E 00	0.0	1.00266E 02	0.0	3.20941E 00		CJ06-219
2.97472E 00	4.26368E-01	1.91190E-02	5.52647E-04	0.0	0.0	CJ06-220
5.43689E 00	1.85178E-01	5.91817E-03	0.0	0.0	0.0	CJ06-221
1.39675E 01	4.32842E-01	0.0	0.0	0.0	0.0	CJ06-222
7.81701E 01	1.01198E-01	0.0	0.0	0.0	0.0	CJ06-223
1.46820E 02						CJ06-224
33 1260000	0 0 5	IRON				CJ06-225
5.58450E 01	0.0	0.0	0.0	0.0	0.0	CJ06-226
0.0	0.0	0.0	0.0	0.0	1.11000E 01	CJ06-227
1.11000E 01	0.0	0.0	2.53000E 00	0.0	0.0	CJ06-228
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-229
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-230
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-231
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-232
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-233
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-234
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-235
2.51985E-03	0.0	2.16809E 00	0.0	0.1		CJ06-236
5.25250E-03	0.0	3.48269E 00	0.0			CJ06-237
1.94638E-02	0.0	6.56612E 00	0.0			CJ06-238
5.07491E-02	0.0	9.03109E 00	0.0			CJ06-239
2.05683E-02	0.0	1.05557E 01	0.0			CJ06-240
2.56554E 00	3.41932E-01	1.16128E-02	5.35425E-04	0.0	0.0	CJ06-241
3.92653E 00	3.94111E-02	0.0	0.0	0.0	0.0	CJ06-242
7.63638E 00	8.63198E-02	0.0	0.0	0.0	0.0	CJ06-243
8.83405E 00	6.57564E-02	0.0	0.0	0.0	0.0	CJ06-244
1.04709E 01						CJ06-245
35 1280000	0 0 0	NICKEL				CJ06-246
5.87050E 01	0.0	0.0	0.0	0.0	0.0	CJ06-247
0.0	0.0	0.0	0.0	0.0	1.50000E 01	CJ06-248
1.50000E 01	0.0	0.0	4.80000E 00	0.0	0.0	CJ06-249
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-250
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-251
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-252
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-253
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-254
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-255
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-256
7.41152E-02	0.0	2.29983E 00	0.0	3.21049E-01		CJ06-257
9.02358E-03	0.0	4.37301E 00	0.0	1.68293E-01		CJ06-258
1.71448E-02	0.0	1.71661E 01	0.0	1.10779E-01		CJ06-259
1.96466E-02	0.0	1.57946E 01	0.0	1.17714E-01		CJ06-260
3.63698E-02	0.0	1.63349E 01	0.0	3.63922E-02		CJ06-261
2.73575E 00	2.40997E-01	5.38329E-03	5.39596E-04	4.56925E-06	0.0	CJ06-262

4.62189E 00	1.59264E-01	0.0	0.0	0.0	0.0	CJ06-263
1.83695E 01	9.36497E-02	0.0	0.0	0.0	0.0	CJ06-264
1.58959E 01	9.80518E-02	0.0	0.0	0.0	0.0	CJ06-265
1.61756E 01						CJ06-266
39 1420000	0	0	0	MOLYBDENUM		CJ06-267
9.50660E 01	0.0	0.0	0.0	0.0	0.0	CJ06-268
0.0	0.0	0.0	0.0	0.0	5.40000E 00	CJ06-269
5.40000E 00	0.0	0.0	2.70000E 00	0.0	0.0	CJ06-270
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-271
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-272
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-273
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-274
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-275
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-276
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-277
2.51470E-02	1.48565E-03	3.66378E 00	2.00000E 00	8.98973E-01		CJ06-278
6.21075E-02	0.0	7.08564E 00	0.0	1.36303E-01		CJ06-279
2.11270E-01	0.0	7.32896E 00	0.0	2.4911E-01		CJ06-280
1.51834E 00	0.0	7.27143E 00	0.0	1.53864E 00		CJ06-281
3.24845E 00	0.0	1.32352E 01	0.0	3.24848E 00		CJ06-282
4.57700E 00	8.57759E-01	1.58817E-02	0.0	0.0	0.0	CJ06-283
8.47920E 00	7.33391E-02	8.11662E-04	2.71073E-05	0.0	0.0	CJ06-284
7.31518E 00	3.78363E-02	0.0	0.0	0.0	0.0	CJ06-285
5.65871E 00	2.03029E-02	0.0	0.0	0.0	0.0	CJ06-286
9.64216E 00						CJ06-287
47 1731810	0	0	0	TANTALUM-181-RESONANCE		CJ06-288
1.79390E 02	0.0	0.0	0.0	0.0	0.0	CJ06-289
0.0	0.0	0.0	0.0	0.0	5.00000E 00	CJ06-290
5.00000E 00	0.0	0.0	2.10000E 01	0.0	0.0	CJ06-291
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-292
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-293
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-294
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-295
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-296
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-297
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-298
8.02544E-02	3.77369E-03	4.13773E 00	2.00000E 00	1.40174E 00		CJ06-299
2.88760E-01	0.0	6.66616E 00	0.0	4.10918E-01		CJ06-300
8.25829E-01	0.0	1.07501E 01	0.0	6.66963E-01		CJ06-301
3.22442E 00	0.0	1.68717E 01	0.0	2.47022E 00		CJ06-302
6.86634E 00	0.0	2.47096E 01	0.0	4.82713E 00		CJ06-303
5.05329E 00	1.30057E 00	2.06913E-02	0.0	0.0	0.0	CJ06-304
7.27798E 00	1.37964E-01	1.50033E-03	0.0	0.0	0.0	CJ06-305
1.04264E 01	7.56080E-02	0.0	0.0	0.0	0.0	CJ06-306
1.45104E 01	3.95691E-02	0.0	0.0	0.0	0.0	CJ06-307
2.00356E 01						CJ06-308
74 1161	0	0	0	SLOW-SATURATING FISSION		CJ06-309
1.61000E 02	0.0	0.0	0.0	0.0	0.0	CJ06-310
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-311
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-312
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-313
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-314
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-315
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-316
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-317
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-318
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-319
3.68039E-02	0.0	3.56375E-02	0.0	3.68039E-02		CJ06-320
1.40968E-01	0.0	1.37183E-01	0.0	1.40968E-01		CJ06-321
3.77136E-01	0.0	3.71634E-01	0.0	3.77136E-01		CJ06-322
9.28332E-01	0.0	9.29480E-01	0.0	9.28332E-01		CJ06-323
3.13092E 00	0.0	3.05539E 00	0.0	3.13092E 00		CJ06-324
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-325
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-326
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-327
0.0	0.0	0.0	0.0	0.0	0.0	CJ06-328

[illegible]

0.
0
999

0.

0.5

CJ06-395
CJ06-396
CJ06-397

REFLECTING BOUNDARY IN THETA-R GEOMETRY, CASE A1 WITH BLACK ABSORBER										CJ07- 1	
24X20X3 GROUP, 1440 POINTS										CJ07- 2	
STREAM OF CITATION CASES ORNL 72										CJ07- 3	
001	1	1	1	0	1	1	0				CJ07- 4
100						2					CJ07- 5
	2.0		0.1								CJ07- 6
003											CJ07- 7
0	8			1	1	1	0	2			CJ07- 8
											CJ07- 9
			-3.0	0.01	0.99			0.5			CJ07- 10
	0.0		0.0	.4692							CJ07- 11
004											CJ07- 12
2	.0853981	8	1.4	4	.1707963	8	1.4	2	.0853981		CJ07- 13
6	30.0	4	5.0	4	10.0	6	25.0				CJ07- 14
005											CJ07- 15
1	1	1	1	1							CJ07- 16
2	1	2	1	2							CJ07- 17
1	1	1	1	1							CJ07- 18
3	3	3	3	3							CJ07- 19
008											CJ07- 20
3	1	0									CJ07- 21
	1	1	1.677		0.0		0.0				CJ07- 22
		0.0	0.04378		0.0						CJ07- 23
	1	2	0.8696		0.02864		0.00755		0.0	-13	CJ07- 24
		0.0	0.0		0.04295						CJ07- 25
	1	3	0.3346		0.1132		0.1088		1.0	-12	CJ07- 26
		0.0	0.0		0.0						CJ07- 27
	2	1	1.831		0.013		0.0				CJ07- 28
		0.0	0.0043		0.0						CJ07- 29
	2	2	1.214		0.008		0.0				CJ07- 30
		0.0	0.0		0.0025						CJ07- 31
	2	3	0.0		0.0		0.0				CJ07- 32
		0.0	0.0		0.0						CJ07- 33
	3	1	1.367		0.0		0.0				CJ07- 34
		0.0	0.02016		0.0						CJ07- 35
	3	2	1.022		0.0029		0.0				CJ07- 36
		0.0	0.0		0.01392						CJ07- 37
	3	3	0.6602		0.00716		0.0				CJ07- 38
		0.0	0.0		0.0						CJ07- 39
	0										CJ07- 40
		0.6	0.4		0.0						CJ07- 41
024											CJ07- 42
1	0.001										CJ07- 43
040											CJ07- 44
											CJ07- 45
999											CJ07- 46
											CJ07- 47
PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A2 WITH BLACK ABSORBER											CJ07- 48

1		1		1		1	1	
100								
	2.0		0.1					
004								
4	.1707963	8	1.4	4	.1707963	8	1.4	
6	30.0	4	5.0	4	10.0	6	25.0	
005								
1	1	1	1					
2	1	2	1					
1	1	1	1					
3	3	3	3					
999								

2

CJ07- 65
 CJ07- 66
 CJ07- 67
 CJ07- 68
 CJ07- 69
 CJ07- 70
 CJ07- 71
 CJ07- 72
 CJ07- 73
 CJ07- 74
 CJ07- 75
 CJ07- 76

R-Z CASE TO COMPARE WITH THETA-R-Z CASE, WITH BLACK ABSORBER										CJ08-		
13X20X4 GROUP, 1040 POINTS										STREAM OF CITATION CASES ORNL 72		
001										CJ08-	1	
										CJ08-	2	
										CJ08-	3	
										CJ08-	4	
										CJ08-	5	
100										CJ08-	6	
100.0	0.0001									CJ08-	7	
003										CJ08-	8	
	7									CJ08-	9	
										CJ08-	10	
0.01	-4.0									CJ08-	11	
0.01526	0.07454									CJ08-	12	
004										CJ08-	13	
4 10.0	9 20.0									CJ08-	14	
9 20.0	4 10.0									CJ08-	15	
005										CJ08-	16	
1 1										CJ08-	17	
3 1										CJ08-	18	
1 1										CJ08-	19	
2 2										CJ08-	20	
008										CJ08-	21	
4										CJ08-	22	
1	1 1.79106									CJ08-	23	
	.00367288									CJ08-	24	
1	2 1.41991									CJ08-	25	
										CJ08-	26	
1	3 1.43458									CJ08-	27	
										CJ08-	28	
1	4 1.35637									CJ08-	29	
0										CJ08-	30	
2	1 1.0339									CJ08-	31	
	.012715									CJ08-	32	
2	2 .883601									CJ08-	33	
										CJ08-	34	
2	3 .888521									CJ08-	35	
										CJ08-	36	
2	4 .84142									CJ08-	37	
										CJ08-	38	
0										CJ08-	39	
1.0										CJ08-	40	
024										CJ08-	41	
1										CJ08-	42	
040										CJ08-	43	
0										CJ08-	44	
999										CJ08-	45	
THETA-R-Z CASE WITH BLACK ABSORBER, PERIODIC										CJ08-	46	
4X13X20X4 GROUP, 4160 POINTS										STREAM OF CITATION CASES ORNL 72	CJ08-	47
001										CJ08-	48	
										CJ08-	49	
										CJ08-	50	
100										CJ08-	51	
100.0	0.0001									CJ08-	52	
003										CJ08-	53	
	12									CJ08-	54	
										CJ08-	55	
0.01	-4.0									CJ08-	56	
0.01526	0.07454									CJ08-	57	
004										CJ08-	58	
4 6.233186										CJ08-	59	
4 10.0	9 20.0									CJ08-	60	
9 20.0	4 10.0									CJ08-	61	
005										CJ08-	62	
1										CJ08-	63	
1										CJ08-	64	

3
1
1
1
2
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024
1
040
0
999

CJ08- 65
CJ08- 66
CJ08- 67
CJ08- 68
CJ08- 69
CJ08- 70
CJ08- 71
CJ08- 72
CJ08- 73
CJ08- 74
CJ08- 75

[illegible]

HEXAGONAL 3-D CASE (Y. TANA, IBM JAPAN, WITH BLACK ABSORBER)																		CJ10-	
9X9X9X3 GROUP, 2187 POINTS																		STREAM OF CITATION CASES ORNL 72	
001		1																CJ10-	1
	1		1		1													CJ10-	2
																		CJ10-	3
																		CJ10-	4
																		CJ10-	5
																		CJ10-	6
																		CJ10-	7
003																		CJ10-	8
			13														2	CJ10-	9
																		CJ10-	10
004																		CJ10-	11
	9	37.148																CJ10-	12
	9	37.148																CJ10-	13
	9	30.0																CJ10-	14
005																		CJ10-	15
	2																	CJ10-	16
006																		CJ10-	17
	1																	CJ10-	18
	5	9	1	1	1	9	4	9	2	2	1	9	3	9	3	3	1	CJ10-	19
	1	7	7	7	1	9	1	6	8	8	1	9	1	5	9	9	1	9CJ10-	20
	2	9	4	4	1	9	1	9	5	5	1	9	1	8	6	6	1	9CJ10-	21
																		9CJ10-	22
																		CJ10-	23
																		CJ10-	24
008																		CJ10-	25
	3	1																CJ10-	26
		1		1	1.4													CJ10-	27
	0.				.03													CJ10-	28
		1		2	.8													CJ10-	29
	0.				0.													CJ10-	30
		1		3	0.4													CJ10-	31
0.																		CJ10-	32
																		CJ10-	33
	1.																	CJ10-	34
024																		CJ10-	35
	1																	CJ10-	36
999																		CJ10-	37

3-D WARD FFTF PROBLEM IN REDUCED MESH, FEWER GROUPS										CJ11-			
10X10X10X4 GROUP, 4000 POINTS										STREAM OF CITATION CASES	URNL 72		
001											CJ11-	1	
	1		1								CJ11-	2	
										1	CJ11-	3	
											CJ11-	4	
											CJ11-	5	
										40 40	60CJ11-	6	
0											CJ11-	7	
003											CJ11-	8	
		11			1	1	0	0	1	0	CJ11-	9	
0											CJ11-	10	
0.0				400.0		0.97				0.125	CJ11-	11	
004											CJ11-	12	
6	45.72		2 15.24		2 15.24						CJ11-	13	
2	4.852		1 9.700125		1 9.700125		1 9.700125		1 9.700125		1 9.700125	CJ11-	14
1	9.700125		1 9.700125		1 9.700125							CJ11-	15
2	4.852		1 9.700125		1 9.700125		1 9.700125		1 9.700125		1 9.700125	CJ11-	16
1	9.700125		1 9.700125		1 9.700125							CJ11-	17
005											CJ11-	18	
1	4	5									CJ11-	19	
1	4	5									CJ11-	20	
1	4	5									CJ11-	21	
1	4	5									CJ11-	22	
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2	4	5									CJ11-	24	
3	3	3									CJ11-	25	
3	3	3									CJ11-	26	
3	3	3									CJ11-	27	
1	4	5									CJ11-	28	
1	4	5									CJ11-	29	
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6	7	7									CJ11-	39	
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2	4	5									CJ11-	55	
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7	5	5									CJ11-	57	
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3	3	3									CJ11-	61	
3	3	3									CJ11-	62	
3	3	3									CJ11-	63	
2	4	5									CJ11-	64	

[illegible]

0.0	0.0	0.0	1.84434E-02			CJ11-131
4	4	5.00130E-01	6.13276E-03	0.0	0.0	CJ11-132
0.0	0.0	0.0	0.0	0.0	0.0	CJ11-133
5	1	4.38953E-00	1.46239E-04	0.0	0.0	CJ11-134
0.0	0.0	4.57627E-03	0.0	0.0	0.0	CJ11-135
5	2	3.00246E-00	3.08240E-04	0.0	0.0	CJ11-136
0.0	0.0	0.0	1.49166E-03	0.0	0.0	CJ11-137
5	3	1.13814E-00	1.35444E-03	0.0	0.0	CJ11-138
0.0	0.0	0.0	0.0	9.63235E-03	0.0	CJ11-139
5	4	1.40566E-00	3.64238E-03	0.0	0.0	CJ11-140
0.0	0.0	0.0	0.0	0.0	0.0	CJ11-141
6	1	4.50332E-00	8.95205E-05	0.0	0.0	CJ11-142
0.0	0.0	5.68279E-03	0.0	0.0	0.0	CJ11-143
6	2	3.13821E-00	1.42537E-04	0.0	0.0	CJ11-144
0.0	0.0	0.0	1.54596E-03	0.0	0.0	CJ11-145
6	3	1.16628E-00	1.28444E-03	0.0	0.0	CJ11-146
0.0	0.0	0.0	0.0	1.02232E-02	0.0	CJ11-147
6	4	2.26403E-00	1.57812E-03	0.0	0.0	CJ11-148
0.0	0.0	0.0	0.0	0.0	0.0	CJ11-149
7	1	1.81997E-00	4.40678E-03	0.0	0.0	CJ11-150
0.0	0.0	2.16601E-02	0.0	0.0	0.0	CJ11-151
7	2	1.07130E-00	1.80587E-02	0.0	0.0	CJ11-152
0.0	0.0	0.0	5.14782E-03	0.0	0.0	CJ11-153
7	3	5.52718E-01	7.34017E-02	0.0	0.0	CJ11-154
0.0	0.0	0.0	0.0	1.86345E-02	0.0	CJ11-155
7	4	5.16224E-01	1.94427E-01	0.0	0.0	CJ11-156
0.0	0.0	0.0	0.0	0.0	0.0	CJ11-157
0	0					CJ11-158
9.34200E-01	6.55000E-02	3.00000E-04	0.0			CJ11-159
024						CJ11-160
1						CJ11-161
999						CJ11-162

6	1	1.677					CJ12- 65
		0.04378					CJ12- 66
6	2	0.8696	0.00743	0.00755	0.8	-12	CJ12- 67
			0.04295				CJ12- 68
6	3	0.3346	0.0799	0.1088	1.2	-12	CJ12- 69
			0.				CJ12- 70
7	1	1.674					CJ12- 71
		0.04378					CJ12- 72
7	2	0.8696	0.00916	0.00736	0.79	-13	CJ12- 73
			0.04311				CJ12- 74
7	3	0.3347	0.1013	0.1055	1.19	-12	CJ12- 75
			0.				CJ12- 76
8	1	1.367					CJ12- 77
		0.02016					CJ12- 78
8	2	1.022	0.0029				CJ12- 79
			0.01392				CJ12- 80
8	3	0.6602	0.00716				CJ12- 81
			0.				CJ12- 82
							CJ12- 83
							CJ12- 84
							CJ12- 85
							CJ12- 86
							CJ12- 87

0
1.0
024
1
999

[illegible]

3-D, 90 DEGREE ROTATIONAL SYMMETRY, QUARTER SECTION WITH BLACK ABSORBER										3-D, 90 DEGREE ROTATIONAL SYMMETRY, QUARTER SECTION WITH BLACK ABSORBER									
9X9X3X2 GROUP, 486 POINTS										9X9X3X2 GROUP, 486 POINTS									
001										001									
1	1	1	1							0	1					1			
100																			
				0.01															
003										0	0	2	0	1	1	1			
	.0001			.0001															
	.1									0.25			0.95			0.25			
004																			
3		9.0	3		12.0	3		9.0											
3		9.0	3		12.0	3		9.0											
3		1.0																	
005																			
1	2	3																	
2	2	3																	
3	2	1																	
008																			
2	1	0																	
	1		1		1.5		0.0012		0.004	5.						-14			
		0.0		0.0033															
	1		2		1.2		0.0047		0.063	6.						-13			
		0.0			0.0														
	2		1		1.7		0.0007		0.001	5.						-15			
		0.0		0.0052															
	2		2		1.13		0.0063		0.025	2.5						-13			
		0.0			0.0														
	3		1		1.20		0.00052		0.0										
		0.0		0.0067															
	3		2		0.87		0.0080		0.0										
		0.0			0.0														
	0																		
		1.0																	
024																			
1		0.0																	
999																			
3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER										3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER									
9X18X3X2 GROUP, 972 POINTS										9X18X3X2 GROUP, 972 POINTS									
001										001									
										0	1					1			
1			1			1		1	1		1	1		1					
100																			
				0.01															
003										0	0	3	0	1	1	1			
	.0001			.0001															
	0.1									0.25			0.95			0.5			
004																			
3		9.0	3		12.0	3		9.0											
3		9.0	3		12.0	3													

FICTICIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE										CJ15-	1	
1X2 GROUP, 2 POINTS										CJ15-	2	
000										CJ15-	3	
8										CJ15-	4	
UNREAL PLUTONIUM DATA SET 1										CJ15-	5	
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1.0	+05	0.2								CJ15-	9	
2.3	-09	1.6	-06								CJ15-	10
0										CJ15-	11	
0										CJ15-	12	
0										CJ15-	13	
0										CJ15-	14	
5			0	0 GRAPHITE						CJ15-	15	
12.										CJ15-	16	
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										CJ15-	20	
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2

FISS COUNT

2.8

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UNREAL PLUTONIUM DATA SET 2
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1.0 +05 0.2
2.3 -09 1.6 -06
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77.

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15		1		3.34 -11		
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300.	10.				2.9	.01
252.						.01
16	1		0 PU-241			
241.			3.46 -11	1.7	-09	
96.	64.				3.1	
1000.	600.				3.1	
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1.	-10					
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0						
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1 0	3 1 2					
003						

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5h

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020
1      1
5      .06      14      .001      15      .01
0
024
1      3.      -03
026
-01
0.7      0.3
1      2.5 +14
034
1      1
17      1.71-09
0
1      1
14 15 16 17
91      1.0      1.0      1.0      1.0
0
0
036
1      1      2
4      14      15      16      17
1      91
0
999

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MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)										CJ16-	1	
12XRX3 GROUPS, 788 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72										CJ16-	2	
000										CJ16-	3	
8										CJ16-	4	
REFERENCE 3-GROUP CROSS SECTIONS FOR A FUEL MANAGEMENT PROBLEM -DV-1-71C										CJ16-	5	
-2	24	3	2	0	0					CJ16-	6	
0.617			0.373		0.010					CJ16-	7	
14.92	+06		1.225	+06	0.08652+06					CJ16-	8	
4.274	+06		0.3255	+06	20.8					CJ16-	9	
4.911	-10		1.451	-09	6.665 -09					CJ16-	10	
.0127			.0317		.12	.315	1.36	3.8		CJ16-	11	
0										CJ16-	12	
0										CJ16-	13	
0										CJ16-	14	
10	2922351	0	0	0	U-235					CJ16-	15	
235.					3.23	-11					CJ16-	16
										CJ16-	17	
										CJ16-	18	
										CJ16-	19	
										CJ16-	20	
										CJ16-	21	
										CJ16-	22	
.0031		.00624		.00182		.00066	.00052	.00345		CJ16-	23	
										CJ16-	24	
										CJ16-	25	
1.282		1.235		4.65		2.71				CJ16-	26	
1.615		1.351		7.78		2.46				CJ16-	27	
4.228		3.09		14.8		2.43				CJ16-	28	
4.8		0.998		0.019		0.	7.6	0.14		CJ16-	29	
0.		0.		10.8							CJ16-	30
11	2922361	0	0	0	U-236					CJ16-	31	
236.					3.24	-11				CJ16-	32	
										CJ16-	33	
										CJ16-	34	
										CJ16-	35	
										CJ16-	36	
										CJ16-	37	
										CJ16-	38	
.006		.012		.008		.002	.00056	.0051		CJ16-	39	
										CJ16-	40	
										CJ16-	41	
0.9197		0.8122		4.79		2.73				CJ16-	42	
0.3411		0.0365		8.76		2.51				CJ16-	43	
0.9903				14.4						CJ16-	44	
4.7		1.83		0.0605		0.	9.8	0.169		CJ16-	45	
										CJ16-	46	
12	292238			13.8						CJ16-	47	
238.				U-238						CJ16-	48	
										CJ16-	49	
										CJ16-	50	
										CJ16-	51	
										CJ16-	52	
										CJ16-	53	
.00634		.01519		.00881		.00294	.000475	.00536		CJ16-	54	
										CJ16-	55	
										CJ16-	56	
0.492		0.438		4.74		2.73				CJ16-	57	
0.159		0.0017		8.13		2.49				CJ16-	58	
0.555				14.2						CJ16-	59	
4.48		2.28		0.0517		0.	9.53	0.172		CJ16-	60	
										CJ16-	61	
										CJ16-	62	
14	294239			13.9						CJ16-	63	
239.				PU-239						CJ16-	64	
										CJ16-	64	
										CJ16-	64	

						CJ16- 65
						CJ16- 66
						CJ16- 67
						CJ16- 68
						CJ16- 69
				.00024	.00176	CJ16- 70
.00136	.00207	.00065	.00022			CJ16- 71
						CJ16- 72
						CJ16- 73
1.875	1.866	4.89	3.22			CJ16- 74
1.683	1.537	7.78	2.93			CJ16- 75
3.171	2.159	14.3	2.88			CJ16- 76
5.36	1.142	0.0299	0.	8.02	0.11	CJ16- 77
		11.65				CJ16- 78
15 294240		PU-240				CJ16- 79
240.		3.36 -11				CJ16- 80
						CJ16- 81
						CJ16- 82
						CJ16- 83
						CJ16- 84
						CJ16- 85
				.00028	.0024	CJ16- 86
.00165	.0033	.00125	.00024			CJ16- 87
						CJ16- 88
						CJ16- 89
1.585	1.535	4.76	3.14			CJ16- 90
0.525	0.34	7.54	2.96			CJ16- 91
0.892	0.106	14.1	2.89			CJ16- 92
4.78	1.04	0.0137		9.04	0.185	CJ16- 93
		13.83				CJ16- 94
16 294241		PU-241				CJ16- 95
241.		3.37 -11	1.689 -09			CJ16- 96
						CJ16- 97
						CJ16- 98
						CJ16- 99
						CJ16-100
						CJ16-101
				.00015	.00365	CJ16-102
.00275	.0062	.0024	.0005			CJ16-103
						CJ16-104
						CJ16-105
1.76	1.676	4.6	3.27			CJ16-106
1.98	1.79	8.177	2.98			CJ16-107
4.67	3.79	15.64	2.94			CJ16-108
4.68	1.023	0.026		8.62	0.211	CJ16-109
		11.74				CJ16-110
17 294242		PU-242				CJ16-111
242.		3.38 -11				CJ16-112
						CJ16-113
						CJ16-114
						CJ16-115
						CJ16-116
						CJ16-117
				.00028	.0024	CJ16-118
.00165	.0033	.00125	.00024			CJ16-119
						CJ16-120
						CJ16-121
1.55	1.518	4.4	3.18			CJ16-122
0.372	0.249	7.29	2.92			CJ16-123
0.776	0.0352	16.1	2.81			CJ16-124
4.81	0.753	0.0215		8.79	0.138	CJ16-125
		15.9				CJ16-126
23 280161		0-16				CJ16-127
15.86						CJ16-128
						CJ16-129
						CJ16-130

4.86	-03	1.52	-04	2.49	2.0	
9.6	-03			4.83		
0.182				26.6		
2.85		0.646		0.0246	4.91	0.15
				26.8		
33 226000			5FE-NAT			
55.36						

9.02	-03	5.98	-05	2.39	2.0	2800.	
7.05	-03			2.90		1100.	
3.03	-02			8.07			
2.72		0.532		6.83	-03	3.18	0.0894
				8.12			
35 228000				NI-NAT			
58.21							

0.1029	1.83	-06	2.54	2.0	
0.01055			4.6		
0.0533			16.8		
2.8	0.49	0.022		4.85	0.091
		17.0			
58	1	XE-135			
135.			2.093	-05	

2.0	-04	2.0	-04
1.0	-03	1.0	-03
6.1	-02	6.1	-02
63 261147		PM-147	
147.			8.289 -09

0.152	1.46	-03	6.42	2.0		
0.381			6.28			
3.45			15.1			
4.7	1.573		0.0394		5.89	0.0418
			11.7			
64 261148	1		PM-148M			
148.				1.976	-07	

2.92
8.58
197.7
65 261148 1
148.

2.92
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197.7
PM-148

1.488 -06

0.0756
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67 262149 0
149.

0.0756
0.222
340.
SM-149

5.19 -02 1.23 -02 3.94
0.483 8.26
2.95 16.7
5.09 1.5 0.0153
13.64
76 1 NSFP
0.0

7.38 0.255

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77 1 SSFP
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81 TA-181
181.

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CJ16-328

0.1029	1.83	-06	2.54	2.0
0.01055			4.6	
0.0533			16.8	
2.8	0.49		0.022	
			17.0	

9					
CONTINUATION OF CROSS SECTIONS (3-GROUP, BLANKET)					
-2	21	3	2	0	0
0.617			0.373		0.010
14.92	+06		1.225	+06	0.08652+06
3.5	+06		0.3	+06	100.

5.3	-10	1.5	-09	20.	-09				CJ16-395
.0127		.0317		.12		.315	1.36	3.8	CJ16-396
									CJ16-397
									CJ16-398
									CJ16-399
10 292235				U-235B					CJ16-400
235.				3.23	-11				CJ16-401
									CJ16-402
									CJ16-403
									CJ16-404
									CJ16-405
									CJ16-406
.0031	.00624	.00182		.00066		.00052		.00346	CJ16-407
									CJ16-408
									CJ16-409
									CJ16-410
1.287	1.238	4.7		2.71					CJ16-411
1.659	1.375	8.1		2.46					CJ16-412
4.577	3.302	15.1		2.43					CJ16-413
4.71	1.038	0.0182				7.79	0.1676		CJ16-414
		10.75							CJ16-415
11 292236		U-236B							CJ16-416
236.		3.24	-11						CJ16-417
									CJ16-418
									CJ16-419
									CJ16-420
									CJ16-421
									CJ16-422
.006	.012	.008		.002		.00056		.0051	CJ16-423
									CJ16-424
									CJ16-425
									CJ16-426
0.9186	0.8004	4.84		2.71					CJ16-427
0.3235	0.01855	9.12		2.50					CJ16-428
1.186		14.78							CJ16-429
4.685	1.838	0.058				10.4	0.203		CJ16-430
		13.93							CJ16-431
12 292238		U-238B							CJ16-432
238.		3.31	-11						CJ16-433
									CJ16-434
									CJ16-435
									CJ16-436
									CJ16-437
									CJ16-438
.00634	.01519	.00881		.00294		.000475		.00536	CJ16-439
									CJ16-440
									CJ16-441
									CJ16-442
0.4731	0.4143	4.77		2.74					CJ16-443
0.1605	8.5	-04 8.47		2.49					CJ16-444
0.5284		14.11							CJ16-445
4.43	2.31	0.0515				9.79	0.20		CJ16-446
		13.91							CJ16-447
14 294239		PU-239B							CJ16-448
239.		3.34	-11						CJ16-449
									CJ16-450
									CJ16-451
									CJ16-452
									CJ16-453
									CJ16-454
.00136	.00207	.00065		.00022		.00024		.00176	CJ16-455
									CJ16-456
									CJ16-457
									CJ16-458
1.875	1.866	4.915		3.21					CJ16-459
1.682	1.522	8.078		2.92					CJ16-460

3.696	2.511	14.7	2.88			CJ16-461
4.294	1.164	0.0297		8.27	0.1305	CJ16-462
		11.58				CJ16-463
15 294240		PU-2408				CJ16-464
240.		3.36 -11				CJ16-465
						CJ16-466
						CJ16-467
						CJ16-468
						CJ16-469
						CJ16-470
.00165	.0033	.00125	.00024	.00028	.0024	CJ16-471
						CJ16-472
						CJ16-473
						CJ16-474
1.581	1.529	4.778	3.13			CJ16-475
0.445	0.2523	7.836	2.95			CJ16-476
1.342	0.1029	14.47	2.89			CJ16-477
4.715	1.062	0.01228		9.358	0.225	CJ16-478
		13.83				CJ16-479
16 294241		PU-2418				CJ16-480
241.		3.37 -11	1.689 -09			CJ16-481
						CJ16-482
						CJ16-483
						CJ16-484
						CJ16-485
						CJ16-486
.00275	.0062	.0024	.0005	.00015	.00365	CJ16-487
						CJ16-488
						CJ16-489
						CJ16-490
1.77	1.684	4.61	3.26			CJ16-491
2.028	1.824	8.5	2.98			CJ16-492
5.244	4.278	16.16	2.94			CJ16-493
4.67	1.014	0.023		8.83	0.245	CJ16-494
		11.75				CJ16-495
17 294242		PU-2428				CJ16-496
242.		3.38 -11				CJ16-497
						CJ16-498
						CJ16-499
						CJ16-500
						CJ16-501
						CJ16-502
.00165	.0033	.00125	.00024	.00028	.0024	CJ16-503
						CJ16-504
						CJ16-505
						CJ16-506
1.541	1.509	4.41	3.16			CJ16-507
0.2977	0.1693	7.58	2.90			CJ16-508
1.008	0.0361	16.06	2.81			CJ16-509
4.785	0.7645	0.02135		9.08	0.1685	CJ16-510
		15.69				CJ16-511
23 280161		0-168				CJ16-512
15.86						CJ16-513
						CJ16-514
						CJ16-515
						CJ16-516
						CJ16-517
						CJ16-518
						CJ16-519
						CJ16-520
						CJ16-521
						CJ16-522
7.54 -03		1.58				CJ16-523
0.		3.77				CJ16-524
2.339 -07		3.57				CJ16-525
1.657	0.4179	2.71 -05		3.82	0.2422	CJ16-526

25 211023		3.585						CJ16-527
22.79		NA-23B						CJ16-528
								CJ16-529
								CJ16-530
								CJ16-531
								CJ16-532
								CJ16-533
								CJ16-534
								CJ16-535
								CJ16-536
								CJ16-537
2.409 -03	3.165 -06	1.86	2.0					CJ16-538
5.262 -04		3.43						CJ16-539
1.7 -03		5.92						CJ16-540
2.233	0.4892	0.00477		3.62	0.178			CJ16-541
		6.0						CJ16-542
31 224000		CR-NATB						CJ16-543
51.55								CJ16-544
								CJ16-545
								CJ16-546
								CJ16-547
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								CJ16-553
								CJ16-554
4.43 -03	3.05 -05	2.29	2.0					CJ16-555
5.80 -03		4.04						CJ16-556
3.22 -02		5.28						CJ16-557
2.61	0.6015	0.0146		5.06	0.03675			CJ16-558
		5.6						CJ16-559
32 225055		MN-55B						CJ16-560
54.47								CJ16-561
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								CJ16-567
								CJ16-568
								CJ16-569
								CJ16-570
4.86 -03	1.89 -04	2.51	2.0					CJ16-571
1.04 -02		5.04						CJ16-572
0.239	25.6							CJ16-573
2.8	0.676	0.027		5.11	0.171			CJ16-574
		2.57						CJ16-575
33 226000		5FE-NAT						CJ16-576
55.4								CJ16-577
								CJ16-578
								CJ16-579
								CJ16-580
								CJ16-581
								CJ16-582
								CJ16-583
								CJ16-584
								CJ16-585
								CJ16-586
8.42 -03	7.84 -05	2.39	2.0	2500.				CJ16-587
7.62 -03		3.02		1000.				CJ16-588
2.95 -02		8.48						CJ16-589
2.65	0.581	0.00607		3.28	0.11			CJ16-590
		8.53						CJ16-591
35 228000		NI-NATH						CJ16-592

58.2

9.34 -02 2.52 -06 2.59 2.0
 1.09 -02 4.78
 4.86 -02 15.0
 2.84 0.51 0.0232 5.0 0.116
 15.2
 58 1 XE-135B
 135. 2.093 -05

4.0 -04 4.0 -04
 3.0 -03 3.0 -03
 2.7 -01 2.7 -01
 63 261147 PM-147B
 147. 8.289 -09

0.1584 1.674 -03 6.47 2.0
 0.3951 6.25
 4.616 15.3
 4.76 1.57 0.04 5.84 0.0506
 10.76
 64 261148 1 PM-148MB
 148. 1.976 -07

3.0 3.0
 9.1 9.1
 301. 301.
 65 261148 1 PM-148B
 148. 1.488 -06

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0.0777
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67 262149
147.6

0.0777
0.236
544.
SM-149B

0.0556   1.28   -02   4.03   2.0
0.527   8.51
4.30   19.

5.11   1.55   0.0133   7.4   0.294
76   1   14.6
0.0   NSFPB

0.04   0.04
0.07   0.07
0.5   0.5
77   1   SSFPB
0.0

0.3   0.3
0.5   0.5
5.0   5.0
81   TA-181
181.

0.03   4.0
0.3   6.0
2.0   15.0
3.0   1.0   0.1   5.0   0.2

CJ16-659
CJ16-660
CJ16-661
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CJ16-721
CJ16-722
CJ16-723
CJ16-724

001	1	1	0	10.0	0.00001	5	4	18	CJ16-725
001	1	1	0	10.0	0.00001	5	4	18	CJ16-726
002	3	2	2	2	1	1			CJ16-727
003	5000.	2500.					-0.5		CJ16-728
004	75.	75.			75.	75.	75.	75.	CJ16-729
005	0	1		7		1	0	0	CJ16-730
006	.0001								CJ16-731
007					2500.	0.97	0.5		CJ16-732
008	2	91.2213	2	37.7847	2	28.994	2	13.4934	CJ16-733
009	2	30.	1	18.	1	18.	2	22.	CJ16-734
010	22	22	22	22	22	22			CJ16-735
011	8	10	12	16	20	21			CJ16-736
012	7	9	11	15	19	21			CJ16-737
013	2	4	6	14	18	21			CJ16-738
014	1	3	5	13	17	21			CJ16-739
015	1	2	4	1	1				CJ16-740
016	3	4	4	1	2				CJ16-741
017	5	6	4	1	3				CJ16-742
018	7	8	4	2	4				CJ16-743
019	9	10	4	2	5				CJ16-744
020	11	12	4	2	6				CJ16-745
021	13	16	4	2	7				CJ16-746
022	17	20	4	2	8				CJ16-747
023	21	21	1	2	9				CJ16-748
024	22	22	1	2	10				CJ16-749
025						CORE A1			CJ16-750
026						CORE A2			CJ16-751
027						CORE A3			CJ16-752
028						BLNK C1			CJ16-753
029						BLNK C2			CJ16-754
030						BLNK C3			CJ16-755
031						BLNK B1			CJ16-756
032						BLNK B2			CJ16-757
033						RFLTR E			CJ16-758
034						RFLTR D			CJ16-759
035									CJ16-760
036									CJ16-761
037									CJ16-762
038	10	14	16		12	15		11	CJ16-763
039	77							31	CJ16-764
040								32	CJ16-765
041	1	2						33	CJ16-766
042	10	2.287	-5	12	7.5043	-3	14	8.6771	CJ16-767
043	23	.01764		25	.0090585		33	.0097856	CJ16-768
044							31	.0026187	CJ16-769
045							35	.0013783	CJ16-770
046	3	4							CJ16-771
047	10	2.3915	-5	12	7.8475	-3	14	9.9061	CJ16-772
048	23	.018693		25	.0084032		33	.0100866	CJ16-773
049							31	.0026993	CJ16-774
050							35	.0014206	CJ16-775
051	5	6							CJ16-776
052	10	2.3573	-5	12	7.7355	-3	14	1.1587	CJ16-777
053	23	.018553		25	.0082275		33	.0101726	CJ16-778
054							31	.0027223	CJ16-779
055							35	.0014328	CJ16-780
056	7	8							CJ16-781
057	10	2.8395	-5	12					

[illegible]

[illegible]

TABLE 3

*****CITATION - REVISICK 2 (JULY 1971) - SUPPLEMENT 2 (MARCH 1972)*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

ONE-DIMENSIONAL SLAB (X).

34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	12	6	12	24	
1.000000E 02	9.999999E-05	9.999999E 09	9.999999E 23	0.0																1.000000E 00						

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0
9.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																			
0.0	0.0	1.000000E 00	1.000000E 00	5.000000E-01	0.0																			

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	4.692000E-01	0.0	4.692000E-01	4.692000E-01

ONE DIMENSIONAL SLAB GEOMETRY (X) WIDTH 7.000000E 01

REGION SPECIFICATIONS

PTS	REGION	WIDTH
8	1.000000E 01	8 1.000000E 01
5	2.000000E 01	5 2.000000E 01

X-DIR. POINTS 34

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.
2	1.250
3	2.500
4	3.750
5	5.000
6	6.250
7	7.500
8	8.750
9	10.000
10	11.250
11	12.500
12	13.750
13	15.000
14	16.250
15	17.500
16	18.750
17	20.000
18	21.250
19	22.500
20	23.750
21	25.000
22	26.250
23	27.500
24	28.750
25	30.000
26	31.250
27	32.500
28	33.750
29	35.000
30	36.250
31	37.500
32	38.750
33	40.000
34	41.250
35	42.500

DISTANCES TO FLUX POINTS

J	DIST.
1	0.625
2	1.875
3	3.125
4	4.375
5	5.625
6	6.875
7	8.125
8	9.375
9	10.625
10	11.875
11	13.125
12	14.375
13	15.625
14	16.875
15	18.125
16	19.375
17	20.625
18	21.875
19	23.125
20	24.375
21	25.625
22	26.875
23	28.125
24	29.375
25	30.625
26	31.875
27	33.125
28	34.375
29	35.625
30	36.875
31	38.125
32	39.375
33	40.625
34	41.875
35	43.125

ZONE INPUT BY REGION

1	1	1	2	2

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2

FISSION SOURCE DISTRIBUTION AND SUM 0.96750 0.03250 0.0 0.0 0.0 0.0 0.0 1.00000

DESCRIPTION OF REACTOR ZONES

ZN TO ZN	SUB-ZNS	SIGMA-SET	ID	CLASS	DPL	NEX	NAME
1 1	0	0	0	1	0	0	CORE
2 2	0	0	0	2	0	0	REFLECTOR

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 618

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 34 1 1 7 3 3 5 2

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 4830

MEMORY LOCATIONS NOT USED----- 35170

*****WARNING***** INPUT SPECIFIED UPSCATTER = 3 HAS BEEN CHANGED TO ACTUAL UPSCATTER = 4

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	CORE	1	2.38400E 00	1.19800E-02	9.61400E-05	1.07400E-04	0.0	1.07400E 02
		2	1.22100E 00	3.54600E-03	1.98130E-03	6.20700E-04	0.0	6.20700E 02
		3	1.22700E 00	2.14000E-02	1.65540E-03	1.82300E-03	0.0	1.82300E 03
		4	1.22500E 00	3.75838E-02	2.16750E-03	3.10400E-03	0.0	3.10400E 03
		5	1.14500E 00	3.13550E-02	6.58000E-03	1.00300E-02	0.0	1.00300E 04
		6	9.93000E-01	7.44834E-02	1.11380E-02	1.72900E-02	0.0	1.72900E 04
		7	9.17500E-01	7.13005E-02	2.14290E-02	3.39000E-02	0.0	3.39000E 04
2	REFLECTOR	1	1.83900E 00	1.56200E-02	5.62100E-08	0.0	0.0	0.0
		2	9.48000E-01	6.36900E-03	2.49700E-06	0.0	0.0	0.0
		3	9.32900E-01	2.98600E-02	2.02800E-05	0.0	0.0	0.0
		4	9.43200E-01	7.68927E-02	6.04300E-05	0.0	0.0	0.0
		5	8.93200E-01	3.93820E-02	1.17200E-04	0.0	0.0	0.0
		6	7.97100E-01	8.38706E-02	1.91000E-04	0.0	0.0	0.0
		7	7.73000E-01	7.72414E-02	3.41900E-04	0.0	0.0	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	1	2	3	4	5	6	7
1	1	0.0	1.19800E-02	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	3.54600E-03	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	2.14000E-02	0.0	0.0	0.0	0.0
	4	0.0	0.0	0.0	7.82700E-04	0.0	3.04300E-02	1.82100E-04	1.89000E-04

	5	0.0	0.0	0.0	1.04900E-02	0.0	1.85600E-02	2.30500E-03
	6	0.0	0.0	0.0	1.23400E-04	5.94600E-02	0.0	1.49000E-02
	7	0.0	0.0	0.0	4.05100E-05	2.27700E-02	4.86900E-02	0.0
2	1	0.0	1.56200E-02	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	6.36900E-03	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	2.98600E-02	0.0	0.0	0.0
	4	0.0	0.0	4.93600E-04	0.0	7.60000E-02	3.61600E-04	3.75700E-05
	5	0.0	0.0	0.0	7.03100E-03	0.0	2.89300E-02	3.42100E-03
	6	0.0	0.0	0.0	7.06600E-05	6.48100E-02	0.0	1.89900E-02
	7	0.0	0.0	0.0	2.13700E-05	2.20900E-02	5.51300E-02	0.0

ONE-DIMENSIONAL SLAB (X).

34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES ORNL 72

LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	8.04402E-00	1.00000	16.08804	-1.89209	0.0	0.872854
2	7.42661E-01	1.00000	0.83498	0.02274	0.07925	0.889992
3	2.21926E-01	1.00000	0.52075	0.29990	-0.18765	0.898210
4	-1.11044E-01	1.00000	-0.61141	-0.22392	1.73541	0.905541
5	-5.20440E-02	1.00000	0.41664	0.67737	0.89352	0.909385
6	-3.47418E-02	1.00000	0.63280	0.69017	0.81720	0.910208
7	-2.70222E-02	1.00000	0.75078	0.69800	0.79525	0.909261
8	-2.13243E-02	1.00000	0.76782	0.72458	0.78631	0.907497
9	-1.66292E-02	1.00000	0.76319	0.76023	0.78177	0.905486
10	-1.29045E-02	1.00000	0.76311	0.81282	0.77903	0.903529
11	-9.96822E-03	1.00000	0.76249	0.86110	0.77716	0.901767
12	-7.67678E-03	1.00000	0.76245	0.87707	0.77578	0.900249
13	-5.90169E-03	1.00000	0.76287	0.84773	0.77472	0.898979
14	-4.53299E-03	1.00000	0.76355	0.83000	0.77388	0.897937
15	-3.48020E-03	1.00000	0.76427	0.81855	0.77320	0.897094
16	-2.67160E-03	1.00000	0.76499	0.80779	0.77264	
	-9.85847E-03	EXTRAPOLATION WITH 3.6814				0.893921
17	2.82288E-04	1.00000	-0.10538	-0.06520	3.61469	0.893899
18	2.00272E-04	1.00000	0.70966	0.66413	-0.01460	0.893893
19	1.43866E-04	1.00000	0.73348	0.67064	0.78987	0.893894
20	1.09673E-04	1.00000	0.74686	0.69418	0.78655	0.893900
21	8.20160E-05	1.00000	0.74791	0.71833	0.78420	0.893908

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.011 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000467 K 0.8939355

LEAKAGE 1.13694E-01 TOTAL LOSSES 5.59342E-01 TOTAL PRODUCTIONS 5.00000E-01 REACTOR POWER(WATTS) 1.00000E 06

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.16545E-00	1.00000	6.33130	-0.68261	0.0	0.893908
2	2.75743E-01	1.00000	0.36285	0.19610	0.0	0.893908
3	2.62815E-01	1.00000	1.21593	0.47702	0.0	0.893908
4	2.44652E-01	1.00000	1.17554	0.85743	0.0	0.893908
5	2.14993E-01	1.00000	1.09376	0.84870	0.0	0.893908
6	1.77230E-01	1.00000	1.00158	0.81617	0.0	0.893908
7	1.42117E-01	1.00000	0.94399	0.79625	0.0	0.893908
8	1.12660E-01	1.00000	0.90539	0.79215	0.0	0.893908
9	8.89978E-02	1.00000	0.87896	0.79318	0.0	0.893908
10	7.03325E-02	1.00000	0.86060	0.79558	0.0	0.893908
11	5.56993E-02	1.00000	0.84764	0.79806	0.0	0.893908
12	4.42333E-02	1.00000	0.83838	0.80040	0.0	
	1.92177E-01	EXTRAPOLATION WITH 4.5368				0.893908
13	2.41089E-03	1.00000	0.05691	0.10525	0.0	0.893908
14	1.19019E-03	1.00000	0.49486	0.70346	0.0	0.893908
15	-5.93662E-04	1.00000	-0.49939	-0.71269	0.0	0.893908
16	4.36783E-04	1.00000	-0.73531	-0.74575	0.0	0.893908
17	-3.50416E-04	1.00000	-0.80262	-0.75793	0.0	0.893908
18	-2.93553E-04	1.00000	0.83743	0.76971	0.0	0.893908
19	-2.60651E-04	1.00000	0.88766	0.77548	0.0	0.893908
20	-2.45631E-04	1.00000	0.94213	0.79243	0.0	0.893908
21	-2.28226E-04	1.00000	0.92892	0.79281	0.0	0.893908
22	-2.02119E-04	1.00000	0.88541	0.81549	0.0	0.893908
23	-1.74463E-04	1.00000	0.86299	0.81140	0.0	0.893908
24	-1.46925E-04	1.00000	0.84201	0.82565	0.0	0.893908
25	-1.21832E-04	1.00000	0.82909	0.83104	0.0	
	-5.91604E-04	EXTRAPOLATION WITH 4.8846				0.893908
26	1.90735E-05	1.00000	-0.15654	0.0	0.0	0.893908

27	1.71661E-05	1.00000	0.90002	0.90002	0.0	0.893908			
28	1.62125E-05	1.00000	0.94446	0.94446	0.0	0.893908			
END OF ADJOINT CALCULATION - ITERATION TIME 0.015 MINUTES									
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000391 K 0.8939406									
GROSS NEUTRON BALANCE									
GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENGN LOSS
1	0.0	0.0	4.95350E-03	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	1.84458E-02	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	4.43238E-03	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	6.62759E-03	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	5.15600E-02	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	2.07745E-02	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	6.90010E-03	0.0	0.0	0.0	0.0	0.0	0.0
SUM	0.0	0.0	1.13694E-01	0.0	0.0	0.0	0.0	0.0	0.0
GROSS NEUTRON BALANCE									
GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROU/ABSCR		
1	3.26360E-03	5.32928E-01	5.41163E-01	0.0	5.41145E-01	5.41163E-01	1.11698E 00		
2	1.30236E-01	4.02424E-01	1.81786E-02	5.32928E-01	5.51106E-01	5.51106E-01	3.13120E-01		
3	1.72892E-02	3.92344E-01	0.0	4.14065E-01	4.14065E-01	4.14065E-01	1.09388E 00		
4	2.45497E-02	8.72091E-01	0.0	9.03271E-01	9.03268E-01	9.03271E-01	1.41131E 00		
5	1.56546E-01	2.21661E 00	0.0	2.42470E 00	2.42471E 00	2.42470E 00	1.48109E 00		
6	7.44013E-02	1.81326E 00	0.0	1.90843E 00	1.90844E 00	1.90843E 00	1.48886E 00		
7	3.93620E-02	5.36913E-01	0.0	5.83175E-01	5.83175E-01	5.83175E-01	1.50868E 00		
SUM	4.45648E-01	6.76657E 00	5.59341E-01	6.76657E 00	7.32591E 00	7.32591E 00			

ONE-DIMENSIONAL SLAB (X).
34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 3.384966E-01

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE	1	-6.107224E 01	6.843634E 01	-4.948523E-03	-1.455962E 02
		2	-1.243493E 02	1.324590E 02	-5.852360E-03	-1.518304E 02
		3	-2.792706E 01	2.089244E 01	-1.741169E-03	-3.426648E 01
		4	-3.114774E 01	2.245012E 01	-2.581008E-03	-3.815594E 01
		5	-6.481093E 01	4.622151E 01	1.245184E-02	-7.420847E 01
		6	-1.806155E 01	1.277359E 01	7.100739E-03	-1.793512E 01
		7	-5.003603E 00	3.486886E 00	2.743437E-03	-4.590805E 00
2	REFLECTOR	1	-1.110557E 01	1.245941E 01	-2.293273E-02	-2.042313E 01
		2	-3.740997E 01	3.863606E 01	-6.102289E-02	-3.546465E 01
		3	-9.265799E 00	8.125847E 00	-1.505270E-02	-8.644063E 00
		4	-9.130649E 00	8.011184E 00	-1.671884E-02	-8.612027E 00
		5	-5.503320E 01	4.898563E 01	-5.145096E-02	-4.915565E 01
		6	-2.286133E 01	2.041438E 01	-1.651642E-02	-1.822276E 01
		7	-7.605890E 00	6.804513E 00	-4.545864E-03	-5.879353E 00

COMP	NAME	GRP. K ---	SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE	1	6.107224E 01 1.182055E 02 1.864417E 01 2.003413E 01 4.124594E 01 1.139836E 01 3.111449E 00
		2	6.424321E 01 1.243493E 02 1.961687E 01 2.108206E 01 4.344582E 01 1.201251E 01 3.280092E 00
		3	9.155978E 01 1.772067E 02 2.792706E 01 2.998022E 01 6.145364E 01 1.694637E 01 4.620206E 00
		4	9.513881E 01 1.841282E 02 2.901566E 01 3.114774E 01 6.382115E 01 1.759531E 01 4.796492E 00
		5	9.660570E 01 1.869635E 02 2.946269E 01 3.162930E 01 6.481093E 01 1.786827E 01 4.870885E 00
		6	9.763335E 01 1.889495E 02 2.977621E 01 3.196754E 01 6.551004E 01 1.806155E 01 4.923649E 00
		7	9.917889E 01 1.919374E 02 3.024812E 01 3.247693E 01 6.656650E 01 1.835417E 01 5.003603E 00
2	REFLECTOR	1	1.110557E 01 3.444029E 01 7.243574E 00 7.141937E 00 4.367383E 01 1.820097E 01 6.066779E 00
		2	1.208717E 01 3.740997E 01 7.862799E 00 7.734695E 00 4.719556E 01 1.966135E 01 6.552284E 00
		3	1.449663E 01 4.427945E 01 9.265799E 00 9.053481E 00 5.461790E 01 2.270123E 01 7.556673E 00
		4	1.467511E 01 4.473120E 01 9.353771E 00 9.130649E 00 5.498390E 01 2.284482E 01 7.603065E 00
		5	1.471391E 01 4.481937E 01 9.370081E 00 9.144105E 00 5.503320E 01 2.286256E 01 7.608516E 00
		6	1.473202E 01 4.485387E 01 9.375829E 00 9.148006E 00 5.503474E 01 2.286133E 01 7.607795E 00
		7	1.475595E 01 4.489699E 01 9.382749E 00 9.152497E 00 5.503073E 01 2.285693E 01 7.605890E 00

END OF CASE - TOTAL CPU TIME WAS 0.05 MINUTES TOTAL CLOCK TIME WAS 0.61 MINUTES

*****

*****THIS JOB WAS RUN ON* 03-11-72 ON THE IBM 360/91*****

ONE-DIMENSIONAL CYLINDER (R).
 34X7 GROUPS, 238 POINTS. STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	12	6	12	24
1.000000E 02	9.999999E-05	9.999999E 09	9.999999E 23	0.0															1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	2	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0
9.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																		
0.0	0.0	1.000000E 00	1.000000E 00	1.000000E 00	0.0																		

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	4.692000E-01	0.0	4.692000E-01	4.692000E-01

ONE DIMENSIONAL CYLINDRICAL GEOMETRY (R) WIDTH 1.071700E 02

REGION SPECIFICATIONS

PTS	REGION	WIDTH
8	2.239000E 01	8 2.239000E 01 5 2.000000E 01 5 2.000000E 01

X-DIR. POINTS 34

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.
2	7.916
3	11.195
4	13.711
5	15.832
6	17.701
7	19.390
8	20.944
9	22.390
10	26.255
11	29.619
12	32.639
13	35.402
14	37.964
15	40.364
16	42.629
17	44.780
18	48.152
19	51.302
20	54.270
21	57.084
22	59.765
23	62.331
24	64.796
25	67.170
26	71.618
27	75.806
28	79.774
29	83.554
30	87.170
31	91.520
32	95.673
33	99.653
34	103.480
35	107.170

DISTANCES TO FLUX POINTS

J	DIST.
1	5.597
2	9.695
3	12.516
4	14.810
5	16.792
6	18.565
7	20.182
8	21.679
9	24.399
10	27.987
11	31.166
12	34.048
13	36.705
14	39.182
15	41.512
16	43.718
17	46.496
18	49.752
19	52.807
20	55.694
21	58.440
22	61.061
23	63.575
24	65.994
25	69.430
26	73.742
27	77.815
28	81.686
29	85.381
30	89.372
31	93.620
32	97.683
33	101.584
34	105.341

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS 170 INSTEAD OF STORED 618

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 34 1 1 7 4 3 5 2

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 4832

MEMORY LOCATIONS NOT USED----- 35168

ONE-DIMENSIONAL CYLINDER (K).
 34X7 GROUPS, 238 POINTS. STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	9.98723E-00	1.00000	19.97444	-1.92249	0.0	0.798020
2	8.36356E-01	1.00000	0.92010	0.01721	0.12280	0.828857
3	2.30991E-01	1.00000	0.50718	0.30258	0.11446	0.850344
4	-1.33025E-01	1.00000	-0.70891	-0.18142	-0.56564	0.866063
5	-6.74925E-02	1.00000	0.43988	0.67631	1.47045	0.875460
6	-3.57203E-02	1.00000	0.49353	0.68354	0.99534	0.880114
7	-2.28859E-02	1.00000	0.61781	0.69657	0.90889	0.881848
8	-1.92648E-02	1.00000	0.82251	0.71272	0.87688	0.881953
9	-1.62002E-02	1.00000	0.82472	0.72879	0.86069	0.881224
10	-1.44922E-02	1.00000	0.88008	0.76838	0.85071	0.880120
11	-1.26084E-02	1.00000	0.85741	0.79522	0.84376	0.878897
12	-1.07640E-02	1.00000	0.84295	0.83592	0.83857	0.877694
13	-9.06849E-03	1.00000	0.83341	0.87355	0.83451	0.876579
14	-7.56824E-03	1.00000	0.82700	0.90613	0.83126	0.875582
15	-6.27333E-03	1.00000	0.82263	0.88849	0.82860	0.874711
16	-5.17434E-03	1.00000	0.81964	0.86988	0.82641	0.873962
17	-4.25267E-03	1.00000	0.81762	0.85746	0.82458	0.873325
18	-3.48592E-03	1.00000	0.81621	0.85034	0.82304	0.872789
19	-2.85202E-03	1.00000	0.81530	0.84327	0.82174	0.872147
20	-1.38936E-02	EXTRAPOLATION WITH	4.8578			0.870147
21	2.46048E-04	1.00000	-0.08603	-0.06743	4.80722	0.870139
22	2.05994E-04	1.00000	0.83742	0.72164	-0.00955	0.870140
23	1.70708E-04	1.00000	0.82887	0.72660	0.89196	0.870145
24	1.41144E-04	1.00000	0.82696	0.75586	0.87594	0.870152
25	1.15395E-04	1.00000	0.81768	0.78156	0.86458	0.870160
26	9.44138E-05	1.00000	0.81828	0.80836	0.85615	0.870168

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.012 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000229 K 0.8701788

LEAKAGE 2.39236E-01 TOTAL LOSSES 1.14920E 00 TOTAL PRODUCTIONS 1.00000E 00 REACTOR POWER(WATTS) 1.00000E 06

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.17823E-00	1.00000	6.35645	-0.66987	0.0	0.870168
2	2.76060E-01	1.00000	0.36292	0.16417	0.0	0.870168
3	2.62378E-01	1.00000	1.21281	0.46092	0.0	0.870168
4	2.45057E-01	1.00000	1.17904	0.84302	0.0	0.870168
5	2.16040E-01	1.00000	1.09763	0.79860	0.0	0.870168
6	1.78823E-01	1.00000	1.00656	0.82364	0.0	0.870168
7	1.44295E-01	1.00000	0.95121	0.86849	0.0	0.870168
8	1.15439E-01	1.00000	0.91546	0.91282	0.0	0.870168
9	9.23433E-02	1.00000	0.89227	0.90379	0.0	0.870168
10	7.41682E-02	1.00000	0.87735	0.89287	0.0	0.870168
11	5.99232E-02	1.00000	0.86786	0.88244	0.0	0.870168
12	4.87289E-02	1.00000	0.86192	0.87502	0.0	0.870168
13	3.98817E-02	1.00000	0.85832	0.86585	0.0	0.870168
14	3.28379E-02	1.00000	0.85622	0.86617	0.0	0.870168
15	1.97263E-01	EXTRAPOLATION WITH	6.2044			0.870168
16	-1.17677E-03	1.00000	-0.03701	-0.04117	0.0	0.870168
17	-1.09226E-03	1.00000	0.92708	0.72518	0.0	0.870168
18	-9.59396E-04	1.00000	0.87740	0.76230	0.0	0.870168
19	-8.15511E-04	1.00000	0.84921	0.79202	0.0	0.870168
20	-6.80685E-04	1.00000	0.83399	0.83585	0.0	0.870168
21	-5.62489E-04	1.00000	0.82579	0.87093	0.0	0.870168
22	-4.62413E-04	1.00000	0.82162	0.90981	0.0	0.870168
23	-3.79384E-04	1.00000	0.82006	0.93630	0.0	0.870168
24	-3.11136E-04	1.00000	0.81980	0.91678	0.0	0.870168

24	-2.55346E-04	1.00000	0.82043	0.90920	0.0	0.870168
25	-2.09749E-04	1.00000	0.82122	0.90919	0.0	
	-1.34054E-03	EXTRAPOLATION WITH			6.4185	0.870168
26	6.77109E-05	1.00000	-0.32275	0.0	0.0	0.870168
27	5.43594E-05	1.00000	0.80287	0.80287	0.0	0.870168
28	4.48227E-05	1.00000	0.82461	0.82461	0.0	0.870168

END OF ADJOINT CALCULATION - ITERATION TIME 0.013 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0003572 K 0.8702132

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	1.04690E-02	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	3.86748E-02	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	9.28713E-03	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	1.39386E-02	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	1.08568E-01	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	4.37644E-02	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	1.45338E-02	0.0	0.0	0.0	0.0	0.0	0.0
SUM	0.0	0.0	2.39236E-01	0.0	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	7.01078E-03	1.09435E 00	1.11185E 00	0.0	1.11183E 00	1.11185E 00	1.11701E 00
2	2.84448E-01	8.08575E-01	3.73491E-02	1.09435E 00	1.13170E 00	1.13170E 00	3.13150E-01
3	3.75253E-02	7.85258E-01	0.0	8.32071E-01	8.32071E-01	8.32071E-01	1.09521E 00
4	5.12093E-02	1.69248E 00	0.0	1.75763E 00	1.75762E 00	1.75763E 00	1.41413E 00
5	3.09546E-01	4.16911E 00	0.0	4.58720E 00	4.58722E 00	4.58720E 00	1.48427E 00
6	1.44446E-01	3.38318E 00	0.0	3.57138E 00	3.57139E 00	3.57138E 00	1.49226E 00
7	7.57827E-02	9.98997E-01	0.0	1.08931E 00	1.08931E 00	1.08931E 00	1.51193E 00
SUM	9.09968E-01	1.29319E 01	1.14920E 00	1.29319E 01	1.40811E 01	1.40811E 01	

ONE-DIMENSIONAL CYLINDER (R).
34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 3.337429E-02

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE	1	-6.481815E 01	7.464145E 01	-8.738749E-03	-1.545264E 02
		2	-1.359972E 02	1.473706E 02	-1.547203E-02	-1.660526E 02
		3	-3.104494E 01	2.309613E 01	-3.896826E-03	-3.809210E 01
		4	-3.306837E 01	2.371771E 01	-4.231121E-03	-4.050873E 01
		5	-6.436694E 01	4.571561E 01	9.067114E-03	-7.370010E 01
		6	-1.751649E 01	1.233987E 01	5.967271E-03	-1.739388E 01
		7	-4.797166E 00	3.330464E 00	2.370345E-03	-4.401399E 00
2	REFLECTOR	1	-7.751861E 00	8.935453E 00	-2.186396E-02	-1.425567E 01
		2	-2.616640E 01	2.766048E 01	-5.615450E-02	-2.480574E 01
		3	-6.498569E 00	5.825153E 00	-1.443093E-02	-6.062513E 00
		4	-6.430265E 00	5.767530E 00	-1.523987E-02	-6.065026E 00
		5	-3.908388E 01	3.555788E 01	-4.827570E-02	-3.490971E 01
		6	-1.626448E 01	1.484344E 01	-1.584915E-02	-1.296442E 01
		7	-5.415602E 00	4.951549E 00	-4.513852E-03	-4.186259E 00

COMP	NAME	GRP. K --- SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE	1 6.481815E 01 1.279753E 02 2.005644E 01 2.059624E 01 3.969855E 01 1.071562E 01 2.892076E 00
		2 6.887585E 01 1.359972E 02 2.131502E 01 2.188782E 01 4.220189E 01 1.139382E 01 3.075546E 00
		3 1.003307E 02 1.982332E 02 3.104494E 01 3.181679E 01 6.099458E 01 1.642226E 01 4.425977E 00
		4 1.042808E 02 2.060254E 02 3.226430E 01 3.306837E 01 6.338644E 01 1.706459E 01 4.598792E 00
		5 1.058603E 02 2.091310E 02 3.275143E 01 3.357237E 01 6.436694E 01 1.732994E 01 4.670477E 00
		6 1.069606E 02 2.112936E 02 3.309091E 01 3.392410E 01 6.505470E 01 1.751649E 01 4.720951E 00
		7 1.086137E 02 2.145434E 02 3.360121E 01 3.445306E 01 6.609117E 01 1.779802E 01 4.797166E 00
2	REFLECTOR	1 7.751861E 00 2.399860E 01 5.054124E 00 5.004572E 00 3.085678E 01 1.268118E 01 4.297001E 00
		2 8.472287E 00 2.616640E 01 5.506199E 00 5.438517E 00 3.344981E 01 1.395775E 01 4.655126E 00
		3 1.017531E 01 3.101605E 01 6.498569E 00 6.373912E 00 3.877309E 01 1.614362E 01 5.378237E 00
		4 1.030470E 01 3.134424E 01 6.562730E 00 6.430265E 00 3.904631E 01 1.625150E 01 5.413204E 00
		5 1.033265E 01 3.140817E 01 6.574645E 00 6.440070E 00 3.908388E 01 1.626529E 01 5.417487E 00
		6 1.034504E 01 3.143175E 01 6.578595E 00 6.442677E 00 3.908495E 01 1.626448E 01 5.417014E 00
		7 1.036084E 01 3.145982E 01 6.583089E 00 6.445422E 00 3.908112E 01 1.626111E 01 5.415602E 00

END OF CASE - TOTAL CPU TIME WAS 0.05 MINUTES TOTAL CLOCK TIME WAS 0.58 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES GRNL 72

[illegible]

0.0	0.0	4.692000E-01	0.0	4.692000E-01	4.692000E-01

ONE DIMENSIONAL SPHERICAL GEOMETRY (R) WIDTH 1.399986E 02

PTS	REGION	WIDTH

8	3.333299E 01	8	3.333299E 01	8	3.333299E 01	5	2.000000E 01	5	2.000000E 01

X-DIR. POINTS 34

DISTANCES TO MESH INTERVAL INTERFACES

J DIST.

2	16.666	3	20.998	4	24.037	5	26.456	6	28.489	7	30.285	8	31.882	9	33.333	10	41.103
11	46.700	12	51.205	13	55.031	14	58.389	15	61.400	16	64.141	17	66.666	18	72.700	19	77.871
20	82.434	21	86.541	22	90.291	23	93.753	24	96.976	25	99.999	26	104.634	27	108.891	28	112.839
29	116.529	30	119.999	31	124.529	32	128.752	33	132.715	34	136.454	35	139.999				

DISTANCES TO FLUX POINTS

J DIST.

1	13.228	2	19.078	3	22.620	4	25.305	5	27.516	6	29.419	7	31.104	8	32.624	9	37.619
10	44.079	11	49.056	12	53.187	13	56.760	14	59.932	15	62.800	16	65.428	17	69.813	18	75.374
19	80.217	20	84.537	21	88.455	22	92.054	23	95.392	24	98.511	25	102.365	26	106.805	27	110.900
28	114.714	29	118.289	30	122.306	31	126.676	32	130.763	33	134.610	34	138.249				

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 618

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF--COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES	34	1	1	7	4	3	5	2

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 4832

MEMORY LOCATIONS NOT USED----- 35168

ONE-DIMENSIONAL SP FINE ISS.
3487 GROUPS, 738 POINTS. STREAM OF CITATION CASES URNL 72
LINE RELAXATION WILL BE DONE ON 99MS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.04035E-01	1.00000	21.20709	-1.92324	0.0	0.747391
2	9.34230E-01	1.00000	1.02233	0.01518	0.14929	0.788257
3	-2.37170E-01	1.00000	-0.49104	-0.29552	0.20251	0.525546
4	-1.44306E-01	1.00000	0.56414	0.26758	0.09779	0.840026
5	-7.62607E-02	1.00000	0.45220	0.66826	-1.23689	0.853203
6	-4.25987E-02	1.00000	0.51599	0.66622	1.49017	0.860538
7	-2.34676E-02	1.00000	0.52743	0.67305	1.05028	0.864259
8	-1.31080E-02	1.00000	0.54545	0.68391	0.95052	0.865887
9	-1.01157E-02	1.00000	0.76161	0.70153	0.90956	0.866348
10	-8.12405E-03	1.00000	0.79499	0.72951	0.88787	0.866187
11	-7.04098E-03	1.00000	0.85964	0.74733	0.87466	0.865714
12	-6.35451E-03	1.00000	0.89615	0.78034	0.86590	0.865109
13	-5.75989E-03	1.00000	0.90067	0.81263	0.85978	0.864470
14	-5.25588E-03	1.00000	0.90724	0.85354	0.85537	0.863850
15	-4.72599E-03	1.00000	0.89446	0.88881	0.85212	0.863276
16	-4.18216E-03	1.00000	0.88075	0.91497	0.84968	0.862759
17	-3.65835E-03	1.00000	0.87109	0.89708	0.84783	0.862303
18	-3.17156E-03	1.00000	0.86377	0.88124	0.84641	0.861906
19	-2.73198E-03	1.00000	0.85867	0.87119	0.84531	0.861562
20	-2.34073E-03	1.00000	0.85445	0.86372	0.84446	0.861267
21	-1.99783E-03	1.00000	0.85151	0.85898	0.84380	
	-1.18266E-02	EXTRAPOLATION WITH 5.9081				0.859521
22	1.30653E-04	1.00000	-0.06527	-0.07507	5.82498	0.859529
23	1.13487E-04	1.00000	0.86873	0.75178	-0.01235	0.859538
24	1.00136E-04	1.00000	0.88245	0.80302	0.86780	0.859549
25	8.96454E-05	1.00000	0.89533	0.83590	0.86246	0.859559
26	8.01086E-05	1.00000	0.89370	0.87188	0.85879	0.859568
27	7.24792E-05	1.00000	0.90483	0.91467	0.85618	0.859577

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.015 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000238 K 0.8595846

LEAKAGE 2.47234E-01 TOTAL LOSSES 1.16336E-01 TOTAL PRODUCTIONS 1.00000E-00 REACTOR POWER(WATTS) 1.00000E-06

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.17881E-00	1.00000	6.35762	-0.56968	0.0	0.859577
2	2.76290E-01	1.00000	0.36321	0.15407	0.0	0.859577
3	2.63218E-01	1.00000	1.21591	0.45606	0.0	0.859577
4	2.45459E-01	1.00000	1.17799	0.82767	0.0	0.859577
5	2.16681E-01	1.00000	1.09944	0.77830	0.0	0.859577
6	1.79548E-01	1.00000	1.00818	0.79064	0.0	0.859577
7	1.45066E-01	1.00000	0.95302	0.82833	0.0	0.859577
8	1.16261E-01	1.00000	0.91770	0.87367	0.0	0.859577
9	9.32331E-02	1.00000	0.89516	0.91064	0.0	0.859577
10	7.51381E-02	1.00000	0.88105	0.93942	0.0	0.859577
11	6.09789E-02	1.00000	0.87254	0.94461	0.0	0.859577
12	4.98714E-02	1.00000	0.86772	0.93070	0.0	0.859577
13	4.11034E-02	1.00000	0.86529	0.92139	0.0	0.859577
14	3.41282E-02	1.00000	0.86443	0.91314	0.0	0.859577
15	2.85311E-02	1.00000	0.86453	0.90631	0.0	
	2.14361E-01	EXTRAPOLATION WITH 7.7276				0.859577
16	-4.02433E-03	1.00000	-0.14507	-0.09735	0.0	0.859577
17	-3.31980E-03	1.00000	0.82161	0.74695	0.0	0.859577
18	-2.70772E-03	1.00000	0.81292	0.75847	0.0	0.859577
19	-2.19458E-03	1.00000	0.80830	0.77682	0.0	0.859577
20	-1.77300E-03	1.00000	0.80613	0.79049	0.0	0.859577
21	-1.43123E-03	1.00000	0.80580	0.79977	0.0	0.859577

22	-1.15663E-03	1.00000	0.80698	0.82760	0.0	0.859577
23	-9.36806E-04	1.00000	0.80901	0.83879	0.0	0.859577
24	-7.61151E-04	1.00000	0.81173	0.86403	0.0	0.859577
25	-6.20723E-04	1.00000	0.81488	0.89146	0.0	0.859577
26	-5.08368E-04	1.00000	0.81849	0.90868	0.0	0.859577
27	-4.18127E-04	1.00000	0.82207	0.93302	0.0	0.859577
28	-3.45290E-04	1.00000	0.82546	0.94977	0.0	0.859577
29	-2.86281E-04	1.00000	0.82882	0.95467	0.0	0.859577
30	-2.38240E-04	1.00000	0.83195	0.94456	0.0	0.859577
	-1.88757E-03	EXTRAPOLATION WITH 7.9488				0.859577
31	1.16348E-04	1.00000	-0.48825	-0.02836	0.0	0.859577
32	9.15527E-05	1.00000	0.78698	0.0	0.0	0.859577
33	7.43866E-05	1.00000	0.81257	0.81257	0.0	0.859577

END OF ADJOINT CALCULATION - ITERATION TIME 0.017 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000477 K 0.8596151

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	WT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	1.09266E-02	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	4.01953E-02	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	9.64683E-03	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	1.44005E-02	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	1.11955E-01	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	4.51269E-02	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	1.49833E-02	0.0	0.0	0.0	0.0	0.0	0.0
SUM	0.0	0.0	2.47234E-01	0.0	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	7.18411E-03	1.10742E 00	1.12555E 00	0.0	1.12553E 00	1.12555E 00	1.11702E 00
2	2.92370E-01	8.12668E-01	3.78093E-02	1.10742E 00	1.14523E 00	1.14523E 00	3.13158E-01
3	3.84918E-02	7.88105E-01	0.0	8.36244E-01	8.36244E-01	8.36244E-01	1.09555E 00
4	5.18923E-02	1.67759E 00	0.0	1.74389E 00	1.74389E 00	1.74389E 00	1.41496E 00
5	3.08376E-01	4.08051E 00	0.0	4.50083E 00	4.50084E 00	4.50083E 00	1.48535E 00
6	1.43007E-01	3.30059E 00	0.0	3.48872E 00	3.48872E 00	3.48872E 00	1.49349E 00
7	7.48077E-02	9.73459E-01	0.0	1.06325E 00	1.06325E 00	1.06325E 00	1.51314E 00
SUM	9.16129E-01	1.27404E 01	1.16336E 00	1.27404E 01	1.39037E 01	1.39037E 01	

ONE-DIMENSIONAL SPHERE (S).

34X7 GROUPS, 238 POINTS.

STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PH)*M(PH) = 1.223769E-05

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE	1	-6.619910E 01	7.718333E 01	-1.115517E-02	-1.578186E 02
		2	-1.403360E 02	1.532591E 02	-2.127609E-02	-1.713502E 02
		3	-3.223384E 01	2.396388E 01	-5.201966E-03	-3.955089E 01
		4	-3.379323E 01	2.421143E 01	-5.413853E-03	-4.139668E 01
		5	-6.418312E 01	4.551572E 01	6.060701E-03	-7.348964E 01
		6	-1.730411E 01	1.216933E 01	4.952725E-03	-1.718297E 01
		7	-4.716915E 00	3.263853E 00	2.046841E-03	-4.327769E 00
2	REFLECTOR	1	-6.452821E 00	7.530427E 00	-2.067273E-02	-1.186674E 01
		2	-2.181708E 01	2.329057E 01	-5.257200E-02	-2.068259E 01
		3	-5.429978E 00	4.903693E 00	-1.341830E-02	-5.065626E 00
		4	-5.343306E 00	4.828357E 00	-1.415496E-02	-5.039805E 00
		5	-3.242035E 01	2.971638E 01	-4.509145E-02	-2.895784E 01
		6	-1.349172E 01	1.240509E 01	-1.491949E-02	-1.075425E 01
		7	-4.492418E 00	4.138287E 00	-4.300956E-03	-3.472638E 00

COMP	NAME	GRP. K	SIGS(FROM ALL GRPS. KK TO GRP. K)							
1	CORE	1	6.619910E 01	1.314478E 02	2.055341E 01	2.076579E 01	3.903799E 01	1.043736E 01	2.803616E 00	
		2	7.066814E 01	1.403360E 02	2.194405E 01	2.216862E 01	4.168042E 01	1.114519E 01	2.993594E 00	
		3	1.037995E 02	2.062749E 02	3.223384E 01	3.250244E 01	6.079089E 01	1.621448E 01	4.349596E 00	
		4	1.079234E 02	2.144551E 02	3.351155E 01	3.379323E 01	6.320207E 01	1.685654E 01	4.521632E 00	
		5	1.095628E 02	2.176970E 02	3.401874E 01	3.430962E 01	6.418312E 01	1.711975E 01	4.592443E 00	
		6	1.107018E 02	2.199479E 02	3.437119E 01	3.466896E 01	6.486879E 01	1.730411E 01	4.642096E 00	
		7	1.124104E 02	2.233252E 02	3.490019E 01	3.520837E 01	6.590013E 01	1.758171E 01	4.716915E 00	
2	REFLECTOR	1	6.452821E 00	1.995947E 01	4.202475E 00	4.138288E 00	2.547163E 01	1.063329E 01	3.547248E 00	
		2	7.071134E 00	2.181708E 01	4.589703E 00	4.507934E 00	2.767551E 01	1.154825E 01	3.851612E 00	
		3	8.512380E 00	2.592265E 01	5.429978E 00	5.295538E 00	3.215579E 01	1.338871E 01	4.460595E 00	
		4	8.622187E 00	2.620200E 01	5.484655E 00	5.343306E 00	3.238840E 01	1.348075E 01	4.490459E 00	
		5	8.645601E 00	2.625575E 01	5.494707E 00	5.351523E 00	3.242035E 01	1.349252E 01	4.494132E 00	
		6	8.655611E 00	2.627477E 01	5.497881E 00	5.353561E 00	3.242079E 01	1.349172E 01	4.493701E 00	
		7	8.668062E 00	2.629657E 01	5.501331E 00	5.355559E 00	3.241655E 01	1.348856E 01	4.492418E 00	

END OF CASE - TOTAL CPU TIME WAS 0.05 MINUTES TOTAL CLOCK TIME WAS 0.60 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

2-D PERTURBATION (OLD EXTERMINATOR CASE)
 9X24X4 GROUP, 864 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0																																															
1	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0																																															
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24																																															
1.000000E 01												9.999999E-04												9.999999E 09												9.999999E 23												0.0												1.000000E 00											

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

1	0	0	0	7	0	0	0	0	0	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0																																															
9.999999E-05												9.999999E-05												9.999999E-05												9.999999E-05												9.999999E-05												0.0											
9.999999E 29												-4.000000E 00												1.000000E 00												1.000000E 00												1.000000E 00												0.0											

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	9.999999E 29	9.999999E 29	0.0	9.999999E 29	9.999999E 29

ROD BND. CONSTANTS FOR ZONE 2

2.000000E-01	2.000000E-01	2.000000E-01	0.0

TWO DIMENSIONAL CYLINDRICAL GEOMETRY (R,Z) WIDTH 2.999998E 01 HEIGHT 4.699998E 01

REGION SPECIFICATIONS

PTS REGION WIDTH											
2	6.000000E 00	2	4.000000E 00	3	1.200000E 01	2	8.000000E 00				

PTS REGION HEIGHT

4	8.000000E 00	7	1.400000E 01	13	2.500000E 01

X-DIR. POINTS

9

Y-DIR. POINTS

24

DISTANCES TO MESH INTERVAL INTERFACES

J DIST.																	
2	4.243	3	6.000	4	8.246	5	10.000	6	15.100	7	18.868	8	22.000	9	26.306	10	30.000
I DIST.																	
2	2.000	3	4.000	4	6.000	5	8.000	6	10.000	7	12.000	8	14.000	9	16.000	10	18.000
11	20.000	12	22.000	13	23.923	14	25.846	15	27.769	16	29.692	17	31.615	18	33.538	19	35.462
20	37.385	21	39.308	22	41.231	23	43.154	24	45.077	25	47.000						

DISTANCES TO FLUX POINTS

J DIST.																	
1	3.000	2	5.196	3	7.211	4	9.165	5	12.806	6	17.088	7	20.494	8	24.249	9	28.213
I DIST.																	
1	1.000	2	3.000	3	5.000	4	7.000	5	9.000	6	11.000	7	13.000	8	15.000	9	17.000
10	19.000	11	21.000	12	22.962	13	24.885	14	26.808	15	28.731	16	30.654	17	32.577	18	34.500
19	36.423	20	38.346	21	40.269	22	42.192	23	44.115	24	46.038						

ZONE INPUT BY REGION

3	2	3	3
1	2	1	3
1	1	1	3

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9
1	3	3	2	2	3	3	3	3	3
2	3	3	2	2	3	3	3	3	3
3	3	3	2	2	3	3	3	3	3
4	3	3	2	2	3	3	3	3	3
5	1	1	2	2	1	1	1	3	3
6	1	1	2	2	1	1	1	3	3
7	1	1	2	2	1	1	1	3	3
8	1	1	2	2	1	1	1	3	3
9	1	1	2	2	1	1	1	3	3
10	1	1	2	2	1	1	1	3	3
11	1	1	2	2	1	1	1	3	3
12	1	1	1	1	1	1	1	3	3
13	1	1	1	1	1	1	1	3	3
14	1	1	1	1	1	1	1	3	3
15	1	1	1	1	1	1	1	3	3
16	1	1	1	1	1	1	1	3	3
17	1	1	1	1	1	1	1	3	3
18	1	1	1	1	1	1	1	3	3
19	1	1	1	1	1	1	1	3	3
20	1	1	1	1	1	1	1	3	3
21	1	1	1	1	1	1	1	3	3
22	1	1	1	1	1	1	1	3	3
23	1	1	1	1	1	1	1	3	3
24	1	1	1	1	1	1	1	3	3

FISSION SOURCE DISTRIBUTION AND SUM 0.60000 0.20000 0.10000 0.10000 1.00000

PERTURBATION INPUT - SECTION 040

0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1395

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 9 24 1 4 3 3 12 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 7779

MEMORY LOCATIONS NOT USED----- 32221

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	CORE	1	5.00028E-01	1.17500E-02	2.80000E-02	4.00000E-03	1.00000E-03	4.00000E 03
		2	5.00028E-01	1.67000E-02	3.60000E-02	8.00000E-03	1.00000E-03	8.00000E 03
		3	5.00025E-01	2.23000E-02	6.00000E-02	1.00000E-02	1.00000E-03	1.00000E 04
		4	5.00028E-01	0.0	9.00000E-02	4.00000E-02	1.00000E-03	4.00000E 04
2	REFLECTOR	1	0.0	0.0	0.0	0.0	0.0	0.0

	2	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0
	4	1.00000E-00	0.0	1.00000E-04	0.0	1.00000E-02	0.0
3	1	9.99002E-01	1.00000E-03	1.25000E-04	0.0	1.00000E-03	0.0
	2	9.99002E-01	2.10000E-03	2.30000E-04	0.0	1.00000E-03	0.0
	3	9.99002E-01	3.00000E-03	3.05000E-03	0.0	1.00000E-03	0.0
	4	9.99002E-01	2.00000E-03	4.06000E-03	0.0	1.00000E-03	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	1	2	3	4
1	1		0.0	1.10000E-02	5.00000E-04	2.50000E-04
	2		2.00000E-04	0.0	1.60000E-02	5.00000E-04
	3		1.00000E-04	2.00000E-04	0.0	2.20000E-02
	4		0.0	0.0	0.0	0.0
2	1		0.0	0.0	0.0	0.0
	2		0.0	0.0	0.0	0.0
	3		0.0	0.0	0.0	0.0
	4		0.0	0.0	0.0	0.0
3	1		0.0	5.00000E-04	3.00000E-04	2.00000E-04
	2		5.00000E-04	0.0	1.30000E-03	4.00000E-04
	3		3.00000E-04	6.00000E-04	0.0	2.10000E-03
	4		2.00000E-04	8.00000E-04	1.00000E-03	0.0

2-D PERTURBATION (OLD EXTERMINATOR CASE)						
9X24X4 GROUP, 864 POINTS			STREAM OF CITATION CASES QRNL 72			
LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-7.23477E-01	1.00000	-1.44695	0.0	0.0	0.099071
2	4.47373E 00	1.76993	-1.70992	-1.70992	0.49260	0.171197
3	3.59105E 00	1.62593	4.39375	0.10790	-0.13891	0.170951
4	5.59764E 00	1.54713	7.15641	0.21375	-0.02282	0.172557
5	1.11947E 01	1.50717	13.19463	0.23481	7.95482	0.175974
6	2.42099E 01	1.48769	26.37251	0.09538	0.36925	0.174552
7	3.39375E 00	1.47836	3.53393	0.35621	3.94308	0.176125
8	-5.76964E-01	1.47394	-0.74697	-0.19567	0.86781	0.178053
9	-4.86648E-01	1.47186	0.35682	0.62363	0.71041	0.179361
10	-3.39457E-01	1.47088	0.35808	0.73016	0.81338	0.180408
11	-1.69839E-01	1.47042	0.33049	0.78766	0.84019	0.181277
12	-1.89368E-01	1.47020	0.92562	0.84555	0.85391	0.182040
13	-1.98016E-01	1.47010	0.84765	0.83923	0.83990	0.182696
14	-1.07066E-01	1.47005	0.43363	0.84598	0.83619	0.183250
15	-8.66832E-02	1.47003	0.72294	0.84299	0.84424	0.183708
16	-7.90104E-02	1.47002	0.83247	0.83661	0.84339	0.184103
17	-7.41873E-02	1.47001	0.86477	0.84162	0.84176	0.184431
18	-6.95415E-02	1.47001	0.86784	0.83833	0.84381	0.184707
19	-6.46205E-02	1.47001	0.86462	0.83552	0.84208	
	-3.91690E-01	EXTRAPOLATION WITH			5.6698	0.186245
20	3.54834E-02	1.00000	-0.51362	-3.44644	5.62991	0.186234
21	-2.74363E-02	1.47001	-0.80065	-0.71722	-0.00761	0.186206
22	-2.65713E-02	1.47001	0.94190	0.83390	1.06797	0.186180
23	-2.89768E-02	1.47001	1.06155	0.85302	1.08648	0.186156
24	-3.76419E-02	1.47001	1.26139	1.45827	0.99859	0.186136
25	4.86794E-02	1.47001	-1.24454	-0.57350	1.20409	0.186113
26	2.98233E-02	1.47001	0.64247	1.47480	0.97298	0.186089
27	-2.88395E-02	1.47001	-0.99585	-0.83688	0.86546	0.186073
28	3.10707E-02	1.47001	-1.04629	-0.48568	1.15824	0.186050
29	-1.32339E-02	1.47001	-0.43916	-1.14212	0.73056	0.186035
30	7.35569E-03	1.47001	-0.54847	-0.07104	1.05955	0.186019
31	5.26428E-03	1.47001	0.72094	0.84515	0.87715	0.186006
32	5.00393E-03	1.47001	0.95555	0.84150	0.90119	0.185994
33	4.77791E-03	1.47001	0.95961	0.84091	0.89438	0.185983
34	4.09603E-03	1.47001	0.86138	0.84001	0.88117	0.185974
35	3.71265E-03	1.47001	0.91012	0.83651	0.87643	0.185966
36	3.38268E-03	1.47001	0.91451	0.83189	0.87043	0.185959
37	3.02029E-03	1.47001	0.89589	0.83541	0.86476	0.185953
38	2.68078E-03	1.47001	0.89027	0.84913	0.85943	0.185948
39	2.35653E-03	1.47001	0.88140	0.84269	0.85380	0.185943
40	2.05708E-03	1.47001	0.87498	0.83747	0.84890	0.185940
41	1.78337E-03	1.47001	0.86873	0.83306	0.84304	
	1.01590E-02	EXTRAPOLATION WITH			5.7066	0.185919
42	1.06812E-04	1.00000	0.06000	0.54770	5.55620	0.185919
43	9.72748E-05	1.47001	0.91081	1.57135	-0.01787	0.185920
44	-7.57575E-05	1.47001	-0.77887	-0.80117	1.27318	0.185920

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.080 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000200 K 0.1859228

LEAKAGE 5.76451E-01 TOTAL LOSSES 5.37865E 00 TOTAL PRODUCTIONS 9.99999E-01 REACTOR POWER(WATTS) 9.99999E 05

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	2.09898E 02	1.00000	419.79590	-1.03872	0.0	0.185920
2	3.66728E 00	1.76993	3.68476	0.24651	0.0	0.185920
3	1.05924E 00	1.62593	1.34808	0.67468	0.0	0.185920
4	7.71167E-01	1.54713	1.49920	0.74171	0.0	0.185920

5	8.91605E-01	1.50717	2.04778	0.94372	0.0	0.185920
6	5.83600E-01	1.48769	1.23815	0.61812	0.0	0.185920
7	3.07478E-01	1.47836	0.83434	0.25634	0.0	0.185920
8	2.00496E-01	1.47394	0.85256	0.62101	0.0	0.185920
9	1.61963E-01	1.47186	0.96977	0.64751	0.0	0.185920
10	1.78000E-01	1.47088	1.27702	0.64085	0.0	0.185920
11	2.16664E-01	1.47042	1.43388	0.72849	0.0	0.185920
12	1.52667E-01	1.47020	0.85729	0.75707	0.0	0.185920
13	9.09872E-02	1.47010	0.68697	0.75367	0.0	0.185920
14	2.87037E-02	1.47005	0.34417	1.79322	0.0	0.185920
15	-1.54812E-02	1.47003	-0.55483	-0.39928	0.0	0.185920
16	7.51495E-03	1.47002	-0.47791	-0.61000	0.0	0.185920
17	6.26087E-03	1.47001	0.83938	0.74932	0.0	0.185920
18	6.21700E-03	1.47001	0.99921	0.74670	0.0	0.185920
19	5.84793E-03	1.47001	0.94648	0.79008	0.0	0.185920
20	5.33485E-03	1.47001	0.91760	0.74364	0.0	0.185920
21	4.81701E-03	1.47001	0.90775	0.92440	0.0	0.185920
22	4.48322E-03	1.47001	0.93519	1.04559	0.0	0.185920
23	3.96347E-03	1.47001	0.88803	1.10595	0.0	0.185920
24	3.85761E-03	1.47001	0.97715	0.95875	0.0	0.185920
25	4.15993E-03	1.47001	1.08253	0.90690	0.0	0.185920
26	5.22804E-03	1.47001	1.26199	1.64706	0.0	0.185920
27	7.35569E-03	1.470286	1.41432	1.09395	0.0	0.185920
28	-7.47782E-03	1.40286	-1.02408	-0.67741	0.0	0.185920
29	5.71442E-03	1.40286	-0.75847	-0.73219	0.0	0.185920
30	1.85394E-03	1.40286	0.32629	0.80263	0.0	0.185920
31	1.23692E-02	1.34531	0.66842	0.00448	0.0	0.185920
32	7.08580E-04	1.34531	0.57357	0.73737	0.0	0.185920
33	5.52177E-04	1.34531	0.77983	0.67123	0.0	0.185920
34	4.87328E-04	1.34531	0.88304	0.48979	0.0	0.185920
35	4.44412E-04	1.34531	0.91238	0.20833	0.0	0.185920
36	3.98636E-04	1.34531	0.89739	0.0	0.0	0.185920
37	3.57628E-04	1.34531	0.89749	0.89749	0.0	0.185920
38	3.21388E-04	1.34531	0.89899	0.89899	0.0	0.185920
39	2.88010E-04	1.34531	0.89643	0.89643	0.0	0.185920
	2.49230E-03	EXTRAPOLATION WITH	8.6553			0.185920
40	1.14441E-05	1.00000	0.03975	0.03975	0.0	0.185920
41	1.52588E-05	1.34531	1.33335	1.23469	0.0	0.185920
42	1.23978E-05	1.34531	0.81251	1.06611	0.0	0.185920

END OF ADJOINT CALCULATION - ITERATION TIME 0.049 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000143 K 0.1859226

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B*2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	1.17358E-02	3.17588E-01	0.0	0.0	0.0	4.42253E-02	0.0	0.0
2	0.0	5.22511E-03	1.42067E-01	0.0	0.0	0.0	1.97429E-02	0.0	0.0
3	0.0	2.05179E-03	5.54690E-02	0.0	0.0	0.0	7.65224E-03	0.0	0.0
4	0.0	2.29658E-03	4.00185E-02	0.0	0.0	0.0	5.72069E-03	0.0	0.0
SUM	0.0	2.13093E-02	5.55142E-01	0.0	0.0	0.0	7.73410E-02	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSORP
1	2.03304E 00	8.30431E-01	3.22719E 00	9.82730E-03	3.23702E 00	3.23702E 00	1.37497E-01
2	1.15687E 00	5.29524E-01	1.07573E 00	7.77703E-01	1.85343E 00	1.85343E 00	2.15656E-01
3	7.41986E-01	2.73988E-01	5.37865E-01	5.43282E-01	1.08114E 00	1.08115E 00	1.62653E-01
4	7.92962E-01	2.36184E-03	5.37865E-01	3.05493E-01	8.43360E-01	8.43358E-01	4.41749E-01
SUM	4.72485E 00	1.63630E 00	5.37865E 00	1.63630E 00	7.01495E 00	7.01495E 00	

GROUP NEUTRON BALANCE FOR EACH ZONE

ZONE NUMBER 1-- CORE VOLUME 5.64858E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	1.95676E 00	8.21141E-01	3.49441E-02	0.0	0.0	7.44401E-03	3.22719E 00	2.79537E 05	1.23720E-03
2	1.12269E 00	5.20822E-01	1.55937E-02	0.0	0.0	7.71141E-01	1.07573E 00	2.49486E 05	5.52099E-04
3	7.24117E-01	2.69130E-01	6.03461E-03	0.0	0.0	5.33914E-01	5.37865E-01	1.20686E 05	2.13658E-04
4	7.88152E-01	0.0	4.37887E-03	0.0	0.0	2.98574E-01	5.37865E-01	3.50290E 05	1.55034E-04

SUM 4.59171E 00 1.61107E 00 6.09513E-02 0.0 0.0 1.61107E 00 5.37865E 00 9.99999E 05

ZONE NUMBER 2-- REFLECTOR VOLUME 4.42336E 03

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	7.51178E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.32312E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.29306E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.62086E-05	0.0	1.62086E-04	0.0	0.0	0.0	0.0	0.0	3.66431E-05

SUM 1.21296E-01 0.0 1.62086E-04 0.0 0.0 0.0 0.0 0.0 0.0

ZONE NUMBER 3-- VOLUME 7.19801E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	1.16130E-03	9.29043E-03	9.28117E-03	0.0	0.0	2.38329E-03	0.0	0.0	1.29070E-04
2	9.55265E-04	8.72198E-03	4.14918E-03	0.0	0.0	6.56150E-03	0.0	0.0	5.77010E-05
3	4.93871E-03	4.85776E-03	1.61764E-03	0.0	0.0	9.36737E-03	0.0	0.0	2.24958E-05
4	4.79452E-03	2.36184E-03	1.17974E-03	0.0	0.0	6.91985E-03	0.0	0.0	1.64062E-05

SUM 1.18498E-02 2.52320E-02 1.62277E-02 0.0 0.0 2.52320E-02 0.0 0.0

2-D PERTURBATION (OLD EXTERMINATOR CASE)
 9X24X4 GROUP, 864 POINTS   STREAM OF CITATION CASES ORNL 72

POINT POWER DISTRIBUTION (WATTS/CC)

	1	2	3	4	5	6	7	8	9
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.043E 00	9.719E-01	0.0	0.0	1.546E 00	1.413E 00	1.011E 00	0.0	0.0
6	1.653E 00	1.477E 00	0.0	0.0	2.384E 00	2.170E 00	1.497E 00	0.0	0.0
7	2.471E 00	2.139E 00	0.0	0.0	3.360E 00	3.025E 00	2.042E 00	0.0	0.0
8	3.626E 00	3.047E 00	0.0	0.0	4.539E 00	4.021E 00	2.667E 00	0.0	0.0
9	5.314E 00	4.346E 00	0.0	0.0	6.009E 00	5.206E 00	3.391E 00	0.0	0.0
10	7.826E 00	6.298E 00	0.0	0.0	7.886E 00	6.606E 00	4.225E 00	0.0	0.0
11	1.154E 01	9.474E 00	0.0	0.0	1.034E 01	8.266E 00	5.174E 00	0.0	0.0
12	1.663E 01	1.529E 01	1.404E 01	1.353E 01	1.358E 01	1.014E 01	6.202E 00	0.0	0.0
13	2.208E 01	2.098E 01	1.983E 01	1.880E 01	1.694E 01	1.210E 01	7.272E 00	0.0	0.0
14	2.753E 01	2.639E 01	2.506E 01	2.353E 01	2.028E 01	1.411E 01	8.369E 00	0.0	0.0
15	3.272E 01	3.143E 01	2.983E 01	2.784E 01	2.350E 01	1.609E 01	9.457E 00	0.0	0.0
16	3.753E 01	3.604E 01	3.417E 01	3.178E 01	2.653E 01	1.799E 01	1.051E 01	0.0	0.0
17	4.190E 01	4.022E 01	3.808E 01	3.534E 01	2.932E 01	1.976E 01	1.150E 01	0.0	0.0
18	4.579E 01	4.393E 01	4.156E 01	3.851E 01	3.184E 01	2.137E 01	1.240E 01	0.0	0.0
19	4.917E 01	4.716E 01	4.459E 01	4.128E 01	3.405E 01	2.280E 01	1.321E 01	0.0	0.0
20	5.203E 01	4.988E 01	4.715E 01	4.362E 01	3.593E 01	2.402E 01	1.390E 01	0.0	0.0
21	5.434E 01	5.208E 01	4.921E 01	4.552E 01	3.746E 01	2.502E 01	1.446E 01	0.0	0.0
22	5.609E 01	5.375E 01	5.078E 01	4.696E 01	3.862E 01	2.578E 01	1.489E 01	0.0	0.0
23	5.726E 01	5.487E 01	5.183E 01	4.792E 01	3.940E 01	2.629E 01	1.518E 01	0.0	0.0
24	5.785E 01	5.543E 01	5.236E 01	4.841E 01	3.979E 01	2.655E 01	1.533E 01	0.0	0.0

2-D PERTURBATION (OLD EXTERMINATOR CASE)
9X24X4 GROUP, 864 POINTS   STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS.   LAMBDA(PHI* M PHI) = 1.144557E-02

COMP	NAME	GRP	SIGA, SIGR, 08**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE	1	-9.706219E 00	7.007422E 01	-8.499362E-02	-4.853380E 00
		2	-6.192710E 00	3.128123E 01	-5.428036E-02	-3.096528E 00
		3	-2.618921E 00	1.210167E 01	-2.298167E-02	-1.309525E 00
		4	-3.623317E 00	8.711510E 00	-3.069989E-02	-1.811759E 00
2	REFLECTOR	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	-1.693007E-02	9.106118E-03	-2.542743E-04	-1.693007E-02
3		1	-1.866440E-01	1.316110E 00	-1.257310E-02	-1.864576E-01
		2	-1.182582E-01	5.885043E-01	-7.989477E-03	-1.181402E-01
		3	-4.910842E-02	2.292884E-01	-3.346435E-03	-4.905941E-02
		4	-6.490189E-02	1.653181E-01	-4.535470E-03	-6.483710E-02

COMP	NAME	GRP. K --- SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE	1 9.706219E 00 4.332900E 00 1.676246E 00 1.206492E 00
		2 1.387244E 01 6.192710E 00 2.395747E 00 1.724424E 00
		3 1.516475E 01 6.769562E 00 2.618921E 00 1.885292E 00
		4 2.913487E 01 1.300563E 01 5.031502E 00 3.623317E 00
2	REFLECTOR	1 0.0 0.0 0.0 0.0
		2 0.0 0.0 0.0 0.0
		3 0.0 0.0 0.0 0.0
		4 0.0 0.0 0.0 1.693007E-02
3		1 1.866440E-01 8.345902E-02 3.251657E-02 2.343795E-02
		2 2.644676E-01 1.182582E-01 4.607479E-02 3.321228E-02
		3 2.818810E-01 1.260443E-01 4.910842E-02 3.540481E-02
		4 5.162278E-01 2.308304E-01 8.593500E-02 6.490189E-02

END OF CASE - TOTAL CPU TIME WAS 0.18 MINUTES TOTAL CLOCK TIME WAS 1.48 MINUTES

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

2-D CASE PERTURBED TO CHECK PERTURBATION RESULT, D(1,1) CHANGED -.05
 9X74X4 GROUP, 864 POINTS STREAM OF CITATION CASES DRNL 72

CENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	12	6	12	24
1.000000E 01	9.999999E-04	9.999999E 09	9.999999E 23	0.0													1.000000E 00						

FISSION SOURCE DISTRIBUTION AND SUM 0.60000 0.20000 0.10000 0.10000 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1395

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 2 24 1 4 3 3 12 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 7779

MEMORY LOCATIONS NOT USED----- 32221

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	CORE	1	4.50028E-01	1.17500E-02	2.80000E-02	4.00000E-03	1.00000E-03	4.00000E 03
		2	5.00028E-01	1.67000E-02	3.60000E-02	8.00000E-03	1.00000E-03	8.00000E 03
		3	5.00025E-01	2.23000E-02	5.99999E-02	1.00000E-02	1.00000E-03	1.00000E 04
		4	5.00028E-01	0.0	8.99999E-02	4.00000E-02	1.00000E-03	4.00000E 04
2	REFLECTOR	1	0.0	0.0	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0	0.0	0.0
		4	1.00000E 00	0.0	9.99998E-05	0.0	1.00000E-03	0.0
3		1	9.99002E-01	1.00000E-03	1.25000E-04	0.0	1.00000E-03	0.0
		2	9.99002E-01	2.10000E-03	2.30000E-04	0.0	1.00000E-03	0.0
		3	9.99002E-01	3.00000E-03	3.04999E-03	0.0	1.00000E-03	0.0
		4	9.99002E-01	2.00000E-03	4.05999E-03	0.0	1.00000E-03	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	1	2	3	4
1	1		0.0	1.10000E-02	5.00000E-04	2.50000E-04
	2		2.00000E-04	0.0	1.60000E-02	5.00000E-04
	3		1.00000E-04	2.00000E-04	0.0	2.20000E-02
	4		0.0	0.0	0.0	0.0
2	1		0.0	0.0	0.0	0.0
	2		0.0	0.0	0.0	0.0
	3		0.0	0.0	0.0	0.0
	4		0.0	0.0	0.0	0.0
3	1		0.0	5.00000E-04	3.00000E-04	2.00000E-04
	2		4.00000E-04	0.0	1.30000E-03	4.00000E-04

3	3.00000E-04	6.08700E-04	9.0	2.10000E-03		
4	2.00000E-04	8.00000E-04	1.00000E-03	0.0		
2-D CASE PERTURBED TO CHECK PERTURBATION RESULTS. D(1,1) CHANGED -0.05						
5X24X4 GROUP, 864 POINTS STREAM OF CITATION CASES GRN1 72						
LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-3.23677E-01	1.00000	-1.44695	0.0	0.0	0.089107
2	4.57975E-00	1.76893	-1.74891	-1.34791	0.50454	0.171277
3	3.34830E-00	1.62593	4.32375	0.16787	-0.11635	0.121472
4	5.78732E-00	1.54713	7.41834	0.21525	-0.09039	0.173272
5	1.15325E-01	1.50717	13.52540	0.22587	2.72846	0.176774
6	7.48818E-01	1.38769	27.03925	0.09534	0.38881	0.174454
7	3.41350E-00	1.47826	3.51076	0.35266	2.22700	0.176991
8	-0.379624E-01	1.47354	-0.81407	-0.20175	0.88230	0.178974
9	-0.01589E-01	1.47186	0.29506	0.61423	0.70277	0.180248
10	-3.27703E-01	1.47088	0.32563	0.72784	0.82827	0.181300
11	-1.69247E-01	1.47042	0.34722	0.80702	0.83967	0.182176
12	-1.88468E-01	1.47020	0.92510	0.84388	0.85158	0.182942
13	-2.00100E-01	1.47010	0.86162	0.84107	0.83973	0.183599
14	-1.06852E-01	1.47005	0.42714	0.84571	0.83592	0.184154
15	-8.68902E-02	1.47003	0.72629	0.84523	0.84377	0.184613
16	-7.97650E-02	1.47002	0.83823	0.83727	0.84320	0.185008
17	-7.55096E-02	1.47001	0.87114	0.84042	0.84155	0.185336
18	-7.07695E-02	1.47001	0.86646	0.83878	0.84323	0.185612
19	-6.57786E-02	1.47001	0.86370	0.83614	0.84168	
	-3.98732E-01	EXTRAPOLATION WITH	5.6630			0.187149
20	3.54176E-02	1.00000	-0.50302	-3.41471	5.62257	0.187138
21	-2.75711E-02	1.47001	-0.80603	-0.70184	-0.00802	0.187110
22	-2.67227E-02	1.47001	0.94251	0.83242	1.05322	0.187084
23	-2.91629E-02	1.47001	1.06215	0.85574	1.05981	0.187060
24	-3.14022E-02	1.47001	1.26177	1.47054	0.98706	0.187041
25	4.87337E-02	1.47001	-1.23704	-0.59549	1.18399	0.187018
26	2.97499E-02	1.47001	0.64021	1.45615	0.97594	0.186995
27	-2.97685E-02	1.47001	-1.03039	-0.81784	0.87702	0.186979
28	3.20702E-02	1.47001	-1.04525	-0.49859	1.13916	0.186956
29	-1.41387E-02	1.47001	-0.45501	-1.12184	0.74414	0.186942
30	8.02517E-03	1.47001	-0.55958	-0.07140	1.05163	0.186926
31	5.39017E-03	1.47001	0.67705	0.84535	0.87768	0.186913
32	5.00107E-03	1.47001	0.93281	0.83595	0.90440	0.186901
33	4.79126E-03	1.47001	0.96284	0.84223	0.89562	0.186890
34	4.13132E-03	1.47001	0.86639	0.84113	0.88263	0.186881
35	3.75462E-03	1.47001	0.91257	0.83784	0.87814	0.186873
36	3.43227E-03	1.47001	0.91758	0.82330	0.87231	0.186866
37	3.07178E-03	1.47001	0.89804	0.83401	0.86680	0.186860
38	2.73323E-03	1.47001	0.89252	0.84588	0.86163	0.186855
39	2.40803E-03	1.47001	0.88343	0.84411	0.85662	0.186851
40	2.10571E-03	1.47001	0.87656	0.84032	0.85168	0.186847
41	1.82915E-03	1.47001	0.87049	0.83432	0.84671	
	1.05445E-02	EXTRAPOLATION WITH	5.7753			0.186827
42	1.13487E-04	1.00000	0.06216	0.55457	5.64097	0.186827
43	9.91621E-05	1.47001	0.87405	1.56752	-0.01455	0.186827
44	-7.79629E-05	1.47001	-0.78614	-0.80686	1.29677	0.186827
END OF EIGENVALUE CALCULATION - ITERATION TIME 0.079 MINUTES						
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000200 K 0.1868303						
LEAKAGE 5.54295E-01 TOTAL LOSSES 5.35253E-00 TOTAL PRODUCTIONS 1.00000E-00 REACTOR POWER(WATTS) 1.00000E-06						
GROSS NEUTRON BALANCE						

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	1.08108E-02	2.99786E-01	0.0	0.0	0.0	4.03370E-02	0.0	0.0
2	0.0	5.05634E-03	1.40228E-01	0.0	0.0	0.0	1.96899E-02	0.0	0.0
3	0.0	1.98755E-03	5.47427E-02	0.0	0.0	0.0	7.62118E-03	0.0	0.0
4	0.0	2.23248E-03	3.94521E-02	0.0	0.0	0.0	5.68838E-03	0.0	0.0
SUM	0.0	2.00872E-02	5.34208E-01	0.0	0.0	0.0	7.33363E-02	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	2.03698E 00	8.33394E-01	3.21152E 00	9.79422E-03	3.22131E 00	3.22131E 00	1.37814E-01
2	1.15671E 00	5.29496E-01	1.07051E 00	7.80677E-01	1.85118E 00	1.85118E 00	2.15723E-01
3	7.40662E-01	2.73507E-01	5.35253E-01	5.43268E-01	1.07852E 00	1.07852E 00	1.62692E-01
4	7.90541E-01	2.32740E-03	5.35253E-01	3.04987E-01	8.40241E-01	8.40240E-01	4.41780E-01
SUM	4.72489E 00	1.63872E 00	5.35253E 00	1.63872E 00	6.99125E 00	6.99125E 00	

GROUP NEUTRON BALANCE FOR EACH ZONE

ZONE NUMBER 1-- CORE VOLUME 5.64858E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	1.96508E 00	8.24632E-01	3.15836E-02	0.0	0.0	7.44322E-03	3.21152E 00	2.80726E 05	1.24246E-03
2	1.12288E 00	5.20891E-01	1.55964E-02	0.0	0.0	7.74406E-01	1.07051E 00	2.49529E 05	5.52194E-04
3	7.22999E-01	2.68715E-01	6.02529E-03	0.0	0.0	5.34149E-01	5.35253E-01	1.20500E 05	2.13328E-04
4	7.85800E-01	0.0	4.36581E-03	0.0	0.0	2.98241E-01	5.35253E-01	3.49245E 05	1.54572E-04
SUM	4.59676E 00	1.61424E 00	5.75711E-02	0.0	0.0	1.61424E 00	5.35253E 00	9.99999E 05	

ZONE NUMBER 2-- REFLECTOR VOLUME 4.42336E 03

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	7.08095E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.28896E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.27913E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.60038E-05	0.0	1.60038E-04	0.0	0.0	0.0	0.0	0.0	3.61802E-05
SUM	1.16506E-01	0.0	1.60038E-04	0.0	0.0	0.0	0.0	0.0	

ZONE NUMBER 3-- VOLUME 7.19801E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	1.09526E-03	8.76208E-03	8.75333E-03	0.0	0.0	2.35101E-03	0.0	0.0	1.21729E-04
2	9.42439E-04	8.60488E-03	4.09347E-03	0.0	0.0	6.27048E-03	0.0	0.0	5.69263E-05
3	4.87230E-03	4.79244E-03	1.59589E-03	0.0	0.0	9.11914E-03	0.0	0.0	2.21934E-05
4	4.72460E-03	2.32740E-03	1.16254E-03	0.0	0.0	6.74614E-03	0.0	0.0	1.61669E-05
SUM	1.16346E-02	2.44868E-02	1.56052E-02	0.0	0.0	2.44868E-02	0.0	0.0	

END OF CASE - TOTAL CPU TIME WAS 0.09 MINUTES TOTAL CLOCK TIME WAS 0.46 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

2-D CASE PERTURBED TO CHECK PERTURBATION RESULT, D(1,1) CHANGED -.25
 9X24X4 GROUP, 864 POINTS STREAM OF CITATION CASES ORNL 72

FISSION SOURCE DISTRIBUTION AND SUM 0.60000 0.20000 0.10000 0.10000 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1395

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 9 24 1 4 3 3 12 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 7779

MEMORY LOCATIONS NOT USED----- 32221

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	CORE	1	2.50014E-01	1.17500E-02	2.80000E-02	4.00000E-03	1.00000E-03	4.00000E 03
		2	5.00028E-01	1.67000E-02	3.60000E-02	8.00000E-03	1.00000E-03	8.00000E 03
		3	5.00025E-01	2.23000E-02	5.99999E-02	1.00000E-02	1.00000E-03	1.00000E 04
		4	5.00028E-01	0.0	8.99999E-02	4.00000E-02	1.00000E-03	4.00000E 04
2	REFLECTOR	1	0.0	0.0	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0	0.0	0.0
		4	1.00000E 00	0.0	9.99998E-05	0.0	1.00000E-03	0.0
3		1	9.99002E-01	1.00000E-03	1.25000E-04	0.0	1.00000E-03	0.0
		2	9.99002E-01	2.10000E-03	2.30000E-04	0.0	1.00000E-03	0.0
		3	9.99002E-01	3.00000E-03	3.04999E-03	0.0	1.00000E-03	0.0
		4	9.99002E-01	2.00000E-03	4.05999E-03	0.0	1.00000E-03	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	1	2	3	4
1	1		0.0	1.10000E-02	5.00000E-04	2.50000E-04
	2		2.00000E-04	0.0	1.60000E-02	5.00000E-04
	3		1.00000E-04	2.00000E-04	0.0	2.20000E-02
	4		0.0	0.0	0.0	0.0
2	1		0.0	0.0	0.0	0.0
	2		0.0	0.0	0.0	0.0
	3		0.0	0.0	0.0	0.0
	4		0.0	0.0	0.0	0.0
3	1		0.0	5.00000E-04	3.00000E-04	2.00000E-04
	2		4.00000E-04	0.0	1.30000E-03	4.00000E-04
	3		3.00000E-04	6.00000E-04	0.0	2.10000E-03
	4		2.00000E-04	8.00000E-04	1.00000E-03	0.0

2-D CASE PERTURBED TO CHECK PERTURBATION RESULT, D(1,1) CHANGED -.25
 9X24X4 GROUP, 864 POINTS STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-7.23477E-01	1.00000	-1.44695	0.0	0.0	0.099285
2	5.15432E 00	1.76993	-1.97005	-1.97005	0.58137	0.171683
3	3.50204E 00	1.62593	4.18148	0.10768	-0.00363	0.174434
4	6.65699E 00	1.54713	8.55788	0.22383	-11.32960	0.177158
5	1.28672E 01	1.50717	14.80007	0.20637	0.98995	0.180946
6	2.75329E 01	1.48769	29.67271	0.09507	0.42383	0.180092
7	3.36094E 00	1.47836	3.48301	0.45000	2.30433	0.181729
8	-5.19458E-01	1.47394	-0.67402	-0.12619	0.84793	0.183404
9	-5.07001E-01	1.47186	0.46902	0.58882	0.77075	0.184598
10	-2.72380E-01	1.47088	0.26486	0.76492	0.84655	0.185641
11	-1.62979E-01	1.47042	0.43537	0.83464	0.83304	0.186508
12	-1.78816E-01	1.47020	0.91835	0.84561	0.84347	0.187259
13	-1.98861E-01	1.47010	0.91324	0.86371	0.83726	0.187897
14	-1.03176E-01	1.47005	0.41566	0.84771	0.83712	0.188436
15	-8.74956E-02	1.47003	0.76053	0.84516	0.84339	0.188885
16	-8.44445E-02	1.47002	0.88068	0.84114	0.84352	0.189271
17	-7.93935E-02	1.47001	0.86079	0.83922	0.84214	0.189593
18	-7.46733E-02	1.47001	0.86587	0.84048	0.84339	0.189864
19	-6.96930E-02	1.47001	0.86361	0.84260	0.84286	
	-4.35067E-01	EXTRAPOLATION WITH	5.8076			0.191411
20	3.51229E-02	1.00000	-0.46884	-3.30237	5.76132	0.191401
21	-2.77506E-02	1.47001	-0.81785	-0.63775	-0.01096	0.191375
22	-2.70032E-02	1.47001	0.94606	0.82868	0.96037	0.191350
23	-2.95641E-02	1.47001	1.06527	0.88897	0.94182	0.191328
24	-3.85300E-02	1.47001	1.26474	1.47543	0.92537	0.191309
25	4.89187E-02	1.47001	-1.22071	-0.61427	1.08345	0.191289
26	2.59256E-02	1.47001	0.55590	1.56180	0.94297	0.191269
27	-3.18609E-02	1.47001	-1.26080	-0.69719	0.91144	0.191254
28	3.33595E-02	1.47001	-1.01367	-0.58625	1.06529	0.191235
29	-1.70646E-02	1.47001	-0.52860	-0.99156	0.78882	0.191222
30	1.03531E-02	1.47001	-0.59635	-0.07765	1.01595	0.191208
31	5.17845E-03	1.47001	0.50536	0.84816	0.87900	0.191196
32	4.71115E-03	1.47001	0.91447	0.84587	0.91465	0.191185
33	4.50325E-03	1.47001	0.96037	0.85009	0.89550	0.191175
34	4.07887E-03	1.47001	0.90984	0.84337	0.88752	0.191167
35	3.75557E-03	1.47001	0.92449	0.84628	0.88385	0.191159
36	3.48663E-03	1.47001	0.93188	0.84397	0.87746	0.191153
37	3.16143E-03	1.47001	0.90989	0.84127	0.87277	0.191147
38	2.86198E-03	1.47001	0.90814	0.83774	0.86819	0.191142
39	2.55680E-03	1.47001	0.89593	0.83468	0.86348	0.191138
40	2.26879E-03	1.47001	0.88962	0.83796	0.85927	0.191134
41	1.99795E-03	1.47001	0.88262	0.84810	0.85473	
	1.28158E-02	EXTRAPOLATION WITH	6.4271			0.191112
42	1.17302E-04	1.00000	0.05883	0.67686	6.27431	0.191112
43	-1.02162E-04	1.47001	-0.87104	-1.45569	-0.01831	0.191112
44	-9.93609E-05	1.47001	0.97248	0.54723	1.14026	0.191113

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.681 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000191 K 0.1911157

LEAKAGE 4.49819E-01 TOTAL LOSSES 5.23251E 00 TOTAL PRODUCTIONS 1.00000E 00 REACTOR POWER(WATTS) 1.00000E 06

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	HIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	7.12723E-03	2.13149E-01	0.0	0.0	0.0	2.41170E-02	0.0	0.0
2	0.0	4.46755E-03	1.32583E-01	0.0	0.0	0.0	1.94655E-02	0.0	0.0
3	0.0	1.76067E-03	5.16747E-02	0.0	0.0	0.0	7.48414E-03	0.0	0.0
4	0.0	2.00539E-03	3.70507E-02	0.0	0.0	0.0	5.54651E-03	0.0	0.0
SUM	0.0	1.53612E-02	4.34458E-01	0.0	0.0	0.0	5.66172E-02	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	2.05681E 00	8.47953E-01	3.13950E 00	9.65518E-03	3.14916E 00	3.14916E 00	1.39317E-01
2	1.15600E 00	5.29266E-01	1.04650E 00	7.95268E-01	1.84178E 00	1.84179E 00	2.15958E-01
3	7.34278E-01	2.71154E-01	5.23251E-01	5.43100E-01	1.06635E 00	1.06635E 00	1.62835E-01
4	7.78979E-01	2.18393E-03	5.23251E-01	3.02513E-01	8.25765E-01	8.25764E-01	4.41907E-01
SUM	4.72607E 00	1.65055E 00	5.23251E 00	1.65055E 00	6.88306E 00	6.88306E 00	

GROUP NEUTRON BALANCE FOR EACH ZONE

ZONE NUMBER 1-- CORE VOLUME 5.64858E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	2.00585E 00	8.41740E-01	1.79104E-02	0.0	0.0	7.43685E-03	3.13950E 00	2.86550E 05	1.26824E-03
2	1.12341E 00	5.21140E-01	1.56039E-02	0.0	0.0	7.90403E-01	1.04650E 00	2.49648E 05	5.52457E-04
3	7.17396E-01	2.66633E-01	5.97860E-03	0.0	0.0	5.35114E-01	5.23251E-01	1.19566E 05	2.11675E-04
4	7.74530E-01	0.0	4.30319E-03	0.0	0.0	2.96558E-01	5.23251E-01	3.44236E 05	1.52355E-04
SUM	4.62119E 00	1.62951E 00	4.37960E-02	0.0	0.0	1.62951E 00	5.23251E 00	1.00000E 06	

ZONE NUMBER 2-- REFLECTOR VOLUME 4.42336E 03

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	5.01901E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3.16965E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1.22853E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1.52448E-05	0.0	1.52447E-04	0.0	0.0	0.0	0.0	0.0	3.44642E-05
SUM	9.41870E-02	0.0	1.52447E-04	0.0	0.0	0.0	0.0	0.0	

ZONE NUMBER 3-- VOLUME 7.19801E 04

GRP	ABSORPTIONS	OUT-SCATTER	B**2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	7.76611E-04	6.21287E-03	6.20667E-03	0.0	0.0	2.21833E-03	0.0	0.0	8.63138E-05
2	8.89993E-04	8.12666E-03	3.86565E-03	0.0	0.0	4.88424E-03	0.0	0.0	3.37586E-05
3	4.59646E-03	4.52114E-03	1.50554E-03	0.0	0.0	7.98624E-03	0.0	0.0	2.09370E-05
4	4.43336E-03	2.18393E-03	1.09088E-03	0.0	0.0	5.95519E-03	0.0	0.0	1.51704E-05
SUM	1.06964E-02	2.10440E-02	1.26688E-02	0.0	0.0	2.10440E-02	0.0	0.0	

END OF CASE - TOTAL CPU TIME WAS 0.10 MINUTES TOTAL CLOCK TIME WAS 0.43 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

2-D FIXED SOURCE PROBLEM (X,Y - NO FISSION SOURCE, AFTER KAPLAN)
 39X41X1 GROUP, 1599 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	-5	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1	0	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24
1.500000E 00	5.000000E-01	9.999999E 09	9.999999E 23	0.0															1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	6	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
9.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																			
0.0	0.0	1.000000E 00	1.000000E 00	1.000000E 00	0.0																			

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	0.0	0.0	4.692000E-01	4.692000E-01

TWO DIMENSIONAL SLAB GEOMETRY (X,Y) WIDTH 1.904999E 01 HEIGHT 1.904999E 01

REGION SPECIFICATIONS

PTS	REGION	WIDTH																							
2	9.087999E-01	15	7.776099E 00	5	1.680200E 00	15	7.776099E 00	2	9.087999E-01																

PTS	REGION	HEIGHT																							
17	8.813800E 00	4	1.422400E 00	2	2.808999E-01	15	6.829200E 00	3	1.703699E 00																

X-DIR. POINTS 39 Y-DIR. POINTS 41

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																								
2	0.454	3	0.909	4	1.427	5	1.946	6	2.464	7	2.982	8	3.501	9	4.019	10	4.538								
11	5.056	12	5.574	13	6.093	14	6.611	15	7.130	16	7.648	17	8.166	18	8.685	19	9.021								
20	9.357	21	9.693	22	10.029	23	10.365	24	10.884	25	11.402	26	11.920	27	12.439	28	12.957								
29	13.476	30	13.994	31	14.512	32	15.031	33	15.549	34	16.068	35	16.586	36	17.104	37	17.623								
38	18.141	39	18.596	40	19.050																				

I	DIST.																								
2	0.518	3	1.037	4	1.555	5	2.074	6	2.592	7	3.111	8	3.629	9	4.148	10	4.666								
11	5.185	12	5.703	13	6.222	14	6.740	15	7.258	16	7.777	17	8.295	18	8.814	19	9.169								
20	9.525	21	9.881	22	10.236	23	10.377	24	10.517	25	10.972	26	11.428	27	11.883	28	12.338								
29	12.793	30	13.249	31	13.704	32	14.159	33	14.615	34	15.070	35	15.525	36	15.980	37	16.436								
38	16.891	39	17.346	40	17.914	41	18.482	42	19.050																

DISTANCES TO FLUX POINTS

J	DIST.																								
1	0.227	2	0.682	3	1.168	4	1.686	5	2.205	6	2.723	7	3.242	8	3.760	9	4.278								
10	4.797	11	5.315	12	5.834	13	6.352	14	6.870	15	7.389	16	7.907	17	8.426	18	8.853								
19	9.189	20	9.525	21	9.861	22	10.197	23	10.624	24	11.143	25	11.661	26	12.180	27	12.698								
28	13.216	29	13.735	30	14.253	31	14.772	32	15.290	33	15.808	34	16.327	35	16.845	36	17.364								
37	17.882	38	18.368	39	18.823																				

DESCRIPTION OF REACTOR ZONES

ZN TO ZN	SUB-ZNS	SIGMA-SET	ID	CLASS	DPL	NEX	NAME
1 1	0	0	0	0	0	0	BLANKET 1
2 2	0	0	0	0	0	0	BLANKET 2
3 3	0	0	0	0	0	0	BLANKET 3
4 4	0	0	0	0	0	0	SEED
5 5	0	0	0	0	0	0	MOD-STK

FIXED SOURCE INPUT SECTION 026

ZONE-SOURCE (N/CC-SEC)

1 2.14231E-03 2 2.15024E-03 3 2.17729E-03 4 1.048C8E-02

SOURCE DISTRIBUTION AND SUM

1.0000E 00 1.0000D 00

POINT NEUTRON SOURCE- N/SEC

	1	2	3	4	5	6	7	8	9	10	11
1	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
2	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
3	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
4	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
5	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
6	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
7	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
8	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
9	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
10	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
11	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
12	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
13	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
14	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
15	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
16	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
17	0.0	0.0	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04	5.758E-04
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
25	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
26	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
27	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
28	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
29	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
30	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
31	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
32	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
33	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
34	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
35	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
36	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
37	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
38	0.0	0.0	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03	2.474E-03
39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	34	35	36	37	38	39
1	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
2	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
3	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
4	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
5	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
6	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
7	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
8	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
9	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
10	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
11	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
12	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
13	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
14	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
15	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
16	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
17	5.779E-04	5.779E-04	5.779E-04	5.779E-04	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0
22	1.585E-04	1.585E-04	1.585E-04	1.585E-04	0.0	0.0
23	1.585E-04	1.585E-04	1.585E-04	1.585E-04	0.0	0.0
24	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
25	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
26	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
27	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
28	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
29	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
30	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
31	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
32	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
33	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
34	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
35	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
36	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
37	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
38	5.139E-04	5.139E-04	5.139E-04	5.139E-04	0.0	0.0
39	6.410E-04	6.410E-04	6.410E-04	6.410E-04	0.0	0.0
40	6.410E-04	6.410E-04	6.410E-04	6.410E-04	0.0	0.0
41	6.410E-04	6.410E-04	6.410E-04	6.410E-04	0.0	0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS 1/0 INSTEAD OF STORED 0

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 39 41 1 1 0 0 25 5

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 20340

MEMORY LOCATIONS NOT USED----- 19660

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	BLANKET 1	1	2.09500E 00	0.0	6.42560E-02	0.0	0.0	0.0
2	BLANKET 2	1	2.09500E 00	0.0	6.42560E-02	0.0	0.0	0.0
3	BLANKET 3	1	2.09500E 00	0.0	6.42560E-02	0.0	0.0	0.0
4	SEED	1	2.20079E 00	0.0	6.21580E-02	0.0	0.0	0.0
5	MOD-SYR	1	2.23813E 00	0.0	4.95910E-02	0.0	0.0	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	
1	1	1	0.0
2	1	1	0.0
3	1	1	0.0
4	1	1	0.0
5	1	1	0.0

2-D FIXED SOURCE PROBLEM (X,Y - NO FISSION SOURCE, AFTER KAPLAN)
 39X41X1 GROUP, 1599 POINTS- STREAM OF CITATION CASES ORNL 72

A FIXED SOURCE PROBLEM FOLLOWS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	-2.31420E-02	1.00000	-0.04628	0.0	0.0	2.137980 13	0.000000
2	2.88038E-01	1.97690	-12.15853	-12.15853	0.0	2.139130 13	0.999464
3	-1.97359E-01	1.95484	-0.88254	-0.70638	0.0	2.139490 13	0.999829
4	-1.46376E-01	1.93423	0.59530	0.95131	0.0	2.139170 13	1.000150
5	-1.24281E-01	1.91536	0.72477	0.85515	0.0	2.142650 13	0.998378
6	-8.04542E-02	1.89841	0.56690	0.89669	0.0	2.147500 13	0.997743
7	6.43969E-02	1.88344	-0.73602	-0.71472	0.0	2.150190 13	0.998747
8	4.96454E-02	1.87041	0.82057	0.68587	0.0	2.152180 13	0.999075
9	3.56903E-02	1.85921	0.75459	0.76709	0.0	2.153550 13	0.999365
10	-2.58627E-02	1.84969	-0.75050	-0.75029	0.0	2.154590 13	0.999517
11	-1.88767E-02	1.84169	0.71101	0.70504	0.0	2.155420 13	0.999616
12	-1.29674E-02	1.83500	0.67398	0.74802	0.0	2.156030 13	0.999717
13	-1.10272E-02	1.82945	0.83935	0.81620	0.0	2.156480 13	0.999788
14	-7.76708E-03	1.82488	0.69659	0.79294	0.0	2.156880 13	0.999814
15	-6.62124E-03	1.82112	0.84585	0.85802	0.0	2.157250 13	0.999832
16	5.23090E-03	1.81805	-0.78479	-0.76415	0.0	2.157560 13	0.999854
17	4.68922E-03	1.81554	0.90113	0.83341	0.0	2.157860 13	0.999864
18	3.91197E-03	1.81350	0.83816	0.79138	0.0	2.158110 13	0.999883
19	3.20625E-03	1.81185	0.82281	0.79674	0.0	2.158310 13	0.999904
20	2.62642E-03	1.81050	0.82178	0.83690	0.0	2.158470 13	0.999928
21	2.30980E-03	1.80942	0.88176	0.87959	0.0	2.158610 13	0.999935
22	1.96457E-03	1.80854	0.85250	0.86702	0.0	2.158730 13	0.999942
23	1.61266E-03	1.80783	0.82249	0.84923	0.0	2.158840 13	0.999951
24	1.37997E-03	1.80726	0.85709	0.87285	0.0	2.158930 13	0.999956
25	1.15395E-03	1.80680	0.83737	0.86334	0.0	2.159010 13	0.999963
26	9.85146E-04	1.80642	0.85470	0.85316	0.0	2.159090 13	0.999967
27	8.23021E-04	1.80612	0.83625	0.86088	0.0		
	4.60817E-03	EXTRAPOLATION WITH	5.6036			2.159490 13	0.999972
28	-1.94848E-04	1.00000	-0.23694	-0.20035	0.0	2.159490 13	0.999999
29	1.85013E-04	1.80569	-0.94934	-0.71031	0.0	2.159500 13	0.999997
30	1.23978E-04	1.80553	0.67023	0.66205	0.0	2.159500 13	0.999998
31	9.25064E-05	1.80540	0.74625	0.61625	0.0	2.159500 13	0.999998

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.098 MINUTES

LEAKAGE	0.0	TOTAL LOSSES	1.00000E 00	TOTAL PRODUCTIONS	0.0	REACTOR POWER(WATTS)	0.0

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	I/V LOSS	XENON LOSS
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	1.00000E 00	0.0	0.0	0.0	1.00000E 00	0.0	0.0
SUM	1.00000E 00	0.0	0.0	0.0	1.00000E 00	0.0	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--BLANKET 1
4.11747E-02

ZONE 2--BLANKET 2
3.43504E-02

ZONE 3--BLANKET 3
4.11127E-02

ZONE 4--SEED
7.12874E-02

ZONE 5--MOD-STR
4.85892E-02

2-D FIXED SOURCE PROBLEM (X,Y - NE FISSION SOURCE, AFTER KAPLAN)
 39X41X1 GROUP, 1999 POINTS STREAM OF CITATION CASES ONNL 72

GROUP 1 FLUX

	1	2	3	4	5	6	7	8	9	10	11
1	3.6790-02	3.6890-02	3.7110-02	3.7290-02	3.7420-02	3.7490-02	3.7510-02	3.7470-02	3.7390-02	3.7260-02	3.7080-02
2	3.6880-02	3.6980-02	3.7200-02	3.7380-02	3.7500-02	3.7570-02	3.7590-02	3.7560-02	3.7470-02	3.7340-02	3.7160-02
3	3.7060-02	3.7160-02	3.7380-02	3.7560-02	3.7680-02	3.7750-02	3.7760-02	3.7730-02	3.7640-02	3.7500-02	3.7310-02
4	3.7340-02	3.7440-02	3.7650-02	3.7830-02	3.7950-02	3.8010-02	3.8020-02	3.7980-02	3.7890-02	3.7740-02	3.7550-02
5	3.7720-02	3.7810-02	3.8020-02	3.8200-02	3.8310-02	3.8370-02	3.8380-02	3.8330-02	3.8220-02	3.8070-02	3.7870-02
6	3.8190-02	3.8290-02	3.8500-02	3.8660-02	3.8770-02	3.8830-02	3.8820-02	3.8760-02	3.8650-02	3.8490-02	3.8270-02
7	3.8770-02	3.8860-02	3.9070-02	3.9230-02	3.9340-02	3.9380-02	3.9370-02	3.9300-02	3.9180-02	3.9000-02	3.8770-02
8	3.9460-02	3.9550-02	3.9750-02	3.9910-02	4.0010-02	4.0050-02	4.0020-02	3.9940-02	3.9800-02	3.9610-02	3.9360-02
9	4.0270-02	4.0360-02	4.0550-02	4.0710-02	4.0800-02	4.0820-02	4.0790-02	4.0700-02	4.0540-02	4.0330-02	4.0060-02
10	4.1200-02	4.1290-02	4.1480-02	4.1630-02	4.1710-02	4.1720-02	4.1680-02	4.1570-02	4.1400-02	4.1160-02	4.0870-02
11	4.2260-02	4.2350-02	4.2540-02	4.2680-02	4.2750-02	4.2760-02	4.2700-02	4.2570-02	4.2380-02	4.2130-02	4.1800-02
12	4.3470-02	4.3550-02	4.3740-02	4.3870-02	4.3940-02	4.3930-02	4.3860-02	4.3720-02	4.3510-02	4.3230-02	4.2870-02
13	4.4830-02	4.4910-02	4.5090-02	4.5220-02	4.5280-02	4.5270-02	4.5180-02	4.5030-02	4.4790-02	4.4480-02	4.4090-02
14	4.6350-02	4.6430-02	4.6600-02	4.6730-02	4.6790-02	4.6770-02	4.6680-02	4.6500-02	4.6250-02	4.5900-02	4.5470-02
15	4.8040-02	4.8120-02	4.8300-02	4.8420-02	4.8480-02	4.8460-02	4.8360-02	4.8170-02	4.7890-02	4.7520-02	4.7050-02
16	4.9910-02	5.0000-02	5.0180-02	5.0310-02	5.0380-02	5.0360-02	5.0260-02	5.0050-02	4.9750-02	4.9340-02	4.8820-02
17	5.1980-02	5.2060-02	5.2260-02	5.2420-02	5.2490-02	5.2490-02	5.2390-02	5.2180-02	5.1850-02	5.1410-02	5.0840-02
18	5.3880-02	5.3970-02	5.4160-02	5.4330-02	5.4430-02	5.4440-02	5.4330-02	5.4140-02	5.3800-02	5.3320-02	5.2710-02
19	5.5520-02	5.5620-02	5.5810-02	5.6010-02	5.6140-02	5.6180-02	5.6100-02	5.5890-02	5.5530-02	5.5040-02	5.4390-02
20	5.7250-02	5.7380-02	5.7620-02	5.7870-02	5.8050-02	5.8120-02	5.8060-02	5.7850-02	5.7490-02	5.6980-02	5.6300-02
21	5.9060-02	5.9250-02	5.9540-02	5.9930-02	6.0180-02	6.0290-02	6.0260-02	6.0060-02	5.9690-02	5.9150-02	5.8440-02
22	6.0360-02	6.0610-02	6.1080-02	6.1520-02	6.1830-02	6.1980-02	6.1960-02	6.1760-02	6.1400-02	6.0840-02	6.0100-02
23	6.1100-02	6.1390-02	6.1950-02	6.2460-02	6.2800-02	6.2970-02	6.2960-02	6.2770-02	6.2400-02	6.1840-02	6.1090-02
24	6.2670-02	6.3050-02	6.3910-02	6.4550-02	6.4970-02	6.5180-02	6.5200-02	6.5020-02	6.4650-02	6.4070-02	6.3290-02
25	6.4570-02	6.5450-02	6.6530-02	6.7330-02	6.7850-02	6.8130-02	6.8190-02	6.8030-02	6.7650-02	6.7050-02	6.6220-02
26	6.7090-02	6.7630-02	6.8810-02	6.9730-02	7.0330-02	7.0670-02	7.0760-02	7.0610-02	7.0220-02	6.9600-02	6.8730-02
27	6.8980-02	6.9550-02	7.0800-02	7.1780-02	7.2450-02	7.2820-02	7.2900-02	7.2790-02	7.2400-02	7.1760-02	7.0850-02
28	7.0620-02	7.1210-02	7.2490-02	7.3510-02	7.4220-02	7.4620-02	7.4750-02	7.4610-02	7.4210-02	7.3550-02	7.2610-02
29	7.1990-02	7.2590-02	7.3890-02	7.4940-02	7.5660-02	7.6080-02	7.6220-02	7.6080-02	7.5670-02	7.4990-02	7.4030-02
30	7.3090-02	7.3690-02	7.5000-02	7.6060-02	7.6790-02	7.7220-02	7.7360-02	7.7220-02	7.6800-02	7.6100-02	7.5120-02
31	7.3920-02	7.4520-02	7.5830-02	7.6890-02	7.7630-02	7.8050-02	7.8190-02	7.8040-02	7.7610-02	7.6900-02	7.5890-02
32	7.4490-02	7.5090-02	7.6390-02	7.7440-02	7.8160-02	7.8580-02	7.8700-02	7.8540-02	7.8100-02	7.7370-02	7.6360-02
33	7.4790-02	7.5380-02	7.6670-02	7.7700-02	7.8410-02	7.8800-02	7.8910-02	7.8730-02	7.8280-02	7.7540-02	7.6520-02
34	7.4840-02	7.5420-02	7.6690-02	7.7690-02	7.8360-02	7.8730-02	7.8810-02	7.8610-02	7.8140-02	7.7400-02	7.6370-02
35	7.4660-02	7.5220-02	7.6440-02	7.7390-02	7.8020-02	7.8340-02	7.8390-02	7.8170-02	7.7690-02	7.6940-02	7.5910-02
36	7.4260-02	7.4780-02	7.5940-02	7.6820-02	7.7370-02	7.7650-02	7.7660-02	7.7410-02	7.6910-02	7.6150-02	7.5130-02
37	7.3670-02	7.4130-02	7.5190-02	7.5950-02	7.6420-02	7.6620-02	7.6580-02	7.6310-02	7.5790-02	7.5020-02	7.4010-02
38	7.2950-02	7.3320-02	7.4170-02	7.4760-02	7.5120-02	7.5250-02	7.5160-02	7.4850-02	7.4310-02	7.3540-02	7.2540-02
39	7.2100-02	7.2300-02	7.2690-02	7.3040-02	7.3260-02	7.3300-02	7.3160-02	7.2810-02	7.2250-02	7.1480-02	7.0480-02
40	7.1350-02	7.1460-02	7.1650-02	7.1830-02	7.1940-02	7.1900-02	7.1710-02	7.1330-02	7.0760-02	6.9980-02	6.8990-02
41	7.0450-02	7.1010-02	7.1130-02	7.1240-02	7.1290-02	7.1220-02	7.1000-02	7.0600-02	7.0020-02	6.9240-02	6.8260-02
	12	13	14	15	16	17	18	19	20	21	22
1	3.6850-02	3.6580-02	3.6270-02	3.5910-02	3.5500-02	3.5050-02	3.4650-02	3.4420-02	3.4250-02	3.4140-02	3.4090-02
2	3.6930-02	3.6660-02	3.6340-02	3.5970-02	3.5560-02	3.5110-02	3.4710-02	3.4470-02	3.4300-02	3.4190-02	3.4140-02
3	3.7080-02	3.6800-02	3.6470-02	3.6100-02	3.5690-02	3.5230-02	3.4820-02	3.4580-02	3.4400-02	3.4280-02	3.4230-02
4	3.7310-02	3.7020-02	3.6680-02	3.6300-02	3.5880-02	3.5400-02	3.4990-02	3.4740-02	3.4550-02	3.4430-02	3.4370-02
5	3.7610-02	3.7310-02	3.6970-02	3.6570-02	3.6130-02	3.5640-02	3.5220-02	3.4960-02	3.4760-02	3.4630-02	3.4560-02
6	3.8010-02	3.7690-02	3.7330-02	3.6910-02	3.6450-02	3.5950-02	3.5510-02	3.5230-02	3.5020-02	3.4880-02	3.4800-02
7	3.8480-02	3.8150-02	3.7760-02	3.7330-02	3.6850-02	3.6320-02	3.5860-02	3.5570-02	3.5340-02	3.5180-02	3.5090-02
8	3.9060-02	3.8700-02	3.8290-02	3.7830-02	3.7320-02	3.6760-02	3.6270-02	3.5970-02	3.5720-02	3.5540-02	3.5430-02
9	3.9730-02	3.9350-02	3.8910-02	3.8410-02	3.7870-02	3.7280-02	3.6760-02	3.6430-02	3.6160-02	3.5960-02	3.5820-02
10	4.0510-02	4.0100-02	3.9620-02	3.9090-02	3.8510-02	3.7870-02	3.7320-02	3.6970-02	3.6670-02	3.6440-02	3.6270-02
11	4.1410-02	4.0960-02	4.0450-02	3.9870-02	3.9240-02	3.8560-02	3.7960-02	3.7580-02	3.7250-02	3.6980-02	3.6780-02
12	4.2450-02	4.1950-02	4.1390-02	4.0760-02	4.0080-02	3.9330-02	3.8690-02	3.8270-02	3.7900-02	3.7600-02	3.7360-02

36	5.1040-02	4.9180-02	4.7510-02	4.6010-02	4.4660-02	4.3440-02	4.2330-02	4.1340-02	4.0440-02	3.9620-02	3.8890-02
37	5.0990-02	4.9190-02	4.7560-02	4.6040-02	4.4750-02	4.3540-02	4.2440-02	4.1450-02	4.0550-02	3.9740-02	3.9000-02
38	5.0900-02	4.9160-02	4.7580-02	4.6130-02	4.4820-02	4.3620-02	4.2530-02	4.1540-02	4.0640-02	3.9830-02	3.9090-02
39	5.0780-02	4.9110-02	4.7580-02	4.6160-02	4.4860-02	4.3680-02	4.2600-02	4.1610-02	4.0720-02	3.9910-02	3.9170-02
40	5.0660-02	4.9060-02	4.7560-02	4.6170-02	4.4890-02	4.3720-02	4.2650-02	4.1670-02	4.0770-02	3.9960-02	3.9220-02
41	5.0540-02	4.9020-02	4.7550-02	4.6180-02	4.4910-02	4.3740-02	4.2670-02	4.1690-02	4.0800-02	3.9990-02	3.9250-02

	34	35	36	37	38	39
1	3.2650-02	3.2390-02	3.2110-02	3.1800-02	3.1500-02	3.1370-02
2	3.2670-02	3.2410-02	3.2120-02	3.1810-02	3.1510-02	3.1380-02
3	3.2700-02	3.2430-02	3.2140-02	3.1830-02	3.1530-02	3.1400-02
4	3.2730-02	3.2470-02	3.2180-02	3.1870-02	3.1560-02	3.1430-02
5	3.2790-02	3.2510-02	3.2220-02	3.1910-02	3.1600-02	3.1470-02
6	3.2850-02	3.2570-02	3.2280-02	3.1960-02	3.1650-02	3.1520-02
7	3.2930-02	3.2640-02	3.2340-02	3.2020-02	3.1710-02	3.1570-02
8	3.3010-02	3.2720-02	3.2410-02	3.2090-02	3.1780-02	3.1640-02
9	3.3110-02	3.2800-02	3.2490-02	3.2160-02	3.1850-02	3.1710-02
10	3.3210-02	3.2900-02	3.2570-02	3.2240-02	3.1930-02	3.1780-02
11	3.3310-02	3.2990-02	3.2660-02	3.2330-02	3.2010-02	3.1860-02
12	3.3420-02	3.3090-02	3.2760-02	3.2410-02	3.2090-02	3.1950-02
13	3.3530-02	3.3190-02	3.2850-02	3.2500-02	3.2180-02	3.2030-02
14	3.3640-02	3.3290-02	3.2940-02	3.2590-02	3.2270-02	3.2120-02
15	3.3740-02	3.3380-02	3.3020-02	3.2670-02	3.2350-02	3.2210-02
16	3.3830-02	3.3450-02	3.3100-02	3.2760-02	3.2450-02	3.2310-02
17	3.3900-02	3.3510-02	3.3160-02	3.2830-02	3.2550-02	3.2420-02
18	3.3930-02	3.3540-02	3.3180-02	3.2880-02	3.2650-02	3.2540-02
19	3.4030-02	3.3630-02	3.3270-02	3.2970-02	3.2770-02	3.2660-02
20	3.4210-02	3.3800-02	3.3430-02	3.3130-02	3.2920-02	3.2810-02
21	3.4460-02	3.4040-02	3.3660-02	3.3330-02	3.3100-02	3.2990-02
22	3.4700-02	3.4260-02	3.3860-02	3.3520-02	3.3250-02	3.3130-02
23	3.4830-02	3.4380-02	3.3980-02	3.3630-02	3.3340-02	3.3210-02
24	3.5110-02	3.4650-02	3.4230-02	3.3850-02	3.3530-02	3.3390-02
25	3.5510-02	3.5020-02	3.4580-02	3.4160-02	3.3830-02	3.3670-02
26	3.5880-02	3.5370-02	3.4910-02	3.4480-02	3.4120-02	3.3960-02
27	3.6220-02	3.5700-02	3.5220-02	3.4780-02	3.4400-02	3.4230-02
28	3.6540-02	3.6000-02	3.5500-02	3.5050-02	3.4670-02	3.4490-02
29	3.6830-02	3.6280-02	3.5770-02	3.5310-02	3.4920-02	3.4740-02
30	3.7100-02	3.6530-02	3.6020-02	3.5550-02	3.5150-02	3.4970-02
31	3.7350-02	3.6770-02	3.6240-02	3.5770-02	3.5370-02	3.5190-02
32	3.7570-02	3.6980-02	3.6450-02	3.5970-02	3.5570-02	3.5390-02
33	3.7760-02	3.7170-02	3.6640-02	3.6150-02	3.5750-02	3.5560-02
34	3.7940-02	3.7340-02	3.6800-02	3.6310-02	3.5910-02	3.5720-02
35	3.8090-02	3.7490-02	3.6950-02	3.6450-02	3.6050-02	3.5860-02
36	3.8220-02	3.7620-02	3.7070-02	3.6580-02	3.6170-02	3.5990-02
37	3.8330-02	3.7730-02	3.7180-02	3.6680-02	3.6270-02	3.6090-02
38	3.8420-02	3.7810-02	3.7260-02	3.6770-02	3.6360-02	3.6180-02
39	3.8500-02	3.7890-02	3.7340-02	3.6840-02	3.6430-02	3.6250-02
40	3.8550-02	3.7950-02	3.7400-02	3.6900-02	3.6490-02	3.6310-02
41	3.8580-02	3.7970-02	3.7420-02	3.6930-02	3.6520-02	3.6330-02

END OF CASE - TOTAL CPU TIME WAS 0.13 MINUTES TOTAL CLOCK TIME WAS 0.54 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

STREAM OF CITATION CASES ONNL 72

GENERAL CONTROL INPUT - SECTION 001

[illegible]

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

4.692000E-01 4.692000E-01 4.692000E-01 4.692000E-01 4.692000E-01 4.692000E-01

END DIMENSIONAL SLAB GEOMETRY (X,Y) WIDTH 1.000000E 01 HEIGHT 1.000000E 01

REGION SPECIFICATIONS

PTS	REGION	WIDTH
8	4.000000E 00	12 4.000000E 00

PTS		REGION		HEIGHT	
12	6.000000E 00	B	4.000000E 00		

X-DIR. POINTS 20 Y-DIR. POINTS 20

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																
2	0.500	3	1.000	4	1.500	5	2.000	6	2.500	7	3.000	8	3.500	9	4.000	10	4.500
11	5.000	12	5.500	13	6.000	14	6.500	15	7.000	16	7.500	17	8.000	18	8.500	19	9.000
20	9.500	21	10.000														

[illegible]

DISTANCES TO FLUX POINTS

J	DIST.
1	0.250
2	0.750
3	1.250
4	1.750
5	2.250
6	2.750
7	3.250
8	3.750
9	4.250
10	4.750
11	5.250
12	5.750
13	6.250
14	6.750
15	7.250
16	7.750
17	8.250
18	8.750
19	9.250
20	9.750

0	0.250	1	0.750	2	1.250	3	1.750	4	2.250	5	2.750	6	3.250	7	3.750	8	4.250	9	4.750	10	5.250	11	5.750	12	6.250	13	6.750	14	7.250	15	7.750	16	8.250	17	8.750	18	9.250	19	9.750	20	10.250

ZONE INPUT BY REGION

1 1
2 1

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
14	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
15	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
16	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
17	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
18	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
19	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
20	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1

FSSION SOURCE DISTRIBUTION AND SUM 1.00000 1.00000

DESCRIPTION OF REACTOR ZONES

ZN TO ZN	SUB-ZNS	SIGMA-SET	ID	CLASS	DPL	NEX	NAME
1 1	0	0	0	0	0	0	MATERIAL 1
2 2	0	0	0	0	0	0	MATERIAL 2

FIXED SOURCE INPUT SECTION 026

SOURCE DISTRIBUTION AND SUM
1.0000E 00 1.0000D 00

TOTAL FIXED SOURCE 8.400000E 01 N/SEC

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 0

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 20 20 1 1 0 0 4 2

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000
MEMORY LOCATIONS USED FOR THIS PROBLEM----- 6973
MEMORY LOCATIONS NOT USED----- 33027

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	MATERIAL 1	1	2.20022E 00	0.0	6.22000E-02	2.16000E-01	0.0	2.16000E 05
2	MATERIAL 2	1	2.20022E 00	0.0	1.36500E-01	3.62822E-02	0.0	3.62822E 04

SCATTERING MATRIX

ZONE	GRP	TO GRP	
1	1		0.0
2	1		0.0

2-D FIXED SOURCE PROBLEM WITH FISSION SOURCE
20X20X1 GROUP, 400 POINTS STREAM OF CITATION CASES UNKL 72

A FIXED SOURCE PROBLEM FOLLOWS
LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	-2.41101E-01	1.00000	-0.48220	0.06780	0.0	9.330100 10	0.000000
2	-3.82687E-01	1.91627	1.20456	6.00867	0.04054	5.089210 10	1.047334
3	2.67488E-01	1.84948	-0.45148	-1.15956	1.27329	4.474730 10	1.137321
4	1.27590E-01	1.78958	0.20458	0.46749	0.88624	3.346030 10	1.337326
5	-6.69729E-02	1.74778	-7.59188	-0.51955	0.64650	1.785860 10	1.873621
6	-4.37755E-02	1.71778	0.60985	0.37900	0.33567	1.213220 10	1.472004
7	-2.80910E-02	1.69688	0.61386	0.66199	0.33836	1.114070 10	1.488992
8	-1.72223E-02	1.68260	0.59532	0.75057	0.61678	1.062020 10	1.049016
9	-1.11921E-02	1.67300	0.63867	0.69574	0.65580	1.029570 10	1.031515
10	-7.40594E-03	1.66660	0.65430	0.68744	0.67967		
	-1.52070E-02	EXTRAPOLATION WITH	2.0383			9.626140 09	1.021873
11	-1.69754E-03	1.00000	0.22752	0.28846	2.04684	9.628400 09	0.999972
12	1.21403E-03	1.65956	-0.71395	-0.49723	0.03627	9.635970 09	0.999007
13	9.97600E-04	1.65772	0.49235	0.53926	0.83815	9.639430 09	0.999641
14	4.36783E-04	1.65651	0.73207	0.68283	0.80322	9.639260 09	1.000017
15	3.08990E-04	1.65572	0.70773	0.75434	0.84512	9.638540 09	1.000281
16	2.74113E-04	1.65520	0.72553	0.79764	0.84437	9.638240 09	1.000238
17	1.65939E-04	1.65486	0.74059	0.78534	0.81602	9.632100 09	1.000222
18	1.24931E-04	1.65464	0.75300	0.78575	0.82163		
	4.16771E-04	EXTRAPOLATION WITH	3.3360			9.624520 09	1.000181
19	-1.69873E-05	1.00000	-0.13599	-0.15773	3.45674	9.624270 09	1.000025
20	1.90735E-05	1.65440	-1.12279	-1.19844	0.05899	9.624040 09	1.000023
21	1.52588E-05	1.65433	0.80002	0.50745	0.83753	9.627970 09	1.000008

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.019 MINUTES

LEAKAGE 1.53540E 03 TOTAL LOSSES 2.32960E 03 TOTAL PRODUCTIONS 2.24560E 03 REACTOR POWER(WATTS) 2.24559E 09

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	ROT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	BPZ LOSSES	1/V LOSS	REMOM LOSS
1	3.25659E 02	4.42028E 02	4.42043E 02	3.25673E 02	0.0	0.0	0.0	0.0	0.0
SUM	3.25659E 02	4.42028E 02	4.42043E 02	3.25673E 02	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCRP
1	7.94192E 02	0.0	2.24559E 03	0.0	2.32959E 03	2.24559E 03	2.62752E 00
SUM	7.94192E 02	0.0	2.24559E 03	0.0	2.32959E 03	2.24559E 03	

GROUP NEUTRON BALANCE FOR EACH ZONE

ZONE NUMBER	1--MATERIAL 1	VOLUME	0.40000E 01						
GRP	ABSORPTIONS	OUT-SCATTER	BPZ LOSSES	1/V LOSS	REMOM LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	6.34419E 02	0.0	0.0	0.0	0.0	0.0	2.20313E 03	2.20313E 09	1.21425E 02
SUM	6.34419E 02	0.0	0.0	0.0	0.0	0.0	2.20313E 03	2.20313E 09	
ZONE NUMBER	2--MATERIAL 2	VOLUME	1.60000E 01						

GRP	ABSORPTIONS	OUT-SCATTER	B+2 LOSSES	1/V LOSS	XENON LOSS	IN-SCATTER	SOURCE	POWER(WATTS)	AVERAGE FLUX
1	1.59773E 02	0.0	0.0	0.0	0.0	0.0	4.24602E 01	4.24602E 07	7.31561E 01
SUM	1.59773E 02	0.0	0.0	0.0	0.0	0.0	4.24602E 01	4.24602E 07	

2-D FIXED SOURCE PROBLEM WITH FISSION SOURCE
 202001 GROUP, 400 POINTS

STREAM OF CITATION CASES URM 72

GROUP 1 FLOW

	1	2	3	4	5	6	7	8	9	10	11
1	7.2480 01	7.9350 01	8.5730 01	9.1570 01	9.6830 01	1.0150 02	1.0540 02	1.0860 02	1.1110 02	1.1270 02	1.1350 02
2	7.8890 01	8.6380 01	9.3940 01	9.9710 01	1.0550 02	1.1090 02	1.1480 02	1.1840 02	1.2110 02	1.2290 02	1.2380 02
3	8.4310 01	9.2370 01	9.9780 01	1.0640 02	1.1280 02	1.1730 02	1.2300 02	1.2680 02	1.2970 02	1.3170 02	1.3270 02
4	8.8660 01	9.7110 01	1.0500 02	1.1220 02	1.1880 02	1.2460 02	1.2960 02	1.3380 02	1.3700 02	1.3920 02	1.4030 02
5	9.1880 01	1.0070 02	1.0890 02	1.1640 02	1.2330 02	1.2950 02	1.3480 02	1.3920 02	1.4270 02	1.4510 02	1.4650 02
6	9.3900 01	1.0290 02	1.1130 02	1.1920 02	1.2630 02	1.3260 02	1.3840 02	1.4310 02	1.4690 02	1.4960 02	1.5110 02
7	9.4670 01	1.0380 02	1.1240 02	1.2040 02	1.2780 02	1.3450 02	1.4040 02	1.4540 02	1.4940 02	1.5240 02	1.5420 02
8	9.4260 01	1.0330 02	1.1190 02	1.2000 02	1.2760 02	1.3450 02	1.4060 02	1.4600 02	1.5040 02	1.5360 02	1.5570 02
9	9.2910 01	1.0130 02	1.0990 02	1.1800 02	1.2560 02	1.3270 02	1.3920 02	1.4490 02	1.4960 02	1.5330 02	1.5570 02
10	8.9100 01	0.7830 01	1.0620 02	1.1430 02	1.2200 02	1.2920 02	1.3590 02	1.4200 02	1.4720 02	1.5140 02	1.5430 02
11	8.4520 01	0.2860 01	1.0100 02	1.0890 02	1.1650 02	1.2380 02	1.3080 02	1.3740 02	1.4320 02	1.4800 02	1.5140 02
12	7.8960 01	0.6390 01	0.4100 01	1.0170 02	1.0920 02	1.1660 02	1.2380 02	1.3090 02	1.3770 02	1.4320 02	1.4720 02
13	7.1230 01	7.8410 01	8.5570 01	9.2730 01	9.9920 01	1.0720 02	1.1470 02	1.2250 02	1.3090 02	1.3740 02	1.4200 02
14	6.4740 01	7.1340 01	7.8010 01	8.4790 01	9.1720 01	9.8910 01	1.0650 02	1.1470 02	1.2360 02	1.3080 02	1.3590 02
15	5.8940 01	6.5020 01	7.1240 01	7.7650 01	8.4320 01	9.1350 01	9.8910 01	1.0720 02	1.1660 02	1.2390 02	1.2920 02
16	5.3690 01	5.9290 01	6.5080 01	7.1130 01	7.7500 01	8.4320 01	9.1720 01	9.9930 01	1.0920 02	1.1650 02	1.2200 02
17	4.8900 01	5.4050 01	5.9420 01	6.5090 01	7.1130 01	7.7650 01	8.4790 01	9.2730 01	1.0170 02	1.0890 02	1.1430 02
18	4.4470 01	4.9180 01	5.4150 01	5.9420 01	6.5080 01	7.1240 01	7.8010 01	8.5570 01	9.4100 01	1.0100 02	1.0620 02
19	4.0330 01	4.4470 01	4.9180 01	5.4050 01	5.9290 01	6.5020 01	7.1340 01	7.8410 01	8.5570 01	9.2730 01	9.9920 01
20	3.6440 01	4.0330 01	4.4470 01	4.8900 01	5.3690 01	5.8940 01	6.4740 01	7.1230 01	7.8960 01	8.4520 01	8.9100 01

	12	13	14	15	16	17	18	19	20
1	1.1340 02	1.1240 02	1.1040 02	1.0750 02	1.0370 02	9.8940 01	9.3300 01	8.4310 01	7.9550 01
2	1.2370 02	1.2240 02	1.2050 02	1.1730 02	1.1320 02	1.0800 02	1.0190 02	9.4780 01	8.6810 01
3	1.3270 02	1.3160 02	1.2930 02	1.2600 02	1.2160 02	1.1600 02	1.0950 02	1.0190 02	9.3300 01
4	1.4040 02	1.3930 02	1.3700 02	1.3350 02	1.2880 02	1.2300 02	1.1600 02	1.0800 02	9.8940 01
5	1.4660 02	1.4560 02	1.4330 02	1.3970 02	1.3490 02	1.2940 02	1.2160 02	1.1320 02	1.0370 02
6	1.5140 02	1.5040 02	1.4820 02	1.4460 02	1.3970 02	1.3390 02	1.2600 02	1.1730 02	1.0750 02
7	1.5470 02	1.5360 02	1.5170 02	1.4820 02	1.4330 02	1.3700 02	1.2930 02	1.2050 02	1.1040 02
8	1.5650 02	1.5540 02	1.5390 02	1.5040 02	1.4560 02	1.3930 02	1.3160 02	1.2260 02	1.1240 02
9	1.5680 02	1.5570 02	1.5470 02	1.5110 02	1.4660 02	1.4030 02	1.3280 02	1.2380 02	1.1350 02
10	1.5530 02	1.5420 02	1.5320 02	1.4960 02	1.4520 02	1.3920 02	1.3160 02	1.2290 02	1.1270 02
11	1.4980 02	1.4880 02	1.4740 02	1.4390 02	1.4270 02	1.3700 02	1.2980 02	1.2130 02	1.1110 02
12	1.4490 02	1.4400 02	1.4240 02	1.4310 02	1.3930 02	1.3380 02	1.2680 02	1.1840 02	1.0840 02
13	1.3920 02	1.4060 02	1.4040 02	1.3640 02	1.3480 02	1.2960 02	1.2300 02	1.1460 02	1.0540 02
14	1.3270 02	1.3450 02	1.3450 02	1.3280 02	1.2950 02	1.2460 02	1.1830 02	1.1090 02	1.0150 02
15	1.2560 02	1.2760 02	1.2780 02	1.2640 02	1.2330 02	1.1880 02	1.1280 02	1.0550 02	9.6830 01
16	1.1800 02	1.2000 02	1.2040 02	1.1920 02	1.1640 02	1.1220 02	1.0640 02	9.9780 01	9.1580 01
17	1.0990 02	1.1190 02	1.1240 02	1.1130 02	1.0890 02	1.0500 02	9.9780 01	9.3340 01	8.5570 01
18	1.0130 02	1.0330 02	1.0380 02	1.0290 02	1.0070 02	9.7110 01	9.2330 01	8.4390 01	7.9360 01
19	9.2310 01	9.4160 01	9.4660 01	9.3980 01	9.1860 01	8.8670 01	8.4320 01	7.8960 01	7.2480 01

END OF CASE - TOTAL CPU TIME WAS 0.03 MINUTES TOTAL CLOCK TIME WAS 0.26 MINUTES

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

~~2-D SEARCH ON ANSWER, PAGE SLAM WITH UPSCATTER, AND NEW MARK PROBLEM
22X47 GROUPS, 616 POINTS SINCE OF CITATION CASES ONH 72~~

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	-1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	12	6	12	24
1.000000E 01		9.999999E-04		9.999999E 05		9.999999E 23												1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	9.999999E 29	9.999999E 29	0.0	9.999999E 29	9.999999E 29

TWO DIMENSIONAL SLAB GEOMETRY (X,Y) WIDTH 6.749558E 01 HEIGHT 1.350000E 01

REGION SPECIFICATIONS

PTS	REGION	WIDTH
22	6.750000	01

~~PYS REGION HEIGHT~~
4 1.350000E 01

X-DIR. POINTS 22 Y-DIR. POINTS 4

DISTANCES TO NEARBY INTERVAL INTERFACES

J	DIST.	3	4	5	6	7	8	9	10
2	3.068	3	4.125	5	12.272	6	15.341	7	18.409
11	30.682	12	33.740	13	36.808	14	42.955	15	46.023
20	58.295	21	61.353	22	64.422	23	67.500	24	70.578
29	85.890	30	88.948	31	92.006	32	95.064	33	98.122
38	113.482	39	116.540	40	119.598	41	122.656	42	125.714
47	141.074	48	144.132	49	147.190	50	150.248	51	153.306
56	168.798	57	171.856	58	174.914	59	177.972	60	181.030
65	196.390	66	199.448	67	202.506	68	205.564	69	208.622
74	215.000	75	218.058	76	221.116	77	224.174	78	227.232
83	233.610	84	236.668	85	239.726	86	242.784	87	245.842
92	252.220	93	255.278	94	258.336	95	261.394	96	264.452
101	270.830	102	273.888	103	276.946	104	279.999	105	283.057
110	289.440	111	292.498	112	295.556	113	298.614	114	301.672
119	308.050	120	311.108	121	314.166	122	317.224	123	320.282
128	326.890	129	329.948	130	332.999	131	336.057	132	339.115
137	347.720	138	350.778	139	353.836	140	356.894	141	359.952
146	368.560	147	371.618	148	374.676	149	377.734	150	380.792
155	390.400	156	393.458	157	396.516	158	399.574	159	402.632
164	409.010	165	412.068	166	415.126	167	418.184	168	421.242
173	427.850	174	430.908	175	433.966	176	437.024	177	440.082
182	448.690	183	451.748	184	454.806	185	457.864	186	460.922
191	469.530	192	472.588	193	475.646	194	478.704	195	481.762
200	490.370	201	493.428	202	496.486	203	499.544	204	502.602
209	510.010	210	513.068	211	516.126	212	519.184	213	522.242
218	529.850	219	532.908	220	535.966	221	539.024	222	542.082
227	550.690	228	553.748	229	556.806	230	559.864	231	562.922
236	571.530	237	574.588	238	577.646	239	580.704	240	583.762
245	592.370	246	595.428	247	598.486	248	601.544	249	604.602
254	611.010	255	614.068	256	617.126	257	620.184	258	623.242
263	630.850	264	633.908	265	636.966	266	640.024	267	643.082
272	649.690	273	652.748	274	655.806	275	658.864	276	661.922
281	669.530	282	672.588	283	675.646	284	678.704	285	681.762
290	690.370	291	693.428	292	696.486	293	699.544	294	702.602
299	711.010	300	714.068	301	717.126	302	720.184	303	723.242
308	730.850	309	733.908	310	736.966	311	740.024	312	743.0

1	DISY.				
2	3.375	3	6.750	4	10.125
		5	13.500		

DISTANCES TO FLUX POINTS

J	DIST.
1	1.534
2	4.602
3	7.670
4	10.739
5	13.807
6	16.875
7	19.943
8	23.011
9	26.080
10	29.148
11	32.216
12	35.284
13	38.352
14	41.420
15	44.489
16	47.557
17	50.625
18	53.693
19	56.761
20	59.830
21	62.898
22	65.966

1	DISY.			
1	1.688	2	5.063	3 8.438 4 11.813

ZONE INPUT BY REGION

1

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

FISSION SOURCE DISTRIBUTION AND SUM 0.90000 0.09000 0.01000 0.0 0.0 0.0 0.0 1.00000

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1212

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 22 4 1 7 2 4 1 1

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 6362

MEMORY LOCATIONS NOT USED----- 33698

2-D SEARCH ON ABSORBER, BARE SLAB WITH UPSCATTER, ANS HENCHMARK PROBLEM
22X4X7 GROUPS, 616 POINTS STREAM OF CITATION CASES URNL 72

LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -1.60000E 00 -2.7512CE 00

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
1	3.09000E 00	1.00000	6.18000	-1.68232	0.0	0.717467	0.0
2	-9.10631E-01	1.34679	-1.20533	-0.11405	-0.38457	0.743811	-4.65401D-02
3	1.14377E 00	1.20976	-0.11225	-1.75719	0.14733	0.783922	-8.28796D-02
4	-3.23083E-01	1.18449	-0.60556	-0.06227	0.57865	0.775076	-1.11143D-01
5	-2.89992E-01	1.17994	0.60758	0.34331	1.05000	0.797954	-1.54670D-01
6	-2.45725E-01	1.17912	0.60163	0.0	0.81961	0.843049	-1.79393D-01
7	-1.58394E-01	1.17898	0.48621	0.48621	0.70973	0.875729	-1.54264D-01
8	-1.29044E-01	1.17895	0.68566	0.68566	0.74696	0.900698	-2.27622D-01
9	-1.06249E-01	1.17895	0.71711	1.97284	0.53697	0.933745	-2.65452D-01
10	-8.74079E-02	1.17895	0.73526	2.13823	-0.03172	0.977203	-2.90362D-01
11	-6.90845E-02	1.17895	0.72128	1.02832	20.42039	1.013545	-2.72493D-01
12	-5.30329E-02	1.17895	0.71462	0.64949	0.06562	1.008017	-2.61845D-01
13	-4.05108E-02	1.17895	0.72337	0.85185	-3.89599	1.001568	-2.59749D-01
14	-3.22856E-02	1.17895	0.76468	0.90198	0.65721	0.998665	-2.61538D-01
15	-2.66374E-02	1.17895	0.79842	0.99048	0.16738	0.998280	-2.62690D-01
16	-2.42859E-02	1.17895	0.88744	0.77149	-0.31314	0.999086	-2.63914D-01
17	-2.32628E-02	1.17895	0.93461	0.90169	6.60946	1.001663	-2.62492D-01
18	-2.14238E-02	1.17895	0.89952	0.86168	0.02700	1.000740	-2.61503D-01
19	-1.90700E-02	1.17895	0.87106	0.97457	-11.52828	1.000305	-2.61094D-01
20	-1.72907E-02	1.17895	0.88941	0.99217	0.65884	1.000135	-2.60913D-01
21	-1.58910E-02	1.17895	0.90316	0.97435	0.32152	1.000091	-2.60791D-01
22	-1.47807E-02	1.17895	0.91535	0.92896	-0.40804	1.000187	-2.60541D-01
23	-1.38552E-02	1.17895	0.92353	0.93363	0.23919	1.000218	-2.60249D-01
24	-1.28950E-02	1.17895	0.91780	0.94791	-5.24819	1.000189	-2.59995D-01
25	-1.19824E-02	1.17895	0.91725	0.95207	1.29929	1.000155	-2.59787D-01
26	-1.11541E-02	1.17895	0.91972	0.94998	0.79686		
			EXTRAPOLATION WITH		14.3491		
27	-1.61845E-01	1.00000	-0.17163	-0.14382	10.61831	1.001931	-2.57031D-01
28	1.93596E-03	1.00000	-0.17163	-0.14382	10.61831	1.000028	-2.56993D-01
29	2.05322E-03	1.17895	1.06264	1.10808	-0.18458	1.000066	-2.56905D-01
30	1.59359E-03	1.17895	0.77772	0.79395	-0.21491	1.000019	-2.56874D-01
31	1.23596E-03	1.17895	0.77682	0.72730	1.84964	0.999979	-2.56906D-01
32	1.05572E-03	1.17895	0.85522	0.79486	0.23108	0.999976	-2.56938D-01
33	0.95500E-04	1.17895	0.84913	0.88718	-1.24399	0.999987	-2.56955D-01
34	6.75201E-04	1.17895	0.75467	0.88794	1.16423	0.999999	-2.56957D-01
35	5.03540E-04	1.17895	0.74627	0.86266	0.39306	1.000001	-2.56956D-01
36	3.77655E-04	1.17895	0.75036	0.83403	-0.08344	0.999999	-2.56957D-01
37	2.79427E-04	1.17895	0.74018	0.83166	1.53701	0.999998	-2.56960D-01
38	2.11716E-04	1.17895	0.75789	0.85093	-1.42730	0.999998	-2.56962D-01
39	1.88828E-04	1.17895	0.89208	0.87545	1.79624	0.999999	-2.56963D-01
40	1.68800E-04	1.17895	0.89411	0.88036	0.85723	1.000000	-2.56963D-01
41	1.52588E-04	1.17895	0.90411	0.88013	0.57927	1.000000	-2.56962D-01
42	1.39236E-04	1.17895	0.91264	0.89774	0.59750	1.000000	-2.56961D-01
43	1.26839E-04	1.17895	0.91109	0.90527	0.98623	1.000000	-2.56960D-01
44	1.15395E-04	1.17895	0.90989	0.92063	1.06936	1.000000	-2.56959D-01
45	1.04904E-04	1.17895	0.90920	0.93359	0.85246	1.000000	-2.56958D-01
46	9.63211E-05	1.17895	0.91028	0.95210	0.82839	1.000001	-2.56956D-01

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000563 K 1.0000277

END OF CRITICALITY SEARCH - ITERATION TIME 0.041 MINUTES

DENSITY OF 1/V CROSS SECTION IS -2.56956E-01, FRACTION ABSORPTIONS IN SEARCH PARAMETER -0.152187

LEAKAGE 4.44251E-01 TOTAL LOSSES 1.00000E 00 TOTAL PRODUCTIONS 1.00000E 00 REACTOR POWER(WATTS) 1.00000E 00

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	6.28135E-01	1.00000	1.25627	-0.22226	0.0	1.000001

2	3.57251E-01	1.34679	0.92626	0.43771	0.0	1.000001
3	1.19164E-01	1.20976	0.45263	0.74460	0.0	1.000001
4	7.26175E-02	1.18449	0.68201	0.42563	0.0	1.000001
5	4.28963E-02	1.17994	0.63361	0.61074	0.0	1.000001
6	-1.14403E-02	1.17912	-0.27814	-0.68615	0.0	1.000001
7	-1.76191E-03	1.17898	0.15225	0.19704	0.0	1.000001
8	-1.07223E-03	1.17895	0.60749	0.09020	0.0	1.000001
9	2.32697E-04	1.17895	-0.21679	-0.47679	0.0	1.000001
10	-8.39233E-05	1.17895	-0.36074	-0.93224	0.0	1.000001

END OF ADJOINT CALCULATION - ITERATION TIME 0.007 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000248 * 1.0000238

GROSS NEUTRON BALANCE

GRP	LF1 LEAKAGE	TOP LEAKAGE	RTT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B*2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	2.76197E-01	1.12064E-02	0.0	0.0	0.0	0.0	-3.31876E-02	0.0
2	0.0	5.62816E-02	2.28352E-03	0.0	0.0	0.0	0.0	-1.54577E-02	0.0
3	0.0	3.22962E-02	1.31034E-03	0.0	0.0	0.0	0.0	-1.55227E-02	0.0
4	0.0	2.07037E-02	8.40000E-04	0.0	0.0	0.0	0.0	-3.98037E-02	0.0
5	0.0	2.03300E-02	8.24846E-04	0.0	0.0	0.0	0.0	-2.44283E-02	0.0
6	0.0	1.32383E-02	5.37116E-04	0.0	0.0	0.0	0.0	-2.96931E-02	0.0
7	0.0	7.88170E-03	3.19778E-04	0.0	0.0	0.0	0.0	-3.40940E-02	0.0
SUM	0.0	4.26924E-01	1.73220E-02	0.0	0.0	0.0	0.0	-1.92187E-01	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	1.29157E-01	5.16626E-01	8.99999E-01	0.0	8.99999E-01	8.99999E-01	2.00000E 00
2	6.01569E-02	1.80471E-01	8.99999E-02	1.93735E-01	2.83735E-01	2.83735E-01	5.00000E-01
3	6.04099E-02	1.20820E-01	9.99999E-03	1.89313E-01	1.99313E-01	1.99313E-01	6.66667E-01
4	1.54904E-01	9.29427E-02	0.0	2.29587E-01	2.29587E-01	2.29587E-01	4.00000E-01
5	9.50679E-02	1.52109E-01	0.0	2.43903E-01	2.43903E-01	2.43903E-01	2.00000E 00
6	1.15557E-01	1.65081E-01	0.0	2.64720E-01	2.64720E-01	2.64720E-01	1.71428E 00
7	1.32684E-01	1.17941E-01	0.0	2.24733E-01	2.24733E-01	2.24733E-01	1.66667E 00
SUM	7.47937E-01	1.34599E 00	9.99999E-01	1.34599E 00	2.34599E 00	2.34599E 00	

2-D SEARCH ON ABSORBER, RARE SLAB WITH UPSCATTER, ANS BENCHMARK PROBLEM
 22X4X7 GROUPS, 616 POINTS: STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 1.955232E-02

COMP	NAME	GRP	SIG, SIGR, DR**2	NU*SIGF	DIFF. COEF.	B**2
1	MATERIAL 1	1	-1.283395E 01	1.291571E 01	-1.784793E-01	-2.053432E 01
		2	-3.114834E 00	3.007876E 00	-4.331714E-02	-4.360765E 00
		3	-2.516418E 00	2.013688E 00	-3.499505E-02	-3.019700E 00
		4	-1.698620E 00	1.549063E 00	-2.362226E-02	-1.698620E 00
		5	-3.896276E 00	1.901379E 00	-5.418469E-02	-3.117020E 00
		6	-3.346133E 00	1.650827E 00	-4.653384E-02	-2.007679E 00
		7	-3.023274E 00	1.474287E 00	-4.204375E-02	-1.209310E 00

COMP	NAME	GRP. K ---	SIGS(FROM ALL GRPS. KK TO GRP. K)
1	MATERIAL 1	1	1.283395E 01 2.988839E 00 2.000944E 00 1.539259E 00 1.887345E 00 1.640380E 00 1.464956E 00
		2	1.337498E 01 3.114834E 00 2.085294E 00 1.604146E 00 1.968592E 00 1.709531E 00 1.526712E 00
		3	1.614018E 01 3.758780E 00 2.516418E 00 1.935795E 00 2.376068E 00 2.062966E 00 1.842351E 00
		4	1.416268E 01 3.298266E 00 2.208106E 00 1.698620E 00 2.084553E 00 1.810212E 00 1.616627E 00
		5	2.646678E 01 6.163684E 00 4.126423E 00 3.174332E 00 3.896276E 00 3.362858E 00 3.021105E 00
		6	2.617943E 01 6.090764E 00 4.081619E 00 3.139866E 00 3.853571E 00 3.346133E 00 2.988302E 00
		7	2.643581E 01 6.168111E 00 4.129376E 00 3.176613E 00 3.899074E 00 3.385288E 00 3.023274E 00

END OF CASE - TOTAL CPU TIME WAS 0.09 MINUTES TOTAL CLOCK TIME WAS 0.79 MINUTES

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 *****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

2-D FAST REACTOR DIMENSION SEARCH
27X18X3 GROUP, 2430 POINTS   STREAM OF CITATION CASES ORNL 72

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS 8*****

NEW CROSS SECTION TAPE 8 MADE

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS 4*****

THE TITLES OF THE CROSS SECTION SETS PRESENTLY ON THIS CITATION
CROSS SECTION LIBRARY TAPE ARE-

HOMOGENEOUS DESIGN 2 REACTOR
TYPE,NUCS,GRPS,DWS,UPS,X 1 15 5 4 0 0

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
1	?	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
75	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24
1.500000E 00	5.000000E-01	9.999999E 09	9.999999E 23	0.0														1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	?	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
4.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																		
0.0	0.0	2.345000E 03	1.000000E 00	5.000000E-01	0.0																		

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	4.692000E-01	4.692000E-01	0.0	4.692000E-01	4.692000E-01

TWO DIMENSIONAL CYLINDRICAL GEOMETRY (R,Z) WIDTH 1.538989E 02 HEIGHT 9.905997E 01

REGION SPECIFICATIONS

PTS	REGION WIDTH						
4	1.848199E 01	7	4.000000E 01	3	1.500000E 01	5	3.042999E 01
						5	3.474699E 01
						3	1.524000E 01
PTS	REGION HEIGHT						
3	1.524000E 01	6	3.809999E 01	9	4.571999E 01		

X-DIR. POINTS 27

Y-DIR. POINTS 18

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.	3	4	5	6	7	8	9	10
2	9.241	13.069	16.006	18.482	21.953	34.945	40.755	45.134	50.404
11	54.593	58.482	63.875	68.846	73.482	80.494	86.942	92.943	98.580
20	103.912	111.729	119.034	125.916	132.441	138.659	143.918	148.992	153.899

I	DIST.	3	4	5	6	7	8	9	10
2	5.080	10.150	15.240	21.590	27.940	34.290	40.640	46.990	53.340
11	58.420	63.500	68.580	73.660	78.740	83.820	88.900	93.980	99.060

DISTANCES TO FLUX POINTS

J	DIST.	2	3	4	5	6	7	8	9
1	6.534	11.318	14.611	17.288	23.696	31.643	37.961	43.369	48.173
10	52.540	56.571	61.238	66.407	71.202	77.068	83.780	89.492	95.803
19	101.281	107.891	115.439	122.523	129.220	135.586	141.313	146.477	151.465

I	DIST.	2	3	4	5	6	7	8	9
1	2.540	7.620	12.700	18.415	24.765	31.115	37.465	43.415	50.165
10	55.880	60.950	66.040	71.120	76.200	81.280	86.360	91.440	96.520

ZONE INPUT BY REGION

7	7	7	7	7	7
3	3	3	4	6	8
1	1	1	2	5	8

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
2	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
3	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
9	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	6	6	6	6	6	8	8
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	8	8

DESCRIPTION OF REACTOR ZONES

ZN TO ZN	SUB-ZNS	STG4A-SET	TO	CLASS	DPL	NEX	NAME
1	1	1	0	0	0	0	CORE ZONE 1
2	2	4	0	0	0	0	CORE ZONE 2
3	3	1	0	0	0	0	AXIAL BLKT 1
4	4	1	0	0	0	0	AXIAL BLKT 2
5	5	1	0	0	0	0	RADIAL BLKT
6	6	1	0	0	0	0	CNR RADL BKT
7	8	1	0	0	0	0	REFLECTOR

SFT	NUC	GRPS	UPSC	DNCS	TITLE	
1	15	5	0	4	HOMOGENECUS DESIGN 2 REACTOR	
GROUP	UPPER ENERGY		MEAN ENERGY		1/V X-SECTION	DIST.FUNCT
1	1.491820E	07	3.499380E	06	3.876078E-04	0.755037
2	8.208500E	05	2.351770E	05	1.121930E-03	0.238025
3	6.737950E	04	2.478750E	04	3.081630E-03	0.006938
4	9.118816E	03	2.612590E	03	9.142660E-03	0.0
5	7.485188E	02	2.735910E	01	2.293970E-02	0.0
SUM						1.000000

ZONES 1- 1 SUB-ZONE INDICATOR 0 AND CONTROL OPTION 0											
14	9.96070E-04	15	2.89620E-04	16	2.79690E-05	17	7.21790E-06	74	5.22400E-04	12	7.17910E-03
33	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								

14	1.26940E-03	15	3.92740E-04	16	3.79200E-05	17	9.93140E-06	74	5.44420E-04	12	6.77410E-03
23	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								
14	1.26940E-03	15	3.92740E-04	16	3.79200E-05	17	9.93140E-06	74	5.44420E-04	12	6.77410E-03
23	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								
14	1.26940E-03	15	3.92740E-04	16	3.79200E-05	17	9.93140E-06	74	5.44420E-04	12	6.77410E-03
23	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								
14	1.26940E-03	15	3.92740E-04	16	3.79200E-05	17	9.93140E-06	74	5.44420E-04	12	6.77410E-03
23	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								

14	1.84150E-04	15	6.19720E-06	16	1.00900E-15	74	4.51510E-05	10	2.12480E-05	12	8.59640E-03
33	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.18650E-04	32	4.32550E-04	47	5.26200E-05
25	8.21860E-03	23	1.80480E-02								

14	1.47770E-04	15	4.42420E-06	16	1.00000E-15	74	3.18540E-05	10	2.21200E-05	12	8.64230E-03
33	1.13490E-02	31	2.94590E-03	35	2.07870E-03	39	5.13650E-04	32	4.32550E-04	47	5.26200E-03
25	8.21860E-03	23	1.80400E-02								

14	2.74170E-04	15	1.16890E-05	16	1.00000E-15	74	8.60770E-05	10	2.33790E-05	12	1.02310E-02
33	1.10720E-02	31	2.87400E-03	35	2.02800E-07	39	5.06000E-04	32	4.22000E-04	47	1.00000E-15
25	6.54000E-03	23	2.16400E-02								

14	1.14480E-04	15	2.12000E-06	16	1.00000E-15	74	1.06000E-05	10	2.86190E-05	12	1.04440E-02
33	1.10720E-02	31	2.87400E-03	35	2.02800E-03	39	5.06000E-04	32	4.22000E-04	47	1.00000E-15
25	6.54000E-03	23	2.16400E-02								

[illegible][illegible]

LEFT TO RIGHT 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00

TOP TO BOTTOM 0.0 0.0 5.00000E-01

FISSILE NUCLIDES--- 10 14 16

FERTILE NUCLIDES--- 12 15

INTERMEDIATE NUCLIDES---NONE SPECIFIED

OTHER NUCLIDES--- 17 34

STRUCTURAL NUCLIDES--- 33 31 35 39 32

SPECIAL NUCLIDES--- 25 23

FISSION PRODUCT NUCLIDES---NONE SPECIFIED

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 4549

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 27 19 1 5 0 4 18 8

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 18151

MEMORY LOCATIONS NOT USED----- 21849

2-D FAST REACTOR DIMENSION SEARCH
 27X18X5 GROUP, 2430 POINTS STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.91791E 00	1.00000	3.83582	-1.94127	0.0	0.535809
2	2.77532E 00	1.90126	4.22237	0.02934	0.48219	0.763262
3	1.24606E 01	1.82026	14.95036	0.03022	0.62682	0.866177
4	2.61286E 00	1.75880	2.82255	0.02468	0.57770	0.931278
5	7.37245E 00	1.71486	10.19405	0.09131	0.50523	0.970520
6	2.57857E 00	1.68478	3.30258	0.10529	0.41033	0.988598
7	4.35509E 00	1.66477	5.81723	0.23227	0.45401	0.997373
8	1.46455E 00	1.65174	1.80083	0.16409	0.53852	1.002384
9	-4.55151E-01	1.64335	-0.76593	-0.64733	0.56083	1.005353
10	-2.48126E-01	1.63800	0.29702	0.36561	0.58557	1.007167
11	2.80874E-01	1.63461	-0.85111	-1.68376	0.62281	1.008314
12	8.06293E-02	1.63246	0.36749	0.45652	0.66753	1.009087
13	-1.97747E-02	1.63110	-0.26503	-0.33475	0.70387	1.009617
14	-1.57644E-02	1.63025	0.78143	0.86954	0.73705	1.009997
15	1.32990E-02	1.62971	-0.83031	-0.52703	0.76344	1.010279
16	1.12581E-02	1.62937	0.85780	0.77755	0.78631	1.010492
17	9.46617E-03	1.62916	0.85030	0.76056	0.80160	1.010658
18	7.99656E-03	1.62903	0.85275	0.79792	0.81329	1.010789
19	6.72626E-03	1.62894	0.84787	0.80750	0.82061	1.010894
20	5.59711E-03	1.62889	0.83773	0.81407	0.82617	1.010980
21	2.64037E-02	EXTRAPOLATION WITH	4.7437			1.011380
22	-3.07137E-03	1.62880	-0.55181	-0.77730	4.77277	1.011380
23	2.65121E-04	1.62884	-0.08606	-0.03859	-0.00132	1.011372
24	1.83105E-04	1.62882	0.69083	0.58693	-5.44394	1.011369
25	1.12534E-04	1.62881	0.61470	1.18402	1.15560	1.011368
26	9.05991E-05	1.62881	0.80518	0.46304	1.04785	1.011367
27	5.91278E-05	1.62881	0.65269	1.04759	1.01441	1.011366
28	4.19617E-05	1.62880	0.70972	0.88160	0.99857	1.011366

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.120 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999977 K 1.011366

2-D FAST REACTOR DIMENSION SEARCH
 27X18X5 GROUP, 2430 POINTS STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE IN ROWS AND COLUMNS - 1 INNER ITERATION(S)
 ITERATION FLUX CHANGE BETA MU-1 MU-2 MU-3 K
 0 1.00000E 00 1.00000 0.000000000000000 0.0 0.972222

2-D FAST REACTOR DIMENSION SEARCH
 27X18X5 GROUP, 2430 POINTS   STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	4.65450E-02	1.00000	0.09309	-0.04931	0.0	0.948200
2	1.01507E 00	1.90126	22.82335	12.52729	-0.00402	0.948445
3	9.30408E-01	1.82026	1.84700	1.75661	1.38662	0.943660
4	2.88801E 00	1.75880	5.99204	0.10083	0.25755	0.941877
5	8.36799E-01	1.71486	1.12655	0.36317	0.26294	0.941134
6	1.83687E-01	1.68478	0.40320	0.44741	0.08925	0.940895
7	8.07972E-02	1.66478	0.52066	0.34316	0.54396	0.940760
8	-4.87395E-02	1.65174	-0.65197	-0.43418	0.63367	0.940680
9	-2.77686E-02	1.64335	0.54197	0.53597	0.60294	0.940633
10	1.16119E-02	1.63800	-0.40656	-0.34772	0.37713	0.940608
11	4.25434E-03	1.63461	0.37063	0.44067	-0.31041	0.940596
12	-2.35546E-03	1.63246	-0.55601	-0.41425	2.83124	0.940591
13	-8.65340E-04	1.63111	0.36651	0.37854	1.35627	0.940588
14	3.73840E-04	1.63025	-0.43164	-0.66559	1.11792	0.940588
15	-2.25008E-04	1.62971	-0.60211	-0.48111	1.07030	0.940587
16	1.23024E-04	1.62937	-0.54663	-0.71029	1.03596	0.940588
17	-8.43406E-05	1.62916	-0.68565	-0.75219	1.02028	0.940588
18	4.48227E-05	1.62903	-0.53140	-0.50404	1.01107	0.940588

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.081 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999999 K 0.9405873

2-D FAST REACTOR DIMENSION SEARCH
 27X18X5 GROUP, 2430 POINTS
 STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-4.13138E-03	1.00000	-0.00826	0.00399	0.0	0.949638
2	-4.98182E-02	1.90134	12.00867	8.49954	-0.00010	0.949440
3	8.10614E-02	1.82040	-1.54608	-1.78704	-3.24769	0.949765
4	-4.43949E-02	1.75897	-0.59206	-0.76881	0.15693	0.949842
5	-3.62708E-02	1.71505	0.78073	0.69745	0.32682	0.949880
6	1.92585E-02	1.68496	-0.51171	-0.58858	0.40576	0.949901
7	-8.35413E-03	1.66495	-0.44214	-0.71783	0.90084	0.949916
8	3.55339E-03	1.65191	-0.42179	-0.36860	0.86883	0.949926
9	1.50585E-03	1.64352	0.42528	0.46267	0.93897	0.949933
10	-9.37402E-04	1.63816	-0.62344	-0.26355	0.94759	0.949937
11	-2.18272E-04	1.63476	0.23263	0.71541	0.96211	0.949941
12	1.39236E-04	1.63261	-0.63776	-0.41989	0.97127	0.949943
13	-7.72476E-05	1.63125	-0.55487	-0.66397	0.98557	0.949945
14	4.76837E-05	1.63040	-0.61724	-0.59031	0.99002	0.949946

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.064 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.999929 K 0.9499417

2-D FAST REACTOR DIMENSION SEARCH

27X18X5 GROUP, 2430 POINTS
 LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

STREAM OF CITATION CASES ORNL 72

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	6.00815E-05	1.00000	0.00012	-0.00006	0.0	0.950000
2	1.30653E-04	1.90191	2.17473	1.65340	0.00001	0.950000
3	-2.76685E-04	1.82134	-2.11798	-1.93930	1.06652	0.950000
4	1.80244E-04	1.76011	-0.65126	-1.27941	0.87734	0.950001
5	9.72748E-05	1.71624	0.53978	0.28495	0.87713	0.950002
6	-2.72989E-05	1.68615	-0.28066	-0.68569	0.90569	0.950002

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.027 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999990 K 0.9500027

INNER REACTIVITY LOOP SEARCH CONVERGED

ESTIMATE OF N(DK/DN) SAVED 2.197317E-01 FINAL 2.333167E-01

TWO DIMENSIONAL CYLINDRICAL GEOMETRY (R,Z) WIDTH 1.270797E 02 HEIGHT 9.315987E 01

REGION SPECIFICATIONS

PTS	REGION WIDTH						
4	1.371188E 01	7	2.967616E 01	3	1.112857E 01	5	2.257614E 01
		5	3.474699E 01	3	1.524000E 01		

PTS	REGION HEIGHT				
3	1.524000E 01	6	3.809999E 01	9	3.981989E 01

X-DIR. POINTS 27 Y-DIR. POINTS 18

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.										
2	6.856	3	9.696	4	11.875	5	13.712	6	20.739	7	25.926
8	30.236	9	34.004	10	37.395	11	40.502	12	43.388	13	47.389
14	51.077	15	54.517	16	59.719	17	64.502	18	68.955	19	73.137
20	77.593	21	85.184	22	92.570	23	99.409	24	105.807	25	111.840
26	117.140	27	122.211	28	127.080						

I	DIST.										
2	5.080	3	10.160	4	15.240	5	21.590	6	27.940	7	34.290
8	40.640	9	46.990	10	53.340	11	57.764	12	62.189	13	66.613
14	71.038	15	75.462	16	79.887	17	84.311	18	88.735	19	93.160

DISTANCES TO FLUX POINTS

J	DIST.										
1	4.848	2	8.397	3	10.840	4	12.826	5	17.580	6	23.476
7	28.164	8	32.176	9	35.740	10	38.980	11	41.970	12	45.432
13	49.268	14	52.825	15	57.177	16	62.156	17	66.766	18	71.077
19	75.141	20	81.239	21	87.954	22	96.051	23	102.658	24	108.865
25	114.521	26	119.702	27	124.869						

I	DIST.										
1	2.540	2	7.620	3	12.700	4	18.415	5	24.765	6	31.115
7	37.465	8	43.815	9	50.165	10	55.552	11	59.977	12	64.401
13	68.826	14	73.250	15	77.674	16	82.099	17	86.523	18	90.948

LEAKAGE 3.53555E 18 TOTAL LOSSES 1.10605E 20 TOTAL PRODUCTIONS 1.05075E 20 REACTOR POWER(WATTS) 2.34500E 09

GROSS NEUTRON BALANCE

GRP LFT LEAKAGE TOP LEAKAGE RIT LEAKAGE BOT LEAKAGE FNT LEAKAGE BAK LEAKAGE B*2 LOSSES 1/V LOSS XENON LOSS

1	0.0	6.71774E 16	1.13276E 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	8.43075E 17	1.24359E 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	3.46882E 17	4.95320E 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	1.40890E 17	1.96216E 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	3.78491E 16	5.12769E 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUM	0.0	1.43587E 18	2.09968E 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	1.25393E 19	7.07912E 19	8.35108E 19	0.0	8.35109E 19	8.35108E 19	2.42140E 00
2	2.97429E 19	6.40814E 19	2.63267E 19	6.95842E 19	9.59109E 19	9.59109E 19	1.26277E 00
3	3.40055E 19	3.11104E 19	7.67377E 17	6.51906E 19	6.59581E 19	6.59580E 19	6.30778E-01
4	2.49293E 19	5.92481E 18	0.0	3.11911E 19	3.11911E 19	3.11911E 19	4.90854E-01
5	5.85266E 18	0.0	0.0	5.94178E 18	5.94179E 18	5.94178E 18	5.92465E-01
SUM	1.07070E 20	1.71908E 20	1.10605E 20	1.71908E 20	2.82513E 20	2.82513E 20	

PCINT DAMAGE RATE (DISPLACEMENT/CC-SEC) FOR NUCLEI 33

	1	2	3	4	5	6	7	8	9	10	11
1	6.497E 10	6.461E 10	6.426E 10	6.391E 10	6.294E 10	6.111E 10	5.926E 10	5.738E 10	5.547E 10	5.352E 10	5.155E 10
2	1.328E 11	1.320E 11	1.313E 11	1.306E 11	1.287E 11	1.250E 11	1.212E 11	1.175E 11	1.136E 11	1.097E 11	1.057E 11
3	2.436E 11	2.423E 11	2.410E 11	2.397E 11	2.362E 11	2.295E 11	2.228E 11	2.160E 11	2.091E 11	2.020E 11	1.948E 11
4	1.126E 11	1.120E 11	1.114E 11	1.108E 11	1.092E 11	1.062E 11	1.032E 11	1.001E 11	9.697E 10	9.378E 10	9.052E 10
5	1.800E 11	1.791E 11	1.781E 11	1.772E 11	1.748E 11	1.701E 11	1.654E 11	1.606E 11	1.558E 11	1.509E 11	1.459E 11
6	2.812E 11	2.798E 11	2.785E 11	2.771E 11	2.733E 11	2.663E 11	2.592E 11	2.522E 11	2.450E 11	2.378E 11	2.304E 11
7	4.455E 11	4.434E 11	4.413E 11	4.392E 11	4.334E 11	4.226E 11	4.119E 11	4.013E 11	3.907E 11	3.800E 11	3.691E 11
8	7.269E 11	7.234E 11	7.201E 11	7.167E 11	7.075E 11	6.904E 11	6.736E 11	6.571E 11	6.407E 11	6.246E 11	6.084E 11
9	1.231E 12	1.226E 12	1.220E 12	1.214E 12	1.199E 12	1.171E 12	1.143E 12	1.116E 12	1.089E 12	1.063E 12	1.038E 12
10	2.027E 12	2.017E 12	2.008E 12	1.999E 12	1.974E 12	1.927E 12	1.882E 12	1.837E 12	1.794E 12	1.752E 12	1.712E 12
11	2.555E 12	2.543E 12	2.532E 12	2.520E 12	2.489E 12	2.430E 12	2.373E 12	2.318E 12	2.264E 12	2.212E 12	2.163E 12
12	2.997E 12	2.983E 12	2.970E 12	2.956E 12	2.919E 12	2.851E 12	2.785E 12	2.721E 12	2.658E 12	2.599E 12	2.542E 12
13	3.369E 12	3.353E 12	3.338E 12	3.323E 12	3.282E 12	3.206E 12	3.132E 12	3.060E 12	2.991E 12	2.924E 12	2.861E 12
14	3.677E 12	3.660E 12	3.644E 12	3.628E 12	3.583E 12	3.500E 12	3.420E 12	3.342E 12	3.267E 12	3.195E 12	3.127E 12
15	3.925E 12	3.907E 12	3.890E 12	3.872E 12	3.825E 12	3.737E 12	3.651E 12	3.569E 12	3.489E 12	3.412E 12	3.340E 12
16	4.112E 12	4.093E 12	4.075E 12	4.057E 12	4.007E 12	3.915E 12	3.826E 12	3.740E 12	3.656E 12	3.576E 12	3.501E 12
17	4.238E 12	4.218E 12	4.199E 12	4.181E 12	4.130E 12	4.035E 12	3.943E 12	3.855E 12	3.769E 12	3.687E 12	3.609E 12
18	4.301E 12	4.281E 12	4.262E 12	4.243E 12	4.191E 12	4.095E 12	4.002E 12	3.912E 12	3.825E 12	3.742E 12	3.663E 12
	12	13	14	15	16	17	18	19	20	21	22
1	4.907E 10	4.602E 10	4.298E 10	3.907E 10	3.445E 10	3.012E 10	2.609E 10	2.235E 10	1.897E 10	1.655E 10	8.010E 09
2	1.006E 11	9.438E 10	8.809E 10	7.996E 10	7.043E 10	6.156E 10	5.326E 10	4.547E 10	3.811E 10	3.233E 10	1.591E 10
3	1.856E 11	1.741E 11	1.624E 11	1.469E 11	1.293E 11	1.130E 11	9.770E 10	8.312E 10	6.999E 10	4.109E 10	2.804E 10
4	8.638E 10	8.113E 10	7.560E 10	6.790E 10	5.975E 10	5.230E 10	4.527E 10	3.853E 10	2.698E 10	1.801E 10	1.226E 10
5	1.395E 11	1.314E 11	1.228E 11	1.107E 11	9.762E 10	8.546E 10	7.384E 10	6.264E 10	4.349E 10	2.851E 10	1.908E 10
6	2.210E 11	2.090E 11	1.962E 11	1.781E 11	1.577E 11	1.381E 11	1.190E 11	1.003E 11	6.847E 10	4.368E 10	2.852E 10
7	3.554E 11	3.380E 11	3.193E 11	2.926E 11	2.609E 11	2.288E 11	1.962E 11	1.639E 11	1.088E 11	6.678E 10	4.224E 10
8	5.883E 11	5.634E 11	5.370E 11	4.986E 11	4.486E 11	3.942E 11	3.364E 11	2.773E 11	1.761E 11	1.026E 11	6.251E 10
9	1.008E 12	9.722E 11	9.370E 11	8.871E 11	8.074E 11	7.118E 11	6.049E 11	4.904E 11	2.884E 11	1.577E 11	9.252E 10
10	1.665E 12	1.614E 12	1.572E 12	1.536E 12	1.412E 12	1.249E 12	1.062E 12	8.514E 11	4.382E 11	2.268E 11	1.303E 11
11	2.106E 12	2.045E 12	1.998E 12	1.959E 12	1.805E 12	1.599E 12	1.357E 12	1.084E 12	5.488E 11	2.785E 11	1.579E 11
12	2.476E 12	2.408E 12	2.354E 12	2.309E 12	2.131E 12	1.887E 12	1.600E 12	1.277E 12	6.449E 11	3.243E 11	1.824E 11
13	2.788E 12	2.712E 12	2.653E 12	2.603E 12	2.403E 12	2.128E 12	1.804E 12	1.439E 12	7.267E 11	3.641E 11	2.038E 11
14	3.048E 12	2.966E 12	2.901E 12	2.847E 12	2.628E 12	2.327E 12	1.973E 12	1.573E 12	7.949E 11	3.975E 11	2.219E 11
15	3.256E 12	3.169E 12	3.109E 12	3.042E 12	2.808E 12	2.487E 12	2.108E 12	1.680E 12	8.497E 11	4.246E 11	2.367E 11
16	3.413E 12	3.322E 12	3.250E 12	3.190E 12	2.944E 12	2.607E 12	2.210E 12	1.762E 12	8.910E 11	4.451E 11	2.478E 11
17	3.519E 12	3.425E 12	3.351E 12	3.289E 12	3.036E 12	2.688E 12	2.278E 12	1.816E 12	9.187E 11	4.588E 11	2.554E 11
18	3.572E 12	3.477E 12	3.401E 12	3.338E 12	3.081E 12	2.729E 12	2.313E 12	1.844E 12	9.326E 11	4.657E 11	2.592E 11
	23	24	25	26	27						
1	5.470E 09	3.631E 09	2.323E 09	1.412E 09	7.487E 08						
2	1.084E 10	7.161E 09	4.496E 09	2.689E 09	1.411E 09						
3	1.908E 10	1.253E 10	7.572E 09	4.405E 09	2.276E 09						

4	8.346E 09	5.491E 09	1.242E 10	6.968E 09	3.539E 09
5	1.283E 10	8.381E 09	1.902E 10	1.062E 10	5.376E 09
6	1.882E 10	1.215E 10	2.764E 10	1.544E 10	7.807E 09
7	2.723E 10	1.732E 10	3.939E 10	2.196E 10	1.108E 10
8	3.927E 10	2.456E 10	5.564E 10	3.081E 10	1.545E 10
9	5.684E 10	3.498E 10	7.802E 10	4.250E 10	2.108E 10
10	7.927E 10	4.840E 10	1.027E 11	5.449E 10	2.666E 10
11	9.533E 10	5.786E 10	1.219E 11	6.419E 10	3.123E 10
12	1.095E 11	6.615E 10	1.393E 11	7.317E 10	3.553E 10
13	1.218E 11	7.338E 10	1.546E 11	8.115E 10	3.937E 10
14	1.323E 11	7.954E 10	1.676E 11	8.797E 10	4.267E 10
15	1.408E 11	8.457E 10	1.782E 11	9.354E 10	4.538E 10
16	1.473E 11	8.840E 10	1.863E 11	9.779E 10	4.744E 10
17	1.517E 11	9.099E 10	1.917E 11	1.007E 11	4.883E 10
18	1.539E 11	9.230E 10	1.945E 11	1.021E 11	4.953E 10

2-D FAST REACTOR DIMENSION SEARCH

27X18X5 GROUP, 2430 POINTS

STREAM OF CITATION CASES-ORNL 72

SUMMARY TABLE OF NEUTRON LOSSES, ETC.

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE ZONE 1	0.15551	0.18413	0.0	0.00963	0.02502	0.00193	0.00233	0.37856	0.99942	1.12736E 03	2.99722E 02
CORE ZONE 2	0.12737	0.11590	0.0	0.00639	0.01574	0.00129	0.00146	0.26815	0.74657	9.08871E 02	3.82534E 02
AXIAL BLKT 1	0.00924	0.05880	0.0	0.00027	0.00857	0.00044	0.00081	0.07814	5.97892	7.65051E 01	5.74079E 01
AXIAL BLKT 2	0.00484	0.03712	0.0	0.00012	0.00540	0.00028	0.00051	0.04821	7.21974	4.24683E 01	4.74489E 01
RADIAL BLKT	0.02013	0.10608	0.0	0.00077	0.01227	0.00063	-0.00000	0.13989	4.91348	1.64290E 02	1.92069E 02
CNR RADL BKT	0.00307	0.03309	0.0	0.00003	0.00408	0.00017	-0.00000	0.04044	10.38188	2.55202E 01	8.62009E 01
REFLECTOR	0.0	0.0	0.0	0.0	0.01452	0.00007	0.0	0.01459	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.03197			
OVERALL	0.32016	0.53513	0.0	0.01721	0.08561	0.00482	0.00511	1.00000	1.47256	2.34502E 03	1.06738E 03

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE(NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 0.0 DAYS

ZONE NUMBER 1--CORE ZONE 1

10 0.0	12 7.17910E-03	14 9.96070E-04	15 2.89620E-04	16 2.79690E-05	17 7.21790E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.22400E-04			

ZONE NUMBER 2--CORE ZONE 2

10 0.0	12 6.77410E-03	14 1.26940E-03	15 3.92740E-04	16 3.79200E-05	17 9.93139E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.44420E-04			

SUB-ZONE NUMBER 1

10 0.0	12 6.77410E-03	14 1.26940E-03	15 3.92740E-04	16 3.79200E-05	17 9.93140E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.44420E-04			

SUB-ZONE NUMBER 2

10 0.0	12 6.77410E-03	14 1.26940E-03	15 3.92740E-04	16 3.79200E-05	17 9.93140E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.44420E-04			

SUB-ZONE NUMBER 3

10 0.0	12 6.77410E-03	14 1.26940E-03	15 3.92740E-04	16 3.79200E-05	17 9.93140E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.44420E-04			

SUB-ZONE NUMBER 4

10 0.0	12 6.77410E-03	14 1.26940E-03	15 3.92740E-04	16 3.79200E-05	17 9.93140E-06
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 5.44420E-04			

ZONE NUMBER 3--AXIAL BLKT 1

10 2.12480E-05	12 8.59640E-03	14 1.84150E-04	15 6.19720E-06	16 1.00000E-15	17 0.0
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 4.51510E-05			

ZONE NUMBER 4--AXIAL BLKT 2

10 2.21200E-05	12 8.64230E-03	14 1.47770E-04	15 4.42420E-06	16 1.00000E-15	17 0.0
23 1.80480E-02	25 8.21860E-03	31 2.94590E-03	32 4.32550E-04	33 1.13490E-02	35 2.07870E-03
39 5.18650E-04	47 5.26200E-05	74 3.18540E-05			

ZONE NUMBER 5--RADIAL BLKT

10 2.33790E-05	12 1.02310E-02	14 2.74170E-04	15 1.16890E-05	16 1.00000E-15	17 0.0
23 2.16400E-02	25 6.54000E-03	31 2.87400E-03	32 4.22000E-04	33 1.10720E-02	35 2.02800E-03
39 5.06000E-04	47 1.00000E-15	74 8.60770E-05			

ZONE NUMBER 6--CNR RADL BKT

10 2.86190E-05	12 1.04440E-02	14 1.14480E-04	15 2.12000E-06	16 1.00000E-15	17 0.0
23 2.16400E-02	25 6.54000E-03	31 2.87400E-03	32 4.22000E-04	33 1.10720E-02	35 2.02800E-03

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*****THIS JOB WAS RUN ON 03-13-72 ON THE IBM 360/91*****

***** THIS GDB WAS RUN ON 05-25-72 ON THE IBM 360/91 *****

EMERSON GROUP, 1715 POINTS GREEN, ST. CATHARINES BRANCH #2

0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0

2400000001	00	7077777702	02	7077777703	03	7077777704	04	7077777705	05	7077777706	06	7077777707	07	7077777708	08	7077777709	09	7077777710	10	7077777711	11	7077777712	12	7077777713	13	7077777714	14	7077777715	15	7077777716	16	7077777717	17	7077777718	18	7077777719	19	7077777720	20	7077777721	21	7077777722	22	7077777723	23	7077777724	24	7077777725	25	7077777726	26	7077777727	27	7077777728	28	7077777729	29	7077777730	30	7077777731	31	7077777732	32	7077777733	33	7077777734	34	7077777735	35	7077777736	36	7077777737	37	7077777738	38	7077777739	39	7077777740	40	7077777741	41	7077777742	42	7077777743	43	7077777744	44	7077777745	45	7077777746	46	7077777747	47	7077777748	48	7077777749	49	7077777750	50	7077777751	51	7077777752	52	7077777753	53	7077777754	54	7077777755	55	7077777756	56	7077777757	57	7077777758	58	7077777759	59	7077777760	60	7077777761	61	7077777762	62	7077777763	63	7077777764	64	7077777765	65	7077777766	66	7077777767	67	7077777768	68	7077777769	69	7077777770	70	7077777771	71	7077777772	72	7077777773	73	7077777774	74	7077777775	75	7077777776	76	7077777777	77	7077777778	78	7077777779	79	7077777780	80	7077777781	81	7077777782	82	7077777783	83	7077777784	84	7077777785	85	7077777786	86	7077777787	87	7077777788	88	7077777789	89	7077777790	90	7077777791	91	7077777792	92	7077777793	93	7077777794	94	7077777795	95	7077777796	96	7077777797	97	7077777798	98	7077777799	99	7077777800	00	7077777801	01	7077777802	02	7077777803	03	7077777804	04	7077777805	05	7077777806	06	7077777807	07	7077777808	08	7077777809	09	7077777810	10	7077777811	11	7077777812	12	7077777813	13	7077777814	14	7077777815	15	7077777816	16	7077777817	17	7077777818	18	7077777819	19	7077777820	20	7077777821	21	7077777822	22	7077777823	23	7077777824	24	7077777825	25	7077777826	26	7077777827	27	7077777828	28	7077777829	29	7077777830	30	7077777831	31	7077777832	32	7077777833	33	7077777834	34	7077777835	35	7077777836	36	7077777837	37	7077777838	38	7077777839	39	7077777840	40	7077777841	41	7077777842	42	7077777843	43	7077777844	44	7077777845	45	7077777846	46	7077777847	47	7077777848	48	7077777849	49	7077777850	50	7077777851	51	7077777852	52	7077777853	53	7077777854	54	7077777855	55	7077777856	56	7077777857	57	7077777858	58	7077777859	59	7077777860	60	7077777861	61	7077777862	62	7077777863	63	7077777864	64	7077777865	65	7077777866	66	7077777867	67	7077777868	68	7077777869	69	7077777870	70	70777

0	0	0	0	8	0	0	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	

0.0	0.0	0.0	4.692000E-01	4.692000E-01	4.692000E-01

0.0	0.0	4.692000E-01

_____

REGION 8 DATA									
PTS	REGION WIDTH								
2	8.539808E-02	8	1.400000E 00	4	1.707963E-01	8	1.400000E 00	2	8.539808E-02

X-DIR. POINTS	24	Y-DIR. POINTS	20

DISTANCES TO MESH INTERVAL INTERFACES

[illegible]

1 DIST.

DISTANCES TO FLUX POINTS

J	DIST.																		
1	0.021	2	0.064	3	0.173	4	0.348	5	0.523	6	0.698	7	0.873	8	1.048	9	1.223		
10	1.398	11	1.507	12	1.549	13	1.592	14	1.635	15	1.744	16	1.919	17	2.094	18	2.269		
19	2.444	20	2.619	21	2.794	22	2.969	23	3.078	24	3.120								

I	DIST.																		
1	8.660	2	15.000	3	19.365	4	22.913	5	25.981	6	28.723	7	30.670	8	31.967	9	33.213		
10	34.415	11	36.401	12	39.051	13	41.533	14	43.875	15	47.588	16	52.381	17	56.771	18	60.845		
19	64.663	20	68.267																

ZONE INPUT BY REGION

1	1	1	1	1
2	1	2	1	2
3	1	1	1	1
3	3	3	3	3

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	2	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2
8	2	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2
9	2	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2
10	2	2	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
16	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
17	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
18	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
19	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
20	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

FISSION SOURCE DISTRIBUTION AND SUM 0.60000 0.40000 0.0 1.00000

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 2008

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 24 20 1 3 0 1 20 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 11578

MEMORY LOCATIONS NOT USED----- 28422

REFLECTING BOUNDARY IN THETA-R GEOMETRY, CASE A1 WITH BLACK ABSORBER						
24X20X3 GROUP, 1440 POINTS			STREAM OF CITATION CASES ORNL 72			
LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-8.86503E-01	1.00000	-1.77300	0.65961	0.0	0.536414
2	-9.01325E-01	1.91652	0.11539	1.99946	-0.03187	0.584135
3	1.30442E 00	1.84591	-0.14281	-2.36564	-0.82257	0.608200
4	2.59260F 00	1.79011	4.58015	0.21023	-1.08916	0.600598
5	7.13799E 00	1.74836	9.89120	0.12530	0.27032	0.598343
6	1.42860E 00	1.71836	1.62874	0.64667	-1.10891	0.603882
7	-4.57645E-01	1.69744	-0.77799	-0.56430	0.20517	0.606320
8	3.88820E-01	1.68315	-0.46079	-0.84672	0.73899	0.607627
9	2.07312E-01	1.67353	0.74049	0.43092	1.38109	0.608962
10	-9.24826E-02	1.66711	-0.53859	-0.20370	0.48894	0.609622
11	-4.93319E-02	1.66285	0.48409	1.23974	0.68529	0.610395
12	2.35424E-02	1.66004	-0.45368	-0.45612	0.86664	0.610828
13	-1.35811E-02	1.65819	-0.59046	-0.30138	0.71992	0.611137
14	-9.78291E-03	1.65698	0.71055	0.78197	0.71682	0.611355
15	-7.89481E-03	1.65618	0.79911	0.81868	0.76790	0.611514
16	-6.49625E-03	1.65566	0.81635	0.77839	0.73813	0.611634
17	-5.36257E-03	1.65532	0.82012	0.80138	0.75136	0.611724
18	-4.38780E-03	1.65509	0.81384	0.81287	0.74817	0.611790
19	-3.64405E-03	1.65494	0.82685	0.83634	0.72539	0.611839
20	-3.07566E-03	1.65485	0.84095	0.84677	0.74019	0.611875
21	-2.61790E-03	1.65478	0.84855	0.85517	0.74695	0.611902
22	-2.24435E-03	1.65474	0.85507	0.87916	0.73914	0.611921
23	-1.94043E-03	1.65472	0.86264	0.89684	0.74535	0.611936
24	-1.68961E-03	1.65470	0.86905	0.90833	0.74648	0.611947
25	-1.48094E-03	1.65469	0.87501	0.92017	0.74765	0.611956
26	-1.30630E-03	1.65468	0.88077	0.98011	0.75881	0.611962
27	-1.15860E-03	1.65467	0.88577	0.99019	0.76695	0.611966
28	-1.03277E-03	1.65467	0.89037	0.97277	0.77761	0.611970
29	-9.24885E-04	1.65467	0.89461	0.96510	0.79460	0.611972
30	-8.31485E-04	1.65467	0.89818	0.95667	0.82086	
	-1.06272E-02	EXTRAPOLATION WITH			12.7791	0.611997
31	6.84738E-04	1.00000	-0.82283	-0.44112	9.86619	0.611992
32	7.30515E-04	1.65467	1.06758	0.46958	0.04199	0.611989
33	3.66211E-04	1.65467	0.50167	0.59016	-2.05833	0.611987
34	1.66893E-04	1.65467	0.45590	1.34739	0.14051	0.611985
35	1.34468E-04	1.65467	0.80585	0.38960	-1.75475	0.611983
36	1.16348E-04	1.65467	0.86536	0.82511	1.75687	0.611982
37	9.82285E-05	1.65467	0.84436	0.78806	1.36465	0.611981

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.132 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999983 K 0.6119786

LEAKAGE 1.60506E 13 TOTAL LOSSES 8.77122E 14 TOTAL PRODUCTIONS 5.36783E 14 REACTOR POWER(WATTS) 1.01010E 04

ADJOINT PROBLEM FOLLOWS						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	9.09544E 29	1.00000*****	-0.67721	0.0		0.611981
2	8.67655E 00	1.91652	8.67655	1.08209	0.0	0.611981
3	1.89302E 00	1.84591	2.11120	0.54627	0.0	0.611981
4	1.83442E 00	1.79011	2.80347	0.35413	0.0	0.611981
5	3.89970E 00	1.74836	6.02554	0.14049	0.0	0.611981
6	1.14842E 00	1.71836	1.44291	0.48830	0.0	0.611981
7	4.42015E-01	1.69744	0.82690	0.45825	0.0	0.611981
8	2.15405E-01	1.68315	0.70273	0.62724	0.0	0.611981
9	-1.28175E-01	1.67353	-0.72321	-0.43648	0.0	0.611981
10	-4.48965E-02	1.66711	0.30538	0.31326	0.0	0.611981
11	3.70522E-02	1.66285	-0.78823	-0.34332	0.0	0.611981
12	1.89962E-02	1.66004	0.53169	0.35062	0.0	0.611981

13	8.23021E-03	1.65819	0.44148	0.57318	0.0	0.611981
14	5.82695E-03	1.65698	0.71382	1.83434	0.0	0.611981
15	4.23527E-03	1.65613	0.73108	0.65080	0.0	0.611981
16	3.23200E-03	1.65566	0.76635	0.44671	0.0	0.611981
17	2.46143E-03	1.65532	0.76404	0.47986	0.0	0.611981
18	1.95694E-03	1.65509	0.79700	0.63362	0.0	0.611981
19	1.57452E-03	1.65494	0.80616	0.79897	0.0	0.611981
20	1.27220E-03	1.65485	0.80927	0.82379	0.0	0.611981
21	1.03378E-03	1.65478	0.81363	0.83006	0.0	0.611981
22	8.45909E-04	1.65474	0.81911	0.85505	0.0	0.611981
23	6.97136E-04	1.65472	0.82482	0.86912	0.0	0.611981
24	5.79834E-04	1.65470	0.83232	0.88665	0.0	0.611981
25	4.85420E-04	1.65469	0.83766	0.90746	0.0	0.611981
26	4.09126E-04	1.65468	0.84324	0.92378	0.0	0.611981
27	3.47137E-04	1.65467	0.84883	0.92888	0.0	0.611981
28	2.97546E-04	1.65467	0.85744	0.96137	0.0	0.611981
29	2.56538E-04	1.65467	0.86244	0.97128	0.0	0.611981
30	2.23160E-04	1.65467	0.87011	1.02806	0.0	0.611981
31	1.94550E-04	1.65467	0.87199	1.00054	0.0	0.611981
32	1.71661E-04	1.65467	0.88252	0.98208	0.0	0.611981
33	1.51634E-04	1.65467	0.88348	0.96945	0.0	0.611981
34	1.35422E-04	1.65467	0.89322	0.95914	0.0	0.611981
35	1.21117E-04	1.65467	0.89449	0.95183	0.0	0.611981
	1.45512E-03	EXTRAPOLATION WITH 12.0142				0.611981
36	-1.28984E-04	1.00000	-1.06509	-0.31623	0.0	0.611981
37	-2.98023E-05	1.65467	0.23102	0.81484	0.0	0.611981
38	-2.80738E-05	1.65467	0.94197	0.22728	0.0	0.611981

END OF ADJOINT CALCULATION - ITERATION TIME 0.093 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999974 K 0.6119796

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	0.0	3.04103E 12	0.0	0.0	2.04180E 13	0.0	0.0
2	0.0	0.0	0.0	5.66160E 12	0.0	0.0	1.24056E 13	0.0	0.0
3	0.0	0.0	0.0	7.34792E 12	0.0	0.0	3.36573E 12	0.0	0.0
SUM	0.0	0.0	0.0	1.60506E 13	0.0	0.0	3.61893E 13	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSORP
1	1.97548E 12	5.00839E 14	5.26273E 14	0.0	5.26273E 14	5.26273E 14	0.0
2	3.24226E 14	5.09394E 14	3.50849E 14	5.00839E 14	8.51687E 14	8.51687E 14	2.56510E-01
3	4.98680E 14	0.0	0.0	5.09394E 14	5.09394E 14	5.09394E 14	9.09631E-01
SUM	8.24882E 14	1.01023E 15	8.77121E 14	1.01023E 15	1.88735E 15	1.88735E 15	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--	3.41279E 12	3.52458E 12	1.33401E 12
ZONE 2--	2.85193E 12	2.85193E 12	0.0
ZONE 3--	3.60979E 11	5.70770E 11	6.60979E 11

REFLECTING BOUNDARY IN THETA-R GEOMETRY, CASE A1 WITH BLACK ABSORBER
24X20X3 GROUP, 1440 POINTS

STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI)*M(PHI) = 1.903895E-03

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1		1	-1.176969E 01	2.000514E 01	-1.172748E-02	-1.973775E 01
		2	-1.335031E 01	2.062125E 01	-1.456433E-02	-1.160743E 01
		3	-7.318512E 00	7.760094E 00	-1.675026E-02	-2.448773E 00
2		1	-1.239777E-01	2.034568E-01	-2.318673E-04	-2.270030E-01
		2	-1.304851E-01	2.118524E-01	-2.026779E-04	-1.584089E-01
		3	0.0	0.0	0.0	0.0
3		1	-5.121354E-01	8.040180E-01	-6.088134E-03	-7.000889E-01
		2	-6.685605E-01	1.169436E 00	-6.063506E-03	-6.832684E-01
		3	-6.639817E-01	1.196918E 00	-1.499321E-03	-4.383607E-01

COMP	NAME	GRP. K	SIGS(FROM ALL GROUPS. KK TO GRP. K)			
1		1	1.176969E 01	1.213286E 01	4.566282E 00	
		2	1.295245E 01	1.335031E 01	5.023176E 00	
		3	1.886134E 01	1.944095E 01	7.318512E 00	
2		1	1.239777E-01	1.290932E-01	0.0	
		2	1.253135E-01	1.304851E-01	0.0	
		3	0.0	0.0	0.0	
3		1	5.121354E-01	7.470840E-01	7.687084E-01	
		2	4.619086E-01	6.685605E-01	6.781681E-01	
		3	4.711916E-01	6.722189E-01	6.639817E-01	

END OF CASE - TOTAL CPU TIME WAS 0.29 MINUTES TOTAL CLOCK TIME WAS 2.77 MINUTES

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*****

*****THIS JOB WAS RUN ON 03-13-72 ON THE IBM 360/91*****

PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A2 WITH BLACK ABSORBER
 24X20X3 GROUP, 1440 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	12	6	12	24
2.000000E 00		9.999996E-02		9.999999E 09		9.999999E 2.		0.0				1.000000E 00											

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	8	0	0	0	0	0	-1	1	-1	0	0	0	2	0	0	0	0	0	0	0
9.999999E-05		1.000000E-05		9.999999E-05		9.999999E-05		9.999999E-05		0.0													
0.0		-3.000000E 00		9.999998E-03		9.899999E-C1		5.000000E-01		0.0													

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

PERIODIC 0.0 PERIODIC 4.692000E-01 4.692000E-01 4.692000E-01

ROD BND. CONSTANTS FOR ZONE 2

0.0 0.0 4.692000E-01

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 2008

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 24 20 1 3 0 1 20 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 11578

MEMORY LOCATIONS NOT USED----- 28422

PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A2 WITH BLACK ABSORBER						
24X20X3 GROUP, 1440 POINTS			STREAM OF CITATION CASES ORN 72			
LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-8.86502E-01	1.00000	-1.77320	0.65929	0.0	0.535777
2	-9.01205E-01	1.91652	0.11538	2.17925	-0.02215	0.582171
3	1.30327E 00	1.84591	-0.14287	-2.33636	-1.49119	0.607930
4	2.62630E 00	1.79011	4.64145	0.15920	-0.72729	0.600729
5	6.34566E 00	1.74836	8.76186	0.14709	0.11917	0.598266
6	6.07937E-01	1.71836	0.70374	0.70391	-3.91373	0.604258
7	-4.56884E-01	1.69744	-1.20842	-0.31442	0.18277	0.606952
8	3.91133E-01	1.68315	-0.46496	-1.47437	0.75301	0.608446
9	2.90319E-01	1.67353	1.03257	0.20823	0.94479	0.609581
10	1.65334E-01	1.66711	0.73482	0.64370	0.62327	0.610201
11	5.89361E-02	1.66285	0.41540	0.72550	0.90968	0.610638
12	-4.91940E-02	1.66004	-0.88389	-0.13171	0.87079	0.611022
13	-2.97485E-02	1.65819	0.57497	0.75652	0.74252	0.611303
14	-1.58711E-02	1.65698	0.51764	0.75969	0.65706	0.611486
15	-9.02164E-03	1.65618	0.55941	0.76965	0.71352	0.611617
16	-7.27433E-03	1.65566	0.79905	0.77071	0.78186	0.611713
17	-5.83059E-03	1.65532	0.79570	0.77895	0.75727	0.611783
18	-4.59677E-03	1.65509	0.78379	0.79789	0.75664	
	-1.74596E-02	EXTRAPOLATION WITH			3.7810	0.612030
19	3.19481E-03	1.00000	-0.69182	-0.91826	3.46818	0.612013
20	1.74809E-03	1.65485	0.54891	0.54462	0.00125	0.612007
21	1.15204E-03	1.65478	0.66018	0.43564	-24.90323	0.612000
22	6.84738E-04	1.65474	0.59506	0.50831	0.56496	0.611995
23	5.10216E-04	1.65472	0.74564	0.80110	0.58918	0.611991
24	4.03404E-04	1.65470	0.79106	0.91129	0.49468	0.611988
25	3.12805E-04	1.65469	0.77573	0.87602	0.28946	0.611986
26	2.45094E-04	1.65468	0.78378	0.89465	-0.32149	0.611984
27	1.93596E-04	1.65467	0.79008	0.87661	4.51145	0.611983
28	1.51634E-04	1.65467	0.78340	0.86332	1.57071	0.611982
29	1.20163E-04	1.65467	0.79257	0.85575	1.26293	0.611981
30	9.53674E-05	1.65467	0.79375	0.84459	1.14788	
	4.32017E-04	EXTRAPOLATION WITH			4.5300	0.611978
31	-1.73450E-05	1.00000	-0.18189	-0.29014	6.12235	0.611978
32	-8.10623E-06	1.65467	0.46735	0.57144	0.21046	0.611979
33	5.72205E-06	1.65467	-0.70588	-0.57813	1.08415	0.611970

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.120 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 0.6119790

LEAKAGE 1.60522E 13 TOTAL LOSSES 8.77126E 14 TOTAL PRODUCTIONS 5.36783E 14 REACTOR POWER(WATTS) 1.01010E 04

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	-4.27433E 07	0.0	4.27433E 07	3.04133E 12	0.0	0.0	2.04182E 13	0.0	0.0
2	8.14447E 07	0.0	-8.14447E 07	5.66221E 12	0.0	0.0	1.24058E 13	0.0	0.0
3	6.58052E 07	0.0	-6.58052E 07	7.34864E 12	0.0	0.0	3.36587E 12	0.0	0.0
SUM	1.04507E 08	0.0	-1.04507E 08	1.60522E 13	0.0	0.0	3.61898E 13	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSORP
1	1.97556E 12	5.00841E 14	5.26275E 14	0.0	5.26275E 14	5.26275E 14	0.0
2	3.24226E 14	5.09396E 14	3.50850E 14	5.00841E 14	8.51690E 14	8.51691E 14	2.56510E-01

3	4.98682E 14	0.0	0.0	5.09397E 14	5.09395E 14	5.09397E 14	9.09628E-01
SUM	8.24883E 14	1.01024E 15	8.77125E 14	1.01024E 15	1.88736E 15	1.88736E 15	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--	3.41278E 12	3.52458E 12	1.33401E 12
ZONE 2--	2.73775E 12	2.85205E 12	0.0
ZONE 3--	3.64924E 11	5.70811E 11	6.61027E 11

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

1.61598E 00	0.0	0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 1 AND COLUMN 18 IS 2.626443E 00

THE AVERAGE POWER DENSITY ALONG ROW 1 IS 2.625729E 00 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE

9.997254E-01	9.997341E-01	9.997744E-01	9.999484E-01	1.000144E 00	1.000270E 00	1.000271E 00	1.000146E 00	9.999524E-01
9.997802E-01	9.997424E-01	9.997352E-01	9.997355E-01	9.997432E-01	9.997817E-01	9.999539E-01	1.000148E 00	1.000272E 00
1.000270E 00	1.000143E 00	9.999462E-01	9.997715E-01	9.997323E-01	9.997243E-01			

THE AVERAGE POWER DENSITY DOWN COLUMN 18 IS 1.678942E 00 AND THE RELATIVE POWER DENSITIES ARE

1.564343E 00	1.445086E 00	1.337614E 00	1.238172E 00	1.145384E 00	1.058205E 00	9.940931E-01	9.507440E-01	9.085980E-01
8.676471E-01	7.997390E-01	7.110897E-01	6.407340E-01	6.201540E-01	0.0	0.0	0.0	0.0
0.0	0.0							

END OF CASE - TOTAL CPU TIME WAS 0.14 MINUTES TOTAL CLOCK TIME WAS 0.64 MINUTES

*****THIS JOB WAS RUN ON 03-13-72 ON THE IBM 360/91*****

PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A4 WITH BLACK ABSORBER
24X20X3 GROUP, 1440 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

C	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	12	6	12	24
2.000000E 00		9.999996E-02		9.999999E 09		9.999999E 23		0.0		1.000000E 00														

TWO DIMENSIONAL CIRCULAR GEOMETRY (R,THETA) WIDTH 3.141591E 00 HEIGHT 6.999998E 01

REGION SPECIFICATIONS

PTS	REGION WIDTH																							
4	1.707963E-01	8	1.400000E 00	4	1.707963E-01	8	1.400000E 00																	

PTS	REGION HEIGHT																							
6	3.000000E 01	4	5.000000E 00	4	1.000000E 01	6	2.500000E 01																	

X-DIR. POINTS 24 Y-DIR. POINTS 20

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																								
2	0.043	3	0.085	4	0.128	5	0.171	6	0.214	7	0.257	8	0.299	9	0.342	10	0.385	11	0.428	12	0.471	13	0.514	14	0.557
11	1.221	12	1.396	13	1.571	14	1.613	15	1.656	16	1.699	17	1.742	18	1.785	19	1.828	20	1.871	21	1.914	22	1.957	23	2.000
20	2.267	21	2.442	22	2.617	23	2.792	24	2.967	25	3.142														

I	DIST.																								
2	12.247	3	17.320	4	21.213	5	24.495	6	27.386	7	30.000	8	31.325	9	32.596	10	33.819	11	35.000	12	37.749	13	40.311	14	42.720
11	35.000	12	37.749	13	40.311	14	42.720	15	45.000	16	50.042	17	54.620	18	58.843	19	62.783	20	66.489	21	70.000				

DISTANCES TO FLUX POINTS

J	DIST.																								
1	0.021	2	0.064	3	0.107	4	0.149	5	0.258	6	0.433	7	0.608	8	0.783	9	0.958	10	1.133	11	1.308	12	1.483	13	1.592
10	1.133	11	1.308	12	1.483	13	1.592	14	1.635	15	1.678	16	1.720	17	1.829	18	2.004	19	2.179	20	2.354	21	2.529	22	2.704
19	2.179	20	2.354	21	2.529	22	2.704	23	2.879	24	3.054														

I	DIST.																								
1	8.660	2	15.000	3	19.365	4	22.913	5	25.981	6	28.723	7	30.670	8	31.967	9	33.213	10	34.415	11	36.401	12	39.051	13	41.533
10	34.415	11	36.401	12	39.051	13	41.533	14	43.875	15	47.588	16	52.381	17	56.771	18	60.845	19	64.663	20	66.267				

ZONE INPUT BY REGION

1	1	1	1
2	1	2	1
1	1	1	1
3	3	3	3

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A4 WITH BLACK ABSORBER						
24X20X3 GROUP, 1440 POINTS STREAM OF CITATION CASES ORNL 72						
LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-8.86503E-01	1.00000	-1.77301	0.65929	0.0	0.535649
2	-9.01219E-01	1.91652	0.11538	1.96036	-0.02894	0.583222
3	1.30207E 00	1.84591	-0.14272	-2.40078	-1.15361	0.607457
4	2.59157E 00	1.79011	4.58192	0.19712	-0.56856	0.599431
5	4.17443E 00	1.74836	5.78520	0.21934	0.13456	0.598442
6	6.92911E-01	1.71836	0.85890	0.33785	-3.59371	0.604671
7	-4.58327E-01	1.69744	-1.11978	-0.28820	0.06764	0.607052
8	4.11564E-01	1.68315	-0.48641	-0.87407	1.83162	0.608366
9	2.16753E-01	1.67353	0.74341	0.36310	1.22841	0.609468
10	6.27975E-02	1.66711	0.35252	0.80564	0.62318	0.610118
11	-5.42194E-02	1.66285	-0.91762	-0.30230	0.86634	0.610601
12	-2.88921E-02	1.66004	0.50398	0.31810	0.81808	0.610998
13	-1.82989E-02	1.65819	0.61505	0.73832	0.74500	0.611275
14	-1.06639E-02	1.65698	0.57210	0.74980	0.68336	0.611459
15	-8.53842E-03	1.65618	0.79214	0.76321	0.72483	0.611594
16	-6.77997E-03	1.65566	0.78727	0.76720	0.77233	0.611694
17	-5.31715E-03	1.65532	0.77893	0.77452	0.74153	
	-1.85948E-02	EXTRAPOLATION WITH			3.4787	0.612019
18	3.50189E-03	1.00000	-0.65510	-0.61876	3.19403	0.612002
19	1.99086E-03	1.65494	0.57308	0.57968	0.00331	0.611995
20	1.33133E-03	1.65485	0.66704	0.54263	-8.38447	0.611988
21	7.22885E-04	1.65478	0.54370	0.68603	0.57268	0.611983
22	5.34058E-04	1.65474	0.73932	0.75425	0.54466	0.611979
23	4.24385E-04	1.65472	0.79507	0.93151	0.43205	0.611976
24	3.29971E-04	1.65470	0.77786	0.89088	0.05173	0.611974
25	2.58446E-04	1.65469	0.78350	0.87376	-9.19849	0.611972
26	2.05040E-04	1.65468	0.79356	0.85775	1.85867	
	9.71025E-04	EXTRAPOLATION WITH			4.7358	0.611965
27	-8.02875E-05	1.00000	-0.39165	-0.45710	8.24581	0.611966
28	-3.29018E-05	1.65467	0.40977	0.35557	0.29224	0.611966
29	-2.03848E-05	1.65467	0.61954	0.75001	1.18051	0.611966

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.107 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 0.6119677

LEAKAGE 1.60520E 13 TOTAL LOSSES 8.77143E 14 TOTAL PRODUCTIONS 5.36782E 14 REACTOR POWER(WATTS) 1.01010E 04

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	9.09569E 29	1.00000*****	-0.67843	0.0		0.611966
2	1.02837E 01	1.91652	10.28369	1.18297	0.0	0.611966
3	2.94773E 00	1.84591	3.23438	0.48244	0.0	0.611966
4	1.80527E 00	1.79011	2.41770	0.23406	0.0	0.611966
5	3.91966E 00	1.74836	6.09089	0.22546	0.0	0.611966
6	7.98493E-01	1.71836	1.00221	0.34777	0.0	0.611966
7	2.97988E-01	1.69744	0.67118	0.46375	0.0	0.611966
8	2.08034E-01	1.68315	0.90616	0.25181	0.0	0.611966
9	1.13163E-01	1.67353	0.65717	0.52072	0.0	0.611966
10	3.30057E-02	1.66711	0.32461	0.36936	0.0	0.611966
11	-1.88519E-02	1.66285	-0.59002	-0.88796	0.0	0.611966
12	1.11074E-02	1.66004	-0.57809	-0.60231	0.0	0.611966
13	7.72476E-03	1.65819	0.70318	0.54554	0.0	0.611966
14	6.83689E-03	1.65698	0.89190	0.43321	0.0	0.611966
15	5.25475E-03	1.65618	0.77384	0.48311	0.0	0.611966
16	4.05216E-03	1.65566	0.77520	1.03753	0.0	0.611966
17	3.14808E-03	1.65532	0.78004	0.59875	0.0	0.611966
18	2.49672E-03	1.65509	0.79559	0.48143	0.0	0.611966
19	1.95694E-03	1.65494	0.78576	0.73556	0.0	0.611966

20	1.53351E-03	1.65485	0.78516	0.76572	0.0	0.611966
21	1.19972E-03	1.65478	0.78354	0.76496	0.0	0.611966
22	9.36508E-04	1.65474	0.78154	0.76383	0.0	
	3.18051E-03	EXTRAPOLATION WITH 3.3992				0.611966
23	-3.12388E-04	1.00000	-0.33388	-1.73337	0.0	0.611966
24	4.57764E-05	1.65470	-0.14649	-0.21146	0.0	0.611966
25	-3.04580E-05	1.65469	-0.66539	-0.62743	0.0	0.611966

END OF ADJOINT CALCULATION - ITERATION TIME 0.069 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000057 K 0.6119703

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	I/V LOSS	XENON LOSS
1	-1.17789E 12	0.0	1.17789E 12	3.04130E 12	0.0	0.0	2.04189E 13	0.0	0.0
2	-6.07286E 11	0.0	6.07286E 11	5.66215E 12	0.0	0.0	1.24062E 13	0.0	0.0
3	-7.12042E 11	0.0	7.12042E 11	7.34855E 12	0.0	0.0	3.36584E 12	0.0	0.0
SUM	-2.49722E 12	0.0	2.49722E 12	1.60520E 13	0.0	0.0	3.61909E 13	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSORP
1	1.97929E 12	5.00847E 14	5.26285E 14	0.0	5.26286E 14	5.26285E 14	0.0
2	3.24232E 14	5.09404E 14	3.50857E 14	5.00847E 14	8.51704E 14	8.51704E 14	2.56509E-01
3	4.98689E 14	0.0	0.0	5.09404E 14	5.09402E 14	5.09404E 14	9.09613E-01
SUM	8.24900E 14	1.01025E 15	8.77142E 14	1.01025E 15	1.88739E 15	1.88739E 15	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--

3.41282E 12	3.52463E 12	1.33401E 12

ZONE 2--

2.74291E 12	2.85633E 12	0.0

ZONE 3--

3.64917E 11	5.70801E 11	6.61016E 11

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

1.61598E 00	0.0	0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 1 AND COLUMN 8 IS 2.626999E 00

THE AVERAGE POWER DENSITY ALONG ROW 1 IS 2.626125E 00 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE

9.997330E-01	9.997312E-01	9.997378E-01	9.997519E-01	9.998057E-01	9.999967E-01	1.000202E 00	1.000332E 00	1.000330E 00
1.000196E 00	9.999884E-01	9.997995E-01	9.997509E-01	9.997385E-01	9.997342E-01	9.997367E-01	9.997628E-01	9.999157E-01
1.000093E 00	1.000206E 00	1.000200E 00	1.000078E 00	9.998961E-01	9.997461E-01			

THE AVERAGE POWER DENSITY DOWN COLUMN 8 IS 1.680040E 00 AND THE RELATIVE POWER DENSITIES ARE

1.563652E 00	1.444663E 00	1.337394E 00	1.238099E 00	1.145412E 00	1.058302E 00	9.942247E-01	9.508932E-01	9.087605E-01
8.678176E-01	7.999176E-01	7.112684E-01	6.409082E-01	6.203337E-01	0.0	0.0	0.0	0.0
0.0	0.0							

PERIODIC BOUNDARY IN THETA-R GEOMETRY, CASE A4 WITH BLACK ABSORBER
 24X20X3 GROUP, 1440 POINTS STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 1.923210E-03

COMP	NAME	GRP	SIGA,SIGR,DB**2	NU*SIGF	DIFF. COEF.	B**2
1		1	-1.176954E 01	2.000543E 01	-1.172626E-02	-1.973750E 01
		2	-1.335024E 01	2.062161E 01	-1.456099E-02	-1.160937E 01
		3	-7.318287E 00	7.760093E 00	-1.678621E-02	-2.448698E 00
2		1	-1.243766E-01	2.041908E-01	-2.317438E-04	-2.277338E-01
		2	-1.309730E-01	2.125365E-01	-2.028837E-04	-1.590011E-01
		3	0.0	0.0	0.0	0.0
3		1	-5.121053E-01	8.039941E-01	-6.087616E-03	-7.000477E-01
		2	-6.685296E-01	1.169407E 00	-6.063085E-03	-6.832368E-01
		3	-6.639538E-01	1.196888E 00	-1.499188E-03	-4.383423E-01

COMP	NAME	GRP. K ---	SIGS(FROM ALL GRPS. KK TO GRP. K)
1		1	1.176954E 01 1.213273E 01 4.566157E 00
		2	1.295232E 01 1.335024E 01 5.023049E 00
		3	1.886115E 01 1.944041E 01 7.318287E 00
2		1	1.243768E-01 1.294599E-01 0.0
		2	1.258296E-01 1.309730E-01 0.0
		3	0.0 0.0 0.0
3		1	5.121053E-01 7.470433E-01 7.086673E-01
		2	4.618849E-01 6.685296E-01 6.731362E-01
		3	4.711695E-01 6.721905E-01 6.639538E-01

END OF CASE - TOTAL CPU TIME WAS 0.22 MINUTES TOTAL CLOCK TIME WAS 1.84 MINUTES

*****
 *****

*****THIS JOB WAS RUN ON 03-13-72 ON THE IBM 360/91*****

R-Z CASE TO COMPARE WITH THETA-R-Z CASE, WITH BLACK ABSORBER
 13X20X4 GROUP, 1040 POINTS STREAM OF CITATION CASES URNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0																																																
1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0																																																
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24																																																
1.000000E 02												9.999999E-05												9.999999E 09												9.999999E 23												0.0												1.000000E 00											

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	7	0	0	0	0	0	1	1	0	0	0	0	3	0	0	0	0	0	0	0																																																
9.999999E-05												1.000000E-05												9.999999E-05												9.999999E-05												9.999999E-05												0.0											
9.999998E-03												-4.000000E 00												6.800000E 01												1.000000E 00												1.000000E 00												0.0											

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0				0.0				9.999998E-03				9.999998E-03				9.999998E-03				9.999998E-03			

ROD BND. CONSTANTS FOR ZONE 3

1.526000E-02				7.453996E-02				1.102300E-01				1.242099E-01			

TWO DIMENSIONAL CYLINDRICAL GEOMETRY (R,Z) WIDTH 2.999998E 01 HEIGHT 4.999998E 01

REGION SPECIFICATIONS

PTS REGION WIDTH
 4 1.000000E 01 9 2.000000E 01

PTS REGION HEIGHT
 9 2.000000E 01 4 1.000000E 01 3 6.000000E 00 4 1.000000E 01

X-DIR. POINTS 13 Y-DIR. POINTS 20

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.		
2	5.000	3	7.071	4	8.660	5	10.000	6	13.744	7	16.667	8	19.149	9	21.344	10	23.333	11	25.166	12	26.874	13	28.480	14	30.000

I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.																
2	2.222	3	4.444	4	6.667	5	8.889	6	11.111	7	13.333	8	15.556	9	17.778	10	20.000	11	22.500	12	25.000	13	27.500	14	30.000	15	32.000	16	34.000	17	36.000	18	38.500	19	41.000	20	43.500	21	46.000

DISTANCES TO FLUX POINTS

J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.	J	DIST.		
1	3.536	2	6.124	3	7.906	4	9.354	5	12.019	6	15.275	7	17.951	8	20.276	9	22.361	10	24.267	11	26.034	12	27.689	13	29.250

I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.	I	DIST.												
1	1.111	2	2.333	3	5.556	4	7.778	5	10.000	6	12.222	7	14.444	8	16.667	9	18.889	10	21.250	11	23.750	12	26.250	13	28.750	14	31.000	15	33.000	16	35.000	17	37.250	18	39.750

19 42.250 20 44.750

ZONE INPUT BY REGION

1 1
3 1
1 1
2 2

ZONE NUMBER AT EACH MESH INTERVAL

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1
10	3	3	3	3	1	1	1	1	1	1	1	1	1
11	3	3	3	3	1	1	1	1	1	1	1	1	1
12	3	3	3	3	1	1	1	1	1	1	1	1	1
13	3	3	3	3	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1
17	2	2	2	2	2	2	2	2	2	2	2	2	2
18	2	2	2	2	2	2	2	2	2	2	2	2	2
19	2	2	2	2	2	2	2	2	2	2	2	2	2
20	2	2	2	2	2	2	2	2	2	2	2	2	2

FISSION SOURCE DISTRIBUTION AND SUM 1.00000 0.0 0.0 0.0 1.00000

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1659

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 13 20 1 4 0 0 8 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 8554

MEMORY LOCATIONS NOT USED----- 31006

*****WARNING***** INPUT SPECIFIED UPSCATTER = 0 HAS BEEN CHANGED TO ACTUAL UPSCATTER = 1

*****WARNING***** INPUT SPECIFIED DOWNSCATTER = 0 HAS BEEN CHANGED TO ACTUAL DOWNSCATTER = 1

R-Z CASE TO COMPARE WITH THETA-R-Z CASE, WITH BLACK ABSORBER						
13X20X4 GROUP, 1040 POINTS			STREAM OF CITATION CASES OFNL 72			
LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.12299E-01	1.00000	0.62460	-0.36638	0.0	0.388723
2	-7.77383E-01	1.84153	-3.24560	-2.86353	0.08366	0.438437
3	-7.22449E-01	1.72641	0.21290	0.59021	0.60952	0.468017
4	8.44198E-01	1.65142	-0.32432	-3.25641	0.66200	0.486351
5	8.55601E-01	1.60598	1.86911	0.25855	0.71798	0.498031
6	4.41313E-01	1.57964	0.95711	0.39634	0.72576	0.505915
7	-2.40255E-01	1.56476	-0.78467	-0.39082	0.59875	0.511456
8	-2.70151E-01	1.55648	0.85428	0.44222	0.53446	0.516437
9	1.68539E-01	1.55192	-0.45533	-2.99261	0.23721	0.519092
10	-1.39412E-01	1.54941	-0.96659	-0.67724	-1.20965	0.520747
11	-9.84510E-02	1.54803	0.60773	0.31132	2.19028	0.521463
12	-7.60495E-02	1.54728	0.69641	0.95159	1.38883	0.521483
13	-6.11475E-02	1.54686	0.74290	0.92597	1.18325	0.521063
14	-4.96933E-02	1.54664	0.76299	0.88406	1.08322	0.520341
15	-3.99801E-02	1.54652	0.76456	0.87122	1.03115	0.519374
16	-3.23465E-02	1.54645	0.77672	0.90900	1.00793	0.518288
17	-2.77042E-02	1.54641	0.82878	0.94231	0.93418	0.517119
18	-2.30943E-02	1.54639	0.81051	0.91675	0.98183	0.515870
19	-1.68281E-02	1.54638	0.71184	0.87562	0.96150	0.514582
20	-1.39726E-02	1.54638	0.81634	0.84447	0.95217	0.513315
21	-1.36354E-02	1.54637	0.96223	0.83258	0.96159	0.512075
22	7.87067E-03	1.54637	-0.56935	-0.80305	0.96000	0.510818
23	-7.10750E-03	1.54637	-0.91014	-0.90388	0.93294	0.509608
24	-6.67340E-03	1.54637	0.93225	0.86760	0.92757	0.508458
25	-6.21027E-03	1.54637	0.92439	0.87515	0.92537	0.507374
26	-5.81551E-03	1.54637	0.93062	0.94356	0.92459	0.506354
27	-5.44858E-03	1.54637	0.93146	0.93946	0.92246	0.505399
28	-5.10019E-03	1.54637	0.93096	0.93895	0.91969	
	-7.36788E-02	EXTRAPOLATION WITH			14.3735	0.491441
29	4.01306E-03	1.00000	-0.78283	-0.47090	14.28078	0.491496
30	3.91960E-03	1.54637	0.98063	1.13537	-0.01828	0.491606
31	3.70502E-03	1.54637	0.94896	1.01221	1.04591	0.491752
32	3.12233E-03	1.54637	0.84585	0.94305	1.00630	0.491917
33	2.44713E-03	1.54637	0.78620	0.89847	0.98119	0.492091
34	1.80531E-03	1.54637	0.73953	0.88775	0.97811	0.492276
35	-1.50687E-03	1.54637	-0.83619	-0.73757	0.96522	0.492465
36	-1.33598E-03	1.54637	0.88526	0.78567	0.95864	0.492652
37	-1.13374E-03	1.54637	0.84749	0.96520	0.94977	0.492835
38	-1.10477E-03	1.54637	0.97334	0.96384	0.94647	0.493013
39	-9.36985E-04	1.54637	0.84719	0.97384	0.94035	0.493185
40	8.64983E-04	1.54637	-0.92229	-0.92609	0.93540	0.493348
41	8.35419E-04	1.54637	0.96666	0.89039	0.93147	0.493503
42	7.97272E-04	1.54637	0.95514	0.94709	0.92773	0.493649
43	7.55310E-04	1.54637	0.94812	0.94538	0.92420	0.493785
44	7.08580E-04	1.54637	0.93884	0.94256	0.92093	0.493913
45	6.65665E-04	1.54637	0.94010	0.93508	0.91970	0.494031
46	6.23703E-04	1.54637	0.93759	0.93141	0.91765	0.494140
47	5.80788E-04	1.54637	0.93177	0.92681	0.91525	0.494241
48	5.35011E-04	1.54637	0.92172	0.97413	0.91206	0.494334
49	4.96864E-04	1.54637	0.92920	0.96258	0.91264	0.494419
50	4.59671E-04	1.54637	0.92560	0.95314	0.91041	0.494497
51	-4.27902E-04	1.54637	-0.93131	-0.93653	0.90909	0.494568
52	-4.02153E-04	1.54637	0.93942	0.91931	0.90781	0.494634
53	-3.75628E-04	1.54637	0.93367	0.91702	0.90661	0.494693
54	-3.49104E-04	1.54637	0.92904	0.91476	0.90556	0.494747
55	-3.22819E-04	1.54637	0.92438	0.91550	0.90462	
	-3.70406E-03	EXTRAPOLATION WITH			11.4911	0.495357
56	5.14984E-05	1.00000	-0.15948	-0.10027	11.44253	0.495354
57	5.91278E-05	1.54637	1.14821	1.70911	-0.01698	0.495346

58	6.00815E-05	1.54637	1.01619	0.90904	0.96084	0.495338
59	5.72205E-05	1.54637	0.95244	0.91021	0.94214	0.495330
60	5.34058E-05	1.54637	0.93339	0.91264	0.93135	0.495323
61	4.95911E-05	1.54637	0.92862	0.91817	0.93207	0.495316
62	4.67300E-05	1.54637	0.94235	0.91593	0.92068	0.495309
63	4.38690E-05	1.54637	0.93802	0.91924	0.92058	0.495303
64	4.00543E-05	1.54637	0.91308	0.92013	0.91187	0.495297
65	4.00543E-05	1.54637	1.00004	0.93273	0.91239	0.495291
66	3.62396E-05	1.54637	0.90480	0.92788	0.90599	0.495286

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.127 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9992194 K 0.4953631

LEAKAGE 5.35457E 13 TOTAL LOSSES 1.38698E 14 TOTAL PRODUCTIONS 6.86952E 13 REACTOR POWER(WATTS) 6.80000E 07

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.89566E 28	1.00000*****	-0.05636	0.0		0.495286
2	9.03352E 00	1.84153	9.03352	22.45157	0.0	0.495286
3	4.92919E 00	1.72641	5.47484	0.23856	0.0	0.495286
4	1.98464E 00	1.65142	2.38727	0.37429	0.0	0.495286
5	9.67230E-01	1.60598	1.45459	0.44889	0.0	0.495286
6	5.87255E-01	1.57964	1.19441	0.59138	0.0	0.495286
7	3.82845E-01	1.56476	1.03477	0.60607	0.0	0.495286
8	2.91459E-01	1.55648	1.05276	0.96810	0.0	0.495286
9	2.67919E-01	1.55192	1.18715	0.60590	0.0	0.495286
10	2.55519E-01	1.54941	1.20924	0.80359	0.0	0.495286
11	1.58237E-01	1.54803	0.77752	0.83653	0.0	0.495286
12	1.21853E-01	1.54728	0.89192	0.85377	0.0	0.495286
13	1.07647E-01	1.54686	0.99106	0.87495	0.0	0.495286
14	9.34916E-02	1.54664	0.96199	0.89369	0.0	0.495286
15	7.96766E-02	1.54652	0.93191	0.90408	0.0	0.495286
16	6.82545E-02	1.54645	0.92490	0.91834	0.0	0.495286
17	5.91240E-02	1.54641	0.92535	0.95033	0.0	0.495286
18	5.15862E-02	1.54639	0.92409	0.92420	0.0	0.495286
19	4.47426E-02	1.54638	0.91208	0.89534	0.0	0.495286
20	3.86534E-02	1.54638	0.90256	0.89904	0.0	0.495286
21	3.34101E-02	1.54637	0.89776	0.93451	0.0	0.495286
22	2.93875E-02	1.54637	0.90899	0.88409	0.0	0.495286
23	2.63290E-02	1.54637	0.92226	0.86278	0.0	0.495286
24	-2.26966E-02	1.54637	-0.86473	-0.85638	0.0	0.495286
25	-2.01604E-02	1.54637	0.86809	0.87150	0.0	0.495286
26	-1.78810E-02	1.54637	0.86906	0.86344	0.0	0.495286
27	-1.58452E-02	1.54637	0.87030	0.85857	0.0	
	-1.02662E-01	EXTRAPOLATION WITH	6.3766			0.495286
28	-3.95775E-03	1.00000	0.24582	0.15055	0.0	0.495286
29	-4.94736E-03	1.54637	1.24510	1.39847	0.0	0.495286
30	-5.06425E-03	1.54637	1.01856	0.87562	0.0	0.495286
31	-4.93121E-03	1.54637	0.96880	0.93771	0.0	0.495286
32	-4.53097E-03	1.54637	0.91430	0.94701	0.0	0.495286
33	-4.07958E-03	1.54637	0.89630	0.85779	0.0	0.495286
34	-3.64506E-03	1.54637	0.88984	0.82613	0.0	0.495286
35	-3.24625E-03	1.54637	0.88734	0.90146	0.0	0.495286
36	-2.76411E-03	1.54637	0.84871	0.85951	0.0	0.495286
37	-2.68090E-03	1.54637	0.96722	0.88042	0.0	0.495286
38	-2.24875E-03	1.54637	0.83641	0.87909	0.0	0.495286
39	-1.96671E-03	1.54637	0.87277	0.88263	0.0	0.495286
40	-1.78438E-03	1.54637	0.90551	0.88184	0.0	0.495286
41	-1.65141E-03	1.54637	0.92383	0.88026	0.0	0.495286
42	-1.52028E-03	1.54637	0.91907	0.87424	0.0	0.495286
43	-1.39171E-03	1.54637	0.91404	0.87484	0.0	0.495286
44	-1.26576E-03	1.54637	0.90824	0.88429	0.0	
	-1.09419E-02	EXTRAPOLATION WITH	8.6396			0.495286
45	2.09808E-04	1.00000	-0.16555	-0.26821	0.0	0.495286
46	2.77519E-04	1.54637	1.32300	1.44376	0.0	0.495286

47	2.81334E-04	1.54637	1.01403	0.90600	0.0	0.495286
48	2.77519E-04	1.54637	0.98672	0.88320	0.0	0.495286
49	2.61307E-04	1.54637	0.94184	0.89611	0.0	0.495286
50	2.38419E-04	1.54637	0.91265	0.89914	0.0	0.495286
51	2.14577E-04	1.54637	0.90021	0.90124	0.0	0.495286
52	1.92642E-04	1.54637	0.89797	0.90653	0.0	0.495286
53	1.64986E-04	1.54637	0.85660	0.90715	0.0	0.495286
54	1.60217E-04	1.54637	0.97126	0.91045	0.0	0.495286
55	1.35422E-04	1.54637	0.84537	0.91405	0.0	0.495286
56	1.18256E-04	1.54637	0.87336	0.91954	0.0	0.495286
57	1.03951E-04	1.54637	0.87914	0.94395	0.0	0.495286
58	9.05991E-05	1.54637	0.87165	0.92815	0.0	0.495286

END OF ADJOINT CALCULATION - ITERATION TIME 0.075 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0011587 K 0.4555309

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	1.64306E 13	2.12991E 12	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	5.57573E 12	1.67591E 12	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	2.97323E 12	9.17628E 11	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	1.69606E 13	6.48216E 12	0.0	0.0	0.0	0.0	0.0
SUM	0.0	0.0	4.23401E 13	1.12056E 13	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	5.20004E 12	1.14916E 14	1.38698E 14	0.0	1.38677E 14	1.38698E 14	3.65590E-01
2	1.23706E 13	9.48847E 13	0.0	1.14916E 14	1.14907E 14	1.14916E 14	4.00152E-01
3	8.49695E 12	8.26228E 13	0.0	9.50156E 13	9.50106E 13	9.50156E 13	3.55114E-01
4	5.90847E 13	1.30931E 11	0.0	8.26228E 13	8.26583E 13	8.26228E 13	9.95631E-01
SUM	8.51523E 13	2.92554E 14	1.38698E 14	2.92554E 14	4.31252E 14	4.31252E 14	

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

6.89333E 02 0.0 0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 16 AND COLUMN 9 IS 7.599082E 02

THE AVERAGE POWER DENSITY ALONG ROW 16 IS 7.353403E 02 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE

8.592102E-01 8.805476E-01 9.012581E-01 9.212537E-01 9.609612E-01 9.998210E-01 1.020866E 00 1.030804E 00 1.033410E 00
1.030913E 00 1.024761E 00 1.016002E 00 1.005585E 00

THE AVERAGE POWER DENSITY DOWN COLUMN 9 IS 7.078477E 02 AND THE RELATIVE POWER DENSITIES ARE

1.007688E 00 1.006117E 00 1.003076E 00 9.987614E-01 9.934847E-01 9.876927E-01 9.819849E-01 9.771283E-01 9.740434E-01
9.737147E-01 9.781540E-01 9.883577E-01 1.004836E 00 1.025369E 00 1.047541E 00 1.073547E 00 0.0 0.0
0.0 0.0

R-2 CASE TO COMPARE WITH THETA-R-2 CASE, WITH BLACK ABSORBER
 1342076 GROUP, 1040 POINTS STREAM OF CITATION CASES URM 72

PERTURBATION RESULTS---DELTA-K/TK*DELTA-S WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 1.143320E-05

GROUP	NAME	GRP	SIGA, SIGR, SM**2	NU*SIGF	DIFF. CULF.	S**2
1	CORE ZONE 1	1	-1.592009E 02	3.214287E 02	-6.416064E-03	-2.851482E 02
		2	-6.330983E 01	1.047616E 02	-9.224921E-03	-8.989423E 01
		3	-3.513837E 01	5.072002E 01	-7.347491E-03	-5.040834E 01
		4	-2.095449E 02	2.707122E 02	-3.929822E-02	-2.842190E 02
2	CORE ZONE 2	1	-1.807120E 01	3.648601E 01	-5.598012E-03	-1.868379E 01
		2	-1.327962E 01	2.407881E 01	-1.497888E-03	-1.173388E 01
		3	-7.600723E 00	1.277619E 01	-6.755348E-04	-6.753402E 00
		4	-5.375708E 01	3.737411E 01	4.864288E-03	-4.523227E 01
3	AXIAL BLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0

GROUP	NAME	GRP. K	SIGSITRON ALL GRPS. KA TO GRP. K1
1	CORE ZONE 1	1	1.592009E 02 5.108747E 01 2.512117E 01 1.340813E 02
		2	1.947355E 02 6.330983E 01 3.083490E 01 1.024634E 02
		3	2.234935E 02 7.263855E 01 3.511837E 01 1.866349E 02
		4	2.516054E 02 8.163468E 01 3.948314E 01 2.098439E 02
2	CORE ZONE 2	1	1.807120E 01 1.192602E 01 6.527933E 00 4.327562E 01
		2	2.014252E 01 1.327962E 01 7.045321E 00 4.817142E 01
		3	2.176309E 01 1.432929E 01 7.190723E 00 5.195534E 01
		4	2.258739E 01 1.483817E 01 7.867767E 00 5.375708E 01
3	AXIAL BLKT 1	1	0.0 0.0 0.0 0.0
		2	0.0 0.0 0.0 0.0
		3	0.0 0.0 0.0 0.0
		4	0.0 0.0 0.0 0.0

END OF CASE - TOTAL CPU TIME WAS 0.25 MINUTES TOTAL CLOCK TIME WAS 1.44 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

THETA-R-Z CASE WITH BLACK ABSORBER, PERIODIC
4X13X20X4 GROUP, 4160 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0																																																
1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0																																																
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24																																																
1.000000E 02												9.999999E-05												9.999999E 09												9.999999E 23												0.0												1.000000E 00											

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	12	0	0	0	0	0	-1	1	-1	0	1	0	3	0	0	0	0	0	0	0																																																
9.999999E-05												1.000000E-05												9.999999E-05												9.999999E-05												9.999999E-05												0.0											
9.999998E-03												-4.000000E 00												6.800000E 01												1.000000E 00												1.000000E 00												0.0											

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE
PERIODIC 0.0 PERIODIC 9.999998E-03 0.0 9.999998E-03

ROD BND. CONSTANTS FOR ZONE 3
1.526000E-02 7.453996E-02 1.102300E-01 1.242099E-01

THREE DIMENSIONAL CYLINDRICAL GEOMETRY (R, THETA, Z) WIDTH 6.283186E 00 HEIGHT 3.000000E 01 DEPTH 4.595998E 01

REGION SPECIFICATIONS

PTS REGION WIDTH
4 6.283186E 00

PTS REGION HEIGHT
4 1.000000E 01 9 2.000000E 01

PTS REGION DEPTH
9 2.000000E 01 4 1.000000E 01 3 6.000000E 00 4 1.000000E 01

X-DIR. POINTS 4 Y-DIR. POINTS 13 Z-DIR. POINTS 20

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																						
2	1.571	3	3.142	4	4.712	5	6.283																
1	DIST.																						
2	5.000	3	7.071	4	8.660	5	10.000	6	13.744	7	16.667	8	19.149	9	21.344	10	23.333						
11	25.166	12	26.874	13	28.480	14	30.000																
K8	DIST																						
2	2.222	3	4.444	4	6.667	5	8.889	6	11.111	7	13.333	8	15.556	9	17.778	10	20.000						
11	22.500	12	25.000	13	27.500	14	30.000	15	32.000	16	34.000	17	36.000	18	38.500	19	41.000						
20	43.500	21	46.000																				

DISTANCES TO FLUX POINTS

J DIST.

1	0.785	2	2.356	3	3.927	4	5.498												
1	DIST.																		
1	3.536	2	6.124	3	7.906	4	9.354	5	12.019	6	15.275	7	17.951	8	20.276	9	22.361		
10	24.267	11	26.034	12	27.089	13	29.250												
KR	DIST																		
1	1.111	2	3.333	3	5.556	4	7.778	5	10.000	6	12.222	7	14.444	8	16.667	9	18.889		
10	21.250	11	23.750	12	26.250	13	28.750	14	31.000	15	33.000	16	35.000	17	37.250	18	39.750		
19	42.250	20	44.750																

ZONE INPUT BY REGION

PLANE NUMBER 1

1

1

PLANE NUMBER 2

3

1

PLANE NUMBER 3

1

1

PLANE NUMBER 4

2

2

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

1 2 3 4

1 1 1 1 1

2 1 1 1 1

3 1 1 1 1

4 1 1 1 1

5 1 1 1 1

6 1 1 1 1

7 1 1 1 1

8 1 1 1 1

9 1 1 1 1

10 1 1 1 1

11 1 1 1 1

12 1 1 1 1

13 1 1 1 1

SPECIFICATION FOR LAYER NUMBER 2

1 2 3 4

1 1 1 1 1

2 1 1 1 1

3 1 1 1 1

4 1 1 1 1

5 1 1 1 1

6 1 1 1 1

7 1 1 1 1

8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 6

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 7

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 8

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 9

1 2 3 4

1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	4	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 10

	1	2	3	4
1	3	3	3	3
2	3	3	3	3
3	3	3	3	3
4	3	3	3	3
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 11

	1	2	3	4
1	3	3	3	3
2	3	3	3	3
3	3	3	3	3
4	3	3	3	3
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 12

	1	2	3	4
1	3	3	3	3
2	3	3	3	3
3	3	3	3	3
4	3	3	3	3
5	1	1	1	1

6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 13

	1	2	3	4
1	3	3	3	3
2	3	3	3	3
3	3	3	3	3
4	3	3	3	3
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 14

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 15

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1

12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 16

	1	2	3	4
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 17

	1	2	3	4
1	2	2	2	2
2	2	2	2	2
3	2	2	2	2
4	2	2	2	2
5	2	2	2	2
6	2	2	2	2
7	2	2	2	2
8	2	2	2	2
9	2	2	2	2
10	2	2	2	2
11	2	2	2	2
12	2	2	2	2
13	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 18

	1	2	3	4
1	2	2	2	2
2	2	2	2	2
3	2	2	2	2
4	2	2	2	2
5	2	2	2	2
6	2	2	2	2
7	2	2	2	2
8	2	2	2	2
9	2	2	2	2
10	2	2	2	2
11	2	2	2	2
12	2	2	2	2
13	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 19

	1	2	3	4
1	2	2	2	2
2	2	2	2	2
3	2	2	2	2
4	2	2	2	2
5	2	2	2	2
6	2	2	2	2
7	2	2	2	2
8	2	2	2	2
9	2	2	2	2
10	2	2	2	2
11	2	2	2	2
12	2	2	2	2
13	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 20

	1	2	3	4
1	2	2	2	2
2	2	2	2	2
3	2	2	2	2
4	2	2	2	2
5	2	2	2	2
6	2	2	2	2
7	2	2	2	2
8	2	2	2	2
9	2	2	2	2
10	2	2	2	2
11	2	2	2	2
12	2	2	2	2
13	2	2	2	2

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 12577

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 4 13 20 4 1 1 8 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 28330

MEMORY LOCATIONS NOT USED----- 11670

THETA-R-Z CASE WITH BLACK ABSORBER, PERIODIC						
4X13X20X4 GROUP, 4160 POINTS			STREAM OF CITATION CASES ORNL 72			
LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.45019E-01	1.00000	0.29004	-0.20629	0.0	0.381564
2	6.42240E-01	1.78515	5.07091	4.83015	0.03961	0.408457
3	-4.01546E-01	1.64630	-1.02677	-0.20579	0.72106	0.424379
4	-3.19332E-01	1.56750	0.47592	0.77797	0.81176	0.435985
5	-2.52715E-01	1.52605	0.53867	0.77905	0.86955	0.445395
6	-1.98224E-01	1.50511	0.58615	0.75414	0.90297	0.453470
7	-1.54862E-01	1.49475	0.62639	0.82042	0.91214	0.460576
8	-1.20348E-01	1.48968	0.65678	0.88927	0.91479	0.466945
9	-9.75142E-02	1.48720	0.71275	0.97079	0.90719	0.472699
10	-8.13560E-02	1.48600	0.75294	0.97971	0.90082	0.477956
11	-7.08427E-02	1.48542	0.79993	0.98611	0.89604	0.482772
12	-6.28706E-02	1.48514	0.82460	0.88531	0.88798	0.487181
13	-5.42305E-02	1.48500	0.80834	0.79292	0.88409	0.491195
14	-5.08053E-02	1.48493	0.88604	0.87978	0.88059	0.494859
15	-4.76876E-02	1.48490	0.89095	0.87359	0.87447	0.498197
16	-4.50288E-02	1.48489	0.89922	0.93959	0.86712	0.501234
17	-4.39205E-02	1.48488	0.93147	0.97730	0.85764	0.504004
18	-4.33142E-02	1.48487	0.94288	0.98027	0.84608	0.506519
19	-4.27014E-02	1.48487	0.94315	0.97910	0.83203	0.508801
20	-4.23434E-02	1.48487	0.94927	0.97824	0.81442	0.510863
21	-3.53847E-02	1.48487	0.80028	0.97728	0.79137	0.512711
22	-3.30611E-02	1.48487	0.90127	0.97716	0.75904	0.514366
23	-3.09947E-02	1.48487	0.90650	0.97709	0.70997	0.515839
24	-2.88208E-02	1.48487	0.90104	0.97547	0.62721	0.517144
25	-2.76090E-02	1.48487	0.93034	0.97414	0.45844	0.518293
26	-2.66175E-02	1.48487	0.93747	0.97239	-0.07336	0.519297
27	-2.56031E-02	1.48487	0.93629	0.97104	14.28882	0.520166
28	-2.46052E-02	1.48487	0.93642	0.97068	1.84222	
	-5.17821E-01	EXTRAPOLATION WITH		20.5276		0.536860
29	2.74496E-02	1.00000	-1.08815	-0.63526	24.34102	0.536175
30	3.22828E-02	1.48487	1.20836	1.26730	0.39148	0.534379
31	3.14465E-02	1.48487	1.00554	0.94298	0.96329	0.532637
32	2.86818E-02	1.48487	0.94076	0.94222	0.95599	0.530962
33	2.55842E-02	1.48487	0.91759	0.92619	0.95470	0.529354
34	2.30656E-02	1.48487	0.92462	0.92582	0.95400	0.527812
35	2.11172E-02	1.48487	0.93665	0.94630	0.95363	0.526332
36	1.92783E-02	1.48487	0.93221	0.94750	0.95339	0.524914
37	1.75009E-02	1.48487	0.92529	0.94922	0.95325	
	2.56931E-01	EXTRAPOLATION WITH		14.9380		0.502808
38	4.70924E-03	1.00000	0.27380	0.59022	15.03033	0.502655
39	6.78444E-03	1.48487	1.44745	0.87743	0.01653	0.502267
40	6.34003E-03	1.48487	0.94084	0.92685	0.95797	0.501895
41	6.14357E-03	1.48487	0.97516	0.97420	0.94580	0.501543
42	5.66006E-03	1.48487	0.92696	0.93717	0.94598	0.501210
43	5.17654E-03	1.48487	0.91975	0.93621	0.94586	0.500897
44	4.91714E-03	1.48487	0.95481	0.95761	0.94767	0.500601
45	4.63390E-03	1.48487	0.94703	0.95172	0.94758	0.500321
46	4.37069E-03	1.48487	0.94757	0.95398	0.94757	0.500055
47	4.14562E-03	1.48487	0.95265	0.95626	0.94831	0.499804
48	3.90816E-03	1.48487	0.94663	0.94980	0.94801	0.499566
49	3.66116E-03	1.48487	0.94046	0.94442	0.94720	0.499340
50	3.44276E-03	1.48487	0.94379	0.94630	0.94751	0.499126
51	3.24726E-03	1.48487	0.94646	0.94861	0.94764	0.498924
52	3.04222E-03	1.48487	0.93990	0.94138	0.94726	0.498732
53	2.85435E-03	1.48487	0.94110	0.94505	0.94770	0.498550
54	2.67696E-03	1.48487	0.94053	0.94141	0.94749	
	4.25599E-02	EXTRAPOLATION WITH		15.9408		0.495627
55	5.06401E-04	1.00000	0.18968	0.14279	15.98626	0.495620
56	6.26564E-04	1.48487	1.23791	1.10857	0.00675	0.495602

57	6.01768E-04	1.49487	0.96103	0.88475	0.96723	0.495584
58	5.84602E-04	1.48487	0.97206	0.54990	0.95922	0.495568
59	5.45102E-04	1.48487	0.93366	0.82337	0.95619	0.495551
60	5.10216E-04	1.48487	0.93582	0.91850	0.95565	0.495536
61	4.77791E-04	1.48487	0.93693	0.86516	0.95724	0.495520
62	4.44412E-04	1.48487	0.93058	0.91627	0.95684	0.495506
63	4.10080E-04	1.48487	0.92316	0.95479	0.95322	0.495492
64	3.75748E-04	1.48487	0.91665	0.96420	0.95328	0.495478
65	3.43323E-04	1.48487	0.91405	0.96117	0.95570	
	5.15877E-03	EXTRAPOLATION WITH				15.0286
66	1.38283E-04	1.00000	0.40292	0.79020	15.10462	0.495271
67	-1.10805E-04	1.48487	-0.80140	-1.12735	0.01966	0.495267
68	-1.04725E-04	1.48487	0.94503	0.91458	0.97350	0.495264
69	-6.94666E-05	1.48487	0.85421	0.95357	0.98883	0.495260

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.812 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0005999 K 0.4951507

LEAKAGE 5.35521E 13 TOTAL LOSSFS 1.38706E 14 TOTAL PRODUCTIONS 6.86956E 13 REACTOR POWER(WATTS) 6.80000E 07

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.88219E 28	1.00000*****	-0.03340	0.0	0.495260	
2	1.42179E 01	1.78515	14.21786	8.82361	0.0	0.495260
3	7.07236E 00	1.64630	7.56979	0.54920	0.0	0.495260
4	3.90246E 00	1.56750	4.45425	0.73737	0.0	0.495260
5	1.56926E 00	1.52605	1.97139	0.79452	0.0	0.495260
6	1.00878E 00	1.50511	1.65162	0.79583	0.0	0.495260
7	6.58421E-01	1.49475	1.31111	0.79603	0.0	0.495260
8	4.28100E-01	1.48968	1.07829	0.79301	0.0	0.495260
9	3.28880E-01	1.48720	1.09711	0.78444	0.0	0.495260
10	2.58851E-01	1.48600	1.04592	0.78123	0.0	0.495260
11	2.13256E-01	1.48542	1.03711	0.92706	0.0	0.495260
12	1.80715E-01	1.48514	1.02812	0.94193	0.0	0.495260
13	1.56026E-01	1.48500	1.01941	0.93551	0.0	0.495260
14	1.40358E-01	1.48493	1.03994	0.95271	0.0	0.495260
15	1.29909E-01	1.48490	1.05546	0.94889	0.0	0.495260
16	1.21187E-01	1.48489	1.05405	0.95434	0.0	0.495260
17	1.11580E-01	1.48488	1.03230	0.95621	0.0	0.495260
18	1.02804E-01	1.48487	1.02415	0.95456	0.0	0.495260
19	9.46550E-02	1.48487	1.01539	0.94312	0.0	0.495260
20	8.71105E-02	1.48487	1.00740	0.95743	0.0	0.495260
21	8.07619E-02	1.48487	1.00788	0.93767	0.0	0.495260
22	7.50647E-02	1.48487	1.00452	0.96346	0.0	0.495260
23	7.02515E-02	1.48487	1.00613	0.96517	0.0	0.495260
24	6.66103E-02	1.48487	1.01478	0.96927	0.0	0.495260
25	6.31027E-02	1.48487	1.01044	0.96925	0.0	0.495260
26	5.97639E-02	1.48487	1.00685	0.96887	0.0	0.495260
27	5.65929E-02	1.48487	1.00353	0.96930	0.0	0.495260
28	5.35946E-02	1.48487	1.00061	0.96911	0.0	0.495260
29	5.07650E-02	1.48487	0.99797	0.96930	0.0	0.495260
30	4.80986E-02	1.48487	0.99557	0.96916	0.0	0.495260
31	4.55875E-02	1.48487	0.99338	0.97245	0.0	0.495260
32	4.32253E-02	1.48487	0.99141	0.97183	0.0	0.495260
33	4.09994E-02	1.48487	0.98950	0.97129	0.0	0.495260
34	3.89081E-02	1.48487	0.98790	0.97069	0.0	0.495260
35	3.69349E-02	1.48487	0.98622	0.97016	0.0	0.495260
36	3.50790E-02	1.48487	0.98483	0.96946	0.0	0.495260
37	3.33290E-02	1.48487	0.98344	0.96889	0.0	
	1.32096E 00	EXTRAPOLATION WITH				40.9548
38	1.76868E-02	1.00000	0.54836	0.60234	0.0	0.495260
39	2.53210E-02	1.48487	1.45695	1.48530	0.0	0.495260
40	2.36673E-02	1.48487	0.95836	0.95119	0.0	0.495260
41	2.22063E-02	1.48487	0.96047	0.95178	0.0	0.495260
42	2.09217E-02	1.48487	0.96307	0.94964	0.0	0.495260

43	1.99184E-02	1.48487	0.97197	0.97290	0.0	0.495260
44	1.89848E-02	1.48487	0.97211	0.96047	0.0	0.495260
45	1.81236E-02	1.48487	0.97276	0.96472	0.0	0.495260
46	1.72968E-02	1.48487	0.97167	0.95926	0.0	0.495260
47	1.65253E-02	1.48487	0.97192	0.95902	0.0	0.495260
48	1.58743E-02	1.48487	0.97218	0.95727	0.0	0.495260
49	1.51014E-02	1.48487	0.97063	0.96188	0.0	0.495260
50	1.44596E-02	1.48487	0.97196	0.97544	0.0	0.495260
51	1.38683E-02	1.48487	0.97298	0.97169	0.0	0.495260
52	1.33514E-02	1.48487	0.97608	0.96854	0.0	0.495260
53	1.29004E-02	1.48487	0.97911	0.96834	0.0	0.495260
54	1.24712E-02	1.48487	0.97920	0.96717	0.0	0.495260
55	1.20525E-02	1.48487	0.97848	0.96658	0.0	0.495260
	4.21609E-03	EXTRAPOLATION WITH 35.4026				0.495260
56	-7.06613E-03	1.00000	-0.59334	-0.66495	0.0	0.495260
57	-9.95278E-03	1.48487	1.39857	1.48084	0.0	0.495260
58	-9.39363E-03	1.48487	0.93443	0.97067	0.0	0.495260
59	-8.84581E-03	1.48487	0.93284	0.97135	0.0	0.495260
60	-8.19510E-03	1.48487	0.91824	0.97165	0.0	0.495260
61	7.96604E-03	1.48487	-0.96408	-0.96382	0.0	0.495260
62	7.71999E-03	1.48487	0.97683	0.92187	0.0	0.495260
63	7.53021E-03	1.48487	0.98295	0.92493	0.0	0.495260
64	7.29847E-03	1.48487	0.97652	0.91606	0.0	0.495260
65	7.07626E-03	1.48487	0.97663	0.91333	0.0	0.495260
66	6.83594E-03	1.48487	0.97287	0.93168	0.0	0.495260
67	6.59275E-03	1.48487	0.97102	0.96542	0.0	0.495260
68	6.37341E-03	1.48487	0.97310	0.95645	0.0	0.495260
69	6.14043E-03	1.48487	0.97053	0.95703	0.0	0.495260
70	5.90611E-03	1.48487	0.96681	0.95514	0.0	0.495260
71	5.67818E-03	1.48487	0.96709	0.95465	0.0	0.495260
72	5.45406E-03	1.48487	0.96598	0.95536	0.0	0.495260
73	5.24330E-03	1.48487	0.96600	0.95544	0.0	0.495260
74	5.03254E-03	1.48487	0.96484	0.95217	0.0	0.495260
75	4.83131E-03	1.48487	0.96485	0.95894	0.0	0.495260
76	4.71687E-03	1.48487	0.98103	0.95377	0.0	0.495260
77	4.59862E-03	1.48487	0.97953	0.95394	0.0	0.495260
78	4.47655E-03	1.48487	0.97793	0.95403	0.0	0.495260
79	4.35257E-03	1.48487	0.97666	0.95243	0.0	0.495260
80	4.22382E-03	1.48487	0.97464	0.95372	0.0	0.495260
81	4.09508E-03	1.48487	0.97361	0.95219	0.0	0.495260
82	3.96538E-03	1.48487	0.97229	0.95069	0.0	0.495260
83	3.83568E-03	1.48487	0.97113	0.95151	0.0	0.495260
84	3.70693E-03	1.48487	0.97014	0.95052	0.0	0.495260
85	3.57819E-03	1.48487	0.96885	0.95008	0.0	0.495260
86	3.45039E-03	1.48487	0.96774	0.95046	0.0	0.495260
87	3.32355E-03	1.48487	0.96656	0.94881	0.0	0.495260
88	3.20053E-03	1.48487	0.96618	0.94875	0.0	0.495260
89	3.07751E-03	1.48487	0.96464	0.94833	0.0	0.495260
90	2.95734E-03	1.48487	0.96391	0.94697	0.0	0.495260
91	2.84100E-03	1.48487	0.96350	0.95824	0.0	0.495260
92	2.72560E-03	1.48487	0.96211	0.96145	0.0	0.495260
93	2.61497E-03	1.48487	0.96203	0.96152	0.0	0.495260
	6.59840E-02	EXTRAPOLATION WITH 25.2989				0.495260
94	1.42860E-03	1.00000	0.54775	0.48371	0.0	0.495260
95	1.99509E-03	1.48487	1.39852	1.28088	0.0	0.495260
96	1.88160E-03	1.48487	0.94500	0.95324	0.0	0.495260
97	1.76525E-03	1.48487	0.93993	0.94717	0.0	0.495260
98	1.64318E-03	1.48487	0.93249	0.94282	0.0	0.495260
99	1.55735E-03	1.48487	0.94932	0.94100	0.0	0.495260
100	1.44100E-03	1.48487	0.92673	0.92591	0.0	0.495260

END OF ADJOINT CALCULATION - ITERATION TIME 0.622 MINUTES

*****WARNING - FLUX CALCULATION NOT CONVERGED*****0

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9379113 K 0.4930810

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	ROT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	SEACH LOSS
1	-1.47446E 09	0.0	1.47446E 09	1.64386E 13	0.0	2.13054E 12	0.0	0.0	0.0
2	-4.27833E 08	0.0	4.27833E 08	5.97935E 12	0.0	1.67675E 12	0.0	0.0	0.0
3	-2.35591E 08	0.0	2.35591E 08	2.97504E 12	0.0	9.18239E 11	0.0	0.0	0.0
4	-1.26857E 09	0.0	1.26857E 09	1.69557E 13	0.0	6.47794E 12	0.0	0.0	0.0
SUM	-3.40646E 09	0.0	3.40646E 09	4.23487E 13	0.0	1.12035E 13	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	FRCO/ABSCRP
1	5.20243E 12	1.14969E 14	1.38706E 14	0.0	1.34741E 14	1.38706E 14	3.65619E-01
2	1.23787E 13	9.49425E 13	0.0	1.14969E 14	1.14977E 14	1.14969E 14	4.00146E-01
3	8.50254E 12	8.26752E 13	0.0	9.50734E 13	9.50710E 13	9.50734E 13	3.55089E-01
4	5.90702E 13	1.30839E 11	0.0	8.26751E 13	8.26347E 13	8.26751E 13	9.95781E-01
SUM	8.51539E 13	2.92718E 14	1.38706E 14	2.92718E 14	4.31424E 14	4.31424E 14	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--CORE ZONE 1			
2.22717E 11	7.27708E 10	3.52582E 10	1.88609E 11
ZONE 2--CORE ZONE 2			
9.53406E 10	6.30742E 10	3.34864E 10	2.28777E 11
ZONE 3--AXIAL SLKT 1			
0.0	0.0	0.0	0.0

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

6.89334E 02	0.0	0.0

THE MAXIMUM POWER DENSITY(WATTS/CCI AT ROW 9 AND COLUMN 4 AND LINE 16 IS 7.594705E 02

THE AVERAGE POWER DENSITY ALONG ROW 9 IS 7.594167E 02 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE
9.999996E-01 9.999443E-01 9.999862E-01 1.000071E 00

THE AVERAGE POWER DENSITY DOWN COLUMN 4 IS 7.349053E 02 AND THE RELATIVE POWER DENSITIES ARE
8.590422E-01 8.804015E-01 9.011369E-01 9.211670E-01 9.609258E-01 9.998122E-01 1.020366E 00 1.030815E 00 1.033426E 00
1.030931E 00 1.024788E 00 1.016043E 00 1.005644E 00

THE AVERAGE POWER DENSITY ALONG LINE 16 IS 7.078665E 02 AND THE RELATIVE POWER DENSITIES ARE
1.008415E 00 1.006801E 00 1.003693E 00 9.992902E-01 9.939139E-01 9.880059E-01 9.821723E-01 9.771872E-01 9.739724E-01
9.735064E-01 9.778190E-01 9.879075E-01 1.004288E 00 1.024763E 00 1.046901E 00 1.072900E 00 0.0 0.0
0.0 0.0

THETA-R-Z CASE WITH BLACK ABSORBER, PERIODIC

4X13X20X4 GROUP, 4160 POINTS

STREAM OF CITATION CASES URNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 1.150679E-05

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE ZONE 1	1	-1.593910E 02	3.218303E 02	-9.164780E-03	-2.854785E 02
		2	-6.313260E 01	1.048648E 02	-9.171370E-03	-8.964256E 01
		3	-3.566536E 01	5.076176E 01	-7.516172E-03	-5.116479E 01
		4	-2.124037E 02	2.706609E 02	-3.978235E-02	-2.880979E 02
2	CORE ZONE 2	1	-1.797398E 01	3.629175E 01	-5.305775E-03	-1.858328E 01
		2	-1.329042E 01	2.395871E 01	-1.683373E-03	-1.174343E 01
		3	-7.647315E 00	1.271487E 01	-6.795276E-04	-6.794799E 00
		4	-5.998534E 01	8.683078E 01	4.942454E-03	-4.542433E 01
3	AXIAL BLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0

COMP	NAME	GRP. K	SIGS(FROM ALL GRPS. KK TO GRP. K)			
1	CORE ZONE 1	1	1.593910E 02	5.193573E 01	2.514046E 01	1.340485E 02
		2	1.941743E 02	6.313260E 01	3.054707E 01	1.624098E 02
		3	2.271497E 02	7.373973E 01	3.566536E 01	1.892641E 02
		4	2.554022E 02	8.284315E 01	4.005937E 01	2.124037E 02
2	CORE ZONE 2	1	1.797398E 01	1.186588E 01	6.297214E 00	4.300414E 01
		2	2.015146E 01	1.329042E 01	7.052422E 00	4.815147E 01
		3	2.188791E 01	1.441464E 01	7.647315E 00	5.219789E 01
		4	2.270660E 01	1.492017E 01	7.912636E 00	5.398534E 01
3	AXIAL BLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0

END OF CASE - TOTAL CPU TIME WAS 1.56 MINUTES TOTAL CLOCK TIME WAS 7.12 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

TRIANGULAR 3-D (TIGAR CASE, ONE-SIXTH WITH BLACK ABSORBER)
 BX4X4X6 GROUP, 768 POINTS , STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0																																																
1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0																																																
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24																																																
1.500000E 00												5.000000E-01												9.999999E 09												9.999559E 23												0.0												1.000000E 00											

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	2	0	0	14	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0																																																
9.999999E-05												1.000000E-05												9.999999E-05												9.999999E-05												9.999999E-05												0.0											
4.690000E-01												4.690000E-01												1.016190E 03												1.000000E 00												1.666666E-01												0.0											

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

4.690000E-01												4.690000E-01												0.0												0.0												4.690000E-01												0.0											

ROD END. CONSTANT FOR ALL GROUPS IN ZONE 3 IS 4.690000E-01

THREE DIMENSIONAL TRIANGULAR GEOMETRY (X,Y,Z) WIDTH 6.120172E 01 HEIGHT 4.590138E 01 DEPTH 6.050098E 01

REGION SPECIFICATIONS

PTS REGION WIDTH
 8 5.300240E 01

PTS REGION HEIGHT
 4 5.300240E 01

PTS REGION DEPTH
 3 3.008099E 01 1 2.042000E 01

X-DIR. POINTS 8 Y-DIR. POINTS 4 Z-DIR. POINTS 4

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																																
2	7.650	3	15.300	4	22.951	5	30.601	6	38.251	7	45.901	8	53.552	9	61.202																		

I	DIST.																
2	11.475	3	22.951	4	34.426	5	45.901										

KA	DIST.																
2	10.027	3	20.054	4	30.081	5	40.501										

DISTANCES TO FLUX POINTS

J	DIST.																																
1	3.825	2	11.475	3	19.126	4	26.776	5	34.426	6	42.076	7	49.726	8	57.377																		

I	ODD J EVEN J																				
1	3.825	7.650	2	15.300	19.126	3	26.776	30.601	4	38.251	42.076										

KR	DIST
1	5.013
2	15.040
3	25.067
4	45.291

ZONE INPUT BY REGION

PLANE NUMBER 1
2

PLANE NUMBER 2
2

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2

MESH OVERLAY INPUT

ZONE NUMBER 3

1	7	1	1	1	4	1	2	2	2	1	4	1	2	3	3	1	4	1	1	4	4	1	4

ZONE NUMBER 1

6 8 3 4 1 3 5 5 4 4 1 3

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8
1	3	3	3	3	3	3	3	2
2	3	3	3	2	2	2	2	2
3	3	3	2	2	2	1	1	1
4	3	2	2	2	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8
1	3	3	3	3	3	3	3	2
2	3	3	3	2	2	2	2	2
3	3	3	2	2	2	1	1	1
4	3	2	2	2	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8
1	3	3	3	3	3	3	3	2
2	3	3	3	2	2	2	2	2
3	3	3	2	2	2	1	1	1
4	3	2	2	2	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8
1	3	3	3	3	3	3	3	2
2	3	3	3	2	2	2	2	2
3	3	3	2	2	2	2	2	2
4	3	2	2	2	2	2	2	2

FISSION SOURCE DISTRIBUTION AND SUM 0.75600 0.23400 0.01000 0.0 0.0 0.0 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 2320

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 8 4 4 6 0 2 3 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 4000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 7312

MEMORY LOCATIONS NOT USED----- 32688

TRIANGULAR 3-D (TIGAR CASE, ONE-SIXTH WITH BLACK ABSORBER)
 8X4X4X6 GROUP, 768 POINTS STREAM OF CITATION CASES ORNL 72
 LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	3.50362E-00	1.00000	7.00724	-1.99125	0.0	0.515388
2	-9.07048E-01	1.76171	-1.16594	-0.00334	0.15317	0.597641
3	6.37325E-01	1.61512	-0.06531	-1.25324	0.98403	0.663180
4	-4.86296E-01	1.53649	-1.24932	-0.24448	0.60475	0.698964
5	-3.57284E-01	1.49737	0.37742	0.37553	0.46631	0.715251
6	-2.09891E-01	1.47865	0.37757	0.48551	0.43238	0.722260
7	-9.94879E-02	1.46985	0.37451	0.52357	0.41617	0.725200
8	-4.07549E-02	1.46576	0.36889	0.50361	0.41319	0.726427
9	-1.60608E-02	1.46386	0.37802	0.48649	0.40727	0.726937
10	-6.49267E-03	1.46298	0.39776	0.50480	0.39924	0.727146
11	-2.58893E-03	1.46257	0.39616	0.53771	0.38404	0.727231
12	-1.02478E-03	1.46238	0.39461	0.52449	0.35126	0.727264
13	-4.02987E-04	1.46230	0.39284	0.50779	0.28197	0.727289
	-3.29694E-04	EXTRAPOLATION WITH		0.8192		0.727289
14	5.62668E-05	1.00000	-0.13957	-0.12449	0.14301	0.727286
15	-1.68681E-05	1.46224	-0.29980	-0.35449	-4.54119	0.727286
16	-1.21593E-05	1.46223	0.72084	0.06667	1.00499	0.727286

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.046 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999970 K 0.7272828

LEAKAGE 8.09226E 05 TOTAL LOSSES 3.25501E 06 TOTAL PRODUCTIONS 2.36733E 06 REACTOR POWER(WATTS) 1.01619E 09

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.37494E 30	1.00000*****	-0.56678	0.0	0.0	0.727286
2	2.84500E 00	1.76171	2.84500	0.25858	0.0	0.727286
3	6.81286E-01	1.61512	0.92075	0.70732	0.0	0.727286
4	2.90318E-01	1.53649	0.71645	0.22628	0.0	0.727286
5	1.04860E-01	1.49737	0.46605	0.58905	0.0	0.727286
6	5.91002E-02	1.47865	0.62271	0.57029	0.0	0.727286
7	2.58999E-02	1.46985	0.46414	0.33275	0.0	0.727286
8	1.05200E-02	1.46576	0.41670	0.47840	0.0	0.727286
9	4.46510E-03	1.46386	0.42891	0.47380	0.0	0.727286
10	1.96362E-03	1.46298	0.44173	0.47888	0.0	0.727286
	1.67152E-03	EXTRAPOLATION WITH		0.8529		0.727286
11	-9.78708E-05	1.00000	-0.04994	-0.12150	0.0	0.727286
12	-2.78950E-05	1.46238	0.28499	0.21876	0.0	0.727286
13	-1.75238E-05	1.46230	0.62819	0.0	0.0	0.727286

END OF ADJOINT CALCULATION - ITERATION TIME 0.027 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999918 K 0.7272815

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RTY LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B*2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	0.0	0.0	2.48709E 05	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	3.42160E 05	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.60121E 05	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	4.24214E 04	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	1.46750E 04	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	1.14016E 03	0.0	0.0	0.0	0.0

SUM 0.0 0.0 0.0 0.0 8.09226E 05 0.0 0.0 0.0 0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCRP
1	4.21575E 05	1.79052E 06	2.46078E 06	0.0	2.46080E 06	2.46078E 06	2.28311E 00
2	6.70921E 05	1.44657E 06	7.61671E 05	1.69798E 06	2.45964E 06	2.45965E 06	9.86974E-01
3	8.05760E 05	6.05491E 05	3.25500E 04	1.53883E 06	1.57137E 06	1.57138E 06	5.38314E-01
4	3.49608E 05	2.17738E 05	0.0	6.05769E 05	6.05767E 05	6.05769E 05	4.94422E-01
5	1.66724E 05	3.23386E 04	0.0	2.13738E 05	2.13738E 05	2.13738E 05	6.66780E-01
6	3.11984E 04	0.0	0.0	3.23386E 04	3.23386E 04	3.23386E 04	7.97029E-01
SUM	2.44578E 06	4.08864E 06	3.25500E 06	4.08865E 06	7.34366E 06	7.34365E 06	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--CORE ZONE 1
2.41561E 03 4.05780E 03 2.31776E 03 7.55815E 02 2.60457E 02 1.73443E 01

ZONE 2--CORE ZONE 2
1.74447E 02 6.92055E 02 5.67905E 02 1.79871E 02 5.28616E 01 6.63607E 00

ZONE 3--AXIAL BLKT 1
0.0 0.0 0.0 0.0 0.0 0.0

ZONE AVERAGE POWER DENSITIES(WATTS/CC)
8.51647E 03 4.62631E 02 0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 4 AND COLUMN 8 AND LINE 3 IS 1.426184E 04

THE AVERAGE POWER DENSITY ALONG ROW 4 IS 7.052707E 03 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE
0.0 4.047263E-02 1.135428E-01 2.825584E-01 1.177644E 00 1.572985E 00 1.790620E 00 2.022180E 00

THE AVERAGE POWER DENSITY DOWN COLUMN 8 IS 6.908465E 03 AND THE RELATIVE POWER DENSITIES ARE
4.131749E-02 2.884573E-01 1.605826E 00 2.064401E 00

THE AVERAGE POWER DENSITY ALONG LINE 3 IS 6.258816E 03 AND THE RELATIVE POWER DENSITIES ARE
1.190118E 00 2.119451E 00 2.278680E 00 1.468655E-01

TRIANGULAR 3-D (TIGAR CASE, ONE-SIXTH WITH BLACK ABSORBER)

8X4X4X6 GROUP, 768 POINTS

STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS--DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRO. CROSS SECTIONS. LAMBDA(PHI* N PHI) = 5.293100E-21

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE ZONE 1	1	-1.380751E 01	1.855656E 01	-3.668613E-02	-3.697797E 01
		2	-2.092856E 01	3.108162E 01	-6.182755E-02	-3.346297E 01
		3	-1.267972E 01	1.772644E 01	-3.857075E-02	-1.480748E 01
		4	-4.454264E 00	5.801460E 00	-1.516820E-02	-4.099686E 00
		5	-1.748740E 00	2.007670E 00	-6.115556E-03	-1.747541E 00
		6	-1.497543E-01	1.332244E-01	-4.595984E-04	-1.452140E-01
2	CORE ZONE 2	1	-1.394552E 00	1.767096E 00	-4.359672E-02	-2.476995E 00
		2	-3.365038E 00	6.336025E 00	-7.015622E-02	-3.641791E 00
		3	-2.090517E 00	4.955665E 00	-4.146499E-02	-1.577501E 00
		4	-6.131905E-01	1.542711E 00	-1.388948E-02	-4.079207E-01
		5	-2.121243E-01	4.547204E-01	-5.571686E-03	-1.560301E-01
		6	-3.030242E-02	5.459602E-02	-3.655595E-04	-2.499764E-02
3	AXIAL RLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0
		5	0.0	0.0	0.0	0.0
		6	0.0	0.0	0.0	0.0

COMP	NAME	GRP	K --- SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE ZONE 1	1	1.380751E 01 2.312906E 01 1.319165E 01 4.316939E 00 1.493802E 00 9.913456E-02
		2	1.249844E 01 2.092856E 01 1.193385E 01 3.906691E 00 1.352409E 00 8.971459E-02
		3	1.328436E 01 2.223987E 01 1.267972E 01 4.151476E 00 1.437447E 00 9.533542E-02
		4	1.426080E 01 2.386784E 01 1.360447E 01 4.454264E 00 1.542445E 00 1.022799E-01
		5	1.617024E 01 2.706505E 01 1.542714E 01 5.050539E 00 1.748740E 00 1.159690E-01
		6	2.088400E 01 3.495628E 01 1.992519E 01 6.522207E 00 2.257585E 00 1.497543E-01
2	CORE ZONE 2	1	1.394552E 00 5.017748E 00 3.932074E 00 1.225026E 00 3.610688E-01 4.342980E-02
		2	5.530874E-01 3.365038E 00 2.609552E 00 8.094576E-01 2.386374E-01 2.842087E-02
		3	7.881554E-01 2.726971E 00 2.090517E 00 6.453357E-01 1.902844E-01 2.241112E-02
		4	7.520424E-01 2.595222E 00 1.967075E 00 6.131905E-01 1.808453E-01 2.127368E-02
		5	8.742967E-01 3.031570E 00 2.327814E 00 7.192466E-01 2.121243E-01 2.502396E-02
		6	1.055336E 00 3.663575E 00 2.815299E 00 8.702030E-01 2.566566E-01 3.030242E-02
3	AXIAL RLKT 1	1	0.0 0.0 0.0 0.0 0.0 0.0
		2	0.0 0.0 0.0 0.0 0.0 0.0
		3	0.0 0.0 0.0 0.0 0.0 0.0
		4	0.0 0.0 0.0 0.0 0.0 0.0
		5	0.0 0.0 0.0 0.0 0.0 0.0
		6	0.0 0.0 0.0 0.0 0.0 0.0

END OF CASE - TOTAL CPU TIME WAS 0.11 MINUTES TOTAL CLOCK TIME WAS 0.82 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

THETA-R-Z CASE TO COMPARE TRIAGONAL, ONE-TWELTH WITH BLACK ABSORBER
8X15X4X6 GROUP, 2880 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0
1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12	6	12	24
1.500000E 00	5.000000E-01	9.999999E 09	9.999999E 23	0.0														1.000000E 00						

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	12	0	0	0	0	0	1	1	1	0	0	1	3	0	0	0	0	0	0	0	0
9.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																			
4.690000E-01	4.690000E-01	1.016190E 03	1.000000E 00	8.333331E-02	0.0																			

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	0.0	4.690000E-01	4.690000E-01	0.0

ROD BND. CONSTANT FOR ALL GROUPS IN ZONE 3 IS 4.690000E-01

THREE DIMENSIONAL CYLINDRICAL GEOMETRY (R, THETA, Z) WIDTH 5.235997E-01 HEIGHT 5.737698E 01 DEPTH 6.050098E 01

REGION SPECIFICATIONS

PTS	REGION WIDTH																								
1	5.240000E-02	1	6.279999E-02	1	5.930000E-02	1	0.579996E-02	1	8.809996E-02	1	6.899995E-02														
2	1.222000E-01																								

PTS	REGION HEIGHT																								
4	2.650000E 01	4	7.924999E 00	3	1.428100E 01	4	8.671000E 00																		

PTS	REGION DEPTH																								
3	3.008099E 01	1	3.042000E 01																						

X-DIR. POINTS	8	Y-DIR. POINTS	15	Z-DIR. POINTS	4

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																								
2	0.052	3	0.115	4	0.174	5	0.244	6	0.332	7	0.401	8	0.462	9	0.524										
J	DIST.																								
2	13.250	3	18.738	4	22.950	5	26.500	6	28.687	7	30.719	8	32.625	9	34.425	10	39.759								
11	44.458	12	48.706	13	51.012	14	53.218	15	55.337	16	57.377														
J	DIST.																								
2	10.027	3	20.054	4	30.081	5	60.501																		

DISTANCES TO FLUX POINTS

J	DIST.																								
1	0.026	2	0.084	3	0.145	4	0.209	5	0.288	6	0.367	7	0.432	8	0.493										

K8	DIST				
1	5.013	2	15.040	3	25.067
		4	45.291		

PLANE NUMBER 1						
1	1	1	1	1	1	1
2	2	2	2	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	2

PLANE NUMBER 2							
2	2	2	2	2	2	2	
2	2	2	2	2	2	2	
2	2	2	2	2	2	2	
3	3	3	3	3	3	3	

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1
5	2	2	2	2	1	1	1	1
6	2	2	2	2	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	3	3	3	3	3	3	2	2
13	3	3	3	3	3	3	2	2
14	3	3	3	3	3	3	2	2
15	3	3	3	3	3	3	2	2

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1
5	2	2	2	2	1	1	1	1
6	2	2	2	2	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	3	3	3	3	3	3	2	2
13	3	3	3	3	3	3	2	2

14	3	3	3	3	3	3	2	2
15	3	3	3	3	3	3	2	2

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1
5	2	2	2	2	1	1	1	1
6	2	2	2	2	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	3	3	3	3	3	3	2	2
13	3	3	3	3	3	3	2	2
14	3	3	3	3	3	3	2	2
15	3	3	3	3	3	3	2	2

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	3	3	3	3	3	3	2	2
13	3	3	3	3	3	3	2	2
14	3	3	3	3	3	3	2	2
15	3	3	3	3	3	3	2	2

MESH OVERLAY INPUT

ZONE NUMBER 1

2 4 5 5 1 3 4 4 6 6 1 3

ZONE NUMBER 2

1 3 12 12 1 4 1 1 13 13 1 4 4 4 12 12 1 4 6 6 12 14 1 4

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1

4	1	1	1	1	1	1	1	1
5	2	1	1	1	1	1	1	1
6	2	2	2	1	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	2	2	2	2	3	2	2	2
13	2	3	3	3	3	2	2	2
14	2	3	3	3	3	2	2	2
15	3	3	3	3	3	3	2	2

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1
5	2	1	1	1	1	1	1	1
6	2	2	2	1	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	2	2	2	2	3	2	2	2
13	2	3	3	3	3	2	2	2
14	3	3	3	3	3	2	2	2
15	3	3	3	3	3	3	2	2

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1
5	2	1	1	1	1	1	1	1
6	2	2	2	1	1	1	1	1
7	2	2	2	2	1	1	1	1
8	2	2	2	2	1	1	1	1
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	2	2	2	2	3	2	2	2
13	2	3	3	3	3	2	2	2
14	3	3	3	3	3	2	2	2
15	3	3	3	3	3	3	2	2

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8
1	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2

4	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2
11	2	2	2	2	2	2	2	2
12	2	2	2	2	3	2	2	2
13	2	3	2	3	3	2	2	2
14	3	3	3	3	3	2	2	2
15	3	3	3	3	3	2	2	2

FISSION SOURCE DISTRIBUTION AND SUM 0.75600 0.23400 0.01000 0.0 0.0 0.0 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 9427

EQUATION CONSTANTS WILL BE STORED ON I/O LOGICAL 15

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 8 15 4 6 0 2 09 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000
 MEMORY LOCATIONS USED FOR THIS PROBLEM----- 10244
 MEMORY LOCATIONS NOT USED----- 29756

THETA-R-Z CASE TO COMPARE TRIANGONAL, ONE-TWELTH WITH BLACK ABSORBER						
8X15X4X6 GROUP, 2880 PCINTS			STREAM OF CITATION CASES URNL 72			
LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	2.17894E 00	1.00000	4.35785	-1.92488	0.0	0.423450
2	3.50959E 00	1.76171	5.12027	0.03895	0.29144	0.553556
3	6.60137E 00	1.61512	8.48232	0.00139	0.90154	0.632546
4	5.95061E-01	1.53649	0.68520	0.16851	0.55130	0.683999
5	-4.01728E-01	1.49737	-1.07683	-0.11300	0.41462	0.704933
6	-2.32168E-01	1.47805	0.34576	0.41413	0.46081	0.713828
7	-1.11632E-01	1.46985	0.36919	0.50533	0.47941	0.718127
8	-5.13231E-02	1.46576	0.40843	0.49325	0.45930	0.720118
9	-2.37967E-02	1.46386	0.43987	0.48734	0.45739	0.721029
10	-1.12673E-02	1.46298	0.46221	0.48623	0.45881	0.721449
11	-5.42796E-03	1.46257	0.47622	0.48857	0.45474	
	-5.08667E-03	EXTRAPOLATION WITH C.9321				0.721828
12	1.57681E-04	1.00000	-0.02761	-0.12417	0.88685	0.721820
13	-1.00255E-04	1.46230	-0.66545	-0.63488	-0.05902	0.721820
14	-6.59823E-05	1.46226	0.65808	0.33336	0.94391	0.721819

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.176 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999914 K 0.7218115

LEAKAGE 4.19212E 05 TOTAL LOSSES 1.63892E 06 TOTAL PRODUCTIONS 1.18300E 06 REACTOR POWER(WATTS) 1.01619E 09

ADJOINT PROBLEM FOLLOWS						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.14888E 30	1.00000*****	-0.64874	0.0		0.721819
2	1.85580E 01	1.76171	18.55798	1.68553	0.0	0.721819
3	1.75914E 01	1.61512	18.53926	0.10369	0.0	0.721819
4	5.49298E-01	1.53649	0.58052	0.17924	0.0	0.721819
5	1.19884E-01	1.49737	0.33813	0.18666	0.0	0.721819
6	3.65963E-02	1.47805	0.34186	0.24252	0.0	0.721819
7	1.21632E-02	1.46985	0.34452	0.29568	0.0	0.721819
8	4.38595E-03	1.46576	0.36498	0.21784	0.0	0.721819
9	1.84631E-03	1.46386	0.42281	0.38090	0.0	0.721819
10	8.35419E-04	1.46298	0.45331	0.46486	0.0	0.721819
11	3.86238E-04	1.46257	0.46271	0.68440	0.0	0.721819
12	1.77383E-04	1.46238	0.45944	0.65201	0.0	0.721819
13	7.72476E-05	1.46230	0.43556	0.74586	0.0	0.721819

END OF ADJOINT CALCULATION - ITERATION TIME 0.117 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999803 K 0.7218079

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B*2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	0.0	1.64030E 03	1.23652E 05	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	6.58166E 03	1.71717E 05	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	4.44383E 03	8.03643E 04	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	1.25565E 03	2.12337E 04	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	3.79576E 02	7.32014E 03	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	5.53665E 01	5.68002E 02	0.0	0.0	0.0	0.0
SUM	0.0	0.0	0.0	1.43564E 04	4.04855E 05	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCRP
1	2.10764E 05	9.02978E 05	1.23902E 06	0.0	1.23903E 06	1.23902E 06	2.28525E 00
2	3.34125E 05	7.77019E 05	3.83506E 05	8.55949E 05	1.23944E 06	1.23945E 06	9.88426E-01
3	4.02039E 05	3.03452E 05	1.63891E 04	7.73908E 05	7.90249E 05	7.90249E 05	5.90387E-01
4	1.74294E 05	1.06808E 05	0.0	3.03592E 05	3.03591E 05	3.03592E 05	4.94807E-01
5	6.29754E 04	1.81130E 04	0.0	1.06808E 05	1.06808E 05	1.06808E 05	6.64954E-01
6	1.55096E 04	0.0	0.0	1.61330E 04	1.61330E 04	1.61330E 04	8.01155E-01
SUM	1.21970E 06	2.05639E 06	1.63891E 06	2.05639E 06	3.64530E 06	3.64530E 06	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--CORE ZONE 1
2.36153E 03 4.02904E 03 2.31302E 03 7.50865E 02 2.57000E 02 1.73061E 01

ZONE 2--CORE ZONE 2
1.79572E 02 6.87637E 02 5.57947E 02 1.76659E 02 5.20737E 01 6.43930E 00

ZONE 3--AXIAL BLKT 1
0.0 0.0 0.0 0.0 0.0 0.0

ZONE AVERAGE POWER DENSITIES(WATTS/CC)
8.41934E 03 4.67651E 02 0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 1 AND COLUMN 8 AND LINE 3 IS 1.41439E 04

THE AVERAGE POWER DENSITY ALONG ROW 1 IS 1.41438E 04 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE
9.999920E-01 9.999925E-01 9.999947E-01 9.999972E-01 1.000001E 00 1.000005E 00 1.000008E 00 1.000009E 00

THE AVERAGE POWER DENSITY DOWN COLUMN 8 IS 3.514645E 03 AND THE RELATIVE POWER DENSITIES ARE
3.613095E 00 1.174569E 00 2.777256E 00 2.411244E 00 2.125601E 00 1.904740E 00 1.708195E 00 1.520344E 00 4.105414E-01
1.985972E-01 1.004868E-01 5.982845E-02 3.943354E-02 2.504769E-02 1.452244E-02

THE AVERAGE POWER DENSITY ALONG LINE 3 IS 6.264750E 03 AND THE RELATIVE POWER DENSITIES ARE
1.189919E 00 2.119615E 00 2.276807E 00 1.468377E-01

TIME-0-2 CASE TO COMPARE TRIANGULAR, ONE-INCH WITH BLACK ANGLE
 ORIGIN 0.000, 2000 POINTS

SOURCE OF CITATION CASES 0000 72

PERFORMANCE RESULTS--DELTA-2/IRDELTA-51 WHERE S REPRESENTS NAME, CROSS SECTIONS, LANGUAGE IN PH1 = 2.3066341-21

COMP	NAME	GRP	STG, SIG, LCP+2	NU+SIG	DIFF. CORR.	0+2
1	CORE ZONE 1	1	-1.353140E 01	1.07108E 01	-3.044543E-02	-3.044007E 01
		2	-2.060171E 01	3.097430E 01	-6.187152E-02	-3.244938E 01
		3	-1.240004E 01	1.771700E 01	-3.004445E-02	-1.450100E 01
		4	-4.378580E 00	5.779467E 00	-1.517000E-02	-4.030034E 00
		5	-1.710027E 00	1.440072E 00	-6.116134E-03	-1.710000E 00
		6	-1.483103E-01	1.329027E-01	-4.500745E-04	-1.483100E-01
2	CORE ZONE 2	1	-1.577445E 00	2.025257E 00	-4.242000E-02	-2.001047E 00
		2	-3.619200E-01	6.700040E 00	-2.900200E-02	-3.910000E 00
		3	-2.240000E 00	5.100387E 00	-4.137530E-02	-1.605144E 00
		4	-6.047010E-01	1.015400E 00	-1.377045E-02	-4.055140E-01
		5	-2.352610E-01	4.003367E-01	-5.406733E-03	-1.730400E-01
		6	-1.240010E-02	5.577232E-02	-3.771554E-04	-2.079412E-02
3	AXIAL RLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0
		5	0.0	0.0	0.0	0.0
		6	0.0	0.0	0.0	0.0

COMP	NAME	GRP	STG, SIG, LCP+2	NU+SIG	DIFF. CORR.	0+2
1	CORE ZONE 1	1	1.353198E 01	2.240834E 01	1.310581E 01	4.274530E 00
		2	1.210443E 01	2.300173E 01	1.177001E 01	3.043000E 00
		3	1.292176E 01	2.105172E 01	1.240000E 01	4.070750E 00
		4	1.347547E 01	2.347584E 01	1.341313E 01	4.370500E 00
		5	1.500836E 01	2.069749E 01	1.525200E 01	4.970477E 00
		6	2.043457E 01	3.454000E 01	1.976750E 01	6.451200E 00
2	CORE ZONE 2	1	1.577445E 00	5.300625E 00	4.000916E 00	1.276100E 00
		2	1.110127E 00	3.019200E 00	2.730200E 00	0.513750E-01
		3	0.554545E-01	3.017000E 00	2.240000E 00	0.455100E-01
		4	0.240377E-01	2.915121E 00	2.104190E 00	0.647011E-01
		5	1.002407E 00	3.413738E 00	2.942125E 00	7.074003E-01
		6	1.337457E 00	4.204722E 00	3.127755E 00	9.000910E-01
3	AXIAL RLKT 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
		3	0.0	0.0	0.0	0.0
		4	0.0	0.0	0.0	0.0
		5	0.0	0.0	0.0	0.0
		6	0.0	0.0	0.0	0.0

END OF CASE - TOTAL CPU TIME WAS 0.40 MINUTES TOTAL CLOCK TIME WAS 2.00 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

*****THIS CASE WAS RUN ON 06-26-77 ON THE IBM 340/SI*****

**** THIS CASE RUN ON CODE MODIFIED IN JUNE, 1972

*****3-D CASE IV, TANK, IAW JAPAN, WITH BLACK ANSCREED

*****GROUP, 3187 POINTS *****

SIPRAH OF CITATION CASES CHAL 72

[illegible]

0	0	0	0	17	C	C	0	0	C	C	0	0	0	0	0	2	0	0	0	0	0	C	C
9.999999E-05				1.000000E-05					6.666666E-05				5.555555E-05	J5				9.999999E-05				0.0	
0.0				0.0					1.000000E+00				1.000000E+00	00				1.000000E+00				0.0	

ROD ENG. CONSTANT FOR ALL GROUPS IN ZONE 2 IS 4.692000E-01

THREE DIMENSIONAL HEXAGONAL GEOMETRY (X,Y,Z) WIDTH 3.714798E 01 HEIGHT 2.714798E 01 DEPTH 2.999998E 01

RTS REGION CENT
9 2.714795 C1

RTS REGION CENT
9 2.000000 C1

DISTANCES TO NEWM INTERVAL INTERFACES																	
J	DIST.																
2	4.128	7	8.255	4	12.382	5	16.510	6	20.638	7	24.765	8	28.892	9	33.020	10	37.148
I	DIST.																
2	4.128	7	8.255	4	12.383	5	16.510	6	20.638	7	24.765	8	28.893	9	33.025	10	37.148
KA	DIST.																
2	2.667	7	1.667	4	10.000	5	13.333	6	16.667	7	20.000	8	23.333	9	26.667	10	30.000

KB	DIST
1	1.6e7
2	5.000
3	8.333
4	11.667
5	15.000
6	18.333
7	21.667
8	25.000
9	28.333

ZONE INPUT BY REGION

PLANE NUMBER 1
2

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 3

[illegible]

SPECIFICATION FOR LAYER NUMBER 4

1 2 3 4 5 6 7 8 9

1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 6

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 7

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 8

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2

2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 9

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2	2	2
4	2	2	2	2	2	2	2	2	2
5	2	2	2	2	2	2	2	2	2
6	2	2	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2
9	2	2	2	2	2	2	2	2	2

MFSD OVERLAY INPUT

ZONE NUMBER 1

5	9	1	1	1	4	4	4	2	2	1	4	3	9	3	3	1	9	1	7	7	7	1	9	1	0	8	8	1	9	1	5	9	9	1	9
2	9	4	4	1	9	1	9	5	5	1	9	1	8	6	6	1	9																		

ZONE NUMBER AT EACH MES-1 INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	1	1	1	1	1
2	2	2	2	1	1	1	1	1	1
3	2	2	1	1	1	1	1	1	1
4	2	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	1	1	1	1	1
2	2	2	2	1	1	1	1	1	1
3	2	2	1	1	1	1	1	1	1
4	2	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	1	2	2	2	2	1	1	1	1
2	2	1	2	1	1	1	1	1	1
3	1	2	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8	9
1	1	2	2	2	2	1	1	1	1
2	2	1	2	1	1	1	1	1	1
3	1	2	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9
1	1	2	2	2	2	1	1	1	1
2	2	1	2	1	1	1	1	1	1
3	1	2	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 6

	1	2	3	4	5	6	7	8	9
1	1	2	2	2	2	1	1	1	1
2	2	1	2	1	1	1	1	1	1
3	1	2	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	2
7	1	1	1	1	1	1	1	2	2
8	1	1	1	1	1	1	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 7

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	1	1	1	1	1
2	2	2	2	1	1	1	1	1	1
3	2	2	1	1	1	1	1	1	1
4	2	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	2	2
7	1	1	1	1	1	1	2	2	2
8	1	1	1	1	1	2	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 8

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	1	1	1	1	1
2	2	2	1	1	1	1	1	1	1
3	2	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	2	2
7	1	1	1	1	1	1	2	2	2
8	1	1	1	1	1	2	2	2	2
9	1	1	1	1	1	2	2	2	2

SPECIFICATION FOR LAYER NUMBER 9

	1	2	3	4	5	6	7	8	9
1	2	2	2	2	1	1	1	1	1
2	2	2	2	1	1	1	1	1	1
3	2	2	1	1	1	1	1	1	1
4	2	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	2	2
7	1	1	1	1	1	1	2	2	2
8	1	1	1	1	1	2	2	2	2
9	1	1	1	1	1	2	2	2	2

FISSION SOURCE DISTRIBUTION AND SUM 1.00000 0.0 0.0 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 6000

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 4 9 9 3 0 1 2 2

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 10010

MEMORY LOCATIONS NOT USED----- 21100

HEXAGONAL 3-D CASE (Y. IANA, IAP JAPAN, WITH BLACK RESURF)
 9X9X9X3 GROUP, 2167 POINTS STREAM OF CITATION CASES CRAL 72
 LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATIONS

ITERATION	FLUX CHANGE	BETA	NU-1	NU-2	NU-3	K
1	4.72005E-00	1.00000	9.44010	-1.88573	0.0	0.293465
2	1.06602E-00	1.79727	7.29187	0.03423	0.33716	0.512364
3	5.91353E-01	1.46288	1.14606	0.34823	0.13892	0.529094
4	-2.23146E-01	1.50435	-0.60050	-0.14751	0.24043	0.533244
5	4.55861E-02	1.56180	-0.15870	-0.32129	0.04557	0.533385
6	-1.89394E-02	1.51569	-0.43440	-0.29911	0.50976	0.533326
7	8.37046E-02	1.50645	-0.43359	-0.66507	0.53026	0.533461
8	1.50353E-02	1.50280	0.22932	0.14330	0.42565	0.533476
9	7.60461E-04	1.49597	0.46458	0.31295	0.29074	0.533481
10	3.92914E-04	1.49856	0.51154	0.48320	-0.25062	0.533485
11	1.69154E-04	1.49786	0.53221	0.59633	2.42719	0.533485
12	4.34601E-05	1.49751	0.55966	0.61765	1.22501	0.533481

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.115 975625

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION C.4999964 K 0.5334792

LEAKAGE 7.79798E-01 TOTAL LOSSES 1.87448E-00 TOTAL PRODUCTIONS 1.00000E-00 REACTOR POWER (WATTS) 1.00000E-00

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	INT LEAKAGE	OUT LEAKAGE	FRT LEAKAGE	PAK LEAKAGE	B+2 LOSSES	1/V LOSS	REACH LOSS
1	8.88704E-02	8.88643E-02	7.18455E-02	8.88720E-02	1.37515E-01	1.37517E-01	0.0	0.0	0.0
2	1.90411E-02	1.90400E-02	1.90402E-02	1.90414E-02	3.00312E-02	3.00310E-02	0.0	0.0	0.0
3	1.80559E-02	1.80549E-02	1.80551E-02	1.80561E-02	2.92265E-02	2.92264E-02	0.0	0.0	0.0
SUM	1.09271E-01	1.09270E-01	1.09271E-01	1.09271E-01	1.70466E-01	1.70471E-01	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PKCD/ABSLAF
1	4.36412E-01	8.07568E-01	1.87448E-00	0.0	1.87448E-00	1.87448E-00	0.0
2	3.57526E-01	3.17813E-01	0.0	8.07568E-01	8.07568E-01	8.07568E-01	1.12573E-00
3	3.04745E-01	0.0	0.0	3.17813E-01	3.17813E-01	3.17813E-01	1.97783E-00
SUM	1.09488E-00	1.12578E-00	1.87448E-00	1.12538E-00	2.99986E-00	2.99986E-00	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--
 9.97008E-04 2.54274E-04 4.46474E-05

ZONE 2--
 0.0 0.0 0.0

ZONE AVERAGE POWER DENSITIES (WATTS/CC)
 3.70374E-01 0.0

THE MAXIMUM POWER DENSITY (WATTS/CC) AT ROW 5 AND COLUMN 5 AND LINE 5 IS 9.668155E-01

10X10X10R4 GROUP, 4000 POINTS   STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

[illegible]

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	4.692000E-01	4.692000E-01	0.0	4.692000E-01

THREE DIMENSIONAL SLAB GEOMETRY (X,Y,Z) WIDTH 7.619598E 01 HEIGHT 8.245299E 01 DEPTH 8.245299E 01

REGION SPECIFICATIONS

PTS	REGION	WIDTH					
6	4.571999F	01	2	1.524000E	01	2	1.524000E 01

PTS	REGION	AFIGHT					
2	4.851999E 00	1	9.700125E 00	1	9.700125F 00	1	9.700125E 00
1	9.700125E 00	1	9.700125E 00	1	9.700125E 00	1	9.700125E 00

PTS	REGION	DEPTH					
2	4.851999E 00	1	9.700125E 00	1	9.700125E 00	1	9.700125E 00
1	9.700125E 00	1	9.700125E 00	1	9.700125E 00		

X-DIR. POINTS	10	Y-DIR. POINTS	10	Z-DIR. POINTS	10

DISTANCES TO MESH INTERVAL INTERFACES

[illegible]

1	DIST.																
2	2.426	3	4.052	4	14.552	5	24.252	6	33.952	7	43.652	8	53.353	9	63.053	10	72.753
11	82.453																

[illegible]

~~DISTANCES TO FLOX POINTS~~

J	NIST.
1	3.810 2 11.430 3 19.050 4 26.670 5 34.290 6 41.910 7 49.530 8 57.150 9 64.770
1c	72.390

1	DIST.	2	1.639	3	9.702	4	19.402	5	29.102	6	38.802	7	48.503	8	58.203	9	67.903
10	77.603																

1	DIST.	2	1.639	3	9.702	4	19.402	5	29.102	6	38.802	7	48.503	8	58.203	9	67.903
10	77.603																

ZONE INPUT BY REGION

PLANE NUMBER 1

1	4	5
1	4	5
1	4	5
1	4	5
2	4	5
2	4	5
7	5	5
2	2	3
2	2	3

PLANE NUMBER 2

1	4	5
1	4	5
1	4	5
1	4	5
2	4	5
2	4	5
2	3	3
2	2	3
2	2	3

PLANE NUMBER 3

1	4	5
1	4	5
6	7	7
1	4	5
7	5	5
2	4	5
2	3	3
2	2	3
3	3	3

PLANE NUMBER 4

1	4	5
1	4	5
1	4	5
1	4	5
2	4	5
2	4	5
3	2	3
3	2	3
3	2	3

PLANE NUMBER 5

2	4	5
2	4	5
7	5	5
2	4	5
2	4	5
2	4	5
2	3	3
2	3	3
2	3	3

PLANE NUMBER 6		
2	4	5
2	4	5
2	4	5
2	4	5
2	4	5
3	3	3
3	3	3
3	3	3

PLANE NUMBER 7		
7	5	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3

PLANE NUMBER 8		
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3

PLANE NUMBER 9		
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3
3	3	3

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1										
	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	4	4	5	5
2	1	1	1	1	1	1	4	4	5	5
3	1	1	1	1	1	1	4	4	5	5
4	1	1	1	1	1	1	4	4	5	5
5	1	1	1	1	1	1	4	4	5	5
6	2	2	2	2	2	2	4	4	5	5
7	2	2	2	2	2	2	4	4	5	5
8	7	7	7	7	7	7	5	5	5	5
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	4	4	5	5
2	1	1	1	1	1	1	4	4	5	5
3	1	1	1	1	1	1	4	4	5	5
4	1	1	1	1	1	1	4	4	5	5
5	1	1	1	1	1	1	4	4	5	5
6	2	2	2	2	2	2	4	4	5	5
7	2	2	2	2	2	2	4	4	5	5
8	7	7	7	7	7	7	5	5	5	5
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	4	4	5	5
2	1	1	1	1	1	1	4	4	5	5
3	1	1	1	1	1	1	4	4	5	5
4	1	1	1	1	1	1	4	4	5	5
5	1	1	1	1	1	1	4	4	5	5
6	2	2	2	2	2	2	4	4	5	5
7	2	2	2	2	2	2	4	4	5	5
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	4	4	5	5
2	1	1	1	1	1	1	4	4	5	5
3	1	1	1	1	1	1	4	4	5	5
4	6	6	6	6	6	6	7	7	7	7
5	1	1	1	1	1	1	4	4	5	5
6	7	7	7	7	7	7	5	5	5	5
7	2	2	2	2	2	2	4	4	5	5
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	4	4	5	5
2	1	1	1	1	1	1	4	4	5	5
3	1	1	1	1	1	1	4	4	5	5
4	1	1	1	1	1	1	4	4	5	5
5	2	2	2	2	2	2			5	5
6	2	2	2	2	2	2			5	5
7	3	3	3	3	3	3			3	3
8	3	3	3	3	3	3			3	3
9	3	3	3	3	3	3			3	3
10	3	3	3	3	3	3			3	3

SPECIFICATION FOR LAYER NUMBER 6

	1	2	3	4	5	6	7	8	9	10
1	2	2	2	2	2	2	4	4	5	5
2	2	2	2	2	2	2	4	4	5	5
3	2	2	2	2	2	2	4	4	5	5
4	7	7	7	7	7	7	5	5	5	5
5	2	2	2	2	2	2	4	4	5	5
6	2	2	2	2	2	2	4	4	5	5
7	2	2	2	2	2	2	4	4	5	5
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 7

	1	2	3	4	5	6	7	8	9	10
1	2	2	2	2	2	2	4	4	5	5
2	2	2	2	2	2	2	4	4	5	5
3	2	2	2	2	2	2	4	4	5	5
4	2	2	2	2	2	2	4	4	5	5
5	2	2	2	2	2	2	4	4	5	5
6	2	2	2	2	2	2	4	4	5	5
7	2	2	2	2	2	2	4	4	5	5
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 8

	1	2	3	4	5	6	7	8	9	10
1	7	7	7	7	7	7	5	5	3	3
2	7	7	7	7	7	7	5	5	3	3
3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3	3	3
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

SPECIFICATION FOR LAYER NUMBER 9

	1	2	3	4	5	6	7	8	9	10
1	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3	3	3
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3

10 3 3 3 3 3 3 3 3 3 3

SPECIFICATION FOR LAYER NUMBER 10

	1	2	3	4	5	6	7	8	9	10
1	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3
4	3	3	3	3	3	3	3	3	3	3
5	3	3	3	3	3	3	3	3	3	3
6	3	3	3	3	3	3	3	3	3	3
7	3	3	3	3	3	3	3	3	3	3
8	3	3	3	3	3	3	3	3	3	3
9	3	3	3	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3	3	3	3

FISSION SOURCE DISTRIBUTION AND SUM 0.93420 0.06580 0.00000 0.0 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 12785

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 10 10 10 4 0 0 243 7

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 28567

MEMORY LOCATIONS NOT USED----- 11013

*****WARNING***** INPUT SPECIFIED DOWNSCATTER = 0 HAS BEEN CHANGED TO ACTUAL DOWNSCATTER = 2

3-D HARD FFTF PROBLEM IN REDUCED MESH, FEWER GRCLPS
10X10X10X4 GROUP, 4000 POINTS STREAM OF CITATION CASES ORNL 72
LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.86557E 00	1.00000	3.73113	-1.99351	0.0	0.639247
2	3.01295E 00	1.78515	4.62798	0.00324	0.53943	0.938069
3	2.50795E 01	1.64630	33.40341	0.00454	0.09144	0.962326
4	1.35279E 01	1.56750	14.00731	0.01724	0.18792	0.972041
5	7.08787E-01	1.52605	0.76118	0.11250	0.84488	0.981377
6	-1.19937E-01	1.50511	-0.28915	-0.32076	0.33975	0.986264
7	-5.50386E-02	1.49475	0.40386	0.56029	0.48096	0.989468
8	3.18031E-02	1.48968	-0.54603	-0.62017	0.47127	0.991533
9	2.04134E-02	1.48720	0.66228	0.58635	0.45478	0.992875
10	1.32141E-02	1.48600	0.66054	0.62464	0.41951	0.993754
11	8.63266E-03	1.48542	0.66192	0.64578	0.30630	0.994331
12	5.66769E-03	1.48514	0.66221	0.65604	-0.12320	0.994710
13	3.72982E-03	1.48500	0.66181	0.66259	5.39456	
	7.28463E-03	EXTRAPOLATION WITH		1.9603		0.995450
14	2.00272E-04	1.00000	0.05389	0.02956	3.08496	0.995447
15	2.02179E-04	1.48490	1.00972	1.60357	0.59567	0.995448
16	1.50681E-04	1.48489	0.74543	0.40182	0.97157	0.995447
17	9.15527E-05	1.48488	0.60769	0.67525	0.92150	0.995447

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.208 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999983 K 0.9954333

LEAKAGE 5.82210E 17 TOTAL LOSSES 4.54167E 18 TOTAL PRODUCTIONS 4.52099E 18 REACTOR POWER(WATTS) 4.12371E 08

GROSS NEUTRON BALANCE

GRP	LFY LEAKAGE	TYP LEAKAGE	RTY LEAKAGE	BOY LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	0.0	1.01273E 17	3.80055E 16	0.0	3.80080E 16	0.0	0.0	0.0
2	0.0	0.0	1.87956E 17	6.78523E 16	0.0	6.78974E 16	0.0	0.0	0.0
3	0.0	0.0	1.34523E 16	5.99496E 15	0.0	5.99481E 15	0.0	0.0	0.0
4	0.0	0.0	2.63898E 16	1.46796E 16	0.0	1.47008E 16	0.0	0.0	0.0
SUM	0.0	0.0	3.29071E 17	1.26532E 17	0.0	1.26006E 17	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PRGD/ABSCR
1	9.26216E 17	3.13936E 18	4.24282E 18	0.0	4.24286E 18	4.24282E 18	2.11805E 00
2	1.91941E 18	1.19367E 18	2.97479E 17	3.13932E 18	3.43678E 18	3.43681E 18	1.04761E 00
3	4.97725E 17	6.71870E 17	1.36250E 15	1.19368E 18	1.19504E 18	1.19505E 18	5.76396E-01
4	6.16110E 17	0.0	0.0	6.71882E 17	6.71880E 17	6.71882E 17	4.29368E-01
SUM	3.95945E 18	5.00489E 18	4.54166E 18	5.00489E 18	9.54656E 18	9.54656E 18	

END OF CASE - TOTAL CPU TIME WAS 0.25 MINUTES TOTAL CLOCK TIME WAS 0.57 MINUTES

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

3-D CASE CALLED CLAG (KAPLI), DATA INPUT FROM DISK FORCED.
13X13X18X3 GROUP, 9126 POINTS   STREAM OF CITATION CASES: ORNL 72

GENERAL CONTROL INPUT - SECTION 001

[illegible]

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTON, FRONT, BACK BOUNDARY CONDITIONS ARE

4.692000E-01	4.692000E-01	0.0	0.0	4.692000E-01	4.692000E-01

THREE DIMENSIONAL SLAB GEOMETRY (X,Y,Z) WIDTH 7.532500E 01 HEIGHT 7.532500E 01 DEPTH 1.246800E 02

REGION SPECIFICATIONS

PTS	REGION	WIDTH
3	9.000000E 00	4 2.653000E 01 4 2.653000E 01 2 1.326500E 01

PTS	REGION	HEIGHT					
3	9.000000E 00	4	2.653000E 01	4	2.653000E 01	2	1.326500E 01

PTS	REGION	DEPTH						
3	9.000000E 00	6	5.842000E 01	6	4.825999E 01	3	9.000000E 00	

X-DIR. POINTS	13	Y-DIR. POINTS	13	Z-DIR. POINTS	18

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.										
2	3.000	3	6.000	4	9.000	5	15.632	6	22.265	7	28.897
8	35.530	9	42.162	10	48.795						

1	DIST.										
2	3.000	3	6.000	4	9.000	5	15.632	6	22.265	7	28.897
8	35.530	9	42.162	10	48.795						
11	55.427	12	62.060	13	68.692	14	75.325				

KB	DIST																
2	3.000	3	6.000	4	9.000	5	18.737	6	26.473	7	38.210	8	47.947	9	57.683	10	67.420
11	75.463	12	83.507	13	91.550	14	99.593	15	107.637	16	115.680	17	118.680	18	121.680	19	124.680

DISTANCES TO FLUX POINTS

J	DIS.										
1	1.500	2	4.500	3	7.500	4	12.316	5	18.949	6	25.581
7	32.214	8	38.046	9	45.479	10	52.111	11	58.744	12	65.376
13	72.009	14	78.642	15	85.274	16	91.907	17	98.539	18	105.172

DIST.																	
1	1.500	2	4.500	3	7.500	4	12.316	5	18.949	6	25.561	7	32.214	8	38.846	9	45.479

5	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2
11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2

11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 6

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2
11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 7

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2
11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 8

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2
11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 9

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	3	3	3	3	2	2
5	1	1	1	1	1	1	1	3	3	3	3	2	2
6	1	1	1	1	1	1	1	3	3	3	3	2	2
7	1	1	1	1	1	1	1	3	3	3	3	2	2
8	1	1	1	3	3	3	3	2	2	2	2	2	2
9	1	1	1	3	3	3	3	2	2	2	2	2	2
10	1	1	1	3	3	3	3	2	2	2	2	2	2
11	1	1	1	3	3	3	3	2	2	2	2	2	2
12	1	1	1	2	2	2	2	2	2	2	2	4	4
13	1	1	1	2	2	2	2	2	2	2	2	4	4

SPECIFICATION FOR LAYER NUMBER 10

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6
9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 11

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6
9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 12

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5

3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6
9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 13

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6
9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 14

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6
9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 15

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	7	7	7	7	6	6
5	5	5	5	5	5	5	5	7	7	7	7	6	6
6	5	5	5	5	5	5	5	7	7	7	7	6	6
7	5	5	5	5	5	5	5	7	7	7	7	6	6
8	5	5	5	7	7	7	7	6	6	6	6	6	6

9	5	5	5	7	7	7	7	6	6	6	6	6	6
10	5	5	5	7	7	7	7	6	6	6	6	6	6
11	5	5	5	7	7	7	7	6	6	6	6	6	6
12	5	5	5	6	6	6	6	6	6	6	6	8	8
13	5	5	5	6	6	6	6	6	6	6	6	8	8

SPECIFICATION FOR LAYER NUMBER 16

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5	5	5	5	5

SPECIFICATION FOR LAYER NUMBER 17

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5	5	5	5	5

SPECIFICATION FOR LAYER NUMBER 18

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	5	5	5	5	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	5	5	5	5	5	5	5	5
8	5	5	5	5	5	5	5	5	5	5	5	5	5
9	5	5	5	5	5	5	5	5	5	5	5	5	5
10	5	5	5	5	5	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	5	5	5	5	5
12	5	5	5	5	5	5	5	5	5	5	5	5	5
13	5	5	5	5	5	5	5	5	5	5	5	5	5

FISSION SOURCE DISTRIBUTION AND SUM										1.00000	0.0	0.0	1.00000				
CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED										25610							
EQUATION CONSTANTS WILL BE STORED ON I/O LOGICAL 15																	
NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES										13	13	18	3	0	1	64	8
MEMORY LOCATIONS RESERVED FOR DATA STORAGE---										40000							
MEMORY LOCATIONS USED FOR THIS PROBLEM-----										38460							
MEMORY LOCATIONS NOT USED-----										1540							

3-D CASE CALLED CLAG (KAPL), DATA INPUT FROM DISK FORCED.

13X13X18X3 GROUP, 9126 POINTS STREAM OF CITATION CASES ORNL 72
LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	1.76721E 00	1.00000	3.53443	-1.87315	0.0	0.718587
2	1.72618E 00	1.86575	2.70296	0.06761	0.23784	0.872779
3	1.25282E 01	1.76328	19.78595	0.00164	0.25911	0.929563
4	4.97034E 01	1.69234	53.67067	0.00730	0.75968	0.965849
5	6.23497E 00	1.64647	6.36041	0.03574	0.62291	0.988688
6	8.19992E 00	1.61813	9.51507	0.01920	0.63505	1.002696
7	3.21992E 00	1.60109	3.61260	0.13658	0.64676	1.011826
8	4.20973E 00	1.59101	5.51712	0.04741	0.65164	1.017467
9	-5.21077E-01	1.58512	-0.64486	-0.15480	0.64611	1.021100
10	-5.37393E-01	1.58169	0.49392	1.69583	0.62457	1.023377
11	-5.00722E-01	1.57571	0.43104	0.86624	0.62249	1.024799
12	4.00571E-01	1.57856	-0.39942	-1.14964	0.62571	1.025691
13	-1.74694E-01	1.57789	-0.61081	-0.12257	0.63012	1.026255
14	-1.32975E-01	1.57751	0.62821	0.07888	0.63148	1.026615
15	-9.16022E-02	1.57729	0.59726	0.69828	0.63147	1.026845
16	-5.73954E-02	1.57716	0.56918	0.69880	0.63049	1.026995
17	-3.74682E-02	1.57709	0.61534	0.71649	0.62458	1.027091
18	-2.38352E-02	1.57704	0.61231	0.73828	0.61438	1.027155
19	-1.47468E-02	1.57702	0.60395	0.74581	0.59367	1.027285
	-3.13531E-02	EXTRAPOLATION WITH 2.0948				1.027285
20	3.73554E-03	1.00000	-0.24958	-1.69596	1.77761	1.027285
21	1.91975E-03	1.57700	0.51583	0.58743	-0.22573	1.027282
22	1.51920E-03	1.57699	0.79288	0.51586	0.84607	1.027282
23	7.33376E-04	1.57699	0.48347	0.88053	1.04687	1.027282
24	6.68526E-04	1.57699	0.91224	0.82188	0.99751	1.027282
25	4.02451E-04	1.57699	0.60240	0.82732	0.99494	1.027282
26	2.43187E-04	1.57699	0.60451	0.90168	0.99329	1.027282
27	1.64986E-04	1.57699	0.67860	0.77206	1.00415	1.027283
28	1.23024E-04	1.57699	0.74579	0.85852	1.00745	1.027283
29	9.05991E-05	1.57699	0.73652	0.85100	0.98619	1.027283

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.805 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 1.0272770

LEAKAGE 3.45311E 11 TOTAL LOSSES 6.40828E 12 TOTAL PRODUCTIONS 6.58312E 12 REACTOR POWER(WATTS) 1.00000E 03

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	2.45977E 10	2.45837E 10	0.0	0.0	8.68050E 08	7.31110E 10	0.0	0.0	0.0
2	1.74310E 10	1.74216E 10	0.0	0.0	6.06542E 08	5.24151E 10	0.0	0.0	0.0
3	2.65618E 10	2.65486E 10	0.0	0.0	9.41098E 08	8.02248E 10	0.0	0.0	0.0
SUM	6.85905E 10	6.85539E 10	0.0	0.0	2.41569E 09	2.05751E 11	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	0.0	6.28515E 12	6.40827E 12	0.0	6.40830E 12	6.40827E 12	0.0
2	1.03602E 12	5.16124E 12	0.0	6.28515E 12	6.28512E 12	6.28515E 12	7.54925E-01
3	3.02695E 12	0.0	0.0	5.16124E 12	5.16122E 12	5.16124E 12	1.15398E 00
SUM	6.06296E 12	1.14664E 13	6.40827E 12	1.14664E 13	1.78546E 13	1.78546E 13	

END OF CASE - TOTAL CPU TIME WAS 0.88 MINUTES TOTAL CLOCK TIME WAS 2.74 MINUTES

*****
*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

3-D (X,Y,Z) BUCKLING SEARCH (OLD WHIRLAWAY CASE)
 9X9X5X2 GROUP, 810 POINTS   STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	-2	0	1	0	0	0	0	0	1	1	0	0	0	0	0
1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	6	12	6	12	24
1.000000E 01	9.999999E-04	9.999999E 09	9.999999E 23	0.0													8.999997E-02						

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	11	0	0	0	0	0	1	0	0	1	0	0	0	0	-1	0	0	0	0
9.999999E-05	1.000000E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0																
9.999999E 29	0.0	1.000000E 01	1.000000E 00	1.000000E 00	1.599999E 00																	

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	9.999999E 29	9.999999E 29	0.0	9.999999E 29	9.999999E 29

THREE DIMENSIONAL SLAB GEOMETRY (X,Y,Z) WIDTH 2.500000E 01 HEIGHT 1.800000E 01 DEPTH 1.500000E 01

REGION SPECIFICATIONS

PTS	REGION WIDTH
4	8.000000E 00 2 8.000000E 00 3 9.000000E 00

PTS	REGION HEIGHT
9	1.800000E 01

PTS	REGION DEPTH
5	1.500000E 01

X-DIR. POINTS	9	Y-DIR. POINTS	9	Z-DIR. POINTS	5

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.
2	2.000 3 4.000 4 6.000 5 8.000 6 12.000 7 16.000 8 19.000 9 22.000 10 25.000

I	DIST.
2	2.000 3 4.000 4 6.000 5 8.000 6 10.000 7 12.000 8 14.000 9 16.000 10 18.000

KB	DIST
2	3.000 3 6.000 4 9.000 5 12.000 6 15.000

DISTANCES TO FLUX POINTS

J	DIST.
1	1.000 2 3.000 3 5.000 4 7.000 5 10.000 6 14.000 7 17.500 8 20.500 9 23.500

I	DIST.
1	1.000 2 3.000 3 5.000 4 7.000 5 9.000 6 11.000 7 13.000 8 15.000 9 17.000

KB	DIST
1	1.500 2 4.500 3 7.500 4 10.500 5 13.500

ZONE INPUT BY REGION

PLANE NUMBER 1			
1	1	1	1

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1

4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1

MESH OVERLAY INPUT

ZONE NUMBER 2

5 6 1 9 1 5

ZONE NUMBER 3

7 9 1 9 1 5

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	2	2	3	3	3
2	1	1	1	1	2	2	3	3	3
3	1	1	1	1	2	2	3	3	3
4	1	1	1	1	2	2	3	3	3
5	1	1	1	1	2	2	3	3	3
6	1	1	1	1	2	2	3	3	3
7	1	1	1	1	2	2	3	3	3
8	1	1	1	1	2	2	3	3	3
9	1	1	1	1	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	2	2	3	3	3
2	1	1	1	1	2	2	3	3	3
3	1	1	1	1	2	2	3	3	3
4	1	1	1	1	2	2	3	3	3
5	1	1	1	1	2	2	3	3	3
6	1	1	1	1	2	2	3	3	3
7	1	1	1	1	2	2	3	3	3
8	1	1	1	1	2	2	3	3	3
9	1	1	1	1	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	2	2	3	3	3
2	1	1	1	1	2	2	3	3	3
3	1	1	1	1	2	2	3	3	3
4	1	1	1	1	2	2	3	3	3
5	1	1	1	1	2	2	3	3	3
6	1	1	1	1	2	2	3	3	3
7	1	1	1	1	2	2	3	3	3
8	1	1	1	1	2	2	3	3	3
9	1	1	1	1	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 4

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	2	2	3	3	3
2	1	1	1	1	2	2	3	3	3
3	1	1	1	1	2	2	3	3	3
4	1	1	1	1	2	2	3	3	3
5	1	1	1	1	2	2	3	3	3
6	1	1	1	1	2	2	3	3	3
7	1	1	1	1	2	2	3	3	3
8	1	1	1	1	2	2	3	3	3
9	1	1	1	1	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 5

	1	2	3	4	5	6	7	8	9
1	1	1	1	1	2	2	3	3	3
2	1	1	1	1	2	2	3	3	3
3	1	1	1	1	2	2	3	3	3
4	1	1	1	1	2	2	3	3	3
5	1	1	1	1	2	2	3	3	3
6	1	1	1	1	2	2	3	3	3
7	1	1	1	1	2	2	3	3	3
8	1	1	1	1	2	2	3	3	3
9	1	1	1	1	2	2	3	3	3

FISSION SOURCE DISTRIBUTION AND SUM 1.00000 0.0 1.00000

PERTURBATION INPUT - SECTION 040

0 0 0 0 0 0 0 0 0 0 0 0 0.0 0.0 0.0

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1386

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 9 9 5 2 0 1 5 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 8262

MEMORY LOCATIONS NOT USED----- 31738

3-D (X,Y,Z) BUCKLING SEARCH (OLD WHIRLAWAY CASE)
 9X9X5X2 GROUP, 810 POINTS STREAM OF CITATION CASES GRNL 72
 LINE RELAXATION WILL BE DONE CN ROWS,COLUMNS,AND PLANES - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.75116E-01 -5.49130E 01

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
1	3.73813E 00	1.00000	7.47626	-1.96707	0.0	0.066221	1.000000 00
2	1.10976E 00	1.88235	1.40664	0.01641	-0.48320	0.045170	8.779910-01
3	3.54570E 00	1.78947	6.74070	0.01960	0.46375	0.053144	7.681830-01
4	3.68834E 00	1.72238	4.72857	0.03253	0.47602	0.055153	6.693550-01
5	1.36367E 00	1.67696	1.73339	0.06271	0.58613	0.057107	5.804110-01
6	1.32409E 00	1.64755	2.29506	0.12985	0.61485	0.058744	5.003600-01
7	2.94818E 00	1.62905	5.17476	0.11482	0.64979	0.060149	4.283150-01
8	1.71740E 00	1.61762	2.29993	0.32965	0.66975	0.061315	2.986340-01
9	1.45105E 00	1.61064	2.29596	0.06624	0.66340	0.063141	9.114400-02
10	-3.11387E-01	1.60641	-0.52598	0.0	0.64175	0.066366	-1.578440-01
11	2.83885E-01	1.60385	-0.62779	-0.62779	0.62278	0.070630	-2.200910-01
12	-1.93981E-01	1.60231	-0.87729	0.0	0.76590	0.071913	-2.200910-01
13	-1.80202E-01	1.60139	0.74876	0.74876	0.83252	0.071964	-2.200910-01
14	-1.74023E-01	1.60083	0.79169	0.79169	0.83522	0.071971	-2.888710-01
15	-1.67790E-01	1.60050	0.79639	0.79639	0.77146	0.073246	-3.033150-01
16	-1.54282E-01	1.60030	0.76521	0.76521	0.83328	0.073567	-3.184800-01
17	-1.49452E-01	1.60018	0.81924	0.81924	0.83550	0.073869	-3.344040-01
18	-1.45189E-01	1.60011	0.82629	0.82629	0.83740	0.074186	-3.511240-01
19	-1.41928E-01	1.60006	0.83562	0.83562	0.83916	0.074521	-3.686800-01
20	-1.38671E-01	1.60004	0.83838	0.83838	0.84079	0.074875	-3.871130-01
21	-1.35309E-01	1.60002	0.84044	0.84044	0.84237		
	-8.24242E-01	EXTRAPOLATION WITH 5.2673				0.077434	-4.267920-01
22	-1.18300E-01	1.00000	0.75600	0.75600	5.33289	0.077663	-4.267920-01
23	-3.99681E-01	1.60001	2.97886	2.97886	0.02989	0.076410	-4.374610-01
24	-1.92048E-01	1.60000	0.28845	0.0	0.86496	0.076313	-4.539990-01
25	-1.42174E-01	1.60000	0.59813	0.59813	0.85848	0.076649	-4.940640-01
26	-1.26068E-01	1.60000	0.76065	0.76065	0.82424	0.077481	-5.187660-01
27	-1.15768E-01	1.60000	0.80253	0.80253	0.84990	0.078029	-5.447040-01
28	-1.06385E-01	1.60000	0.81257	0.81257	0.85023	0.078599	-5.719390-01
29	-1.00897E-01	1.60000	0.84751	0.84751	0.84998	0.079205	-6.005360-01
30	-9.53650E-02	1.60000	0.84981	0.84981	0.84922	0.079850	-6.305620-01
31	-8.95324E-02	1.60000	0.84931	0.84931	0.84721		
	-5.54222E-01	EXTRAPOLATION WITH 5.6360				0.082526	-6.951930-01
32	-5.35833E-02	1.00000	0.54490	0.54490	5.78122	0.083078	-6.951930-01
33	-2.32414E-01	1.60000	4.10502	4.10502	0.06344	0.082306	-7.125730-01
34	-1.06427E-01	1.60000	0.35149	0.0	0.88514	0.082502	-7.664500-01
35	-8.27575E-02	1.60000	0.69484	0.69484	0.77222	0.083772	-8.047710-01
36	-5.85892E-02	1.60000	0.64937	0.64937	0.79865	0.084740	-8.450090-01
37	-4.67505E-02	1.60000	0.75119	0.75119	0.76516	0.085767	-8.872590-01
38	-3.80051E-02	1.60000	0.77493	0.77493	0.70883	0.086869	-9.316210-01
39	-2.87676E-02	1.60000	0.72817	1.85497	0.60072	0.088054	-9.782020-01
40	2.34814E-02	1.60000	-0.79276	-1.34930	0.33324	0.089329	-1.006460 00
41	1.92261E-02	1.60000	0.83801	0.52400	-0.21144	0.090139	-1.000590 00
42	8.84724E-03	1.60000	0.46902	0.65389	0.03666	0.090017	-9.998750-01
43	2.53677E-03	1.60000	0.28927	0.25799	-1.26431	0.089997	-1.000010 00
44	9.83238E-04	1.60000	0.38858	0.47483	0.08640	0.090000	-1.000010 00
45	-6.68228E-04	1.60000	-0.68329	-0.65544	0.08649	0.090000	-1.000000 00
46	-8.20816E-04	1.60000	1.22753	0.47032	-2.42622	0.090000	-9.999960-01
47	2.88963E-04	1.60000	-0.35176	-0.29174	1.60331	0.090000	-9.999950-01
48	-4.15444E-05	1.60000	-0.14381	-0.37236	0.88381	0.090000	-9.999900-01

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 0.0899997
 END OF CRITICALITY SEARCH - ITERATION TIME 0.131 MINUTES
 BUCKLINGS WERE MULTIPLIED BY -9.99990E-01, FRACTION ABSORPTIONS IN SEARCH PARAMETER -0.266016
 LEAKAGE 1.25757E 19 TOTAL LOSSES 1.01092E 19 TOTAL PRODUCTIONS 9.09827E 17 REACTOR POWER(WATTS) 1.00000E 07

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	4.87929E 30	1.00000*****	-0.28688	0.0	0.090000	
2	2.95952E 01	1.88235	29.59515	3.24146	0.0	0.090000
3	2.41423E 00	1.78947	2.49580	0.73649	0.0	0.090000
4	2.99386E 00	1.72238	4.23395	0.09206	0.0	0.090000
5	1.77801E 00	1.67696	2.37190	0.26755	0.0	0.090000
6	5.71321E-01	1.64755	0.89265	0.43337	0.0	0.090000
7	-5.12162E-01	1.62905	-1.40861	-0.57359	0.0	0.090000
8	4.07093E-01	1.61762	-0.38776	-0.80105	0.0	0.090000
9	6.21300E-02	1.61064	0.21475	0.19295	0.0	0.090000
10	2.22187E-02	1.60641	0.37984	0.21920	0.0	0.090000
11	1.29766E-02	1.60385	0.59702	0.27070	0.0	0.090000
12	-1.89221E-03	1.60231	-0.14771	-0.07065	0.0	0.090000
13	1.09673E-04	1.60139	-0.05785	-0.26569	0.0	0.090000
14	3.62396E-05	1.60083	0.33047	0.22976	0.0	0.090000

END OF ADJOINT CALCULATION - ITERATION TIME 0.034 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSOR TION 0.9999553 K 0.0900005

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	0.0	1.77426E 18	2.04650E 17	0.0	4.95648E 18	4.95649E 18	-2.54697E 18	0.0	0.0
2	0.0	9.90819E 16	3.11013E 16	0.0	2.76791E 17	2.76792E 17	-1.42233E 17	0.0	0.0
SUM	0.0	1.87334E 18	2.35751E 17	0.0	5.23327E 18	5.23329E 18	-2.68920E 18	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSCR
1	1.57100E 17	6.07175E 17	1.01092E 19	0.0	1.01092E 19	1.01092E 19	2.75328E 00
2	6.56374E 16	0.0	0.0	6.07175E 17	6.07170E 17	6.07175E 17	7.27159E 00
SUM	2.22737E 17	6.07175E 17	1.01092E 19	6.07175E 17	1.07164E 19	1.07164E 19	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--CORE ZONE 1
4.82498E 16 2.77184E 15

ZONE 2--CORE ZONE 2
1.81258E 16 1.85364E 15

ZONE 3--AXIAL BLKT 1
3.66449E 15 6.31349E 14

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

4.07559E 03 5.54038E 02 0.0

3-D (X,Y,Z) BUCKLING SEARCH (OLD WHIRLAWAY CASE)

9X9X5X2 GROUP, 810 POINTS

STREAM OF CITATION CASES UNKL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRC. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 3.924258E C5

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE ZONE 1	1	-1.104560E 01	1.227289E 02	-5.922751E-01	-1.656841E 01
		2	-6.721769E 00	7.000949E 00	-3.475089E-01	-8.066121E 00
2	CORE ZONE 2	1	-2.113914E 00	2.348793E 01	-1.445156E-01	-3.593654E 00
		2	-1.962718E 00	2.345219E 00	-1.184266E-01	-2.217869E 00
3	AXIAL BLKT 1	1	-1.872991E-01	2.081100E 00	-2.000647E-02	-2.247588E-01
		2	-1.937837E-01	3.451864E-01	-1.991225E-02	-1.685918E-01

COMP	NAME	GRP. K ---	SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE ZONE 1	1	1.104560E 01 6.300853E-01
		2	1.178708E 02 6.721769E 00
2	CORE ZONE 2	1	2.113914E 00 2.110696E-01
		2	1.977719E 01 1.962718E 00
3	AXIAL BLKT 1	1	1.872991E-01 3.106678E-02
		2	1.175499E 00 1.937837E-01

END OF CASE - TOTAL CPU TIME WAS 0.22 MINUTES TOTAL CLOCK TIME WAS 1.45 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

3-D, 90 DEGREE ROTATIONAL SYMMETRY, QUARTER SECTION WITH BLACK ABSORBER
9X9X3X2 GROUP, 486 POINTS

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24
1.500000E 00	9.999998E-03	9.999999E 09	9.999999E 23	0.0														1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

ROD BND. CONSTANT FOR ALL GROUPS IN ZONE 1 IS 4.692000E-01

THREE DIMENSIONAL SLAB GEOMETRY (X,Y,Z) WIDTH 3.000000E 01 HEIGHT 3.000000E 01 DEPTH 9.999999E-01

~~REGION SPECIFICATIONS~~

REGION SPECIFICATION			
PTS	REGION WIDTH		
3	9.000000E 00	3	1.200000E 01
3	9.000000E 00		

PTS	REGION	HEIGHT
3	9.000000E 00	3 1.200000E 01 3 9.000000E 00

PTS	REGION	DEPTH
3	1.000000E 00	

X-DIR. POINTS	9	Y-DIR. POINTS	9	Z-DIR. POINTS	3

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																
2	3.000	3	6.000	4	9.000	5	13.000	6	17.000	7	21.000	8	24.000	9	27.000	10	30.000

I	DIST.
2	3.000
3	6.000
4	9.000
5	13.000
6	17.000
7	21.000
8	24.000
9	27.000
10	30.000

KB	DIST				
2	0.333	3	0.667	4	1.000

DISTANCES TO FLUX POINTS

J	DIST.
1	1.500
2	4.500
3	7.500
4	11.000
5	15.000
6	19.000
7	22.500
8	25.500
9	28.500

1	DISY.																
1	1.500	2	4.500	3	7.500	4	11.000	5	15.000	6	19.000	7	22.500	8	25.500	9	28.500

KB DIST			
1	0.167	2	0.500
3	0.833		

ZONE INPUT BY REGION

PLANE NUMBER 1			
1	2	3	
2	2	3	
3	2	1	

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1

FISSION SOURCE DISTRIBUTION AND SUM 1.00000 0.0 1.00000

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 864

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, POWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 9 9 3 2 0 1 9 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 6056

MEMORY LOCATIONS NOT USED----- 33904

ZONE MACROSCOPIC CROSS SECTIONS

ZONE	NAME	GRP	D	SIGR	SIGA	NUSIGF	BSQ	POWER/FLUX
1	CORE ZONE 1	1	0.0	0.0	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0	0.0	0.0
2	CORE ZONE 2	1	1.70000E 00	5.20000E-03	7.00000E-04	1.00000E-03	0.0	5.00000E-15
		2	1.13000E 00	0.0	6.30000E-03	2.50000E-02	0.0	2.50000E-13
3	AXIAL BLKT 1	1	1.20000E 00	6.70000E-03	5.20000E-04	0.0	0.0	0.0
		2	8.70000E-01	0.0	8.00000E-03	0.0	0.0	0.0

SCATTERING MATRIX

ZONE	GRP	TO GRP	1	2
1	1		0.0	0.0
	2		0.0	0.0
2	1		0.0	5.20000E-03
	2		0.0	0.0
3	1		0.0	6.70000E-03
	2		0.0	0.0

3-0, 90 DEGREE ROTATIONAL SYMMETRY, QUARTER SECTION WITH BLACK ABSORBER						
9X9X3X2 GROUP, 486 POINTS			STREAM OF CITATION CASES DRNL 72			
LINE RELAXATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S)						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-4.40549E-02	1.00000	-0.08811	0.01298	0.0	0.378166
2	-2.07959E-01	1.80966	4.51250	15.60664	-0.03733	0.391353
3	-2.02187E-01	1.68019	0.77006	1.07649	1.11314	0.401515
4	-1.24678E-01	1.60222	0.49197	0.73692	0.66166	0.404175
5	-7.73781E-02	1.55866	0.54324	0.70501	0.73304	0.404426
6	-6.17429E-02	1.53534	0.73619	0.81991	0.85299	0.403884
7	-5.28412E-02	1.52314	0.80299	0.87304	0.90216	0.402816
8	-4.70120E-02	1.51684	0.84267	0.90112	0.92792	0.401350
9	-4.26070E-02	1.51360	0.86369	0.91252	0.94088	0.399564
10	-3.90391E-02	1.51194	0.87722	0.91803	0.94809	0.397519
11	-3.60072E-02	1.51109	0.88633	0.92094	0.95235	0.395262
12	-3.33886E-02	1.51066	0.89389	0.92276	0.95510	0.392838
13	-3.10795E-02	1.51044	0.89976	0.92367	0.95682	0.390281
14	-2.90226E-02	1.51033	0.90480	0.92480	0.95823	
	-3.20913E-01	EXTRAPOLATION WITH			10.7365	0.356431
15	-6.73091E-03	1.00000	0.22519	0.41352	10.93651	0.355148
16	-1.24463E-02	1.51024	1.83668	1.78738	0.03973	0.352422
17	-1.27115E-02	1.51023	1.00860	0.99436	1.16432	0.349330
18	-1.22864E-02	1.51022	0.95427	0.93162	0.98348	0.346372
19	-1.17549E-02	1.51021	0.94498	0.92287	0.97405	0.343557
20	-1.12848E-02	1.51021	0.94872	0.93449	0.97392	0.340870
21	-1.08676E-02	1.51021	0.95216	0.93802	0.97331	0.338298
22	-1.04814E-02	1.51021	0.95398	0.93910	0.97256	0.335834
23	-1.01221E-02	1.51021	0.95560	0.94340	0.97203	0.333468
24	-9.78196E-03	1.51021	0.95661	0.94647	0.97168	0.331194
25	-9.46820E-03	1.51021	0.95846	0.94841	0.97112	
	-1.95700E-01	EXTRAPOLATION WITH			20.4736	0.283418
26	-5.81878E-03	1.00000	0.60874	0.18812	20.61660	0.283236
27	-1.00569E-02	1.51021	1.71828	1.64192	0.01487	0.282832
28	-9.74119E-03	1.51021	0.95887	0.98198	1.14274	0.282345
29	-8.80408E-03	1.51021	0.89500	0.91891	0.96272	0.281853
30	-7.84916E-03	1.51021	0.88369	0.92135	0.95573	0.281364
31	-7.03883E-03	1.51021	0.88972	0.94558	0.95755	0.280878
32	-6.34170E-03	1.51021	0.89462	0.95014	0.95822	0.280398
33	-5.73742E-03	1.51021	0.89898	0.95644	0.95920	0.279925
34	-5.21541E-03	1.51021	0.90380	0.94951	0.96010	0.279459
35	-4.76319E-03	1.51021	0.90853	0.95754	0.96124	0.279001
36	-4.36890E-03	1.51021	0.91285	0.95025	0.96142	0.278552
37	-4.02355E-03	1.51021	0.91693	0.96410	0.96208	0.278113
38	-3.72410E-03	1.51021	0.92185	0.98470	0.96296	0.277683
39	-3.45618E-03	1.51021	0.92460	0.98441	0.96361	0.277263
40	-3.22002E-03	1.51021	0.92845	0.99303	0.96366	0.276853
41	-3.01367E-03	1.51021	0.93290	0.98897	0.96411	0.276453
42	-2.82848E-03	1.51021	0.93572	0.99488	0.96450	0.276064
43	-2.66314E-03	1.51021	0.93888	0.98568	0.96499	0.275685
44	-2.51484E-03	1.51021	0.94180	0.98027	0.96493	0.275316
45	-2.37876E-03	1.51021	0.94351	0.97348	0.96532	0.274957
46	-2.25741E-03	1.51021	0.94673	0.98136	0.96580	0.274608
47	-2.14660E-03	1.51021	0.94877	0.97985	0.96525	0.274269
48	-2.04331E-03	1.51021	0.94984	0.97373	0.96665	0.273940
49	-1.95044E-03	1.51021	0.95260	0.97180	0.96607	0.273621
50	-1.86670E-03	1.51021	0.95520	0.96612	0.96603	0.273311
51	-1.78486E-03	1.51021	0.95437	0.96733	0.96716	0.273010
52	-1.71125E-03	1.51021	0.95705	0.97768	0.96682	0.272713
53	-1.64390E-03	1.51021	0.95900	0.96269	0.96573	0.272435
54	-1.57970E-03	1.51021	0.95937	0.97207	0.96770	0.272161
55	-1.51938E-03	1.51021	0.96030	0.95577	0.96708	0.271895
56	-1.46085E-03	1.51021	0.96002	0.97420	0.96683	0.271637
57	-1.40589E-03	1.51021	0.96098	0.96743	0.96764	0.271388

58	-1.35702E-03	1.51021	0.96388	0.96471	0.96783	0.271146
59	-1.30904E-03	1.51021	0.96333	0.96335	0.96606	
	-3.44341E-02	EXTRAPOLATION WITH	26.2786			0.264725
60	-1.57058E-04	1.00000	0.11982	0.13789	26.31922	0.264713
61	-1.99139E-04	1.51021	1.26773	1.15863	0.00359	0.264686
62	-1.97232E-04	1.51021	0.99022	0.96851	1.16380	0.264656
63	-1.81675E-04	1.51021	0.92094	0.83703	0.99368	0.264627
64	-1.71661E-04	1.51021	0.94471	0.93513	0.97504	0.264600
65	-1.67429E-04	1.51021	0.97518	0.88895	0.98116	0.264574
66	-1.56403E-04	1.51021	0.93398	0.87505	0.98184	0.264549
67	-1.54018E-04	1.51021	0.98460	0.91076	0.97783	0.264525
68	-1.49369E-04	1.51021	0.96966	0.94122	0.98306	0.264503
69	-1.45555E-04	1.51021	0.97432	0.81254	0.98355	0.264481
70	-1.40607E-04	1.51021	0.96587	0.94875	0.97346	0.264460
71	-1.32799E-04	1.51021	0.94434	0.78381	0.97809	0.264440
72	-1.28746E-04	1.51021	0.96935	1.03451	0.98053	0.264420
73	-1.30951E-04	1.51021	1.01700	0.83336	0.96996	0.264402
74	-1.22428E-04	1.51021	0.93479	0.88002	0.98290	0.264384
75	-1.19925E-04	1.51021	0.97943	0.95457	0.97920	0.264367
76	-1.14501E-04	1.51021	0.95466	0.90478	0.98971	0.264350
77	-1.14262E-04	1.51021	0.99780	0.63159	0.97800	0.264333
78	-1.09076E-04	1.51021	0.95451	1.00001	0.97507	0.264318
79	-1.03712E-04	1.51021	0.95072	0.75001	0.97939	0.264303
80	-1.01805E-04	1.51021	0.98151	0.44445	0.97758	0.264289
81	-1.01745E-04	1.51021	0.99931	1.00000	0.97792	0.264275
82	-1.00076E-04	1.51021	0.98350	0.75000	0.97569	0.264262
83	-9.78112E-05	1.51021	0.97727	0.66667	0.98139	0.264249

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.173 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9966622 K 0.2643784

LEAKAGE 6.57840E 15 TOTAL LOSSES 2.65779E 16 TOTAL PRODUCTIONS 7.02319E 15 REACTOR POWER(WATTS) 2.63158E 05

ADJOINT PROBLEM FOLLOWS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	4.57711E 28	1.00000*****	-0.01968	0.0	0.264249	
2	8.03612E 01	1.80966	80.36118	4.60333	0.0	0.264249
3	2.96468E 01	1.68019	30.01575	0.93563	0.0	0.264249
4	5.65157E 00	1.60222	5.84220	0.68815	0.0	0.264249
5	2.02722E 00	1.55866	2.38592	0.71411	0.0	0.264249
6	1.10932E 00	1.53534	1.65654	0.83491	0.0	0.264249
7	7.19409E-01	1.52314	1.36792	0.88738	0.0	0.264249
8	5.17627E-01	1.51684	1.23714	0.91863	0.0	0.264249
9	3.98297E-01	1.51360	1.16776	0.93262	0.0	0.264249
10	3.20476E-01	1.51194	1.12509	0.94264	0.0	0.264249
11	2.65969E-01	1.51109	1.09589	0.94758	0.0	0.264249
12	2.25694E-01	1.51066	1.07426	0.94922	0.0	0.264249
13	1.94779E-01	1.51044	1.05780	0.95052	0.0	0.264249
14	1.70292E-01	1.51033	1.04457	0.95280	0.0	0.264249
15	1.50472E-01	1.51027	1.03408	0.95235	0.0	0.264249
16	1.34095E-01	1.51024	1.02526	0.95374	0.0	0.264249
17	1.20371E-01	1.51023	1.01802	0.95330	0.0	0.264249
18	1.08700E-01	1.51022	1.01174	0.95403	0.0	0.264249
19	9.86824E-02	1.51021	1.00653	0.95438	0.0	0.264249
20	8.99925E-02	1.51021	1.00193	0.95441	0.0	0.264249
21	8.23984E-02	1.51021	0.99801	0.95541	0.0	0.264249
22	7.57074E-02	1.51021	0.99450	0.95569	0.0	0.264249
23	6.97718E-02	1.51021	0.99137	0.95575	0.0	0.264249
24	6.44846E-02	1.51021	0.98871	0.95629	0.0	0.264249
25	5.97382E-02	1.51021	0.98613	0.95752	0.0	
	1.94431E 00	EXTRAPOLATION WITH	34.4914			0.264249
26	-6.19984E-03	1.00000	-0.10998	-0.45485	0.0	0.264249
27	-1.13243E-02	1.51021	1.81523	1.74317	0.0	0.264249
28	-1.14443E-02	1.51021	0.99915	1.01052	0.0	0.264249
29	-1.09503E-02	1.51021	0.94588	0.95845	0.0	0.264249

30	-1.03347E-02	1.51021	0.93345	0.94515	0.0	0.264249
31	-9.75853E-03	1.51021	0.93449	0.94893	0.0	0.264249
32	-9.22173E-03	1.51021	0.93577	0.94874	0.0	0.264249
	-1.51870E-01	EXTRAPOLATION WITH 16.3179				0.264249
33	-5.41770E-03	1.00000	0.58208	0.28489	0.0	0.264249
34	-9.77516E-03	1.51021	1.79452	1.74949	0.0	0.264249
35	-9.75883E-03	1.51021	0.98857	0.95802	0.0	0.264249
36	-9.30393E-03	1.51021	0.94408	0.89301	0.0	0.264249
37	-8.75503E-03	1.51021	0.93225	0.87924	0.0	0.264249
38	-8.22604E-03	1.51021	0.93135	0.87575	0.0	0.264249
39	-7.72601E-03	1.51021	0.93149	0.87535	0.0	0.264249
40	-7.25538E-03	1.51021	0.93183	0.86949	0.0	0.264249
41	-6.81037E-03	1.51021	0.93185	0.87436	0.0	0.264249
42	-6.39224E-03	1.51021	0.93221	0.89515	0.0	0.264249
43	-6.00237E-03	1.51021	0.93301	0.93755	0.0	0.264249
44	-5.63622E-03	1.51021	0.93336	0.93227	0.0	0.264249
45	-5.29128E-03	1.51021	0.93351	0.93393	0.0	0.264249
	-7.49236E-02	EXTRAPOLATION WITH 14.0870				0.264249
46	-4.39405E-04	1.00000	0.08260	0.35100	0.0	0.264249
47	-7.84218E-04	1.51021	1.78394	1.64741	0.0	0.264249
48	-7.74443E-04	1.51021	0.98676	0.98430	0.0	0.264249
49	-7.20084E-04	1.51021	0.92909	0.95104	0.0	0.264249
50	-6.65963E-04	1.51021	0.92417	0.93688	0.0	0.264249
51	-6.16431E-04	1.51021	0.92501	0.94900	0.0	0.264249
52	-5.73456E-04	1.51021	0.92971	0.94402	0.0	0.264249
53	-5.29706E-04	1.51021	0.92318	0.93602	0.0	0.264249
54	-4.90129E-04	1.51021	0.92479	0.95123	0.0	0.264249
55	-4.54783E-04	1.51021	0.92743	0.94609	0.0	0.264249
56	-4.30286E-04	1.51021	0.94570	0.93202	0.0	0.264249
	-6.60478E-03	EXTRAPOLATION WITH 15.3561				0.264249
57	-1.91033E-04	1.00000	0.44378	0.21708	0.0	0.264249
58	-3.31044E-04	1.51021	1.73258	1.33793	0.0	0.264249
59	-3.29673E-04	1.51021	0.99553	0.91928	0.0	0.264249
60	-3.14772E-04	1.51021	0.95449	0.81326	0.0	0.264249
61	-2.92003E-04	1.51021	0.92737	0.81087	0.0	0.264249
62	-2.76864E-04	1.51021	0.94788	0.78338	0.0	0.264249
63	-2.57373E-04	1.51021	0.92934	0.87238	0.0	0.264249
64	-2.44141E-04	1.51021	0.94834	0.78052	0.0	0.264249
65	-2.29120E-04	1.51021	0.93825	0.81252	0.0	0.264249
66	-2.14696E-04	1.51021	0.93683	0.76925	0.0	0.264249
67	-2.03907E-04	1.51021	0.94955	0.95002	0.0	0.264249
68	-1.93417E-04	1.51021	0.94836	0.73686	0.0	0.264249
69	-1.80364E-04	1.51021	0.93233	0.85715	0.0	0.264249
70	-1.73569E-04	1.51021	0.96215	0.58334	0.0	0.264249
71	-1.64688E-04	1.51021	0.94867	0.28572	0.0	0.264249
72	-1.53899E-04	1.51021	0.93434	0.0	0.0	0.264249
73	-1.45376E-04	1.51021	0.94447	0.94447	0.0	0.264249
74	-1.42336E-04	1.51021	0.97895	0.97895	0.0	0.264249
75	-1.34051E-04	1.51021	0.94166	0.94166	0.0	0.264249
76	-1.28448E-04	1.51021	0.95808	0.95808	0.0	0.264249
77	-1.21534E-04	1.51021	0.94605	0.94605	0.0	0.264249
78	-1.17302E-04	1.51021	0.96506	0.96506	0.0	0.264249
79	-1.13010E-04	1.51021	0.96330	0.96330	0.0	0.264249
80	-1.07408E-04	1.51021	0.95031	0.95031	0.0	0.264249
81	-1.04606E-04	1.51021	0.97381	0.97381	0.0	0.264249
82	-1.00970E-04	1.51021	0.96514	0.96514	0.0	0.264249
83	-9.39965E-05	1.51021	0.93084	0.93084	0.0	0.264249

END OF ADJOINT CALCULATION - ITERATION TIME 0.126 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9976392 K 0.2641168

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	2.61320E 15	2.44746E 15	1.28038E 16	-1.28038E 16	0.0	0.0	0.0	0.0	0.0
2	7.71249E 14	7.46484E 14	3.60568E 15	-3.60568E 15	0.0	0.0	0.0	0.0	0.0
SUM	3.38445E 15	3.19395E 15	1.64095E 16	-1.64095E 16	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSGRP
1	1.41979E 16	7.30318E 15	2.65779E 16	0.0	2.65618E 16	2.65779E 16	6.25798E-02
2	5.80160E 15	0.0	0.0	7.30318E 15	7.31932E 15	7.30318E 15	1.05741E 00
SUM	1.99995E 16	7.30318E 15	2.65779E 16	7.30318E 15	3.38811E 16	3.38811E 16	

3-D, 90 DEGREE ROTATIONAL SYMMETRY, QUARTER SECTION WITH BLACK ABSORBER
 9X9X3X2 GROUP, 486 POINTS STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRC. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 3.014174E 01

COMP	NAME	GRP	SIGA, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE ZONE 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
2	CORE ZONE 2	1	-3.313306E 01	1.253796E 02	-1.570457E-01	-5.632319E 01
		2	-3.321208E 01	3.498514E 01	-2.108451E-01	-3.752962E 01
3	AXIAL BLKT 1	1	-1.523181E 01	5.763905E 01	-6.984276E-02	-1.827817E 01
		2	-1.444139E 01	2.224107E 01	-8.466733E-02	-1.256401E 01

COMP	NAME	GRP. K	SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE ZONE 1	1	0.0
		2	0.0
2	CORE ZONE 2	1	3.313306E 01
		2	1.193583E 02
3	AXIAL BLKT 1	1	1.523181E 01
		2	3.773822E 01

END OF CASE - TOTAL CPU TIME WAS 0.33 MINUTES TOTAL CLOCK TIME WAS 1.49 MINUTES

*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER
 9X18X3X2 GROUP, 972 POINTS STREAM OF CITATION CASES ORNL 72

GENERAL CONTROL INPUT - SECTION 001

0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	4	0	0	0
1	0	0	0	1	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
100	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24
1.500000E 00	9.999998E-03	9.999999E 09	9.999999E 23	0.0														1.000000E 00					

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

0	0	0	0	11	0	0	0	0	0	0	3	0	1	1	1	0	0	0	0	0	0	0
9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	9.999999E-05	0.0											
9.999996E-02	0.0			2.500000E-01	9.500000E-01	5.000000E-01	0.0															

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

9.999996E-02	9.999996E-02	ROTATION(180)	9.999996E-02	0.0	0.0

ROD BND. CONSTANT FOR ALL GROUPS IN ZONE 1 IS 4.692000E-01

THREE DIMENSIONAL SLAB GEOMETRY (X,Y,Z) WIDTH 3.000000E 01 HEIGHT 6.000000E 01 DEPTH 9.999999E-01

REGION SPECIFICATIONS

PTS REGION WIDTH

3	9.000000E 00	3	1.200000E 01	3	9.000000E 00

PTS REGION HEIGHT

3	9.000000E 00	3	1.200000E 01	3	9.000000E 00	3	9.000000E 00	3	1.200000E 01	3	9.000000E 00

PTS REGION DEPTH

3	1.000000E 00

X-DIR. POINTS 9

Y-DIR. POINTS 18

Z-DIR. POINTS 3

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.																					
2	3.000	3	6.000	4	9.000	5	13.000	6	17.000	7	21.000	8	24.000	9	27.000	10	30.000					

I	DIST.																					
2	3.000	3	6.000	4	9.000	5	13.000	6	17.000	7	21.000	8	24.000	9	27.000	10	30.000					
11	33.000	12	36.000	13	39.000	14	43.000	15	47.000	16	51.000	17	54.000	18	57.000	19	60.000					

KB DIST

2	0.333	3	0.667	4	1.000

DISTANCES TO FLUX POINTS

J	DIST.																					
1	1.500	2	4.500	3	7.500	4	11.000	5	15.000	6	19.000	7	22.500	8	25.500	9	28.500					

I DIST.

1	1.500	2	4.500	3	7.500	4	11.000	5	15.000	6	19.000	7	22.500	8	25.500	9	28.500
10	31.500	11	34.500	12	37.500	13	41.000	14	45.000	15	49.000	16	52.500	17	55.500	18	58.500

KB	DIST																
1	0.167	2	0.500	3	0.833												

ZONE INPUT BY REGION

PLANE NUMBER	1		
1	2	3	
2	2	3	
3	2	1	
3	3	1	
2	2	2	
1	2	3	

ZONE NUMBER AT EACH MESH INTERVAL

SPECIFICATION FOR LAYER NUMBER 1

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1
10	3	3	3	3	3	3	1	1	1
11	3	3	3	3	3	3	1	1	1
12	3	3	3	3	3	3	1	1	1
13	2	2	2	2	2	2	2	2	2
14	2	2	2	2	2	2	2	2	2
15	2	2	2	2	2	2	2	2	2
16	1	1	1	2	2	2	3	3	3
17	1	1	1	2	2	2	3	3	3
18	1	1	1	2	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 2

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1
10	3	3	3	3	3	3	1	1	1
11	3	3	3	3	3	3	1	1	1
12	3	3	3	3	3	3	1	1	1
13	2	2	2	2	2	2	2	2	2
14	2	2	2	2	2	2	2	2	2
15	2	2	2	2	2	2	2	2	2

16	1	1	1	2	2	2	3	3	3
17	1	1	1	2	2	2	3	3	3
18	1	1	1	2	2	2	3	3	3

SPECIFICATION FOR LAYER NUMBER 3

	1	2	3	4	5	6	7	8	9
1	1	1	1	2	2	2	3	3	3
2	1	1	1	2	2	2	3	3	3
3	1	1	1	2	2	2	3	3	3
4	2	2	2	2	2	2	3	3	3
5	2	2	2	2	2	2	3	3	3
6	2	2	2	2	2	2	3	3	3
7	3	3	3	2	2	2	1	1	1
8	3	3	3	2	2	2	1	1	1
9	3	3	3	2	2	2	1	1	1
10	3	3	3	3	3	3	1	1	1
11	3	3	3	3	3	3	1	1	1
12	3	3	3	3	3	3	1	1	1
13	2	2	2	2	2	2	2	2	2
14	2	2	2	2	2	2	2	2	2
15	2	2	2	2	2	2	2	2	2
16	1	1	1	2	2	2	3	3	3
17	1	1	1	2	2	2	3	3	3
18	1	1	1	2	2	2	3	3	3

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 1701

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 9 18 3 2 0 1 18 3

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM----- 9499

MEMORY LOCATIONS NOT USED----- 30501

3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER						
9X18X3X2 GROUP, 972 POINTS			STREAM OF CITATION CASES ORNL 72			
*** SEPARATION WILL BE DONE ON ROWS - 3 INNER ITERATION(S) ***						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-4.41837E-02	1.00000	-0.08837	0.01258	0.0	0.378167
2	-2.13820E-01	1.80966	4.62553	15.60664	-0.03707	0.391381
3	-2.08785E-01	1.68019	0.76767	1.07045	1.11175	0.401554
4	-1.25513E-01	1.60222	0.47565	0.73668	0.66446	0.404192
5	-7.73781E-02	1.55866	0.55912	0.70507	0.73541	0.404426
6	-6.17429E-02	1.53534	0.73619	0.81986	0.85351	0.403874
7	-5.29412E-02	1.52314	0.80299	0.87579	0.90248	0.402801
8	-4.70117E-02	1.51684	0.84267	0.90119	0.92813	0.401333
9	-4.26053E-02	1.51360	0.86366	0.91221	0.94107	0.399545
10	-3.90347E-02	1.51194	0.87716	0.91802	0.94827	0.397500
11	-3.60084E-02	1.51109	0.88646	0.92115	0.95252	0.395243
12	-3.33878E-02	1.51066	0.89384	0.92285	0.95513	0.392819
13	-3.10766E-02	1.51044	0.89970	0.92403	0.95694	0.390263
14	-2.90186E-02	1.51033	0.90476	0.92621	0.95832	
	-3.23726E-01	EXTRAPOLATION WITH			10.8323	0.356115
15	-6.78372E-03	1.00000	0.22699	0.43794	11.03102	0.354831
16	-1.25302E-02	1.51024	1.83457	1.78535	0.03913	0.352103
17	-1.27765E-02	1.51023	1.00668	0.99132	1.16497	0.349010
18	-1.23426E-02	1.51022	0.95370	0.93182	0.98356	0.346052
19	-1.17975E-02	1.51021	0.94403	0.92083	0.97418	0.343238
20	-1.13108E-02	1.51021	0.94744	0.92619	0.97398	0.340553
21	-1.08649E-02	1.51021	0.94971	0.93056	0.97321	0.337985
22	-1.04590E-02	1.51021	0.95219	0.93356	0.97259	0.335524
23	-1.00951E-02	1.51021	0.95511	0.93675	0.97210	0.333163
24	-9.75609E-03	1.51021	0.95666	0.93935	0.97159	0.330894
25	-9.43905E-03	1.51021	0.95806	0.94176	0.97118	
	-1.80691E-01	EXTRAPOLATION WITH			18.9639	0.286655
26	-5.62978E-03	1.00000	0.59080	0.18272	19.12411	0.286430
27	-9.86296E-03	1.51021	1.74206	1.74351	0.01794	0.285935
28	-9.59152E-03	1.51021	0.96289	0.99688	1.14535	0.285344
29	-8.73238E-03	1.51021	0.90169	0.94183	0.96535	0.284752
30	-7.84355E-03	1.51021	0.84037	0.92865	0.95799	0.284167
31	-7.09373E-03	1.51021	0.89731	0.95405	0.95933	0.283589
32	-6.44112E-03	1.51021	0.90156	0.95030	0.96031	0.283020
33	-5.87577E-03	1.51021	0.90635	0.95508	0.96113	0.282450
34	-5.38272E-03	1.51021	0.91070	0.95785	0.96185	0.281912
35	-4.95368E-03	1.51021	0.91534	0.95127	0.96233	0.281374
36	-4.58002E-03	1.51021	0.91999	0.97489	0.96300	0.280848
37	-4.24778E-03	1.51021	0.92321	0.98152	0.96346	0.280334
38	-3.95912E-03	1.51021	0.92808	0.99029	0.96372	0.279832
39	-3.69811E-03	1.51021	0.93038	0.98554	0.96446	0.279343
40	-3.47114E-03	1.51021	0.93515	0.98597	0.96462	0.278866
41	-3.26580E-03	1.51021	0.93758	0.99243	0.96481	0.278402
42	-3.08222E-03	1.51021	0.94070	0.98186	0.96524	0.277950
43	-2.91342E-03	1.51021	0.94232	0.98324	0.96563	0.277510
44	-2.76566E-03	1.51021	0.94652	0.97836	0.96592	0.277083
45	-2.62856E-03	1.51021	0.94780	0.97967	0.96600	0.276667
46	-2.50292E-03	1.51021	0.94970	0.97349	0.96613	0.276263
47	-2.38752E-03	1.51021	0.95151	0.97561	0.96618	0.275872
48	-2.28184E-03	1.51021	0.95346	0.97593	0.96612	0.275492
49	-2.18844E-03	1.51021	0.95688	0.97219	0.96709	0.275123
50	-2.09510E-03	1.51021	0.95525	0.97025	0.96659	0.274765
51	-2.01076E-03	1.51021	0.95773	0.96490	0.96683	0.274417
52	-1.93042E-03	1.51021	0.95811	0.97031	0.96700	0.274081
53	-1.85889E-03	1.51021	0.96109	0.97282	0.96688	0.273754
54	-1.78623E-03	1.51021	0.95913	0.96360	0.96708	0.273438
55	-1.72150E-03	1.51021	0.96204	0.96587	0.96707	0.273131
56	-1.65957E-03	1.51021	0.96237	0.96975	0.96762	0.272834
57	-1.59663E-03	1.51021	0.96048	0.96341	0.96709	0.272546

58	-1.54483E-03	1.51021	0.96601	0.96470	0.96768	0.272267
59	-1.49006E-03	1.51021	0.96305	0.96477	0.96734	0.271997
60	-1.43534E-03	1.51021	0.96184	0.96639	0.96759	
	-3.86154E-02	EXTRAPOLATION WITH 26.8688				0.264663
61	-1.65641E-04	1.00000	0.11524	0.12334	26.90595	0.264654
62	-1.99378E-04	1.51021	1.20347	1.23759	0.00303	0.264631
63	-1.94073E-04	1.51021	0.97320	0.85867	1.16629	0.264604
64	-1.76847E-04	1.51021	0.91106	0.78830	0.99011	0.264578
65	-1.67131E-04	1.51021	0.94490	0.86573	0.98048	0.264553
66	-1.58489E-04	1.51021	0.94813	0.93109	0.98203	0.264529
67	-1.52171E-04	1.51021	0.95998	0.88893	0.98303	0.264506
68	-1.46925E-04	1.51021	0.96538	0.91671	0.97495	0.264484
69	-1.43290E-04	1.51021	0.97511	0.88640	0.97977	0.264463
70	-1.35601E-04	1.51021	0.94620	0.87183	0.98101	0.264442
71	-1.30534E-04	1.51021	0.96251	0.85297	0.97687	0.264423
72	-1.24454E-04	1.51021	0.95330	0.93106	0.97812	0.264404
73	-1.21653E-04	1.51021	0.97737	0.92595	0.97738	0.264386
74	-1.22547E-04	1.51021	1.00723	0.76002	0.97922	0.264369
75	-1.15335E-04	1.51021	0.94103	0.94739	0.97851	0.264352
76	-1.13130E-04	1.51021	0.98077	1.00002	0.97770	0.264337
77	-1.07169E-04	1.51021	0.94721	0.50001	0.97963	0.264321
78	-1.07765E-04	1.51021	1.00545	1.11112	0.98130	0.264306
79	-1.02043E-04	1.51021	0.94680	0.80001	0.97534	0.264292
80	-9.91225E-05	1.51021	0.97128	0.62500	0.97678	0.264278
81	-8.71420E-05	1.43732	0.87905	0.40000	0.85373	0.264267
82	-8.15988E-05	1.43732	0.93631	1.00000	0.94116	0.264256
83	-8.18372E-05	1.43732	1.00284	0.50000	0.98014	0.264246

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.324 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9966478 K 0.2643681

LEAKAGE 1.31567E 16 TOTAL LOSSES 5.31567E 16 TOTAL PRODUCTIONS 1.40464E 16 REACTOR POWER(WATTS) 2.63158E 05

ADJOINT PROBLEM FOLLOWS						
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	4.60767E 28	1.00000*****	-0.01968	0.0		0.264246
2	1.39662E 02	1.80966	139.66173	4.59437	0.0	0.264246
3	5.01199E 01	1.68019	50.47873	0.93729	0.0	0.264246
4	9.34012E 00	1.60222	9.52648	0.68809	0.0	0.264246
5	2.55742E 00	1.55866	2.83123	0.71442	0.0	0.264246
6	1.23378E 00	1.53534	1.71621	0.83505	0.0	0.264246
7	7.58090E-01	1.52314	1.37254	0.88714	0.0	0.264246
8	5.32166E-01	1.51684	1.23415	0.91872	0.0	0.264246
9	4.04388E-01	1.51360	1.16428	0.93353	0.0	0.264246
10	3.23014E-01	1.51194	1.12179	0.94167	0.0	0.264246
11	2.66808E-01	1.51109	1.09280	0.94758	0.0	0.264246
12	2.25665E-01	1.51066	1.07146	0.94908	0.0	0.264246
13	1.94406E-01	1.51044	1.05588	0.95083	0.0	0.264246
14	1.70071E-01	1.51033	1.04489	0.95302	0.0	0.264246
15	1.50344E-01	1.51027	1.03435	0.95317	0.0	0.264246
16	1.34035E-01	1.51024	1.02556	0.95337	0.0	0.264246
17	1.20339E-01	1.51023	1.01816	0.95368	0.0	0.264246
18	1.08709E-01	1.51022	1.01206	0.95373	0.0	0.264246
19	9.87129E-02	1.51021	1.00676	0.95421	0.0	0.264246
20	9.00373E-02	1.51021	1.00215	0.95460	0.0	0.264246
21	8.24490E-02	1.51021	0.99817	0.95517	0.0	0.264246
22	7.57627E-02	1.51021	0.99467	0.95576	0.0	0.264246
23	6.98347E-02	1.51021	0.99159	0.95611	0.0	0.264246
24	6.45485E-02	1.51021	0.98885	0.95677	0.0	0.264246
25	5.98068E-02	1.51021	0.98635	0.95740	0.0	
	1.95005E 00	EXTRAPOLATION WITH 34.5558				0.264246
26	-6.19859E-03	1.00000	-0.10984	-0.45745	0.0	0.264246
27	-1.13513E-02	1.51021	1.81993	1.73171	0.0	0.264246
28	-1.14754E-02	1.51021	0.99946	1.01389	0.0	0.264246
29	-1.09924E-02	1.51021	0.94691	0.96210	0.0	0.264246

30	-1.03753E-02	1.51021	0.93349	0.94685	0.0	0.264246
31	-9.79960E-03	1.51021	0.93471	0.94946	0.0	0.264246
32	-9.26727E-03	1.51021	0.93641	0.95050	0.0	0.264246
	-1.56072E-01	EXTRAPOLATION WITH	16.6857			0.264246
33	-5.56350E-03	1.00000	0.59477	0.29380	0.0	0.264246
34	-1.50451E-02	1.51021	1.79549	1.68216	0.0	0.264246
35	-1.00180E-02	1.51021	0.98728	0.95659	0.0	0.264246
36	-9.54634E-03	1.51021	0.94337	0.88955	0.0	0.264246
37	-8.97044E-03	1.51021	0.93070	0.87756	0.0	0.264246
38	-8.42512E-03	1.51021	0.93078	0.87404	0.0	0.264246
39	-7.90620E-03	1.51021	0.93050	0.86965	0.0	0.264246
40	-7.41881E-03	1.51021	0.93093	0.87026	0.0	0.264246
41	-6.95586E-03	1.51021	0.93064	0.86964	0.0	0.264246
42	-6.52289E-03	1.51021	0.93123	0.87416	0.0	0.264246
43	-6.12116E-03	1.51021	0.93229	0.93581	0.0	0.264246
44	-5.73826E-03	1.51021	0.93171	0.93308	0.0	0.264246
45	-5.38611E-03	1.51021	0.93325	0.93516	0.0	0.264246
	-7.68814E-02	EXTRAPOLATION WITH	14.1980			0.264246
46	-4.89354E-04	1.00000	0.09037	0.33146	0.0	0.264246
47	-8.51691E-04	1.51021	1.73959	1.80772	0.0	0.264246
48	-8.26538E-04	1.51021	0.96964	0.99148	0.0	0.264246
49	-7.71821E-04	1.51021	0.93303	0.95488	0.0	0.264246
50	-7.10189E-04	1.51021	0.91944	0.94502	0.0	0.264246
51	-6.54757E-04	1.51021	0.92129	0.93971	0.0	0.264246
52	-6.03497E-04	1.51021	0.92111	0.95516	0.0	0.264246
53	-5.58972E-04	1.51021	0.92566	0.93042	0.0	0.264246
54	-5.16236E-04	1.51021	0.92303	0.94697	0.0	0.264246
55	-4.86910E-04	1.51021	0.94271	0.95420	0.0	0.264246
56	-4.52399E-04	1.51021	0.92867	0.93850	0.0	0.264246
57	-4.20153E-04	1.51021	0.92830	0.94014	0.0	0.264246
58	-3.92199E-04	1.51021	0.93307	0.92407	0.0	0.264246
59	-3.62277E-04	1.51021	0.92335	0.95407	0.0	0.264246
60	-3.43382E-04	1.51021	0.94750	0.94490	0.0	0.264246
61	-3.16799E-04	1.51021	0.92227	0.93065	0.0	0.264246
62	-2.99811E-04	1.51021	0.94608	0.95259	0.0	0.264246
63	-2.79784E-04	1.51021	0.93292	0.92997	0.0	0.264246
64	-2.63870E-04	1.51021	0.94286	0.92909	0.0	0.264246
65	-2.49386E-04	1.51021	0.94480	0.95234	0.0	0.264246
66	-2.35736E-04	1.51021	0.94503	0.95495	0.0	0.264246
67	-2.21670E-04	1.51021	0.94011	0.95280	0.0	0.264246
68	-2.14279E-04	1.51021	0.96644	0.91176	0.0	0.264246
69	-2.10345E-04	1.51021	0.98143	0.94560	0.0	0.264246
70	-2.09451E-04	1.51021	0.99554	0.93604	0.0	0.264246
71	-2.03431E-04	1.51021	0.97105	0.96589	0.0	0.264246
72	-2.00808E-04	1.51021	0.98691	0.91502	0.0	0.264246
73	-1.94848E-04	1.51021	0.97012	0.93810	0.0	0.264246
74	-1.92702E-04	1.51021	0.98879	0.94226	0.0	0.264246
75	-1.87755E-04	1.51021	0.97414	0.92593	0.0	0.264246
76	-1.83582E-04	1.51021	0.97759	0.91519	0.0	0.264246
77	-1.80244E-04	1.51021	0.98164	0.95885	0.0	0.264246
78	-1.76489E-04	1.51021	0.97899	0.88180	0.0	0.264246
79	-1.71006E-04	1.51021	0.96876	0.98788	0.0	0.264246
80	-1.67668E-04	1.51021	0.98031	0.93834	0.0	0.264246
81	-1.63615E-04	1.51021	0.97566	0.86848	0.0	0.264246
82	-1.59681E-04	1.51021	0.97580	0.95461	0.0	0.264246
83	-1.54316E-04	1.51021	0.96625	0.92069	0.0	0.264246
84	-1.50800E-04	1.51021	0.97706	0.93109	0.0	0.264246
85	-1.47223E-04	1.51021	0.97614	0.92557	0.0	0.264246
86	-1.43468E-04	1.51021	0.97435	0.82004	0.0	0.264246
87	-1.39296E-04	1.51021	0.97078	0.87808	0.0	0.264246
88	-1.34170E-04	1.51021	0.96307	1.00003	0.0	0.264246
89	-1.34408E-04	1.51021	1.00164	0.91670	0.0	0.264246
90	-1.25527E-04	1.51021	0.93380	0.87882	0.0	0.264246
91	-1.25885E-04	1.51021	1.00272	0.93106	0.0	0.264246
92	-1.08957E-04	1.43732	0.86542	0.74076	0.0	0.264246
93	-9.85265E-05	1.43732	0.90417	0.65001	0.0	0.264246

94	-9.57847E-05	1.43732	0.97208	1.00001	0.0	0.264246
END OF ADJOINT CALCULATION - ITERATION TIME 0.261 MINUTES						
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9963478 K 0.2640337						

GROSS NEUTRON BALANCE

GRP	LFT LEAKAGE	TOP LEAKAGE	RIT LEAKAGE	BOT LEAKAGE	FNT LEAKAGE	BAK LEAKAGE	B**2 LOSSES	1/V LOSS	XENON LOSS
1	5.06085E 15	2.44749E 15	0.0	2.61304E 15	0.0	0.0	0.0	0.0	0.0
2	1.51769E 15	7.46460E 14	0.0	7.71187E 14	0.0	0.0	0.0	0.0	0.0
SUM	6.57854E 15	3.19395E 15	0.0	3.38422E 15	0.0	0.0	0.0	0.0	0.0

GRP	ABSORPTIONS	OUT-SCATTER	SOURCE	IN-SCATTER	TOTAL LOSSES	TOTAL GAINS	PROD/ABSQRP
1	2.83966E 16	1.46069E 16	5.31566E 16	0.0	5.31249E 16	5.31566E 16	6.25801E-02
2	1.16033E 16	0.0	0.0	1.46069E 16	1.46386E 16	1.46069E 16	1.05740E 00
SUM	3.99999E 16	1.46069E 16	5.31566E 16	1.46069E 16	6.77635E 16	6.77635E 16	

AVERAGE FLUXES BY ZONE AND GROUP

ZONE 1--CORE ZONE 1	0.0	0.0
ZONE 2--CORE ZONE 2	1.89858E 15	5.24331E 14
ZONE 3--AXIAL BLKT 1	1.48318E 15	5.70637E 14

ZONE AVERAGE POWER DENSITIES(WATTS/CC)

0.0	1.40576E 02	0.0

THE MAXIMUM POWER DENSITY(WATTS/CC) AT ROW 7 AND COLUMN 4 AND LINE 1 IS 1.847873E 02

THE AVERAGE POWER DENSITY ALONG ROW 7 IS 1.551559E 02 AND THE RELATIVE POWER DENSITIES(FRACTION OF AVERAGE) ARE
0.0 0.0 0.0 1.190978E 00 1.070266E 00 7.387553E-01 0.0 0.0 0.0

THE AVERAGE POWER DENSITY DOWN COLUMN 4 IS 1.375760E 02 AND THE RELATIVE POWER DENSITIES ARE
4.554379E-01 5.720136E-01 7.226242E-01 1.010129E 00 1.240734E 00 1.338956E 00 1.343164E 00 1.320690E 00 1.295718E 00
0.0 0.0 0.0 1.300817E 00 1.220501E 00 1.009924E 00 7.356673E-01 5.879741E-01 4.709763E-01

THE AVERAGE POWER DENSITY ALONG LINE 1 IS 1.847852E 02 AND THE RELATIVE POWER DENSITIES ARE
1.000011E 00 1.000001E 00 9.999876E-01

3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER
 9X18X3X2 GROUP, 972 POINTS STREAM OF CITATION CASES ORNL 72

CUMULATIVE HEAT GENERATION RATE (MW/CM**2) - FLCW FROM BOTTOM TO TOP

PLANE NUMBER 1

	1	2	3	4	5	6	7	8	9
1	2.325E 03	2.831E 03	3.321E 03	6.922E 03	7.748E 03	7.459E 03	1.861E 03	1.756E 03	1.691E 03
2	2.325E 03	2.831E 03	3.321E 03	6.710E 03	7.411E 03	7.059E 03	1.861E 03	1.756E 03	1.691E 03
3	2.325E 03	2.831E 03	3.321E 03	6.443E 03	7.010E 03	6.593E 03	1.861E 03	1.756E 03	1.691E 03
4	2.195E 03	2.670E 03	3.119E 03	6.016E 03	6.457E 03	5.988E 03	1.861E 03	1.756E 03	1.691E 03
5	1.855E 03	2.253E 03	2.619E 03	5.396E 03	5.758E 03	5.278E 03	1.861E 03	1.756E 03	1.691E 03
6	1.392E 03	1.693E 03	1.979E 03	4.687E 03	5.038E 03	4.625E 03	1.861E 03	1.756E 03	1.691E 03
7	1.139E 03	1.390E 03	1.636E 03	4.041E 03	4.432E 03	4.152E 03	1.861E 03	1.756E 03	1.691E 03
8	1.139E 03	1.390E 03	1.636E 03	3.491E 03	3.947E 03	3.830E 03	1.861E 03	1.756E 03	1.691E 03
9	1.139E 03	1.390E 03	1.636E 03	2.951E 03	3.484E 03	3.540E 03	1.861E 03	1.756E 03	1.691E 03
10	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
11	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
12	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
13	8.968E 02	1.099E 03	1.306E 03	2.326E 03	2.905E 03	3.100E 03	1.632E 03	1.555E 03	1.505E 03
14	4.526E 02	5.610E 02	6.872E 02	1.632E 03	2.190E 03	2.442E 03	1.071E 03	1.041E 03	1.016E 03
15	1.253E 02	1.574E 02	1.991E 02	1.019E 03	1.485E 03	1.717E 03	3.695E 02	3.633E 02	3.564E 02
16	0.0	0.0	0.0	5.889E 02	9.210E 02	1.092E 03	0.0	0.0	0.0
17	0.0	0.0	0.0	3.157E 02	5.066E 02	6.073E 02	0.0	0.0	0.0
18	0.0	0.0	0.0	9.719E 01	1.576E 02	1.897E 02	0.0	0.0	0.0

PLANE NUMBER 2

	1	2	3	4	5	6	7	8	9
1	2.325E 03	2.831E 03	3.321E 03	6.922E 03	7.748E 03	7.459E 03	1.861E 03	1.756E 03	1.691E 03
2	2.325E 03	2.831E 03	3.321E 03	6.710E 03	7.411E 03	7.059E 03	1.861E 03	1.756E 03	1.691E 03
3	2.325E 03	2.831E 03	3.321E 03	6.443E 03	7.010E 03	6.593E 03	1.861E 03	1.756E 03	1.691E 03
4	2.195E 03	2.670E 03	3.118E 03	6.016E 03	6.457E 03	5.988E 03	1.861E 03	1.756E 03	1.691E 03
5	1.855E 03	2.252E 03	2.619E 03	5.396E 03	5.758E 03	5.278E 03	1.861E 03	1.756E 03	1.691E 03
6	1.392E 03	1.693E 03	1.979E 03	4.687E 03	5.038E 03	4.625E 03	1.861E 03	1.756E 03	1.691E 03
7	1.139E 03	1.390E 03	1.636E 03	4.041E 03	4.432E 03	4.152E 03	1.861E 03	1.756E 03	1.691E 03
8	1.139E 03	1.390E 03	1.636E 03	3.491E 03	3.947E 03	3.830E 03	1.861E 03	1.756E 03	1.691E 03
9	1.139E 03	1.390E 03	1.636E 03	2.951E 03	3.484E 03	3.540E 03	1.861E 03	1.756E 03	1.691E 03
10	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
11	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
12	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.756E 03	1.691E 03
13	8.968E 02	1.099E 03	1.306E 03	2.326E 03	2.905E 03	3.100E 03	1.632E 03	1.555E 03	1.505E 03
14	4.526E 02	5.610E 02	6.872E 02	1.632E 03	2.190E 03	2.442E 03	1.071E 03	1.041E 03	1.016E 03
15	1.253E 02	1.574E 02	1.991E 02	1.019E 03	1.485E 03	1.717E 03	3.695E 02	3.633E 02	3.564E 02
16	0.0	0.0	0.0	5.889E 02	9.210E 02	1.092E 03	0.0	0.0	0.0
17	0.0	0.0	0.0	3.157E 02	5.066E 02	6.073E 02	0.0	0.0	0.0
18	0.0	0.0	0.0	9.719E 01	1.576E 02	1.897E 02	0.0	0.0	0.0

PLANE NUMBER 3

	1	2	3	4	5	6	7	8	9
1	2.325E 03	2.831E 03	3.321E 03	6.922E 03	7.747E 03	7.459E 03	1.861E 03	1.755E 03	1.691E 03
2	2.325E 03	2.831E 03	3.321E 03	6.710E 03	7.411E 03	7.059E 03	1.861E 03	1.755E 03	1.691E 03
3	2.325E 03	2.831E 03	3.321E 03	6.443E 03	7.010E 03	6.593E 03	1.861E 03	1.755E 03	1.691E 03
4	2.195E 03	2.670E 03	3.118E 03	6.016E 03	6.457E 03	5.988E 03	1.861E 03	1.755E 03	1.691E 03
5	1.855E 03	2.252E 03	2.619E 03	5.396E 03	5.758E 03	5.278E 03	1.861E 03	1.755E 03	1.691E 03
6	1.392E 03	1.693E 03	1.979E 03	4.686E 03	5.038E 03	4.625E 03	1.861E 03	1.755E 03	1.691E 03
7	1.139E 03	1.390E 03	1.636E 03	4.041E 03	4.432E 03	4.152E 03	1.861E 03	1.755E 03	1.691E 03
8	1.139E 03	1.390E 03	1.636E 03	3.491E 03	3.947E 03	3.830E 03	1.861E 03	1.755E 03	1.691E 03
9	1.139E 03	1.390E 03	1.636E 03	2.951E 03	3.484E 03	3.540E 03	1.861E 03	1.755E 03	1.691E 03

10	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.755E 03	1.691E 03
11	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.755E 03	1.691E 03
12	1.139E 03	1.390E 03	1.636E 03	2.684E 03	3.257E 03	3.401E 03	1.861E 03	1.755E 03	1.691E 03
13	8.968E 02	1.099E 03	1.306E 03	2.326E 03	2.905E 03	3.100E 03	1.632E 03	1.555E 03	1.505E 03
14	4.526E 02	5.610E 02	6.872E 02	1.632E 03	2.190E 03	2.442E 03	1.071E 03	1.041E 03	1.016E 03
15	1.253E 02	1.573E 02	1.991E 02	1.019E 03	1.485E 03	1.717E 03	3.695E 02	3.633E 02	3.564E 02
16	0.0	0.0	0.0	5.889E 02	9.210E 02	1.092E 03	0.0	0.0	0.0
17	0.0	0.0	0.0	3.157E 02	5.066E 02	6.073E 02	0.0	0.0	0.0
18	0.0	0.0	0.0	9.719E 01	1.576E 02	1.897E 02	0.0	0.0	0.0

3-D, 180 DEGREE ROTATIONAL SYMMETRY, HALF SECTION WITH BLACK ABSORBER
 9X18X3X2 GROUP, 972 POINTS STREAM OF CITATION CASES ORNL 72

PERTURBATION RESULTS---DELTA-K/(K*DELTA-S) WHERE S REPRESENTS MACRC. CROSS SECTIONS. LAMBDA(PHI* M PHI) = 6.027269E 01

COMP	NAME	GRP	SIG, SIGR, DB**2	NU*SIGF	DIFF. COEF.	B**2
1	CORE ZONE 1	1	0.0	0.0	0.0	0.0
		2	0.0	0.0	0.0	0.0
2	CORE ZONE 2	1	-3.313319E 01	1.253829E 02	-1.570249E-01	-5.632642E 01
		2	-3.322639E 01	3.498450E 01	-2.109395E-01	-3.754579E 01
3	AXIAL BLKT 1	1	-1.523828E 01	5.766483E 01	-6.982625E-02	-1.828592E 01
		2	-1.445229E 01	2.225041E 01	-8.472949E-02	-1.257349E 01

COMP	NAME	GRP. K ---	SIGS(FROM ALL GRPS. KK TO GRP. K)
1	CORE ZONE 1	1	0.0
		2	0.0
2	CORE ZONE 2	1	3.313319E 01
		2	1.194100E 02
3	AXIAL BLKT 1	1	1.523828E 01
		2	3.776773E 01

END OF CASE - TOTAL CPU TIME WAS 0.63 MINUTES TOTAL CLOCK TIME WAS 2.40 MINUTES

*****C*****
 *****I*****

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS B*****

NEW CROSS SECTION TAPE 8 MADE

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS 9*****

~~CROSS SECTION SET ADDED TO TAPE 8~~

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

GENERAL CONTROL INPUT - SECTION 001

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
200	100	10	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	12	6	12	6	12	24
1.500000E+00	00	5.000000E-01	9.999999E+09	9.999999E+23	0.0												1.000000E+00						

DEPLTION HISTORY INPUT - SECTION 002

[illegible]

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	0.0	0.0	0.0	4.692000E-01	4.692000E-01

ONE DIMENSIONAL SLAB GEOMETRY (X) WIDTH 1.000000E 00

REGION SPECIFICATIONS

PTS	REGION WIDTH
1	1.000000E 00

X-DIR. POINTS 1

DISTANCES TO MESH INTERVAL INTERFACES

J	DIST.
2	1.000

DISTANCES TO FLUX POINTS

J	DIST.
1	0.500

ZONE INPUT BY REGION

1

ZONE NUMBER AT EACH MESH INTERVAL

1

1 1

DESCRIPTION OF REACTOR ZONES

ZN TO ZN	SUB-ZNS	SIGMA-SET	ID	CLASS	DPL	NEX	NAME
1 1	0	1	0	0	0	0	EVERYBODIES

DESCRIPTION OF MICROSCOPIC CROSS SECTIONS

SET	NUCS	GRPS	UPSC	DWSC	TITLE
1	6	2	0	1	UNREAL PLUTONIUM DATA SET 1
GROUP	UPPER ENERGY	MEAN ENERGY	1/V X-SECTION	DIST.FUNCT	
1	1.000000E 07	1.000000E 05	2.300000E-09	1.000000	
2	6.000000E-01	2.000000E-01	1.599999E-06	0.0	
SUM				1.000000	

INPUT NUCLEIDE DENSITIES(NUCLEIDE NUMBER - DENSITY)

ZONES	1- 1	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
5	6.00000E-02	14	1.00000E-03	15	1.00000E-02

FIXED SOURCE INPUT SECTION 026

ZONF-SOURCE(N/CC-SEC)

1 2.50000E 14

SOURCE DISTRIBUTION AND SUM

7.0000E-01 3.0000E-01 1.00000 00

TOTAL FIXED SOURCE 2.500000E 14 N/SEC

DECAY CONSTANTS INPUT FROM CARDS

SIGMA-SETS 1- 1

NUC DECAY CNST.
 17 1.71000E-09 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0

CARD INPUT OF YIELD DATA

SIGMA-SETS 1- 1

FISS. NUCL

14 15 16 17 0 0 0 0 0 0 0 0 0 0 0 0 0 0

YIELD FRACTIONS TO NUCLIDE 91
 1.000000E 00 1.000000E 00 1.000000E 00 1.000000E 00

NUCLIDE CHAIN DESCRIPTIONS

SIG.SET 1 THROUGH 1 CONTAIN 2 CHAINS

DECAY	CAPTURE / YIELD	NUCLIDE 14	15	16	17
NEW CHAIN STARTS					
14		0.0	0.0	0.0	0.0
15		0.0	0.0	0.0	0.0
16		0.0	0.0	0.0	0.0
17		0.0	0.0	0.0	0.0
NEW CHAIN STARTS					
91		1.0000000	1.0000000	1.0000000	1.0000000

CHAIN ARRAY (1) 2 2 3 4 5 0 6 0 0

FISSILE NUCLIDES--- 14 16
 FERTILE NUCLIDES--- 15
 INTERMEDIATE NUCLIDES---NONE SPECIFIED
 OTHER NUCLIDES--- 17
 STRUCTURAL NUCLIDES---NONE SPECIFIED
 SPECIAL NUCLIDES--- 5
 FISSION PRODUCT NUCLIDES---NONE SPECIFIED

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 4

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 1 1 1 2 0 1 1 1

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000
 MEMORY LOCATIONS USED FOR THIS PROBLEM----- 3937
 MEMORY LOCATIONS NOT USED----- 36063

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 0.0 DAYS TOTAL TIME 0.0 DAYS

A FIXED SOURCE PROBLEM FOLLOWS

LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	8.85013E-01	1.00000	177.00250	0.0	0.0	7.144210-01	1.399734
2	-2.84562E-01	1.00000	-0.28778	-0.28778	-0.11183	7.177100-01	0.995418
3	-3.85132E-02	1.00000	0.09683	0.04110	0.14817	7.186850-01	0.998644
4	-5.48840E-03	1.00000	0.13702	0.30161	0.11892	7.189160-01	0.999678
5	-5.49376E-04	1.00000	0.09955	0.23957	0.06042	7.189440-01	0.999961
6	3.81470E-05	1.00000	-0.06940	-0.06477	-0.05426	7.189420-01	1.000003

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.0 MINUTES

LEAKAGE 0.0 TOTAL LOSSES 3.38926E 14 TOTAL PRODUCTIONS 8.89261E 13 REACTOR POWER(WATTS) 1.08243E 03

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1
1 1.334D 14

GROUP 2 FLUX

1
1 2.371D 13

NUCLIDE REACTION RATES NORMALIZED TO 3.389258E 14 TOTAL LOSSES

THE AMOUNT(KG) IS AT DEPLETION TIME 0.0

DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 0.0

DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	1.67915E-06	1.67915E-06	0.0
PU-239	14	3.96843E-04	1.17161E-01	4.07070E-02	2.09508E-01
PU-240	15	3.98503E-03	8.61070E-01	8.62839E-01	5.28680E-02
PU-241	16	0.0	0.0	0.0	0.0
PU-242	17	0.0	0.0	0.0	0.0
FISS COUNT	91	0.0	0.0	0.0	0.0
SUM		5.57738E-03	9.98252E-01	9.03548E-01	2.62376E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES DBNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 1 TOTAL DEPLETION TIME 20.0 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SLMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.11718	0.88107	0.0	0.0	0.0	0.00000	0.0	0.99825	7.36333	1.08243E-03	3.96843E-04
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.00175			
OVERALL	0.11718	0.88107	0.0	0.0	0.0	0.00000	0.0	1.00000	7.36333	1.08243E-03	3.96843E-04

*** WARNING HENRY, BAD NORMALIZATION

POWER NORMALIZATION 757.21338, MAXIMUM POWER DENSITY 1.390137E 03 IN ZONE 1 AT END SUBSTEP 1

*****
 AFTER STEP 1 OF CYCLE 1, THE TIME IS 20.0000 DAYS, THE TIME STEP WAS 20.0000 DAYS, AND TOTAL TIME IS 20.0000 DAYS
 *****

NUCLIDE REACTION RATES NORMALIZED TO 3.389258E 14 TOTAL LOSSES

THE AMOUNT(KG) IS AT DEPLETION TIME 2.000000E 01 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 1.000000E 01 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	1.67915E-06	1.67915E-06	0.0
PU-239	14	3.70521E-04	1.13294E-01	3.93570E-02	2.02560E-01
PU-240	15	3.79356E-03	8.66482E-01	8.48539E-01	5.20368E-02
PU-241	16	1.90893E-04	2.56974E-02	9.67833E-03	4.96592E-02
PU-242	17	2.30833E-06	7.18290E-05	7.06988E-05	3.16445E-06
FISS COUNT	91	1.04782E-07	1.46225E-15	1.46225E-15	0.0
SUM		5.55289E-03	1.00555E 00	8.97647E-01	3.04259E-01

1X? GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC., FOR STEP 1 CYCLE 1 AT CYCLE DEPLETION TIME 10.00 DAYS. FISSILE KG IS AT 20.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	7.13899	0.86648	0.0	0.00007	0.0	0.00000	0.0	1.00555	6.10496	1.23799E-03	5.61415E-04

OTHER LOSSES' BASED ON START-OF-STEP TOTAL LOSSES -0.00555

OVERALL	0.13899	0.86648	0.0	0.00007	0.0	0.00000	0.0	1.00000	6.10496	1.23799E-03	5.61415E-04

TIME STEP THERMAL ENERGY, MW-HRS   5.94238E-01   AND TOTAL IS   5.94238E-01

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE (NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 2.000000E 01 DAYS

ZONE NUMBER 1--EVERYBODIES

5	6.00000E-02	14	9.33673E-04	15	9.51952E-03	16	4.77038E-04	17	5.74463E-06	91	6.31052E-05

TIME STEP 1 REQUIRED 0.012 MINUTES CPU TIME, AND 0.143 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 20.0000 DAYS TOTAL TIME 20.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	1.19102E-01	1.00000	0.23820	-0.18300	0.0	9.95070D-01	1.004953
2	-4.90327E-03	1.00000	-0.04608	-0.01256	-0.00160	9.95146D-01	0.999924
3	-6.00815E-04	1.00000	0.12192	0.05739	0.18121	9.95173D-01	0.999973
4	-1.00851E-04	1.00000	0.16776	0.36845	0.14401	9.95181D-01	0.999992
5	-1.22190E-05	1.00000	0.12115	0.25001	0.07384	9.95182D-01	0.999999

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.000 MINUTES

LEAKAGE	0.0	TOTAL LOSSES	3.68890E 14	TOTAL PRODUCTIONS	1.18890E 14	REACTOR POWER(WATTS)	1.41006E 03

FICTICIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1
1 1.500D 14

GROUP 2 FLUX

1
1 2.154D 13

*** WARNING HENRY, BAD NORMALIZATION

POWER NORMALIZATION 503.82813, MAXIMUM POWER DENSITY 2.089265E 03 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 1, THE TIME IS 70.0000 DAYS. THE TIME STEP WAS 50.0000 DAYS, AND TOTAL TIME IS 70.0000 DAYS
*****

NUCLIDE REACTION RATES NORMALIZED TO 3.688899E 14 TOTAL LCSSSES

THE AMOUNT(KG) IS AT DEPLETION TIME 7.000000E 01 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 4.500000E 01 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	1.40162E-06	1.40162E-06	0.0
PU-239	14	3.12330E-04	9.22391E-02	3.21312E-02	1.64986E-01
PU-240	15	3.30851E-03	8.13814E-01	7.96339E-01	5.06778E-02
PU-241	16	6.19746E-04	9.87042E-02	3.68449E-02	1.91764E-01
PU-242	17	2.59838E-05	9.00279E-04	8.85960E-04	4.00941E-05
FISS COUNT	91	4.72755E-07	8.08945E-15	8.08945E-15	0.0
	SUM	5.46252E-03	1.00566E 00	8.66203E-01	4.07467E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE
1X2 GROUP, 2 POINTS   STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 1 AT CYCLE DEPLETION TIME 45.00 DAYS. FISSILE KG IS AT 70.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.19094	0.81381	0.0	0.00090	0.0	0.00000	0.0	1.00566	4.17055	1.75449E-03	9.32076E-04
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								-0.00566			
OVERALL	0.19094	0.81381	0.0	0.00090	0.0	0.00000	0.0	1.00000	4.17055	1.75449E-03	9.32076E-04

TIME STEP THERMAL ENERGY, MW-HRS 2.10539E 00 AND TOTAL IS 2.69963E 00

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE(NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 7.000000E 01DAYS

ZONE NUMBER 1--EVERYBODIES

5	6.00000E-02	14	7.87037E-04	15	8.30233E-03	16	1.54873E-03	17	6.46646E-05	91	2.84719E-04

TIME STEP 2 REQUIRED 0.009 MINUTES CPU TIME, AND 0.150 MINUTES CLOCK TIME

THE MICROSCOPIC CROSS SECTIONS IN SET 1 HAVE BEEN REPLACED BY THOSE IN SET 2

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 70.0000 DAYS TOTAL TIME 70.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	-1.65764E-01	1.00000	-0.33153	0.07869	0.0	1.045080 00	0.956863
2	4.48589E-02	1.00000	-0.22576	-0.24169	0.01353	1.044090 00	1.000951
3	6.29902E-03	1.00000	0.14672	0.09979	0.23765	1.043620 00	1.000452
4	1.37520E-03	1.00000	0.21969	0.48180	0.18673	1.043440 00	1.000169
5	2.14577E-04	1.00000	0.15625	0.37689	0.08470	1.043410 00	1.000030
6	-2.92063E-05	1.00000	-0.13614	-0.05651	-0.13982	1.043410 00	0.999995

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.000 MINUTES

LEAKAGE 0.0   TOTAL LOSSES 4.28731E 14   TOTAL PRODUCTIONS 1.78731E 14   REACTOR POWER(WATTS) 2.06303E 03

FICTIONAL PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1 1.493D 14

GROUP 2 FLUX

1 1.797D 13

*** WARNING HENRY, BAD NORMALIZATION

POWER NORMALIZATION 398.06470, MAXIMUM POWER DENSITY 2.644371E 03 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 3 OF CYCLE 1, THE TIME IS 120.0000 DAYS. THE TIME STEP WAS 50.0000 DAYS, AND TOTAL TIME IS 120.0000 DAYS
*****

NUCLIDE REACTION RATES NORMALIZED TO 4.287312E 14 TOTAL LCSSSES

THE AMOUNT(KG) IS AT DEPLETION TIME 1.200000E 02 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 9.500000E 01 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	1.00590E-06	1.00590E-06	0.0
PU-239	14	2.67483E-04	6.11386E-02	2.13467E-02	1.09347E-01
PU-240	15	2.77308E-03	7.56736E-01	7.33911E-01	6.61920E-02
PU-241	16	1.03321E-03	1.55592E-01	5.76351E-02	3.03668E-01
PU-242	17	6.74024E-05	2.52478E-03	2.48432E-03	1.13277E-04
FISS COUNT	91	9.65947E-07	1.68988E-14	1.68988E-14	0.0
	SUM	5.33764E-03	9.75993E-01	8.15378E-01	4.79370E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE
1X2 GROUP, 2 POINTS   STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 3 CYCLE 1 AT CYCLE DEPLETION TIME 95.00 DAYS. FISSILE KG IS AT 120.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.21673	0.75674	0.0	0.00252	0.0	0.00000	0.00000	0.97599	3.38627	2.35718E-03	1.30069E-03
	OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES 0.02401										
OVERALL	0.21673	0.75674	0.0	0.00252	0.0	0.00000	0.00000	1.00000	3.38627	2.35718E-03	1.30069E-03
TIME STEP THERMAL ENERGY, MW-HRS		2.82862E 00		AND TOTAL IS		5.52824E 00					

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE(NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 1.200000E 02DAYS

ZONE NUMBER 1--EVERYBODIES											
5	6.00000E-02	14	6.74027E-04	15	6.95875E-03	16	2.58196E-03	17	1.67741E-04	91	5.81745E-04

TIME STEP 3 REQUIRED 0.010 MINUTES CPU TIME, AND 0.157 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 120.0000 DAYS TOTAL TIME 120.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	2.64353E-01	1.00000	0.52871	-0.26932	0.0	9.26576D-01	1.079242
2	-7.29930E-02	1.00000	-0.34911	-0.08689	-0.01870	9.28451D-01	0.997981
3	-1.05612E-02	1.00000	0.13413	0.14655	0.32304	9.29662D-01	0.998697
4	-3.18861E-03	1.00000	0.24873	0.65541	0.25878	9.30289D-01	0.999326
5	-6.93023E-04	1.00000	0.21665	0.52153	0.13024	9.30452D-01	0.999825
6	1.73569E-04	1.00000	-0.25028	-0.08285	-0.12634	9.30426D-01	1.000028
7	-2.77162E-05	1.00000	-0.15971	-0.06911	-0.25863	9.30433D-01	0.999993

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.001 MINUTES

LEAKAGE 0.0	TOTAL LOSSES 5.12227E 14	TOTAL PRODUCTIONS 2.62227E 14	REACTOR POWER(WATTS) 2.99171E 03

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1 2.0260 14

GROUP 2 FLUX

1 1.5550 13

*** WARNING HENRY, BAD NORMALIZATION

POWER NORMALIZATION 295.69141, MAXIMUM POWER DENSITY 3.559894E 03 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 4 OF CYCLE 1, THE TIME IS 170.0000 DAYS. THE TIME STEP WAS 50.0000 DAYS, AND TOTAL TIME IS 170.0000 DAYS
*****

NUCLIDE REACTION RATES NORMALIZED TO 5.122267E 14 TOTAL LCSSS

THE AMOUNT(KG) IS AT DEPLETION TIME 1.700000E 02 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 1.450000E 02 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	A. ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	7.28816E-07	7.28816E-07	0.0
PU-239	14	2.25164E-04	4.83107E-02	1.69658E-02	8.65217E-02
PU-240	15	2.18719E-03	6.93152E-01	6.71499E-01	6.27944E-02
PU-241	16	1.4205CE-03	2.09519E-01	7.60464E-02	4.13764E-01
PU-242	17	1.25982E-04	5.97804E-03	5.88089E-03	2.72014E-04
FISS COUNT	91	1.65045E-06	3.35555E-14	3.35555E-14	0.0
	SUM	5.15999E-03	9.56960E-01	7.70392E-01	5.63352E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 4 CYCLE 1 AT CYCLE DEPLETION TIME 145.00 DAYS. FISSILE KG IS AT 170.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.25783	0.69315	0.0	0.00598	0.0	0.00000	0.00000	0.95696	2.60443	3.28039E-03	1.64567E-03
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.04304			
OVERALL	0.25783	0.69315	0.0	0.00598	0.0	0.00000	0.00000	1.00000	2.60443	3.28039E-03	1.64567E-03
TIME STEP THERMAL ENERGY, MW-HRS				3.93647E 00	AND TOTAL IS		9.46471E 00				

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE(NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 1.700000E 02DAYS

ZONE NUMBER 1--EVERYBODIES

5 6.00000E-02 14 5.67388E-04 15 5.48851E-03 16 3.54980E-03 17 3.23481E-04 91 9.93991E-04

TIME STEP 4 REQUIRED 0.010 MINUTES CPU TIME, AND 0.166 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 TOTAL DEPLETION TIME 170.000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	DRIVE FACTOR	BALANCE
1	2.71688E-01	1.00000	0.54338	-0.20513	0.0	8.351560-01	1.197380
2	-1.63559E-01	1.00000	-0.76557	-0.22085	-0.03112	8.395880-01	0.994721
3	-2.05193E-02	1.00000	0.10494	0.20686	0.43332	8.434290-01	0.995446
4	-8.39454E-03	1.00000	0.40071	0.88219	0.35530	8.461590-01	0.996774
5	3.19004E-03	1.00000	-0.37682	-0.56588	0.19928	8.472460-01	0.998716
6	1.27220E-03	1.00000	0.40008	0.12178	-0.11273	8.470930-01	1.000180
7	-1.79172E-04	1.00000	-0.14101	-0.07442	-0.26893	8.471340-01	0.999951
8	4.76837E-05	1.00000	-0.26609	-0.27605	-0.26820	8.471230-01	1.000012
9	-1.28150E-05	1.00000	-0.26876	-0.15054	-0.26421	8.471260-01	0.999996

END OF FIXED SOURCE CALCULATION - ITERATION TIME 0.001 MINUTES

LEAKAGE 0.0 TOTAL LOSSES 6.49158E 14 TOTAL PRODUCTIONS 3.99158E 14 REACTOR POWER(WATTS) 4.52351E 03

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

IX2 GROUP, 2 POINTS

STREAM OF CITATION CASES URNL 12

GROUP 1 FLUX

1
1 3.020D 14

GROUP 2 FLUX

1
1 1.390D 13

FINAL NUCLIDE REACTION RATES FOR CYCLE 1 TOTAL DEPLETION TIME 170.00 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	5.16698E-07	5.16698E-07	0.0
PU-239	14	2.25164E-04	4.38914E-02	1.55088E-02	7.86790E-02
PU-240	15	2.18719E-03	7.10162E-01	6.87409E-01	6.59823E-02
PU-241	16	1.42050E-03	2.34967E-01	8.34172E-02	4.69803E-01
PU-242	17	1.29982E-04	9.16891E-03	9.01842E-03	4.21382E-04
FISS COUNT	91	1.65045E-06	4.83837E-14	4.83837E-14	0.0
SUM		5.15999E-03	9.98189E-01	7.95349E-01	6.14886E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE											
1X2 GROUP, 2 POINTS						STREAM OF CITATION CASES ORNL 72					
FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 1 TOTAL DEPLETION TIME 170.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.27886	0.71016	0.0	0.00917	0.0	0.00000	0.00000	0.99819	2.46508	4.52350E-03	1.64507E-03
			OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES					0.00181			
OVERALL	0.27886	0.71016	0.0	0.00917	0.0	0.00000	0.00000	1.00000	2.46508	4.52350E-03	1.64507E-03
CYCLE 1 REQUIRED 0.050 MINUTES CPU TIME, AND 0.828 MINUTES CLOCK TIME											
MICROSCOPIC CROSS SECTIONS HAVE BEEN RETURNED TO THE ORIGINAL SPECIFICATIONS											

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE
 1X2 GROUP, 2 POINTS   STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 CYCLE TIME 170.0000 DAYS TOTAL TIME 170.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS - 1 INNER ITERATION(S)

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-9.93629E-01	1.00000	-1.98726	0.0	0.0	0.550405
2	0.0	1.00000	0.0	0.0	0.00000	0.550405
3	0.0	1.00000	0.0	0.0	1.00000	0.550405

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.000 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.999999 K 0.5504049

LEAKAGE 0.0   TOTAL LOSSES 1.68964E 15 TOTAL PRODUCTIONS 9.29986E 14 REACTOR POWER(WATTS) 1.05263E 04

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

IX2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1
1 1.011D 15

GROUP 2 FLUX

1
1 3.924D 11

NUCLIDE REACTION RATES NORMALIZED TO 1.689639E 15 TOTAL LOSSES
THE AMOUNT(KG) IS AT DEPLETION TIME 1.700000E 02 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 1.450000E 02 DAYS

TOTAL NUCLIDE REACTION RATES.

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	5.57305E-09	5.57305E-09	0.0
PU-239	14	2.25164E-04	4.08562E-02	1.46377E-02	7.34031E-02
PU-240	15	2.18719E-03	7.40664E-01	7.22154E-01	5.36765E-02
PU-241	16	1.42050E-03	2.04655E-01	6.82733E-02	4.22784E-01
PU-242	17	1.29982E-04	1.16105E-02	1.14170E-02	5.41752E-04
FISS COUNT	91	1.65045E-06	5.94765E-14	5.94765E-14	0.0
SUM		5.15999E-03	9.97785E-01	8.16482E-01	5.50405E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE											
1X7 GROUP, 2 POINTS						STREAM OF CITATION CASES UNHL 72					
SUMMARY OF NEUTRON LOSSES, ETC. REPORT DEPLETING STEP 1 OF CYCLE 2 TOTAL DEPLETION TIME 170.00 DAYS											
ZONE CLASS	FISSILE	FEATILE	INTERMEDIATE	OTHER STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)	
EVERYBODYIES	0.24551	0.74066	0.0	0.01161	0.0	0.00000	0.0	0.99779	2.94143	1.05263E-02	1.64567E-03
			OTHER LOSSES	BASED ON START-OF-STEP TOTAL LOSSES			0.00221				
OVERALL	0.24551	0.74066	0.0	0.01161	0.0	0.00000	0.0	1.00000	2.94143	1.05263E-02	1.64567E-03

POWER NORMALIZATION 0.83770, MAXIMUM POWER DENSITY 1.25697E-04 IN ZONE 1 AT END SUBSTEP 1

*****
 AFTER STEP 1 OF CYCLE 2, THE TIME IS 200.0000 DAYS. THE TIME STEP WAS 30.0000 DAYS, AND TOTAL TIME IS 200.0000 DAYS
 *****

NUCLIDE REACTION RATES NORMALIZED TO 1.689639E-15 TOTAL LOSSES
 THE AMOUNT (KG) IS AT DEPLETION TIME 2.000000E-02 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 1.850000E-02 DAYS

TOTAL NUCLEI REACTION RATES					
	NUC.	AMOUNT (KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19451E-03	5.57305E-09	5.57305E-09	0.0
PU-239	14	1.64263E-04	3.53309E-02	1.26582E-02	6.34702E-02
PU-240	15	1.22748E-03	6.21755E-01	6.06168E-01	4.50564E-02
PU-241	16	1.93584E-03	2.41778E-01	8.06577E-02	4.99474E-01
PU-242	17	2.46622E-04	1.68198E-02	1.65395E-02	7.84822E-04
FISS COUNT	91	3.09409E-06	8.54883E-14	8.54883E-14	0.0
SUM		4.77281E-03	9.15634E-01	7.16024E-01	6.00792E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE
1X2 GROUP, 2 POINTS   STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 2 AT CYCLE DEPLETION TIME 185.00 DAYS. FISSILE KG IS AT 200.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CCNV. RATIO	POWER(MW)	FISSILE(KG)
EVERYBODIES	0.27711	0.62171	0.0	0.01682	0.0	0.00000	0.0	0.91563	2.18747	1.16074E-02	2.10011E-03
				OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES				0.08437			
OVERALL	0.27711	0.62171	0.0	0.01682	0.0	0.00000	0.0	1.00000	2.18747	1.16074E-02	2.10011E-03

TIME STEP THERMAL ENERGY, MW-HRS   8.35734E 00   AND TOTAL IS   1.78221E 01

NUCLIDE DENSITIES BY ZONE AND SUR-ZONE (NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 2.000000E 02 DAYS

ZONE NUMBER 1--EVERYBODIES											
5	6.00000E-02	14	4.13924E-04	15	3.08024E-03	16	4.83764E-03	17	6.13756E-04	91	1.86343E-03

TIME STEP 1 REQUIRED 0.010 MINUTES CPU TIME, AND 0.156 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 CYCLE TIME 200.0000 DAYS   TOTAL TIME 200.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K
1	-2.71115E-01	1.00000	-0.54223	0.0	0.0	0.811042
2	0.0	1.00000	0.0	0.0	0.00000	0.811042
3	0.0	1.00000	0.0	0.0	1.00000	0.811042

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.0 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.999999   K 0.8110417

LEAKAGE	0.0	TOTAL LOSSES	1.15311E 15	TOTAL PRODUCTIONS	9.35224E 14	REACTOR POWER(WATTS)	1.05263E 04

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

GROUP 1 FLUX

1 8.400D 14

GROUP 2 FLUX

1 2.930D 11

POWER NORMALIZATION 0.99859, MAXIMUM POWER DENSITY 1.054121E 04 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 2, THE TIME IS 230.0000 DAYS. THE TIME STEP WAS 30.0000 DAYS, AND TOTAL TIME IS 230.0000 DAYS
*****

NUCLIDE REACTION RATES NORMALIZED TO 1.153115E 15 TOTAL LCSSS

THE AMOUNT(KG) IS AT DEPLETION TIME 2.300000E 02 DAYS, AND THE REACTION RATES ARE AT DEPLETION TIME 2.150900E 02 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	6.09812E-09	6.09812E-09	0.0
PU-239	14	1.26398E-04	3.21076E-02	1.15035E-02	5.76852E-02
PU-240	15	6.99512E-04	4.94802E-01	4.82435E-01	3.58621E-02
PU-241	16	2.03511E-03	3.48261E-01	1.16171E-01	7.19479E-01
PU-242	17	3.47772E-04	3.23327E-02	3.17938E-02	1.50868E-03
FISS COUNT	91	4.40873E-06	1.64648E-13	1.64648E-13	0.0
	SUM	4.40875E-03	9.07503E-01	6.41904E-01	8.14535E-01

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 2 AT CYCLE DEPLETION TIME 219.00 DAYS. FISSILE KG IS AT 230.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER (MW)	FISSILE (KG)
EVERYBODIES	0.38037	0.49480	0.0	0.03223	0.0	0.00000	0.0	0.90750	1.26834	1.05608E-02	2.16151E-03
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.09250			
OVERALL	0.38037	0.49480	0.0	0.03223	0.0	0.00000	0.0	1.00000	1.26834	1.05608E-02	2.16151E-03
TIME STEP THERMAL ENERGY, MW-HRS			7.66374E 00		AND TOTAL IS		2.54250E 01				

NUCLIDE DENSITIES BY ZONE AND SUB-ZONE (NUCLIDE NUMBER - DENSITY) AT DEPLETION TIME 2.300000E 02 DAYS

ZONE NUMBER 1--EVERYBODIES

5 6.00000E-02 14 3.18504E-04 15 1.75547E-03 16 5.08571E-03 17 8.65483E-04 91 2.65517E-03

TIME STEP 2 REQUIRED 0.011 MINUTES CPU TIME, AND 0.161 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 TOTAL DEPLETION TIME 230.000 DAYS

ITERATION	FLUX CHANGE	KEFF	MU-1	MU-2	MU-3	K
1	1.52030E-02	1.00000	0.07041	0.0	0.0	1.000025
2	0.0	1.00000	0.0	0.0	0.00000	1.000025
3	0.0	1.00000	0.0	0.0	1.00000	1.000025

END OF EIGENVALUE CALCULATION - ITERATION TIME 0.000 MINUTES

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999999 K 1.000025

LEAKAGE 0.0 TOTAL LOSSES 9.28969E 14 TOTAL PRODUCTIONS 9.37168E 14 REACTOR POWER (WATTS) 1.05263E 04

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIRED SOURCE

1X2 GROUP, 2 POINTS

STREAM OF CITATION CASES UNCL 72

GROUP 1 FLUX

1 8.3930 14

GROUP 2 FLUX

1 2.9900 11

FINAL NUCLIDE REACTION RATES FOR CYCLE 2 TOTAL DEPLETION TIME 230.00 DAYS

TOTAL NUCLIDE REACTION RATES

	NUC.	AMOUNT(KG)	ABSORPTIONS	CAPTURES	PRODUCTIONS
GRAPHITE	5	1.19551E-03	7.72409E-04	7.72409E-04	0.0
PU-239	14	1.26356E-04	3.44688E-02	1.23655E-02	6.19272E-02
PU-240	15	6.99562E-04	4.74371E-01	4.63002E-01	3.44179E-02
PU-241	16	2.03511E-03	4.40632E-01	1.46480E-01	9.10301E-01
PU-242	17	3.47772E-04	4.86491E-02	4.54194E-02	2.17840E-03
FISS COUNT	41	4.40873E-06	2.38620E-13	2.38620E-13	0.0
SUM		4.40873E-03	4.96670E-01	6.68258E-01	1.00882E 00

FICTITIOUS PLUTONIUM EXPOSURE GIVEN A FIXED SOURCE
 1X2 GROUP, 2 POINTS   STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 2   TOTAL DEPLETION TIME 230.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(PW)	FISSILE(KG)
EVERYBODY	0.47510	0.47487	0.0	0.04670	0.0	0.00000	0.0	0.94667	0.97454	1.05263E-02	2.16151E-03
				OTHER LOSSES*	BASED ON START-OF-STEP	TOTAL LOSSES	0.00333				
OVERALL	0.47510	0.47487	0.0	0.04670	0.0	0.00000	0.0	1.00000	0.97454	1.05263E-02	2.16151E-03

CYCLE 2 REQUIRED 0.025 MINUTES CPU TIME, AND 0.430 MINUTES CLOCK TIME

END OF CASE - TOTAL CPU TIME WAS 0.13 MINUTES   TOTAL CLOCK TIME WAS 1.04 MINUTES

*****THIS JOB WAS RUN ON 03-11-72 ON THE IBM 360/91*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12x6x3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS 8*****

NEW CROSS SECTION TAPE 8 MADE

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

*****CONTROL OPTION IS 9*****

~~CROSS SECTION SET ADDED TO TAPE 8~~

MICROSCOPIC CROSS-SECTION UPDATING FOLLOWS

GENERAL CONTROL INPUT - SECTION 001

[illegible]

DEPLETION HISTORY INPUT - SECTION 002

[illegible]

NEUTRON FLUX PROBLEM DESCRIPTION - SECTION 003

[illegible]

LEFT, TOP, RIGHT, BOTTOM, FRONT, BACK BOUNDARY CONDITIONS ARE

0.0	4.692000E-01	4.692000E-01	0.0	4.692000E-01	4.692000E-01

TWO DIMENSIONAL CYLINDRICAL GEOMETRY (R,Z)   WIDTH   2.139999E 02   HEIGHT   1.100000E 02

REGION SPECIFICATIONS

PTS REGION WIDTH												
2	9.122130E 01	2	3.778470E 01	2	2.899399E 01	2	1.349340E 01	2	1.250660E 01	2	3.000000E 01	
PTS REGION HEIGHT												
2	3.000000E 01	1	1.800000E 01	1	1.800000E 01	2	2.200000E 01	2	2.200000E 01			
X-DIR. POINTS 12 Y-DIR. POINTS 8												
DISTANCES TO MESH INTERVAL INTERFACES												
J DIST.												
2	64.503	3	91.221	4	111.723	5	129.006	6	144.233	7	158.000	
11	184.000	12	199.564	13	214.000							
I DIST.												
2	15.000	3	30.000	4	48.000	5	66.000	6	77.000	7	88.000	
8	99.000	9	110.000									
DISTANCES TO FLUX POINTS												
J DIST.												
1	45.611	2	79.000	3	101.988	4	120.674	5	136.832	6	151.273	
10	180.934	11	191.940	12	206.908							
I DIST.												
1	7.500	2	22.500	3	39.000	4	57.000	5	71.500	6	82.500	
7	93.500	8	104.500									
ZONE INPUT BY REGION												
22	22	22	22	22	22							
8	10	12	16	20	21							
7	9	11	15	19	21							
2	4	6	14	18	21							
1	3	5	13	17	21							
ZONE NUMBER AT EACH MESH INTERVAL												
1 2 3 4 5 6 7 8 9 10 11 12												
1	22	22	22	22	22	22	22	22	22	22	22	22
2	22	22	22	22	22	22	22	22	22	22	22	22
3	8	8	10	10	12	12	16	16	20	20	21	21
4	7	7	9	9	11	11	15	15	19	19	21	21
5	2	2	4	4	6	6	14	14	18	18	21	21
6	2	2	4	4	6	6	14	14	18	18	21	21
7	1	1	3	3	5	5	13	13	17	17	21	21
8	1	1	3	3	5	5	13	13	17	17	21	21
DESCRIPTION OF REACTOR ZONES												
ZN TO ZN	SUM-ZNS	SIGMA-SET	TO	CLASS	DPL	HEX	NAME					
1 2	4	1	0	1	0	0	CORE A1					
3 4	4	1	0	2	0	0	CORE A2					
5 6	4	1	0	3	0	0	CORE A3					
7 8	4	2	0	4	0	0	BLNK C1					
9 10	4	2	0	5	0	0	BLNK C2					
11 12	4	2	0	6	0	0	BLNK C3					
13 16	4	2	0	7	0	0	BLNK B1					
17 20	4	2	0	8	0	0	BLNK B2					
21 21	1	2	0	9	0	0	RFLTR E					
22 22	1	2	0	10	0	0	RFLTR D					
DESCRIPTION OF MICROSCOPIC CROSS SECTIONS												

SET	NUCS	GRPS	UPSC	OWSC	TITLE
1	24	3	0	2	REFERENCE 3-GROUP CROSS SECTIONS FOR A FUEL MANAGEMENT PROBLEM -DV-1-71
GROUP	UPPER ENERGY	MEAN ENERGY	1/V K-SECTION	DIST. FUNCTION	
1	1.492000E 07	4.274000E 04	4.910998E-10	0.617000	
2	1.223000E 06	3.255000E 05	1.451000E-09	0.373000	
3	6.652000E 04	2.079999E 01	6.644997E-09	0.010000	
SUM				1.000000	

SET	NUCS	GRPS	UPSC	OWSC	TITLE
2	21	3	0	2	CONTINUATION OF CROSS SECTIONS (3-GROUP, /LANSET) -DV-1-71
GROUP	UPPER ENERGY	MEAN ENERGY	1/V K-SECTION	DIST. FUNCTION	
1	1.492000E 07	3.300000E 06	3.299998E-10	0.617000	
2	1.223000E 06	3.000000E 05	1.500000E-09	0.373000	
3	6.652000E 04	1.000000E 02	2.000000E-09	0.010000	
SUM				1.000000	

INPUT NUCLEAR DENSITIES (NUCIDE NUMBER - DENSITY)

ZONE	1- 2	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
10	2.28700E-05	12	7.30430E-03	14	8.67710E-04
23	1.76400E-02	25	9.05850E-03	33	9.78560E-03
10	2.28700E-05	12	7.30430E-03	14	8.67710E-04
23	1.76400E-02	25	9.05850E-03	33	9.78560E-03
10	2.28700E-05	12	7.30430E-03	14	8.67710E-04
23	1.76400E-02	25	9.05850E-03	33	9.78560E-03
10	2.28700E-05	12	7.30430E-03	14	8.67710E-04
23	1.76400E-02	25	9.05850E-03	33	9.78560E-03

ZONE	3- 4	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
10	2.39150E-05	12	7.84750E-03	14	9.90610E-04
23	1.86930E-02	25	8.40320E-03	33	1.00866E-02
10	2.39150E-05	12	7.84750E-03	14	9.90610E-04
23	1.86930E-02	25	8.40320E-03	33	1.00866E-02
10	2.39150E-05	12	7.84750E-03	14	9.90610E-04
23	1.86930E-02	25	8.40320E-03	33	1.00866E-02
10	2.39150E-05	12	7.84750E-03	14	9.90610E-04
23	1.86930E-02	25	8.40320E-03	33	1.00866E-02

ZONE	5- 6	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
10	2.35730E-05	12	7.73550E-03	14	1.15870E-03
23	1.85530E-02	25	8.22750E-03	33	1.01726E-02
10	2.35730E-05	12	7.73550E-03	14	1.15870E-03
23	1.85530E-02	25	8.22750E-03	33	1.01726E-02
10	2.35730E-05	12	7.73550E-03	14	1.15870E-03
23	1.85530E-02	25	8.22750E-03	33	1.01726E-02
10	2.35730E-05	12	7.73550E-03	14	1.15870E-03
23	1.85530E-02	25	8.22750E-03	33	1.01726E-02

ZONE	7- 8	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
10	2.83950E-05	12	9.31760E-03	25	9.05850E-03
23	1.86920E-02	25	9.31760E-03	33	9.78560E-03
10	2.83950E-05	12	9.31760E-03	25	9.05850E-03
23	1.86920E-02	25	9.31760E-03	33	9.78560E-03
10	2.83950E-05	12	9.31760E-03	25	9.05850E-03
23	1.86920E-02	25	9.31760E-03	33	9.78560E-03

ZONE	9- 10	SUB-ZONE INDICATOR	0	AND CONTROL OPTION	0
10	3.00920E-05	12	9.87470E-03	25	8.40320E-03
23	1.98100E-02	25	9.87470E-03	33	1.00866E-02
10	3.00920E-05	12	9.87470E-03	25	8.40320E-03
23	1.98100E-02	25	9.87470E-03	33	1.00866E-02

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NUCLIDE CHAIN DESCRIPTIONS

SIG.SET 1 THROUGH 2 CONTAIN 7 CHAINS

DECAY	CAPTURE / YIELD	NUCLIDE	10	11	12	14	15	16	17															
NEW CHAIN STARTS																								
	12		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	14		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	15		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	16		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	17		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
NEW CHAIN STARTS																								
	10		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	11		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
NEW CHAIN STARTS																								
	563FN CAPT *10000 9000		0.0270000	0.0300000	0.0300000	0.0270000	0.0300000	0.0270000	0.0300000															
	64		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	67		0.0130000	0.0200000	0.0200000	0.0130000	0.0200000	0.0130000	0.0200000															
NEW CHAIN STARTS																								
	563FN CAPT *10000 1000		0.0270000	0.0300000	0.0300000	0.0270000	0.0300000	0.0270000	0.0300000															
	65		0.0	0.0	0.0	0.0	0.0	0.0	0.0															
	267																							
NEW CHAIN STARTS																								
	58		0.0714999	0.0600000	0.0600000	0.0714999	0.0600000	0.0714999	0.0600000															
NEW CHAIN STARTS																								
	76		1.5010996	1.5465994	1.5465994	1.5010996	1.5465994	1.5010996	1.5465994															
NEW CHAIN STARTS																								
	77		0.0134000	0.0134000	0.0134000	0.0134000	0.0134000	0.0134000	0.0134000															
CHAIN ARRAY (1)																								
	0	0	3	4	5	6	7	0	1	2	0	5159000	16	18	0	5151000	17	218	0	14	0	19	0	20

DATA FILES AND CORRESPONDING I/O UNIT NUMBERS FOLLOW
MANGDATA-21 SCRATCH1-22 HISTDATA-23 CYCLHIST-24 MASSDATA-25 SBZDENS-26 ZONEDENS-27 SCRATCH2-28 FUELDATA-29

FUELING, MAKEUP, AND DISCHARGE STREAMS INPUT DATA - SECTION 091

DECAY DATA

16	0	1.70000E-09

1	0	0	0	0	0	0	0	0	0	0
9.0			0.0			0.0		0.0		0.0
2	1	0	0	0	0	0	0	0	0	0
0.0			0.0			0.0		0.0		0.0
2.29370E-05			0.0			7.52650E-03		0.0		0.0
3	1	0	0	0	0	0	0	0	0	0
0.0			0.0			0.0		0.0		0.0
2.39820E-05			0.0			1.86970E-03		0.0		0.0
4	1	0	0	0	0	0	0	0	0	0
0.0			0.0			0.0		0.0		0.0
2.31200E-05			0.0			7.58680E-03		0.0		0.0
5	1	0	0	0	0	0	0	0	0	0
0.0			0.0			0.0		0.0		0.0
4.31830E-05			0.0			1.41700E-02		0.0		0.0

1	0	1	0	0	2	0	0	2.86960E-01	0.0	0.0	9.96000E-01
0.0			0.0			0.0		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
2	0	1	0	0	3	0	0	3.28170E-01	0.0	0.0	9.96000E-01
0.0			0.0			0.0		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
3	0	1	0	0	4	0	0	3.84870E-01	0.0	0.0	9.96000E-01
0.0			0.0			0.0		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
4	0	0	0	0	1	0	0	1.00000E 00	0.0	0.0	9.96000E-01
1.00000E 00			1.00000E 00			1.00000E 00		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
5	0	0	0	0	1	0	0	1.00000E 00	0.0	0.0	9.96000E-01
1.00000E 00			1.00000E 00			1.00000E 00		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
6	0	0	0	0	1	0	0	1.00000E 00	0.0	0.0	9.96000E-01
1.00000E 00			1.00000E 00			1.00000E 00		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00
7	0	0	0	0	1	0	0	1.00000E 00	0.0	0.0	9.96000E-01
1.00000E 00			1.00000E 00			1.00000E 00		1.00000E 00	1.00000E 00	1.00000E 00	1.00000E 00

[illegible]

-1 0 0 0 0 0 0 0 0 0 0 0 1 0 5 5 1 0 0 0 0 0

0.0	0.0	0.0	0.0	2.50000E-03	0.0
0.0	1.00000E-02	1.00000E-02	1.00000E 00	1.00000E 00	0.0

CARDS 5+ OR DEFAULT

1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00 1.00000E 00
1.00000E 00 1.00000E 00 1.00000E 00

CARDS 6+

1	1	1	1	0	0	0	1	0	0	1	1	1	0	0	0
2	1	2	2	0	0	0	1	0	0	1	1	2	0	0	0
3	1	3	3	0	0	0	1	0	0	1	1	3	0	0	0
4	1	4	4	0	0	0	1	0	0	1	1	4	0	0	0
5	1	5	5	0	0	0	1	0	0	1	1	5	0	0	0
6	1	6	6	0	0	0	1	0	0	1	1	6	0	0	0
7	1	7	7	0	0	0	1	0	0	1	1	0	16	20	0

FISSILE NUCLIDES--- 10 14 16

FERTILE NUCLIDES--- 12 15

INTERMEDIATE NUCLIDES---NONE SPECIFIED

OTHER NUCLIDES--- 21 17

STRUCTURAL NUCLIDES--- 31 32 33 35

SPECIAL NUCLIDES--- 25

FISSTON PRODUCT NUCLIDES--- 50 63 64 65 67 76 77

CORE STORAGE DIFFERENCE (WORDS) EQUATION CONSTANTS I/O INSTEAD OF STORED 424

EQUATION CONSTANTS WILL BE STORED IN CORE

NUMBER OF---COLUMNS, ROWS, PLANES, GROUPS, UPSCAT, DOWNSCAT, REGIONS, AND ZONES 12 8 1 3 0 2 30 22

MEMORY LOCATIONS RESERVED FOR DATA STORAGE--- 40000

MEMORY LOCATIONS USED FOR THIS PROBLEM--- 12028

MEMORY LOCATIONS NOT USED--- 27972

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 268 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 0.0 DAYS TOTAL TIME 0.0 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.37827E 00 -4.82802E 00
 ITERATION FLUX CHANGE BETA MU-1 MU-2 MU-3 K SEARCH FACTOR

CROSS SECTIONS UPDATED WITH 6.99822D-02
 CROSS SECTIONS UPDATED WITH -2.28648D-03

26	2.64168E-04	1.39174	2.71595	1.14945	2.08573	1.000018	8.25406D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000067 K 1.0000172

END OF CRITICALITY SEARCH - ITERATION TIME 0.044 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 6.76956E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.015078

LEAKAGE 1.41160E 18 TOTAL LOSSES 1.12000E 20 TOTAL PRODUCTIONS 1.12000E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)

12X8X3 GROUPS, 288 PGINTS (R-Z), STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 1 TOTAL DEPLETION TIME 0.0 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.11980	0.15373	0.0	0.00087	0.01393	0.00025	0.00672	0.29529	1.10130	8.73966E 02	8.71813E 02
CORE A2	0.12835	0.15221	0.0	0.00094	0.01336	0.00023	0.00629	0.30139	1.00210	9.42878E 02	9.93276E 02
CORE A3	0.09592	0.09813	0.0	0.00072	0.00860	0.00015	0.00401	0.20753	0.84935	6.99865E 02	1.15794E 03
BLNK C1	0.00104	0.03933	0.0	0.0	0.00337	0.00013	0.00004	0.04390	36.67009	1.40820E 01	2.08547E 01
BLNK C2	0.00096	0.03627	0.0	0.0	0.00301	0.00010	0.00004	0.04028	36.60822	1.35963E 01	2.21008E 01
BLNK C3	0.00060	0.02273	0.0	0.0	0.00187	0.00006	0.00003	0.02529	36.58128	8.76461E 00	2.24319E 01
BLNK B1	0.00110	0.04191	0.0	0.0	0.00236	0.00004	0.00006	0.04548	36.31131	1.93930E 01	3.76564E 01
BLNK B2	0.00048	0.01810	0.0	0.0	0.00105	0.00002	0.00001	0.01965	36.93555	4.81293E 00	3.76566E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00301	0.00004	0.0	0.00305	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00534	0.00007	0.0	0.00542	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01262			
OVERALL	0.34826	0.56240	0.0	0.00293	0.05589	0.00110	0.01720	1.00000	1.42197	2.57736E 03	3.16373E 03

POWER NORMALIZATION 0.99517, MAXIMUM POWER DENSITY 4.805295E 02 IN ZONE 3 AT END SUBSTEP 1

*****
AFTER STEP 1 OF CYCLE 1, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 75.0000 DAYS
*****

MULTI-CYCLE BREFDER (SMEARED PODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 1 AT CYCLE DEPLETION TIME 37.50 DAYS. FISSILE KG IS AT 75.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12012	0.15300	0.0	0.00089	0.01393	0.00025	0.00738	0.29558	1.09263	8.75562E 02	8.77597E 02
CORE A2	0.12823	0.15154	0.0	0.00096	0.01336	0.00023	0.00695	0.30127	0.99823	9.41805E 02	9.92432E 02
CORE A3	0.09551	0.09787	0.0	0.00072	0.00860	0.00015	0.00432	0.20716	0.85043	6.97263E 02	1.14887E 03
BLNK C1	0.00195	0.03925	0.0	0.00000	0.00337	0.00013	0.00005	0.04434	24.61531	1.68343E 01	4.19225E 01
BLNK C2	0.00137	0.03621	0.0	0.00000	0.00301	0.00010	0.00005	0.04074	25.52390	1.58525E 01	4.15180E 01
BLNK C3	0.00076	0.02271	0.0	0.00000	0.00187	0.00006	0.00003	0.02543	28.76982	9.64935E 00	3.46470E 01
BLNK B1	0.00148	0.04186	0.0	0.00000	0.00236	0.00004	0.00007	0.04580	27.13818	2.14385E 01	5.98836E 01
BLNK B2	0.00055	0.01809	0.0	0.00000	0.00105	0.00002	0.00001	0.01971	32.29767	5.18248E 00	4.75892E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00301	0.00004	0.0	0.00305	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00534	0.00007	0.0	0.00542	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01149			
OVERALL	0.34957	0.56052	0.0	0.00257	0.05589	0.00110	0.01886	1.00000	1.41157	2.58359E 03	3.24446E 03
TIME STEP THERMAL ENERGY, MW-HRS				4.65046E 06	AND TOTAL IS		4.65046E 06				

TIME STEP 1 REQUIRED 0.075 MINUTES CPU TIME, AND 0.636 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 CYCLE TIME 75.0000 DAYS TOTAL TIME 75.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
10	4.29153E-05	1.39174	-0.66972	-0.66252	1.05889	1.000003	1.568750-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000038

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 7.64065E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.016673

LEAKAGE 1.44623E 18 TOTAL LOSSES 1.12025E 20 TOTAL PRODUCTIONS 1.12025E 20 REACTOR POWER(WATTS) 2.57732E 09

POWER NORMALIZATION 0.99555, MAXIMUM POWER DENSITY 4.716931E 02 IN ZONE 3 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 1, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 150.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED ROOS ADJUSTED, RECYCLE FEED DETERMINED)
12X0X3 GROUPS, 200 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 1 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG IS AT 150.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12256	0.15387	0.0	0.00093	0.01613	0.00026	0.00953	0.30128	1.07440	0.93899E 02	8.82248E 02
CORE A2	0.12611	0.14806	0.0	0.00097	0.01316	0.00023	0.00875	0.29728	0.99016	9.26938E 02	9.91028E 02
CORE A3	0.09228	0.09484	0.0	0.00072	0.00838	0.00015	0.00518	0.20154	0.85266	6.74410E 02	1.18022E 03
BLNK C1	0.00265	0.04053	0.0	0.00000	0.00348	0.00013	0.00007	0.04687	14.81293	2.38749E 01	6.30184E 01
BLNK C2	0.00220	0.03633	0.0	0.00000	0.00303	0.00010	0.00007	0.04173	15.94156	2.09780E 01	6.04875E 01
BLNK C3	0.00107	0.02248	0.0	0.00000	0.00146	0.00006	0.00004	0.02551	20.22739	1.14986E 01	4.65475E 01
BLNK B1	0.00216	0.04105	0.0	0.00000	0.00232	0.00004	0.00009	0.04566	18.13472	2.74392E 01	8.12438E 01
BLNK B2	0.00068	0.01791	0.0	0.00000	0.00104	0.00002	0.00001	0.01966	25.84329	6.04511E 00	5.73354E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00300	0.00004	0.0	0.00304	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00550	0.00007	0.00000	0.00557	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01166			
OVERALL	0.34971	0.55508	0.0	0.00263	0.05588	0.00110	0.02373	1.00000	1.39577	2.58309E 03	3.32212E 03
TIME STEP THERMAL ENERGY, MW-HRS 4.64956E 06 AND TOTAL IS 9.30002E 06											
TIME STEP 2 REQUIRED 0.069 MINUTES CPU TIME, AND 0.638 MINUTES CLOCK TIME											
A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 1 TOTAL DEPLETION TIME 150.000 DAYS											
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K SEARCH FACTOR					
18	3.43323E-05	1.39174	-0.62469	-0.66849	1.05070	CROSS SECTIONS UPDATED WITH 6.592230-03 CROSS SECTIONS UPDATED WITH -2.37280D-04 1.000003 1.44031D-05					
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000038											
END OF CRITICALITY SEARCH - ITERATION TIME 0.039 MINUTES											
INPUT RELATIVE CONCENTRATION CHANGE TIMES 6.35494E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS											
FRACTION ABSORPTION IN SEARCH NUCLIDES 0.017967											
LEAKAGE 1.48245E 18 TOTAL LOSSES 1.12049E 20 TOTAL PRODUCTIONS 1.12049E 20 REACTOR POWER(WATTS) 2.57732E 09											

MULTI-CYCLE BREEDER (SHEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X6X3 GROUPS, 288 POINTS (R-Z).   STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 1   TOTAL DEPLETION TIME   150.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12441	0.15510	0.0	0.00096	0.01430	0.00026	0.01092	0.30594	1.06503	9.08294E 02	8.82248E 02
CORE A2	0.12424	0.14541	0.0	0.00097	0.01298	0.00023	0.00975	0.29358	0.99606	9.13951E 02	9.91028E 02
CORE A3	0.08974	0.09236	0.0	0.00071	0.00818	0.00014	0.00565	0.19678	0.85381	6.56154E 02	1.14022E 03
BLNK C1	0.00328	0.04185	0.0	0.00000	0.00360	0.00014	0.00009	0.04895	12.33606	2.83083E 01	6.30184E 01
BLNK C2	0.00262	0.03653	0.0	0.00000	0.00304	0.00010	0.00008	0.04238	13.43685	2.38839E 01	6.04875E 01
BLNK C3	0.00122	0.02233	0.0	0.00000	0.00184	0.00006	0.00004	0.02549	17.64008	1.24643E 01	4.55475E 01
BLNK B1	0.00247	0.04040	0.0	0.00000	0.00228	0.00004	0.00009	0.04529	15.59566	2.73592E 01	8.12438E 01
BLNK B2	0.00074	0.01778	0.0	0.00000	0.00103	0.00002	0.00002	0.01958	23.50591	6.53394E 00	5.73354E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00299	0.00004	0.0	0.00304	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00565	0.00008	0.0	0.00573	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01324			
OVERALL	0.34872	0.55170	0.0	0.00265	0.05589	0.00111	0.02664	1.00000	1.39027	2.57733E 03	3.32212E 03

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 1

ARRAY STORAGE ALLOCATED FOR FUEL MANAGEMENT IS 40000
THIS FUEL MANAGEMENT PROBLEM REQUIRES 4796

END FUEL MANAGEMENT FOR CYCLE 1

CYCLE 1 REQUIRED 0.274 MINUTES CPU TIME, AND 3.279 MINUTES CLOCK TIME

MULTI-CYCLE BREEDER (SNEARED RODS ADJUSTED, RECYCLE /EED DETERMINED)
 12XAX3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 CYCLE TIME 0.0 DAYS TOTAL TIME 150.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.44700E 00 -4.89497E 00
 ITERATION FLUX CHANGE BETA MU-1 MU-2 MU-3 K SEARCH FACTOR

CROSS SECTIONS UPDATED WITH 1.734120-02
 CROSS SECTIONS UPDATED WITH -2.835490-04

21	6.77109E-05	1.39174	-1.28065	-1.13954	1.38715	1.000006	2.757800-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 1.0000057

END OF CRITICALITY SEARCH - ITERATION TIME 0.040 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 1.67514E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.017211

LEAKAGE 1.47017E 18 TOTAL LOSSES 1.12036E 20 TOTAL PRODUCTIONS 1.12036E 20 REACTOR POWER(MATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SNEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-21). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 2 TOTAL DEPLETION TIME 190.00 DAYS											
ZONE CLASS	FISSTLE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSTLE(MG)
CORE A1	0.12321	0.15472	0.0	0.00093	0.01420	0.00026	0.00933	0.20315	1.07403	8.99244E 02	8.79639E 02
CORE A2	0.12322	0.14703	0.0	0.00097	0.01307	0.00023	0.00889	0.20343	0.99008	9.20858E 02	9.51590E 02
CORE A3	0.04126	0.09379	0.0	0.00071	0.00828	0.00014	0.00525	0.14944	0.85249	6.66946E 02	1.14445E 03
BLNK C1	0.00269	0.04119	0.0	0.00000	0.00353	0.00013	0.00008	0.04742	14.51081	2.44218E 01	5.24775E 01
BLNK C2	0.00220	0.03645	0.0	0.00000	0.00303	0.00010	0.00007	0.04186	15.97938	2.12775E 01	5.68909E 01
BLNK C3	0.00107	0.02243	0.0	0.00000	0.00185	0.00006	0.00006	0.02545	20.27072	1.15502E 01	4.05134E 01
BLNK B1	0.00214	0.04083	0.0	0.00000	0.00230	0.00016	0.00009	0.04540	10.19908	2.54499E 01	7.03476E 01
BLNK B2	0.00083	0.01791	0.0	0.00000	0.00104	0.00002	0.00002	0.01981	21.12257	7.04208E 00	4.33125E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00302	0.00004	0.0	0.00306	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00557	0.00008	0.00000	0.00565	0.0	0.0	0.0
OTHER LOSSES: BASED ON START-OF-STEP TOTAL LOSSES								0.01213			
OVERALL	0.34863	0.55436	0.0	0.00242	0.05590	0.00110	0.02424	1.00000	1.29792	2.57733E 01	3.29342E 03

POWER NORMALIZATION 0.99572, MAXIMUM POWER DENSITY 4.673062E 02 IN ZONE 3 AT END SUBSTEP 1

*****
 AFTER STEP 1 OF CYCLE 2, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 225.0000 DAYS
 *****

MULTI-CYCLE BREEDER (SHEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC., FOR STEP 1 CYCLE 2 AT CYCLE DEPLETION TIME 37.50 DAYS, FISSILE KG IS AT 75.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12343	0.15398	0.0	0.00095	0.01420	0.00026	0.01051	0.30339	1.02642	9.00279E 02	0.83709E 02
CORE A2	0.12506	0.14642	0.0	0.00098	0.01307	0.00023	0.00951	0.29527	0.98668	9.19507E 02	0.89952E 02
CORE A3	0.09089	0.09355	0.0	0.00071	0.00828	0.00014	0.00553	0.19911	0.85344	0.84415E 02	1.13617E 03
BLNK C1	0.00322	0.04111	0.0	0.00000	0.00353	0.00013	0.00009	0.04809	12.35491	2.75004E 01	7.35412E 01
BLNK C2	0.00260	0.03639	0.0	0.00000	0.00303	0.00010	0.00008	0.04221	13.49997	2.34424E 01	4.96573E 01
BLNK C3	0.00122	0.02241	0.0	0.00000	0.00185	0.00006	0.00004	0.02558	17.70457	1.23886E 01	5.22840E 01
BLNK B1	0.00248	0.04078	0.0	0.00000	0.00230	0.00004	0.00010	0.04570	15.48581	2.73467E 01	9.13548E 01
BLNK B2	0.00090	0.01790	0.0	0.00000	0.00104	0.00002	0.00002	0.01987	19.56543	7.39540E 00	7.29110E 01
RFLTR C	0.0	0.0	0.0	0.0	0.00302	0.00004	0.0	0.00306	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00557	0.00008	0.00000	0.00565	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01213			
OVERALL	0.34981	0.55253	0.0	0.00265	0.05590	0.00110	0.02587	1.00000	1.38820	2.58287E 03	3.34963E 01

TIME STEP THERMAL ENERGY, MW-HRS 4.64916E 06 AND TOTAL IS 1.39492E 07

TIME STEP 1 REQUIRED 0.070 MINUTES CPU TIME, AND 1.825 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 CYCLE TIME 75.0000 DAYS TOTAL TIME 225.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
18	3.17713E-05	1.31	-.62042	-0.60056	1.00526	1.000003	1.333270-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000029

END OF CRITICALITY SEARCH - ITERATION TIME 0.039 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 5.96386E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.018414

LEAKAGE 1.50714E 18 TOTAL LOSSES 1.12060E 20 TOTAL PRODUCTIONS 1.12060E 20 REACTOR POWER(WATTS) 2.57732E 09

POWER NORMALIZATION 5.99606, MAXIMUM POWER DENSITY 4.636438E 02 IN ZCR AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 2, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 300.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED ROCS ADJUSTED, RECYCLE FEED DETERMINED)											
12X8X3 GROUPS, 288 POINTS (R-21).						STREAM OF CITATION CASES ORNL 72					
SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 2 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG IS AT 150.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12529	0.15431	0.0	0.00099	0.01435	0.00026	0.01254	0.30774	1.05053	9.14734E 02	8.86841E 02
CORE A2	0.12307	0.14326	0.0	0.00099	0.01289	0.00022	0.01104	0.29147	0.97963	9.05572E 02	9.87850E 02
CORE A3	0.08814	0.09096	0.0	0.00071	0.00810	0.00014	0.00622	0.19427	0.85563	6.45135E 02	1.12804E 03
BLNK C1	0.00441	0.04232	0.0	0.00001	0.00365	0.00014	0.00013	0.05065	9.26461	3.51057E 01	9.45435E 01
BLNK C2	0.00341	0.03655	0.0	0.00001	0.00305	0.00010	0.00010	0.04323	10.31859	2.85067E 01	8.79883E 01
BLNK C3	0.00152	0.02225	0.0	0.00000	0.00184	0.00006	0.00005	0.02571	14.15690	1.41553E 01	6.37794E 01
BLNK B1	0.00310	0.04012	0.0	0.00000	0.00227	0.00004	0.00011	0.04565	12.33424	3.09896E 01	1.11623E 02
BLNK B2	0.00102	0.01777	0.0	0.00000	0.00105	0.00002	0.00002	0.01986	17.05804	8.21820E 00	8.23572E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00302	0.00004	0.0	0.00306	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00573	0.00008	0.00000	0.00581	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01255			
OVERALL	0.34995	0.54755	0.0	0.00270	0.05593	0.00111	0.03021	1.00000	1.37378	2.58242E 03	3.44303E 03
TIME STEP THERMAL ENERGY, MW-HRS				4.64835E 06	AND TOTAL IS			1.85975E 07			
TIME STEP 2 REQUIRED 0.067 MINUTES CPU TIME, AND 1.329 MINUTES CLOCK TIME											
A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 2 TOTAL DEPLETION TIME 300.000 DAYS											
ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K SEARCH FACTOR					
						CROSS SECTIONS UPDATED WITH 5.05778D-03					
						CROSS SECTIONS UPDATED WITH -1.95519D-04					
16	3.71933E-05	1.39174	-0.40516	-0.55880	1.00921	1.000003	1.66306D-05				
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000048											
END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES											
INPUT RELATIVE CONCENTRATION CHANGE TIMES 4.86226E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS											
FRACTION ABSORPTION IN SEARCH NUCLIDES 0.019366											
LEAKAGE	1.54570E 18	TOTAL LOSSES		1.12081E 20	TOTAL PRODUCTIONS		1.12081E 20	REACTOR POWER(WATTS)		2.57732E 09	

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)											
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72											
FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 2 TOTAL DEPLETION TIME 300.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12670	0.15510	0.0	0.00101	0.01449	0.00027	0.01378	0.31135	1.04241	9.26147E 02	8.86841E 02
CORE A2	0.12135	0.14088	0.0	0.00098	0.01273	0.00022	0.01185	0.28801	0.97609	8.93572E 02	9.87850E 02
CORE A3	0.08599	0.08885	0.0	0.00070	0.00793	0.00014	0.00658	0.19019	0.85669	6.29628E 02	1.12804E 03
BLNK C1	0.00510	0.04359	0.0	0.00001	0.00376	0.00014	0.00015	0.05275	8.22798	4.00422E 01	9.45435E 01
BLNK C2	0.00383	0.03679	0.0	0.00001	0.00307	0.00010	0.00012	0.04393	9.23697	3.14143E 01	8.79883E 01
BLNK C3	0.00166	0.02215	0.0	0.00000	0.00183	0.00006	0.00005	0.02575	12.88066	1.50927E 01	6.37794E 01
BLNK B1	0.00338	0.03960	0.0	0.00000	0.00224	0.00004	0.00012	0.04539	11.16252	3.27456E 01	1.11623E 02
BLNK B2	0.00108	0.01768	0.0	0.00000	0.00102	0.00002	0.00002	0.01982	16.03351	8.68979E 00	8.23572E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00302	0.00004	0.0	0.00306	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00589	0.00008	0.00000	0.00597	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01380			
OVERALL	0.34908	0.54464	0.0	0.00271	0.05598	0.00111	0.03267	1.00000	1.36891	2.57733E 03	3.44303E 03

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED:
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 2

END FUEL MANAGEMENT FOR CYCLE 2

CYCLE REQUIRED 5.264 MINUTES CPU TIME, AND 5.132 MINUTES CLOCK TIME

MULTI-CYCLE BREEDER (SHEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 0.0 DAYS TOTAL TIME 300.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.46168E 00 -4.91593E 00

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 3.82901D-02
							CROSS SECTIONS UPDATED WITH -1.35740D-03
22	1.27792E-04	1.39174	-1.87236	-1.69639	2.41124	1.000011	5.64769D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000038 K 1.0000086

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 3.69327E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.022478

LEAKAGE 1.51781E 18 TOTAL LOSSES 1.12069E 20 TOTAL PRODUCTIONS 1.12069E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 3 TOTAL DEPLETION TIME 300.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMED.	ATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12373	0.15247	0.0		0.00096	0.01410	0.00026	0.01340	0.30492	1.05061	9.04177E 02	8.88929E 02
CORE A2	0.12343	0.14313	0.0		0.00097	0.01281	0.00022	0.01187	0.29243	0.97526	9.08507E 02	9.97030E 02
CORE A3	0.08947	0.09105	0.0		0.00071	0.00811	0.00014	0.00690	0.19639	0.84251	6.54324E 02	1.14607E 03
BLNK C1	0.00381	0.04180	0.0		0.00001	0.00359	0.00014	0.00012	0.04946	10.58113	3.17159E 01	7.36578E 01
BLNK C2	0.00299	0.03645	0.0		0.00000	0.00304	0.00010	0.00009	0.04267	11.75840	2.61494E 01	6.92491E 01
BLNK C3	0.00136	0.02233	0.0		0.00000	0.00185	0.00006	0.00004	0.02564	15.81184	1.33556E 01	5.19862E 01
BLNK B1	0.00277	0.04049	0.0		0.00000	0.00229	0.00004	0.00011	0.04570	13.92332	2.93665E 01	9.05200E 01
BLNK B2	0.00126	0.01798	0.0		0.00000	0.00104	0.00002	0.00003	0.02033	13.96824	9.73456E 00	9.37516E 01
RFLTR E	0.0	0.0	0.0		0.0	0.00308	0.00004	0.0	0.00312	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0		0.0	0.00570	0.00000	0.00000	0.00578	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES									0.01356			
OVERALL	0.34882	0.54570	0.0		0.00266	0.05561	0.00110	0.03256	1.00000	1.37291	2.57733E 03	3.41119E 03

POWER NORMALIZATION 0.99648, MAXIMUM POWER DENSITY 4.595771E 02 IN ZONE 3 AT END SUBSTEP 1

*****
AFTER STEP 1 OF CYCLE 3, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 375.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 3 AT CYCLE DEPLETION TIME 37.50 DAYS. FISSILE KG IS AT 75.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12386	0.15175	0.0	0.00097	0.01410	0.00026	0.01406	0.30500	1.04407	9.04623E 02	8.91514E 02
CORE A2	0.12322	0.14253	0.0	0.00098	0.01281	0.00022	0.01245	0.29222	0.97239	9.06973E 02	9.94426E 02
CORE A3	0.08910	0.09082	0.0	0.00071	0.00811	0.00014	0.00716	0.19605	0.84358	6.61993E 02	1.13727E 03
BLNK C1	0.00434	0.04172	0.0	0.00001	0.00359	0.00014	0.00013	0.04992	9.28108	3.45853E 01	9.43633E 01
BLNK C2	0.00338	0.03639	0.0	0.00001	0.00304	0.00010	0.00010	0.04302	10.38793	2.82750E 01	8.75211E 01
BLNK C3	0.00151	0.02231	0.0	0.00000	0.00185	0.00006	0.00005	0.02577	14.23390	1.41724E 01	6.35169E 01
BLNK B1	0.00310	0.04044	0.0	0.00000	0.00229	0.00004	0.00012	0.04599	12.43860	3.11747E 01	1.10960E 02
BLNK B2	0.00132	0.01797	0.0	0.00000	0.00104	0.00002	0.00003	0.02039	13.28264	1.00813E 01	1.03122E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00312	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00570	0.00008	0.00000	0.00578	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01275			
OVERALL	0.34982	0.54393	0.0	0.00269	0.05561	0.00110	0.03410	1.00000	1.36422	2.58188E 03	3.48263E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.64738E 06 AND TOTAL IS 2.32449E 07

TIME STEP 1 REQUIRED 0.071 MINUTES CPU TIME, AND 0.665 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 75.0000 DAYS TOTAL TIME 375.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 3.40531D-03
							CROSS SECTIONS UPDATED WITH -1.18606D-04
15	2.95639E-05	1.39174	-0.44243	-0.45793	1.00437	1.000002	1.32224D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000038

END OF CRITICALITY SEARCH - ITERATION TIME 0.037 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 3.28671E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.023073

LEAKAGE 1.55651E 18 TOTAL LOSSES 1.12090E 20 TOTAL PRODUCTIONS 1.12090E 20 REACTOR POWER(WATTS) 2.57732E 09

POWER NORMALIZATION 0.99677, MAXIMUM POWER DENSITY 4.629189E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 3, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 450.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 12

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 3 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG I. AT 150.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12539	0.15194	0.0	0.00100	0.01425	0.00026	0.01582	0.30865	1.03046	9.16404E 02	8.93167E 02
CORE A2	0.12133	0.13969	0.0	0.00099	0.01266	0.00022	0.01368	0.28855	0.96656	8.93679E 02	9.91461E 02
CORE A3	0.08661	0.08854	0.0	0.00071	0.00795	0.00014	0.00768	0.19163	0.84592	6.34298E 02	1.12882E 03
BLNK C1	0.00555	0.04290	0.0	0.00001	0.00370	0.00014	0.00018	0.05248	7.44172	4.23468E 01	1.14976E 02
BLNK C2	0.00417	0.03659	0.0	0.00001	0.00306	0.00010	0.00013	0.04407	8.43325	3.32555E 01	1.05409E 02
BLNK C3	0.00180	0.02220	0.0	0.00000	0.00184	0.00006	0.00005	0.02595	11.88430	1.59100E 01	7.48075E 01
BLNK B1	0.00369	0.03989	0.0	0.00001	0.00226	0.00004	0.00014	0.04603	10.27966	3.47000E 01	1.30730E 02
BLNK B2	0.00144	0.01788	0.0	0.00000	0.00104	0.00002	0.00003	0.02042	12.09615	1.08900E 01	1.12362E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00312	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00586	0.00008	0.0	0.00594	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01316			
OVERALL	0.34998	0.53963	0.0	0.00273	0.05569	0.00111	0.03771	1.00000	1.35161	2.58150E 03	3.55173E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.64670E 06 AND TOTAL IS 2.78916E 07

TIME STEP 2 REQUIRED 0.065 MINUTES CPU TIME, AND 0.633 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 TOTAL DEPLETION TIME 450.000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 2.384880-03
							CROSS SECTIONS UPDATED WITH -6.873180-05
15	2.38419E-05	1.39174	-0.43241	-0.73544	0.86551	1.000002	9.712930-06

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000000 K 1.0000038

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 2.31615E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.023458

LEAKAGE 1.59676E 18 TOTAL LOSSES 1.12108E 20 TOTAL PRODUCTIONS 1.12108E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 3 TOTAL DEPLETION TIME 450.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12659	0.15259	0.0	0.00102	0.01437	0.00027	0.01683	0.31166	1.02356	9.26152E 02	8.93167E 02
CORE A2	0.11974	0.13756	0.0	0.00099	0.01251	0.00022	0.01424	0.28526	0.96367	8.82556E 02	9.91461E 02
CORE A3	0.08468	0.08670	0.0	0.00070	0.00781	0.00014	0.00789	0.18791	0.84719	6.20369E 02	1.12882E 03
BLNK C1	0.00626	0.04414	0.0	0.00001	0.00381	0.00014	0.00021	0.05458	6.76677	4.74354E 01	1.14976E 02
BLNK C2	0.00459	0.03687	0.0	0.00001	0.00309	0.00011	0.00015	0.04480	7.71166	3.61680E 01	1.05409E 02
BLNK C3	0.00194	0.02214	0.0	0.00000	0.00183	0.00006	0.00006	0.02603	10.98674	1.68569E 01	7.48075E 01
BLNK B1	0.00396	0.03947	0.0	0.00001	0.00224	0.00004	0.00014	0.04585	9.47166	3.64252E 01	1.30730E 02
BLNK B2	0.00150	0.01783	0.0	0.00000	0.00103	0.00002	0.00004	0.02042	11.57942	1.13682E 01	1.12362E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00603	0.00008	0.0	0.00611	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01425			
OVERALL	0.34926	0.53729	0.0	0.00274	0.05580	0.00111	0.03955	1.00000	1.34764	2.57733E 03	3.55173E 03

REPEAT CYCLE CONVERGENCE IS -8.88779E-01

REPEATING CYCLE 3 ITERATION NUMBER 1

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 2

THE FACTOR APPLIED TO THE RECYCLE FRACTION FOR REPEAT CYCLE IS 9.00000E-01

END FUEL MANAGEMENT FOR CYCLE 2

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 0.0 DAYS TOTAL TIME 300.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.43633E 00 -4.89376E 00

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH -4.192010-02
							CROSS SECTIONS UPDATED WITH 1.333480-03
23	-1.18315E-04	1.39174	-2.06783	-1.66158	3.08830	0.999988	-5.355460-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999946 K 0.9999922

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES -4.05867E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.005870

LEAKAGE 1.53634E 18 TOTAL LOSSES 1.12022E 20 TOTAL PRODUCTIONS 1.12022E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 3 TOTAL DEPLETION TIME 300.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12561	0.15861	0.0	0.00097	0.01475	0.00027	0.00674	0.30696	1.08142	9.15341E 02	8.67023E 02
CORE A2	0.12319	0.14640	0.0	0.00097	0.01318	0.00023	0.00596	0.28994	1.00429	9.04351E 02	9.71977E 02
CORE A3	0.08854	0.09231	0.0	0.00070	0.00828	0.00014	0.00118	0.19315	0.86782	6.45729E 02	1.11669E 03
BLNK C1	0.00394	0.04321	0.0	0.00001	0.00372	0.00014	0.00012	0.05114	10.58401	3.26690E 01	7.36578E 01
BLNK C2	0.00304	0.03716	0.0	0.00000	0.00310	0.00011	0.00009	0.04351	11.76368	2.65392E 01	6.92491E 01
BLNK C3	0.00138	0.02261	0.0	0.00000	0.00187	0.00006	0.00004	0.02596	15.81951	1.34462E 01	5.19862E 01
BLNK B1	0.00280	0.04090	0.0	0.00000	0.00231	0.00004	0.00011	0.04616	13.93439	2.94783E 01	9.05200E 01
BLNK B2	0.00127	0.01810	0.0	0.00000	0.00105	0.00002	0.00003	0.02046	13.97334	9.77479E 00	9.37516E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00581	0.00008	0.00000	0.00589	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01370			
OVERALL	0.34977	0.55930	0.0	0.00266	0.05716	0.00113	0.01627	1.00000	1.40785	2.57733E 03	3.33485E 03

POWER NORMALIZATION 0.99472, MAXIMUM POWER DENSITY 4.647905E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 1 OF CYCLE 3, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 375.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 3 AT CYCLE DEPLETION TIME 37.50 DAYS. FISSILE KG IS AT 75.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12590	0.15783	0.0	0.00098	0.01475	0.00027	0.00744	0.30718	1.07308	9.16721E 02	8.71776E 02
CORE A2	0.12311	0.14578	0.0	0.00098	0.01318	0.00023	0.00656	0.28983	1.00023	9.03538E 02	9.71367E 02
CORE A3	0.08821	0.09207	0.0	0.00070	0.00828	0.00014	0.00344	0.19286	0.86843	6.43696E 02	1.10925E 03
BLNK C1	0.00450	0.04313	0.0	0.00001	0.00372	0.00014	0.00014	0.05163	9.24503	3.57332E 01	9.50509E 01
BLNK C2	0.00345	0.03710	0.0	0.00001	0.00310	0.00011	0.00011	0.04386	10.34880	2.87464E 01	8.78725E 01
BLNK C3	0.00153	0.02258	0.0	0.00000	0.00187	0.00006	0.00005	0.02610	14.22290	1.42827E 01	6.36590E 01
BLNK B1	0.00313	0.04085	0.0	0.00000	0.00231	0.00004	0.00012	0.04646	12.43514	3.13203E 01	1.11167E 02
BLNK B2	0.00133	0.01809	0.0	0.00000	0.00105	0.00002	0.00003	0.02052	13.28360	1.01255E 01	1.03180E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00581	0.00008	0.00000	0.00589	0.0	0.0	0.0

OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES 0.01254

OVERALL 0.35117 0.55743 0.0 0.00269 0.05716 0.00113 0.01788 1.00000 1.39720 2.58416E 03 3.41332E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.65149E 06 AND TOTAL IS 2.32490E 07

TIME STEP 1 REQUIRED 0.070 MINUTES CPU TIME, AND 0.654 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 75.0000 DAYS TOTAL TIME 375.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 1.03988D-02
							CROSS SECTIONS UPDATED WITH -3.68768D-04
19	4.29153E-05	1.39174	-0.43343	-1.01610	0.94554	1.000005	2.27714D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 1.0000057

END OF CRITICALITY SEARCH - ITERATION TIME 0.041 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 1.00300E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.908065

LEAKAGE 1.57356E 18 TOTAL LOSSES 1.12047E 20 TOTAL PRODUCTIONS 1.12047E 20 REACTOR POWER(WATTS) 2.57732E 09

POWER NORMALIZATION 0.99521, MAXIMUM POWER DENSITY 4.700334E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 3, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 450.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 3 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG IS AT 150.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12758	0.15772	0.0	0.00102	0.01488	0.00027	0.00987	0.31133	1.05557	9.29739E 02	8.75326E 02
CORE A2	0.12111	0.14242	0.0	0.00099	0.01298	0.00022	0.00841	0.28614	0.99172	8.89629E 02	9.70177E 02
CORE A3	0.08551	0.08942	0.0	0.00070	0.00808	0.00014	0.00435	0.18819	0.86959	6.24614E 02	1.10209E 03
BLNK C1	0.00579	0.04433	0.0	0.00001	0.00383	0.00014	0.00019	0.05428	7.37030	4.39691E 01	1.16312E 02
BLNK C2	0.00427	0.03722	0.0	0.00001	0.00312	0.00011	0.00013	0.04465	8.39219	3.38504E 01	1.06057E 02
BLNK C3	0.00182	0.02240	0.0	0.00000	0.00186	0.00006	0.00005	0.02620	11.85624	1.60197E 01	7.50514E 01
BLNK B1	0.00372	0.04015	0.0	0.00001	0.00228	0.00004	0.00014	0.04633	10.26398	3.47948E 01	1.31061E 02
BLNK B2	0.00145	0.01794	0.0	0.00000	0.00104	0.00002	0.00003	0.02048	12.09254	1.09123E 01	1.12446E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00597	0.00008	0.00000	0.00605	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01301			
OVERALL	0.35125	0.55159	0.0	0.00273	0.05711	0.00113	0.02317	1.00000	1.38064	2.58353E 03	3.48852E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.65035E 06 AND TOTAL IS 2.78993E 07

TIME STEP 2 REQUIRED 0.067 MINUTES CPU TIME, AND 0.636 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 TOTAL DEPLETION TIME 450.000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 8.82719D-03
							CROSS SECTIONS UPDATED WITH -3.23393D-04
19	3.43323E-05	1.39174	-0.39693	-1.10211	0.96964	1.000004	2.13169D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 1.0000057

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 8.50379E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.009890

LEAKAGE 1.61274E 18 TOTAL LOSSES 1.12070E 20 TOTAL PRODUCTIONS 1.12070E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED ROCS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 3 TOTAL DEPLETION TIME 450.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12873	0.15807	0.0	0.00104	0.01497	0.00028	0.01144	0.31453	1.04664	9.39390E 02	8.75326E 02
CORE A2	0.11937	0.13990	0.0	0.00098	0.01280	0.00022	0.00952	0.28279	0.98739	8.77560E 02	9.70177E 02
CORE A3	0.08339	0.08728	0.0	0.00068	0.00791	0.00014	0.00490	0.18431	0.87016	6.09507E 02	1.10209E 03
BLNK C1	0.00654	0.04557	0.0	0.00001	0.00394	0.00015	0.00022	0.05643	6.68765	4.93295E 01	1.16312E 02
BLNK C2	0.00469	0.03744	0.0	0.00001	0.00313	0.00001	0.00015	0.04553	7.66631	3.67993E 01	1.06057E 02
BLNK C3	0.00196	0.02229	0.0	0.00000	0.00185	0.00006	0.00006	0.02621	10.95558	1.69386E 01	7.50514E 01
BLNK B1	0.00398	0.03960	0.0	0.00001	0.00225	0.00004	0.00015	0.04602	9.45384	3.64436E 01	1.31061E 02
BLNK B2	0.00150	0.01784	0.0	0.00000	0.00103	0.00002	0.00004	0.02043	11.57487	1.13602E 01	1.12446E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00614	0.00008	0.0	0.00622	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01440			
OVERALL	0.35017	0.54799	0.0	0.00273	0.05710	0.00114	0.02647	1.00000	1.37472	2.57733E 03	3.48852E 03

REPEAT CYCLE CONVERGENCE IS -5.74131E-01

REPEATING CYCLE 3 ITERATION NUMBER 2

MULTI-CYCLE BREEDER (SHEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z).   STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 2

THE FACTOR APPLIED TO THE RECYCLE FRACTION FOR REPEAT CYCLE IS 8.79706E-01

END FUEL MANAGEMENT FOR CYCLE 2

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 0.0 DAYS TOTAL TIME 300.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)

LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.43119E 00 -4.88926E 00

ITERATION FLUX CHANGE BETA MU-1 MU-2 MU-3 K SEARCH FACTOR

CROSS SECTIONS UPDATED WITH -5.78961D-02

CROSS SECTIONS UPDATED WITH 1.80530D-03

23 -1.59740E-04 1.39174 -1.99421 -1.63045 2.93628 0.999984 -7.19171D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999929 K 0.9999890

END OF CRITICALITY SEARCH - ITERATION TIME 0.049 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES -5.60908E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.002395

LEAKAGE 1.54014E 18 TOTAL LOSSES 1.12012E 20 TOTAL PRODUCTIONS 1.12012E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 3 TOTAL DEPLETION TIME 300.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12600	0.15991	0.0	0.00097	0.01489	0.00027	0.00532	0.30737	1.08788	9.17639E 02	8.62577E 02
CORE A2	0.12315	0.14709	0.0	0.00097	0.01326	0.00023	0.00473	0.28943	1.01038	9.03489E 02	9.66893E 02
CORE A3	0.08834	0.09258	0.0	0.00070	0.00832	0.00014	0.00241	0.19249	0.87313	6.43969E 02	1.11073E 03
BLNK C1	0.00397	0.04351	0.0	0.00001	0.00374	0.00014	0.00012	0.05149	10.58461	3.28675E 01	7.36578E 01
BLNK C2	0.00306	0.03730	0.0	0.00000	0.00311	0.00011	0.00009	0.04368	11.76477	2.66194E 01	6.92491E 01
BLNK C3	0.00138	0.02266	0.0	0.00000	0.00187	0.00006	0.00004	0.02603	15.82111	1.34646E 01	5.19862E 01
BLNK B1	0.00280	0.04098	0.0	0.00000	0.00232	0.00004	0.00011	0.04626	13.93668	2.95005E 01	9.05200E 01
BLNK B2	0.00127	0.01812	0.0	0.00000	0.00105	0.00002	0.00003	0.02049	13.97440	9.78279E 00	9.37516E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00314	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00583	0.00008	0.0	0.00591	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01374			
OVERALL	0.34997	0.56215	0.0	0.00266	0.05749	0.00113	0.01286	1.00000	1.41515	2.57733E 03	3.31936E 03

POWER NORMALIZATION 0.99434, MAXIMUM POWER DENSITY 4.661343E 02 IN ZONE 1 AT END SUBSTEP 1

*****
 AFTER STEP 1 OF CYCLE 3, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 375.0000 DAYS
 *****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES DRNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 3 AT CYCLE DEPLETION TIME 37.50 DAYS. FISSILE KG IS AT 75.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12632	0.15911	0.0	0.00099	0.01489	0.00027	0.00604	0.30762	1.07913	9.19226E 02	8.67790E 02
CORE A2	0.12309	0.14646	0.0	0.00098	0.01326	0.00023	0.00533	0.28934	1.00606	9.02830E 02	9.66699E 02
CORE A3	0.08803	0.09234	0.0	0.00070	0.00832	0.00014	0.00267	0.19220	0.87364	6.41997E 02	1.10357E 03
BLNK C1	0.00454	0.04342	0.0	0.00001	0.00374	0.00014	0.00014	0.05199	9.23754	3.59733E 01	9.51947E 01
BLNK C2	0.00346	0.03724	0.0	0.00001	0.00311	0.00011	0.00011	0.04404	10.36486	2.88437E 01	8.79452E 01
BLNK C3	0.00154	0.02264	0.0	0.00000	0.00187	0.00006	0.00005	0.02616	14.22064	1.43050E 01	6.36882E 01
BLNK B1	0.00314	0.04093	0.0	0.00000	0.00232	0.00004	0.00012	0.04655	12.43443	3.13495E 01	1.11209E 02
BLNK B2	0.00133	0.01811	0.0	0.00000	0.00105	0.00002	0.00003	0.02054	13.28381	1.01343E 01	1.03192E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00314	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00583	0.00008	0.0	0.00591	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01250			
OVERALL	0.35145	0.56025	0.0	0.00269	0.05749	0.00113	0.01449	1.00000	1.40407	2.58466E 03	3.39929E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.65238E 06 AND TGTAL IS 2.32499E 07

TIME STEP 1. REQUIRED 0.085 MINUTES CPU TIME, AND 0.664 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 75.0000 DAYS TOTAL TIME 375.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 1.18239D-02
							CROSS SECTIONS UPDATED WITH -3.96974D-04
21	3.52859E-05	1.39174	-0.80213	-0.74761	1.24124	1.000004	2.04253D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000019 K 1.0000048

END OF CRITICALITY SEARCH - ITERATION TIME 0.039 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 1.14269E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.004947

LEAKAGE 1.57705E 18 TOTAL LOSSES 1.12039E 20 TOTAL PRODUCTIONS 1.12039E 20 REACTOR POWER(WATTS) 2.57732E 09

POWER NORMALIZATION 0.99468, MAXIMUM POWER DENSITY 4.715022E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 3, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 450.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 3 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG IS AT 150.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12803	0.15892	0.0	0.00102	0.01501	0.00028	0.00861	0.31187	1.03077	9.32472E 02	8.71741E 02
CORE A2	0.12107	0.14299	0.0	0.00098	0.01305	0.00023	0.00733	0.28565	0.99696	8.88803E 02	9.65879E 02
CORE A3	0.08528	0.08960	0.0	0.00069	0.00811	0.00014	0.00367	0.18750	0.87454	6.22640E 02	1.09667E 03
BLNK C1	0.00584	0.04462	0.0	0.00001	0.00385	0.00015	0.00019	0.05466	7.35559	4.43078E 01	1.16589E 02
BLNK C2	0.00429	0.03735	0.0	0.00001	0.00313	0.00011	0.00014	0.04502	8.38375	3.39724E 01	1.06191E 02
BLNK C3	0.00182	0.02244	0.0	0.00000	0.00186	0.00006	0.00006	0.02625	11.85048	1.60407E 01	7.51015E 01
BLNK B1	0.00373	0.04020	0.0	0.00001	0.00228	0.00004	0.00014	0.04639	10.26073	3.48130E 01	1.31128E 02
BLNK B2	0.00145	0.01795	0.0	0.00000	0.00104	0.00002	0.00003	0.02049	12.09182	1.09157E 01	1.12463E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00599	0.00008	0.00000	0.00608	0.0	0.0	0.0
OTHER LOSSES BASED ON START-OF-STEP TOTAL LOSSES								0.01298			
OVERALL	0.35152	0.55408	0.0	0.00273	0.05741	0.00114	0.02015	1.00000	1.38664	2.58396E 03	3.47576E 03

TIME STEP THERMAL ENERGY, MW-HRS 4.65113E 06 AND TOTAL IS 2.79010E 07

TIME STEP 2 REQUIRED 0.072 MINUTES CPU TIME, AND 0.637 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 TOTAL DEPLETION TIME 450.000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 1.01280D-02
							CROSS SECTIONS UPDATED WITH -3.56863D-04
21	3.14713E-05	1.39174	-0.81731	-0.77719	1.29178	1.000004	1.87274D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000048

END OF CRITICALITY SEARCH - ITERATION TIME 0.042 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 9.77109E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.007088

LEAKAGE 1.61599E 18 TOTAL LOSSES 1.12062E 20 TOTAL PRODUCTIONS 1.12062E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 3 TOTAL DEPLETION TIME 450.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12917	0.15921	0.0	0.00104	0.01510	0.00028	0.01031	0.31512	1.05138	9.42122E 02	8.71741E 02
CORE A2	0.11929	0.14039	0.0	0.00098	0.01286	0.00022	0.00855	0.28228	0.99231	8.76524E 02	9.65879E 02
CORE A3	0.08313	0.08740	0.0	0.00068	0.00793	0.00014	0.00430	0.18357	0.87496	6.07272E 02	1.09667E 03
BLNK C1	0.00660	0.04587	0.0	0.00001	0.00396	0.00015	0.00022	0.05681	6.67149	4.97262E 01	1.16589E 02
BLNK C2	0.00471	0.03756	0.0	0.00001	0.00315	0.00011	0.00015	0.04568	7.65700	3.69290E 01	1.06191E 02
BLNK C3	0.00196	0.02232	0.0	0.00000	0.00185	0.00006	0.00006	0.02625	10.94922	1.69545E 01	7.51015E 01
BLNK B1	0.00399	0.03963	0.0	0.00001	0.00225	0.00004	0.00015	0.04605	9.45019	3.64450E 01	1.31128E 02
BLNK B2	0.00150	0.01784	0.0	0.00000	0.00103	0.00002	0.00004	0.02043	11.57397	1.13578E 01	1.12463E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00368	0.00004	0.0	0.00312	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00616	0.00008	0.00000	0.00624	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01443			
OVERALL	0.35035	0.55021	0.0	0.00273	0.05737	0.00114	0.02377	1.00000	1.38031	2.57733E 03	3.47576E 03

REPEAT CYCLE CONVERGENCE IS 4.37382E-02

REFRATING CYCLE 3 ITERATION NUMBER 3

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 2

THE FACTOR APPLIED TO THE RECYCLE FRACTION FOR REPEAT CYCLE IS 8.80317E-01

END FUEL MANAGEMENT FOR CYCLE 2

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
 12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 0.0 DAYS TOTAL TIME 300.0000 DAYS

LINE RELAXATION WILL BE DONE ON ROWS AND COLUMNS - 1 INNER ITERATION(S)
 LIMITING VALUES OF THE SEARCH FACTOR FOR ABSORPTION AND TOTAL LOSS ARE -2.43134E 00 -4.88939E 00

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
23	-1.56105E-04	1.39174	-1.90350	-1.59465	2.67076	0.999984	-7.07467D-05

CROSS SECTIONS UPDATED WITH -5.74101D-02
 CROSS SECTIONS UPDATED WITH 1.78738D-03

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 0.9999929 K 0.9999889

END OF CRITICALITY SEARCH - ITERATION TIME 0.046 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES -5.56227E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.002501

LEAKAGE 1.54002E 18 TOTAL LOSSES 1.12013E 20 TOTAL PRODUCTIONS 1.12013E 20 REACTOR POWER(WATTS) 2.57733E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. BEFORE DEPLETING STEP 1 OF CYCLE 3 TOTAL DEPLETION TIME 300.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12599	0.15987	0.0	0.00097	0.01489	0.00027	0.00537	0.30736	1.08768	9.17588E 02	8.62711E 02
CORE A2	0.12315	0.14707	0.0	0.00097	0.01326	0.00023	0.00477	0.28944	1.01020	9.03508E 02	9.67046E 02
CORE A3	0.08835	0.09257	0.0	0.00070	0.00831	0.00014	0.00243	0.19250	0.87297	6.44010E 02	1.11091E 03
BLNK C1	0.00397	0.04350	0.0	0.00001	0.00374	0.00014	0.00012	0.05148	10.58459	3.28621E 01	7.36578E 01
BLNK C2	0.00306	0.03730	0.0	0.00000	0.00311	0.00011	0.00009	0.04367	11.76474	2.66167E 01	6.92491E 01
BLNK C3	0.00138	0.02266	0.0	0.00000	0.00187	0.00006	0.00004	0.02602	15.82106	1.34638E 01	5.19862E 01
BLNK B1	0.00280	0.04098	0.0	0.00000	0.00232	0.00004	0.00011	0.04625	13.93661	2.94992E 01	9.05200E 01
BLNK B2	0.00127	0.01812	0.0	0.00000	0.00105	0.00002	0.00003	0.02049	13.97438	9.78233E 00	9.37516E 01
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00314	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00583	0.00008	0.0	0.00591	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01373			
OVERALL	0.34996	0.56207	0.0	0.00266	0.05748	0.00113	0.01297	1.00000	1.41493	2.57733E 03	3.31983E 03

POWER NORMALIZATION 0.99435, MAXIMUM POWER DENSITY 4.661038E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 1 OF CYCLE 3, THE TIME IS 75.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 375.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES .RNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 1 CYCLE 3 AT CYCLE DEPLETION TIME 37.50 DAYS. FISSILE KG IS AT 75.00 DAYS											
ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12631	0.15908	0.0	0.00099	0.01489	0.00027	0.00608	0.30762	1.07895	9.19169E 02	8.67911E 02
CORE A2	0.12309	0.14643	0.0	0.00098	0.01326	0.00023	0.00537	0.28936	1.00588	9.02844E 02	9.66840E 02
CORE A3	0.08804	0.09233	0.0	0.00070	0.00831	0.00014	0.00279	0.19222	0.87348	6.42037E 02	1.10374E 03
BLNK C1	0.00454	0.04341	0.0	0.00001	0.00374	0.00014	0.00014	0.05198	9.23774	3.59667E 01	9.51907E 01
BLNK C2	0.00346	0.03724	0.0	0.00001	0.00311	0.00011	0.00011	0.04403	10.36498	2.88405E 01	8.79429E 01
BLNK C3	0.00154	0.02264	0.0	0.00000	0.00127	0.00006	0.00005	0.02616	14.22073	1.43041E 01	6.36871E 01
BLNK B1	0.00314	0.04093	0.0	0.00000	0.00232	0.00004	0.00012	0.04655	12.43449	3.13479E 01	1.11208E 02
BLNK B2	0.00133	0.01811	0.0	0.00000	0.00105	0.00002	0.00003	0.02054	13.28383	1.07338E 01	1.03191E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00309	0.00004	0.0	0.00314	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00583	0.00008	0.0	0.00591	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01250			
OVERALL	0.35144	0.56017	0.0	0.00269	0.05748	0.00113	0.01459	1.00000	1.40386	2.58464E 03	3.39971E 03
TIME STEP THERMAL ENERGY, MW-HRS 4.65236E 06 AND TOTAL IS 2.32499E 07											

TIME STEP 1 REQUIRED 0.077 MINUTES CPU TIME, AND 0.655 MINUTES CLOCK TIME

A FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 CYCLE TIME 75.0000 DAYS TOTAL TIME 375.0000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 1.17815D-02
							CROSS SECTIONS UPDATED WITH -3.96085D-04
21	3.52859E-05	1.39174	-0.80541	-0.79329	1.14486	1.000004	1.98178D-05

CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION 1.0000010 K 1.0000046

END OF CRITICALITY SEARCH - ITERATION TIME 0.046 MINUTES

INPUT RELATIVE CONCENTRATION CHANGE TIMES 1.13855E-02 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS

FRACTION ABSORPTION IN SEARCH NUCLIDES 0.005042

LEAKAGE 1.57694E 18 TOTAL LOSSES 1.12039E 20 TOTAL PRODUCTIONS 1.12039E 20 REACTOR POWER(WATTS) 2.57732E 04

POWER NORMALIZATION 0.99489, MAXIMUM POWER DENSITY 4.71459E 02 IN ZONE 1 AT END SUBSTEP 1

*****
AFTER STEP 2 OF CYCLE 3, THE TIME IS 150.0000 DAYS. THE TIME STEP WAS 75.0000 DAYS, AND TOTAL TIME IS 450.0000 DAYS
*****

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-2). STREAM OF CITATION CASES ORNL 72

SUMMARY OF NEUTRON LOSSES, ETC. FOR STEP 2 CYCLE 3 AT CYCLE DEPLETION TIME 112.50 DAYS. FISSILE KG IS AT 150.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12802	0.15889	0.0	0.00102	0.01500	0.00028	0.00865	0.31185	1.06061	9.32393E 02	6.71849E 02
CORE A2	0.12107	0.14298	0.0	0.00098	0.01305	0.00023	0.00736	0.28566	0.99680	8.88825E 02	9.66007E 02
CORE A3	0.08529	0.08959	0.0	0.00069	0.00811	0.00014	0.00369	0.18752	0.87439	6.22696E 02	1.09684E 03
BLNK C1	0.00584	0.04461	0.0	0.00001	0.00385	0.00015	0.00019	0.05465	7.35600	4.42978E 01	1.16581E 02
BLNK C2	0.00429	0.03735	0.0	0.00001	0.00313	0.00011	0.00014	0.04501	8.38401	3.39687E 01	1.06186E 02
BLNK C3	0.00182	0.02244	0.0	0.00000	0.00186	0.00006	0.00006	0.02624	11.85070	1.60399E 01	7.50997E 01
BLNK B1	0.00373	0.04020	0.0	0.00001	0.00228	0.00004	0.00014	0.04639	10.26087	3.48122E 01	1.31126E 02
BLNK B2	0.00145	0.01795	0.0	0.00000	0.00104	0.00002	0.00003	0.02049	12.09188	1.09155E 01	1.12462E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00313	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00599	0.00008	0.0	0.00608	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01298			
OVERALL	0.35151	0.55400	0.0	0.00273	0.05740	0.00114	0.02025	1.00000	1.38646	2.58385E 03	3.47615E 03
TIME STEP THERMAL ENERGY, MW-HRS 4.65111E 06 AND TOTAL IS 2.79010E 07											

TIME STEP 2 REQUIRED 0.077 MINUTES CPU TIME, AND 0.641 MINUTES CLOCK TIME

A FINAL FLUX - EIGENVALUE PROBLEM FOLLOWS FOR CYCLE 3 TOTAL DEPLETION TIME 450.000 DAYS

ITERATION	FLUX CHANGE	BETA	MU-1	MU-2	MU-3	K	SEARCH FACTOR
							CROSS SECTIONS UPDATED WITH 1.008330-02
							CROSS SECTIONS UPDATED WITH -3.526660-04
21	3.05176E-05	1.39174	-0.76187	-0.69838	1.16248	1.000004	1.768080-05
CONVERGENCE INDICATION BY MINIMIZING THE SUM OF THE SQUARES OF THE RESIDUES - RELATIVE ABSORPTION							1.0000010 K 1.0000048
END OF CRITICALITY SEARCH - ITERATION TIME 0.041 MINUTES							
INPUT RELATIVE CONCENTRATION CHANGE TIMES 9.73066E-03 HAS BEEN ADDED TO THE INITIAL SEARCH CONCENTRATIONS							
FRACTION ABSORPTION IN SEARCH NUCLIDES 0.007173							

LEAKAGE 1.61590E 18 TOTAL LOSSES 1.12063E 20 TOTAL PRODUCTIONS 1.12063E 20 REACTOR POWER(WATTS) 2.57732E 09

MULTI-CYCLE BREEDER (SMEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-Z). STREAM OF CITATION CASES ORNL 72

FINAL SUMMARY OF NEUTRON LOSSES, ETC. FOR CYCLE 3 TOTAL DEPLETION TIME 450.00 DAYS

ZONE CLASS	FISSILE	FERTILE	INTERMEDIATE	OTHER	STRUCTURAL	SPECIAL	UNSPECIFIED	SUMS	CONV. RATIO	POWER(MW)	FISSILE(KG)
CORE A1	0.12916	0.15918	0.0	0.00104	0.01509	0.00028	0.01035	0.31510	1.05124	9.42033E 02	8.71849E 02
CORE A2	0.11929	0.14037	0.0	0.00098	0.01286	0.00022	0.00858	0.28230	0.99217	8.76556E 02	9.66007E 02
CORE A3	0.08314	0.08739	0.0	0.00068	0.00793	0.00014	0.00432	0.18360	0.87481	6.07343E 02	1.09684E 03
BLNK C1	0.00660	0.04586	0.0	0.00001	0.00396	0.00015	0.00022	0.05680	6.67195	4.97141E 01	1.16581E 02
BLNK C2	0.00471	0.03756	0.0	0.00001	0.00314	0.00011	0.00015	0.04568	7.65729	3.69251E 01	1.06186E 02
BLNK C3	0.00196	0.02232	0.0	0.00000	0.00185	0.00006	0.00006	0.02625	10.94945	1.69540E 01	7.50997E 01
BLNK B1	0.00399	0.03963	0.0	0.00001	0.00225	0.00004	0.00015	0.04605	9.45034	3.64451E 01	1.31126E 02
BLNK B2	0.00150	0.01784	0.0	0.00000	0.00103	0.00002	0.00004	0.02043	11.57403	1.13579E 01	1.12462E 02
RFLTR E	0.0	0.0	0.0	0.0	0.00308	0.00004	0.0	0.00312	0.0	0.0	0.0
RFLTR D	0.0	0.0	0.0	0.0	0.00616	0.00008	0.0	0.00624	0.0	0.0	0.0
OTHER LOSSES* BASED ON START-OF-STEP TOTAL LOSSES								0.01442			
OVERALL	0.35035	0.55014	0.0	0.00273	0.05736	0.00114	0.02385	1.00000	1.38014	2.57733E 03	3.47615E 03

REPEAT CYCLE CONVERGENCE IS -3.75089E-04

MULTI-CYCLE BREEDER (SNEARED RODS ADJUSTED, RECYCLE FEED DETERMINED)
12X8X3 GROUPS, 288 POINTS (R-2).   STREAM OF CITATION CASES ORNL 72

START FUEL MANAGEMENT FOR CYCLE 3

ACCOUNTING INFORMATION (MASSES IN KG) FOLLOWS FOR CYCLE 1

FRESH FUEL FEED STREAM 1

INITIAL INVENTORY	10	1.02648E 01	11	0.0	12	3.41117E 03	14	3.96086E 02	15	1.53723E 02
	16	2.95576E 01	17	1.18282E 01						

FRESH FUEL FEED STREAM 2

INITIAL INVENTORY	10	1.07337E 01	11	0.0	12	3.56714E 03	14	4.52180E 02	15	1.75412E 02
	16	3.37256E 01	17	1.34966E 01						

FRESH FUEL FEED STREAM 3

INITIAL INVENTORY	10	1.05805E 01	11	0.0	12	3.51632E 03	14	5.28922E 02	15	2.05303E 02
	16	3.94697E 01	17	1.57928E 01						

FRESH FUEL FEED STREAM 4

INITIAL INVENTORY	10	1.04274E 01	11	0.0	12	3.46535E 03	14	0.0	15	0.0
	16	0.0	17	0.0						

FRESH FUEL FEED STREAM 5

INITIAL INVENTORY	10	1.10504E 01	11	0.0	12	3.67250E 03	14	0.0	15	0.0
	16	0.0	17	0.0						

DISCHARGE STREAM 1

LOADING	10	9.52464E 01	11	1.56806E 00	12	3.35772E 04	14	1.46947E 03	15	5.48834E 02
	16	9.63487E 01	17	4.21559E 01						
DISCHARGES	10	1.92561E 01	11	3.53570E-01	12	6.83597E 03	14	3.61768E 02	15	1.37180E 02
	16	2.40870E 01	17	1.05390E 01						

FRESH FUEL FEED STREAM 1

FRESH FEED	10	2.07753E 01	11	0.0	12	6.90427E 03	14	3.44297E 02	15	1.33609E 02
	16	2.56882E 01	17	1.02794E 01						

FRESH FUEL FEED STREAM 2

FRESH FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						

FRESH FUEL FEED STREAM 3

FRESH FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						

FRESH FUEL FEED STREAM 4

FRESH FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						

FRESH FUEL FEED STREAM 5

FRESH FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						

MAKEUP STREAM 1

RECYCLE FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						
TOTAL NET FEED	10	2.56620E 00	11	0.0	12	8.52793E 02	14	9.90215E 01	15	3.84308E 01
	16	7.38942E 00	17	2.95705E 00						

MAKEUP STREAM 2

RECYCLE FEED	10	0.0	11	0.0	12	0.0	14	0.0	15	0.0
	16	0.0	17	0.0						
TOTAL NET FEED	10	2.68342E 00	11	0.0	12	8.91783E 02	14	1.13045E 02	15	4.38529E 01
	16	8.43141E 00	17	3.37415E 00						

MAKEUP STREAM 3						
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 2.64512E 00	11 0.0	12 8.79080E 02	14 1.32231E 02	15 5.13258E 01	
16 9.86743E 00	17 3.94819E 00					

MAKEUP STREAM 4						
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 2.60685E 00	11 0.0	12 8.66338E 02	14 0.0	15 0.0	
16 0.0	17 0.0					

MAKEUP STREAM 5						
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 2.76261E 00	11 0.0	12 9.18125E 02	14 0.0	15 0.0	
16 0.0	17 0.0					

MAKEUP STREAM 6						
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 2.80400E 00	11 0.0	12 9.31865E 02	14 0.0	15 0.0	
16 0.0	17 0.0					

MAKEUP STREAM 7						
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 4.70707E 00	11 0.0	12 1.56429E 03	14 0.0	15 0.0	
16 0.0	17 0.0					

*****TOTALS SUMMED OVER STREAMS						
LOADING	10 9.52464E 01	11 1.56806E 00	12 3.35772E 04	14 1.46947E 03	15 5.48834E 02	
16 9.63487E 01	17 4.21559E 01					
DISCHARGES	10 1.92561E 01	11 3.53570E-01	12 6.83597E 03	14 3.61768E 02	15 1.37180E 02	
16 2.40870E 01	17 1.05390E 01					
FRESH FEED	10 2.07753E 01	11 0.0	12 6.90427E 03	14 3.44297E 02	15 1.33609E 02	
16 2.56882E 01	17 1.02794E 01					
RECYCLE FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
TOTAL NET FEED	10 2.07753E 01	11 0.0	12 6.90427E 03	14 3.44297E 02	15 1.33609E 02	
16 2.56882E 01	17 1.02794E 01					

ACCOUNTING INFORMATION (MASSES IN KG) FOLLOWS FOR CYCLE 2						
DISCHARGE STREAM 1						
LOADING	10 9.06698E 01	11 2.61364E 00	12 3.33531E 04	14 1.53818E 03	15 5.59863E 02	
16 9.26723E 01	17 4.27832E 01					
DISCHARGES	10 1.79204E 01	11 6.54577E-01	12 6.76897E 03	14 3.77544E 02	15 1.40777E 02	
16 2.28580E 01	17 1.07492E 01					
FRESH FUEL FEED STREAM 1						
FRESH FEED	10 2.07395E 01	11 0.0	12 6.89241E 03	14 0.0	15 0.0	
16 0.0	17 0.0					
FRESH FUEL FEED STREAM 2						
FRESH FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					
FRESH FUEL FEED STREAM 3						
FRESH FEED	10 0.0	11 0.0	12 0.0	14 0.0	15 0.0	
16 0.0	17 0.0					

FRESH FUEL FEED STREAM 4						
FRESH FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
FRESH FUEL FEED STREAM 5						
FRESH FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
MAKEUP STREAM 1						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	6.67836E 00	17	3.00914E 00	14	1.03294E 02
					15	3.91684E 01
TOTAL NET FEED	10	2.56342E 00	11	0.0	12	8.51895E 02
	16	6.65164E 00	17	2.99710E 00	14	1.02881E 02
					15	3.90117E 01
MAKEUP STREAM 2						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	7.63743E 00	17	3.44128E 00	14	1.18128E 02
					15	4.47933E 01
TOTAL NET FEED	10	2.68018E 00	11	0.0	12	8.90729E 02
	16	7.60688E 00	17	3.42751E 00	14	1.17655E 02
					15	4.46142E 01
MAKEUP STREAM 3						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	8.95700E 00	17	4.03585E 00	14	1.38537E 02
					15	5.25326E 01
TOTAL NET FEED	10	2.58391E 00	11	0.0	12	8.58733E 02
	16	8.92117E 00	17	4.01971E 00	14	1.37983E 02
					15	5.23224E 01
MAKEUP STREAM 4						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
TOTAL NET FEED	10	2.60685E 00	11	0.0	12	8.66338E 02
	16	0.0	17	0.0	14	0.0
					15	0.0
MAKEUP STREAM 5						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
TOTAL NET FEED	10	2.76261E 00	11	0.0	12	9.18125E 02
	16	0.0	17	0.0	14	0.0
					15	0.0
MAKEUP STREAM 6						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
TOTAL NET FEED	10	2.80400E 00	11	0.0	12	9.31865E 02
	16	0.0	17	0.0	14	0.0
					15	0.0
MAKEUP STREAM 7						
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	0.0	17	0.0	14	0.0
					15	0.0
TOTAL NET FEED	10	4.70707E 00	11	0.0	12	1.56429E 03
	16	0.0	17	0.0	14	0.0
					15	0.0
*****TOTALS SUMMED OVER STREAMS						
LOADING	10	9.06698E 01	11	2.61364E 00	12	3.33531E 04
	16	9.26723E 01	17	4.27832E 01	14	1.53818E 03
					15	5.59863E 02
DISCHARGES	10	1.79204E 01	11	6.54577E-01	12	6.76897E 03
	16	2.22280E 01	17	1.07492E 01	14	3.77544E 02
					15	1.40777E 02
FRESH FEED	10	2.07395E 01	11	0.0	12	6.89241E 03
	16	0.0	17	0.0	14	0.0
					15	0.0
RECYCLE FEED	10	0.0	11	0.0	12	0.0
	16	2.32728E 01	17	1.04863E 01	14	3.59958E 02
					15	1.36494E 02
TOTAL NET FEED	10	2.07080E 01	11	0.0	12	6.88196E 03
	16	2.31797E 01	17	1.04443E 01	14	3.58519E 02
					15	1.35948E 02

ACCOUNTING INFORMATION (MASSES IN KG) FOLLOWS FOR CYCLE 3

DISCHARGE STREAM 1

LOADING	10	8.75731E 01	11	3.29269E 00	12	3.31698E 04	14	1.56434E 03	15	5.54108E 02
16	8.61663E 01	17	4.19901E 01							
DISCHARGES	10	1.67123E 01	11	9.17956E-01	12	6.70153E 03	14	3.92229E 02	15	1.44573E 02
16	2.19304E 01	17	1.09318E 01							

END FUEL MANAGEMENT FOR CYCLE 3

CYCLE 3 REQUIRED 1.091 MINUTES CPU TIME, AND 12.782 MINUTES CLOCK TIME

END OF CASE - TOTAL CPU TIME WAS 1.80 MINUTES TOTAL CLOCK TIME WAS 22.44 MINUTES

*****THIS JOB WAS RUN ON 03-10-72 ON THE IBM 360/91*****

JOB ENDED NORMALLY

REFERENCES

1. J. A. Davis and S. I. Kaplan, "Transport Synthesis," WARD-T-1849, USAEC Report, Bettis Atomic Power Laboratory (1965).
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3. J. D. Jenkins, "Compilation of Standard Cores," Volume I, KAPL-M-JDJ-1, USAEC Report, Knolls Atomic Power Laboratory (1963).
4. B. J. Goulding, M. W. Croft et. al., "1000 Mw(e) IMFBR Follow-On Study," BAW-1328, USAEC Report, Babcock and Wilcox Company (1969).