LA-7482-PR

Progress Report

C.3.

Applied Nuclear Data Research and Development

April 1—June 30, 1978

University of California

LOS ALAMOS SCIENTIFIC LABORATORY
Post Office Box 1663 Los Alamos. New Mexico 87545

An Affirmative Action/Equal Opportunity Employer

The four most recent reports in this series, unclassified, are LA-6971-PR, LA-7066-PR, LA-7200-PR, and LA-7301-PR.

This work was performed under the auspices of the Electric Power Research Institute and the US Department of Energy's Division of Military Applications, Reactor Research and Technology Division, Division of Basic Energy Sciences, and Office of Fusion Energy.

UNITED STATES
DEPARTMENT OF ENERGY
CONTRACT W-7405-ENG. 36

LA-7482-PR
Progress Report

Special Distribution
Issued: September 1978

Applied Nuclear Data Research and Development

April 1—June 30, 1978

Compiled by

C. I. Baxman
P. G. Young

CONTENTS

APPLIED NUCLEAR DATA RESEARCH AND DEVELOPMENT
QUARTERLY PROGRESS REPORT
April 1 - June 30, 1978

Compiled by

C. I. Baxman and P. G. Young

ABSTRACT

This progress report describes the activities of the Los Alamos Nuclear Data Group for the period April 1 through June 30, 1978. The topical content is summarized in the contents.

I. THEORY AND EVALUATION OF NUCLEAR CROSS SECTIONS

A. R-Matrix Analysis of the Four-Nucleon System (G. M. Hale and D. C. Dodder)

The four-nucleon system is of interest for applied reasons because it contains neutron-source and thermonuclear reactions, but it is also of considerable intrinsic scientific interest, particularly as a testing ground for presumed charge-independence properties of nuclear forces. Our comprehensive R-matrix analysis of this system provides an excellent macroscopic model for these charge-independence properties, while accounting for a large body of experimental measurements for the four-nucleon reactions. The isospin-1 parameters are first determined from analyzing p + ^{3}He scattering data, then incorporated essentially fixed in a larger analysis of data from the six independent reactions possible among p + t, n + ^{3}He, and d + D (i.e., the ^{4}He system).

One aspect of this approach is illustrated in Fig. 1 by the analyzing-power differences for p + ^{3}He and p + T scattering at proton energies near 5 MeV. The differences between measurements of the p and ^{3}He analyzing powers for p + ^{3}He scattering (left of figure) determines the parameters of the singlet-triplet spin transitions in the T = 1 (isospin-1) levels. The dominant such transition at these energies occurs for $J^P = 1^-$. Because the singlet $J^P = 1^-$ state is excluded in T = 0 levels due to symmetrization considerations, the 1^- singlet-

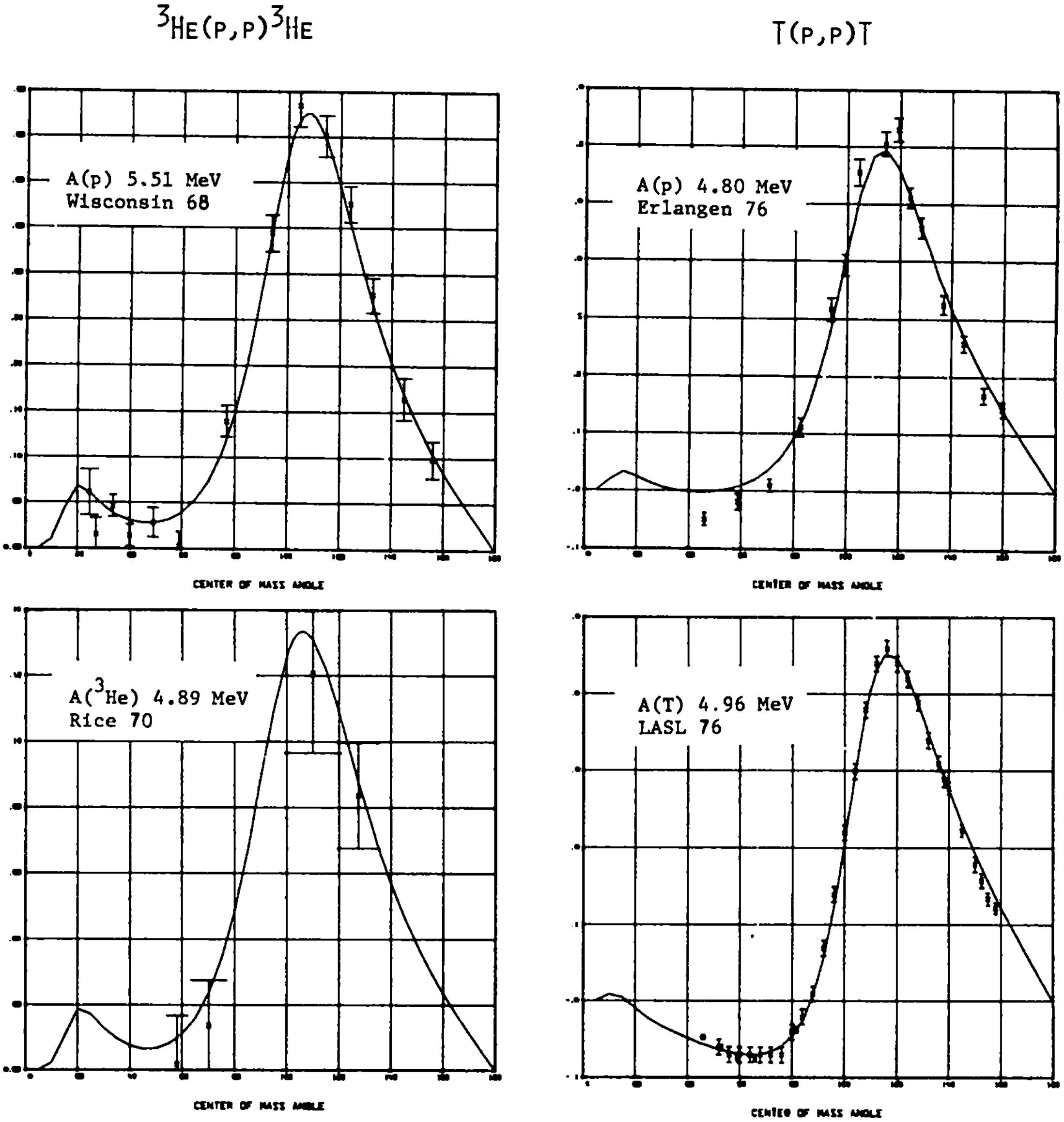

Fig. 1.
Measured and calculated analyzing powers for the ^{3}He(p,p)^{3}He (left) and T(p,p)T (right) reactions at proton energies near 5 MeV .

triplet transitions in ^{4}He are completely determined by the T = 1 parameters, which are fixed in our model by analyzing p + ^{3}He data. The resulting differences predicted for the p and T analyzing powers for p + T elastic scattering are seen in the right side of the figure to agree well with the measurements.

The major progress of this analysis in the past quarter has been a significant improvement in the fit to data for the d + D reactions at deuteron energies

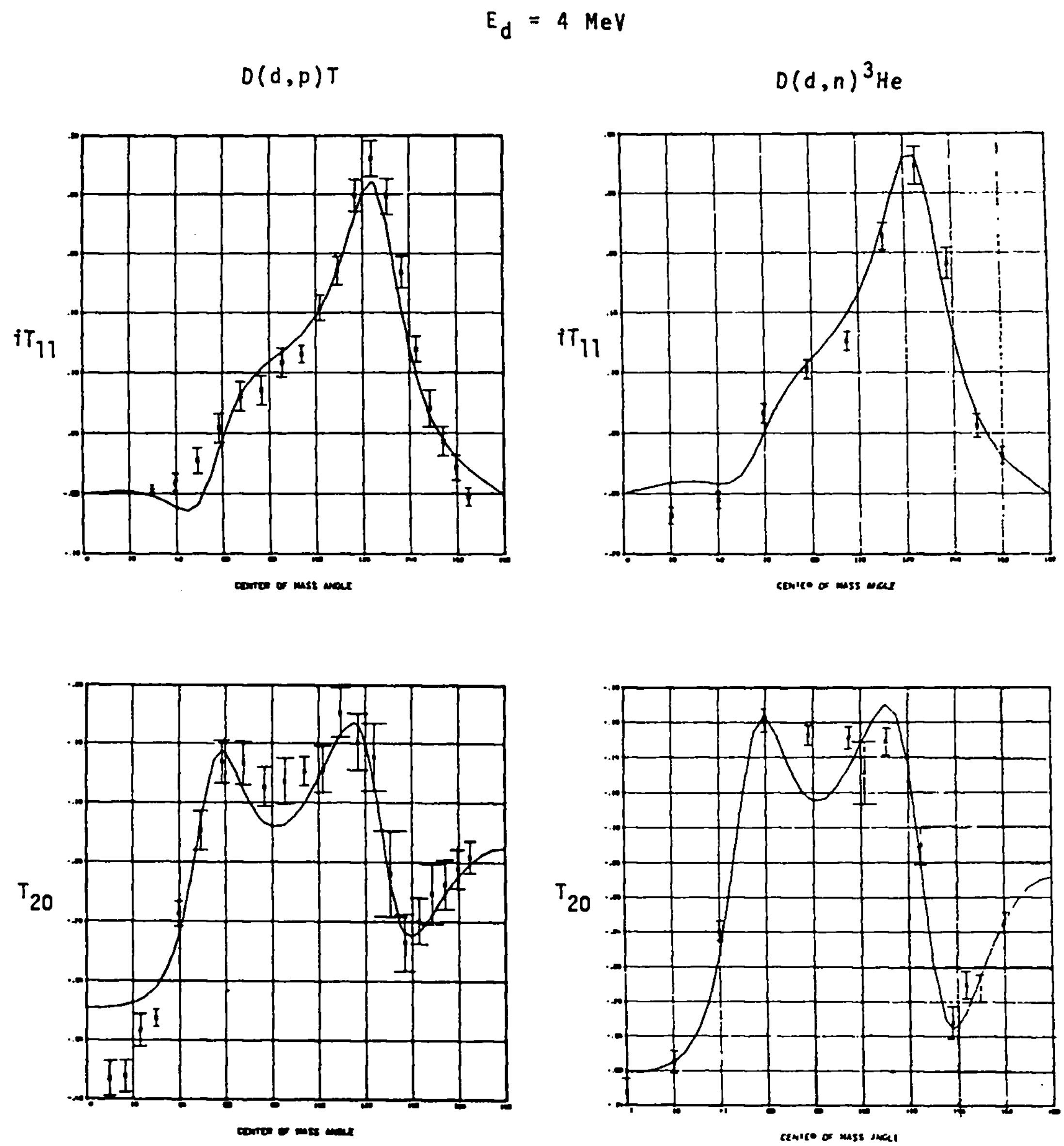

Fig. 2.
Differential cross section and analyzing power $T_{20} = \frac{1}{2} A_{zz}$ for the reaction D(d,p)T at E_d = 4 MeV (left). Differential cross section and analyzing power A_{zz} for the reaction D(d,n)^{3}He at E_d = 4 MeV.

up to 5 MeV. Some of these data are shown in Fig. 2 for the D(d,p) and D(d,n) reactions. The fits illustrate a point that has been characteristic of the charge-independent analysis from the beginning: the calculation does not reproduce measured differences in the cross sections for the two branches of the D + d reactions nearly as well as it does for the analyzing powers.

B. EDA Code Development [K. Witte (C-3), D. C. Dodder, and G. M. Hale]

The EDA program and its auxiliary codes have now been converted for use on LTSS (time-sharing) system using the FTN compiler. The programs have been debugged and checked for a wide range of operating circumstances. Because of the large number of options and features of EDA, it is not possible to test it under all possible configurations. However, it is now reliable under almost all possible arrangements. The program under the batch configuration of LTSS is now running about 10% slower than under the CROS system.

The conversion to LTSS-FTN has meant three important improvements. First, the code is now available as an interactive tool, including graphics display. While it is much slower under the conditions usually present in this mode, it is now suitable for short calculations. Second, the change to a dynamic storage allocation incorporated at the same time as the conversion has allowed problems of larger size in certain respects to be run. And third, it should be possible in the future to make a portable version of the program, suitable for use at other installations where the FTN compiler is available. This was not previously feasible because the structure of its code, particularly its storage arrangements, were very closely matched both to the CROS operating system and to the exact hardware configuration at LASL.

C. R-Matrix Analysis of π-N Scattering (D. C. Dodder)

An R-matrix analysis of the π-nucleon processes up to 300 MeV pion energy has been enlarged to include the $\pi^-(p,\gamma)n$, $\pi^0(n,\gamma)n$, and $\pi^-(p,\sigma^-)p$ channels. The last channel is to represent the large absorption in the $T = 1/2$, $J = 1/2$ state. The use of a definite mass for the σ^- is an approximation suggested by the observed experimental width of the σ^- particle. The gamma-ray data require E1, M1, and E2 multipoles in both $T = 1/2$ and $T = 3/2$ states. The M1 multipoles occur in both $J = 1/2$ and $J = 3/2$ states. The multipole strengths are entirely determined by the data; there are no theoretical inputs. The R-matrix approach makes this feasible despite the limited amount of photoproduction and gamma-emission data for this system.

The analysis is essentially completed and now allows reliable predictions of π-nucleon scattering cross sections over the 0-300 MeV range, which, for the most part, are more accurate than the individual experimental results. The phase shifts are in reasonable agreement with the most reliable single energy phase shifts.

D. Calculation of the $^{39}K(n,2n)^{38}K$ Cross Section from Threshold to 100 MeV (E. D. Arthur)

The $^{39}K(n,2n)^{38}K$ cross section is used in pion radiotherapy to determine the neutron dose arising from negative pion absorption. Because no experimental data exist for this reaction above 23 MeV, we were asked by the biomedical group at LAMPF to calculate this cross section up to neutron energies of 100 MeV. For the calculations, the statistical model code GNASH[1] was used, which included new preequilibrium routines based on recent exciton model efforts of Kalbach.[2] The (n,2n) cross section represents only a few per cent of the total reaction cross section; therefore, competition by proton, deuteron, and alpha emission was included for each compound neucleus in the decay chain. Since charged-particle emission dominates, care was taken in the choice of the global optical parameter sets used.[3] Also, in the case of neutrons, slight adjustments were made to better reproduce the low-energy resonance data. The calculated results are compared to representative experimental data in Fig. 3.

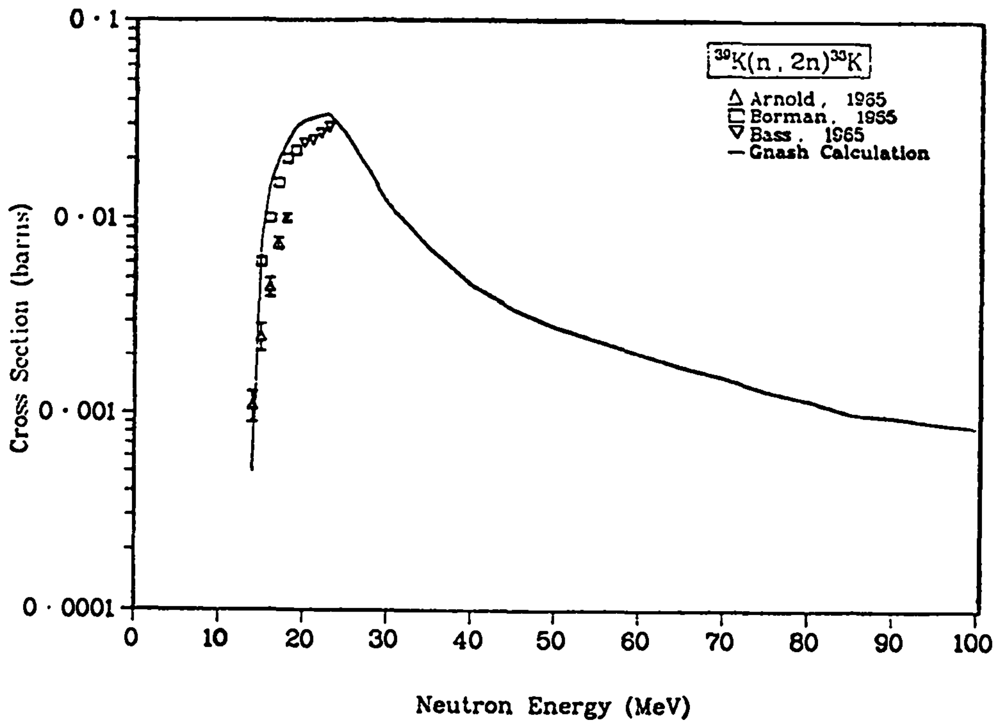

Fig. 3.
Calculation of the $^{39}K(n,2n)$ cross section from threshold to 100 MeV made using GNASH is shown.

E. Calculation of Proton Production From n + ^{88,89}Y Reactions (E. D. Arthur)

As part of a comprehensive effort to calculate neutron-induced reactions on $^{86-92}$Y and $^{89-90}$Zr from 0.001-20 MeV, we have investigated neutron and proton optical-model parameters needed to calculate proton production induced by neutrons on ^{88}Y and ^{89}Y. Recently, experimental data[4] pertaining to these reactions have become available through charged-particle simulation experiments employing the ^{90,91}Zr(t,α) reactions. These reactions produce excited ^{89,90}Y systems, and the subsequent measurements of the proton decay can be used to determine the relative proton production cross section for n + ^{88,89}Y reactions. Previous calculations[5] made using Perey proton parameters[6] produce results for n + ^{89}Y, which are factors of 2-3 above the data for neutrons between 10 and 15 MeV. For the present calculation, we have used as a starting point a new determination of the low-energy proton optical parameters in this mass region performed by Johnson[7] using sub-Coulomb barrier (p,n) reaction data. We have reanalyzed his ^{89}Y(p,n) data[8] making some adjustments to the proton parameters and using a more realistic potential[9] to describe the outgoing neutron channel. Proton production calculations made with these adjusted parameters for n + ^{88,89}Y are compared with the charged-particle simulation results in Figs. 4 and 5. The general features and magnitude of the experimental data are reproduced by the calculations.

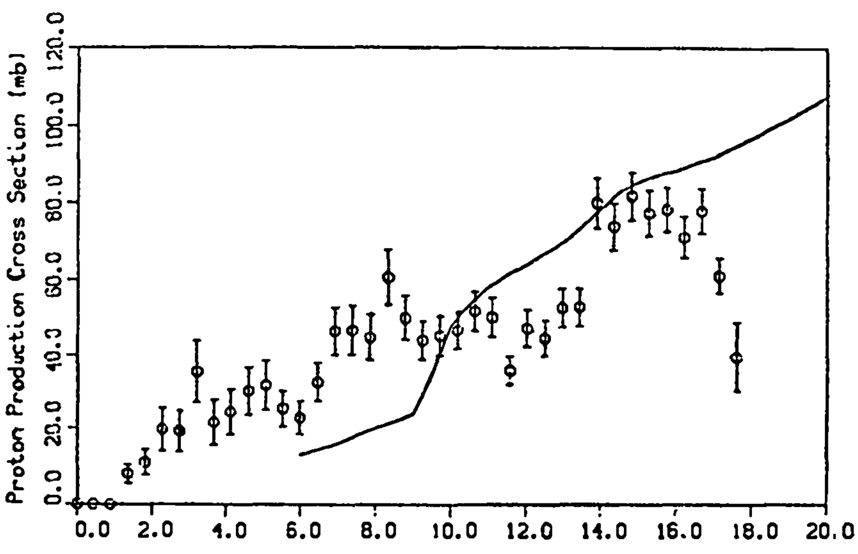

Fig. 4.
Comparison of calculated and experimental proton production cross section resulting from charged particle simulation of n + ^{88}Y.

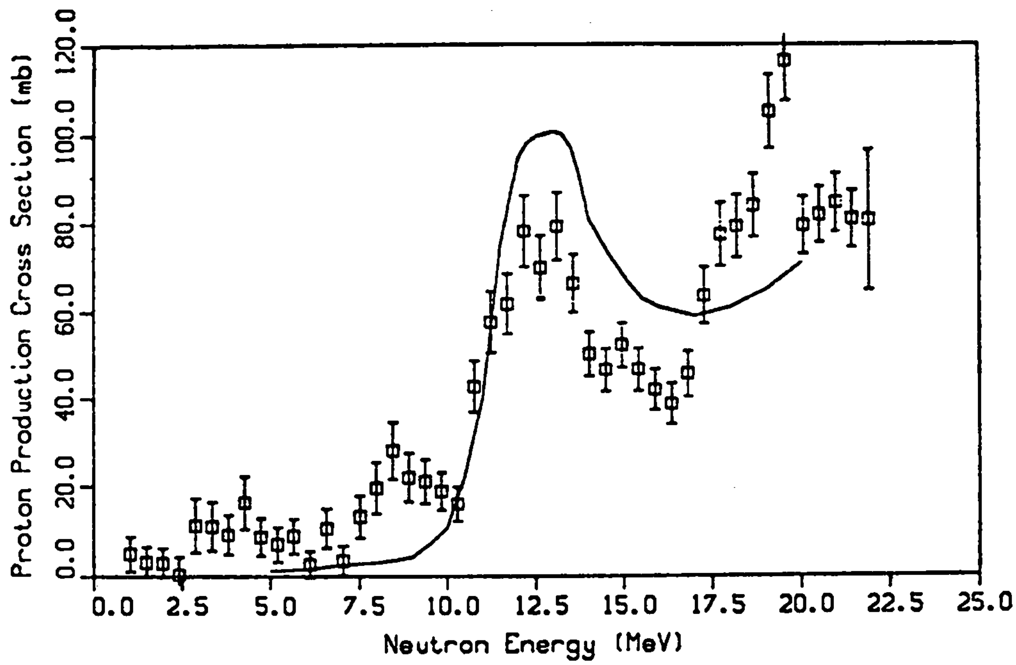

Fig. 5.
The total calculated proton production cross section for n + ^{89}Y is compared to charged particle simulation results.

F. Evaluation of the Tungsten Isotopes [C. Philis (Bruyères-le-Châtel) and E. D. Arthur]

As part of a cooperative effort between Los Alamos Scientific Laboratory, Argonne National Laboratory, and Bruyères-le-Châtel, we have begun a reevaluation of neutron cross sections and gamma-ray production data for neutrons between ∿3 and 20 MeV. As a first step, we have begun an extensive effort to determine sets of spherical optical model parameters for neutrons in the range from 0.2 to 20 MeV suitable for use in statistical model calculations. Since the tungsten isotopes are deformed, direct effects are important, and these must be accounted for in the derivation of neutron optical parameters. Our approach has been the following. Coupled-channel calculations with the JUPITOR code using the Delaroche[10] optical parameters for tungsten were made to determine the total direct inelastic cross section from 0.2 to 20 MeV. This direct inelastic cross section was then subtracted from the experimental total cross section, and the results were used in the determination of spherical optical parameter sets. By doing this, it was hoped that direct effects not accounted for in the spherical optical model could be separated, and the resulting data could be described using realistic spherical parameters. In addition, other data such as the shape elastic cross section, s- and p-wave strengths, and the potential scattering radius were used in the optical parameter determinations.

The above procedure results in preliminary optical sets that fit the available total and elastic cross sections over the energy range 0.2-20 MeV. These parameters, when used in Hauser-Feshbach calculations, produce compound inelastic cross sections which, after being added to calculated direct contributions, give good fits to inelastic level excitation data[11] for $^{182,184,186}W$. Preliminary GNASH (n,2n) cross-section calculations from threshold to 15 MeV also agree well with the data of Frehaut[12] for these nuclei.

G. n + ^{233}U Evaluation (L. Stewart, D. G. Madland, and P. G. Young)

The preliminary ENDF/B-V evaluation that we provided to the National Nuclear Data Center at Brookhaven National Laboratory used the Version IV evaluation of the unresolved energy region, which included several discrepancies. During this quarter we have reevaluated the data in the keV range, and matching unresolved resonance parameters were obtained by F. Mann of Hanford Engineering Development Laboratory. The tasks remaining are to merge the new data into the preliminary file and to derive an energy-dependent fission spectrum representation up to an incident-neutron energy of 20 MeV.

H. n + ^{242}Pu Evaluation (D. G. Madland and P. G. Young)

A new evaluation of n + ^{242}Pu cross sections has been completed for the neutron energy range 10 keV to 20 MeV. The evaluation is available on the photostore file FS=LASL407 (MAT 107, OAC=T02PGY) and has been processed for use in TD Division.

The only ^{242}Pu reactions for which experimental data exist above 10 keV are fission and radiative capture, and the capture data only extend to 100 keV. It was therefore necessary to rely heavily upon nuclear model calculations for the present evaluation. In particular, model calculations were used to derive and/or evaluate elastic; inelastic; (n,2n); (n,3n); (n,γ); and first, second, and third chance fission cross-section components, as well as the elastic and inelastic angular distributions. The model calculations were performed using LASL versions of the Hauser-Feshbach statistical reaction code COMNUC[13] (3/29/78 version) and the direct reaction coupled-channel code JUKARL.[14] All calculations utilized the LASL preliminary global actinide optical potential.[15] Pertinent details of evaluated and calculated quantities are summarized below.

1. $^{242}Pu(n,f)$ Reaction. The evaluated fission cross section is based upon averages of the measurements by Auchampaugh[16] below 100 keV and upon the data of Behrens et al.[17] from 100 keV to 20 MeV. The ENDF/B-V evaluation of ^{235}U fission[18] was used to convert the Behrens' ratio measurements to absolute ^{242}Pu cross sections. In Figs. 6 and 7, the evaluated results are compared to the experimental data.[16,17,19-22] The (n,f), (n,nf), and (n,2nf) cross sections were calculated subject to the constraint that their sum equals the measured[17] total fission cross section. Discrete fission channels (up to 12 each for first, second, and third chance fission) and deformed level continuum fission channels were employed. The calculated and measured total fission cross sections agreed to within ± 5%.

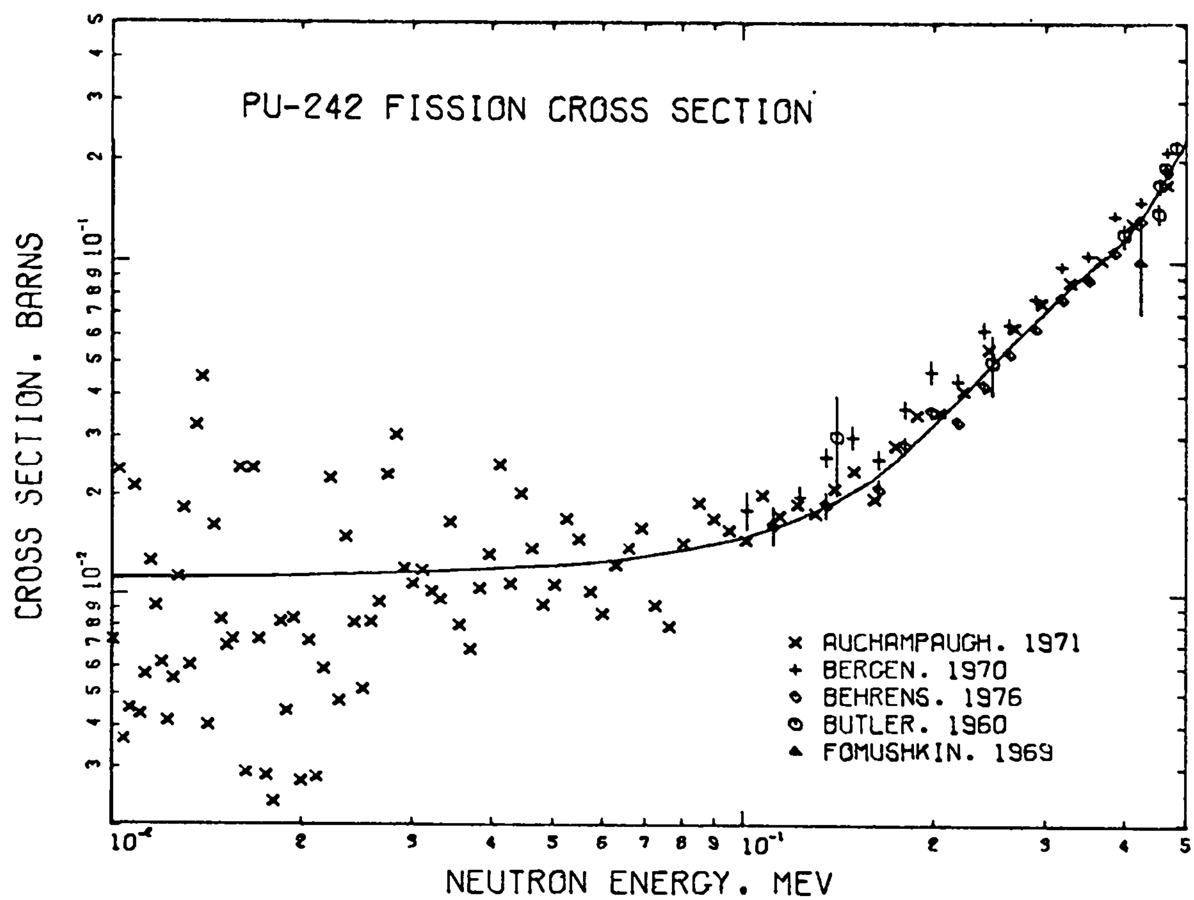

Fig. 6.

Experimental and evaluated $^{242}Pu(n,f)$ cross sections between 10 and 500 keV. The solid curve is the present evaluation (LASL-78).

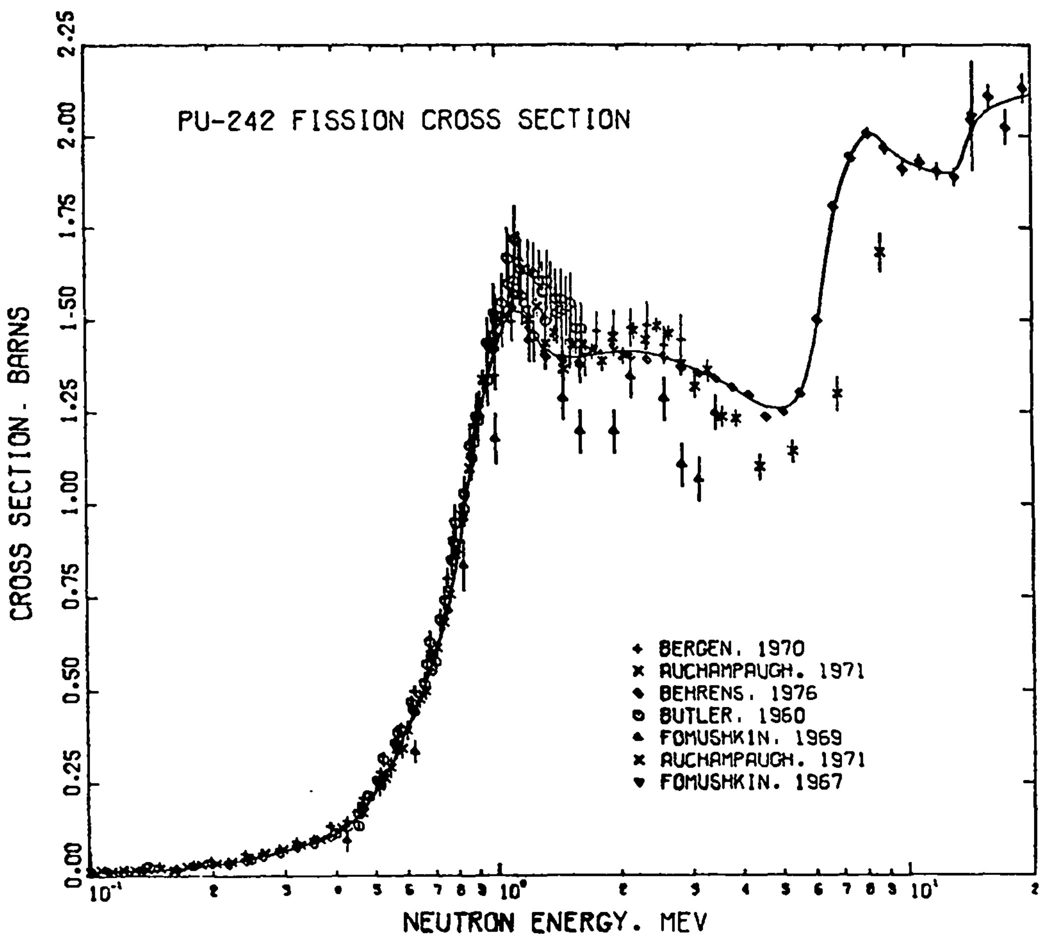

Fig. 7.

Experimental and evaluated $^{242}Pu(n,f)$ cross sections between 0.1 and 20 MeV. The solid curve is the LASL-78 evaluation.

The evaluated fission spectrum is represented by a Maxwellian using temperatures approximated by[23]

$$T = 0.50 + 0.43\sqrt{\bar{\nu}_p(E_n) + 1} \quad . \tag{1}$$

With this representation, the average energy of fission neutrons induced by 1-MeV incident neutrons is 2.031 MeV.

The different evaluations of the fission cross sections are compared in Figs. 8 and 9. The LASL-78, HEDL-78,[24] and ENDL-76[25] evaluations are quite similar. The most significant difference occurs for the ENDF/B-IV[26] evaluation, which is substantially higher than the other data sets below 200 keV and between 2 and 8 MeV.

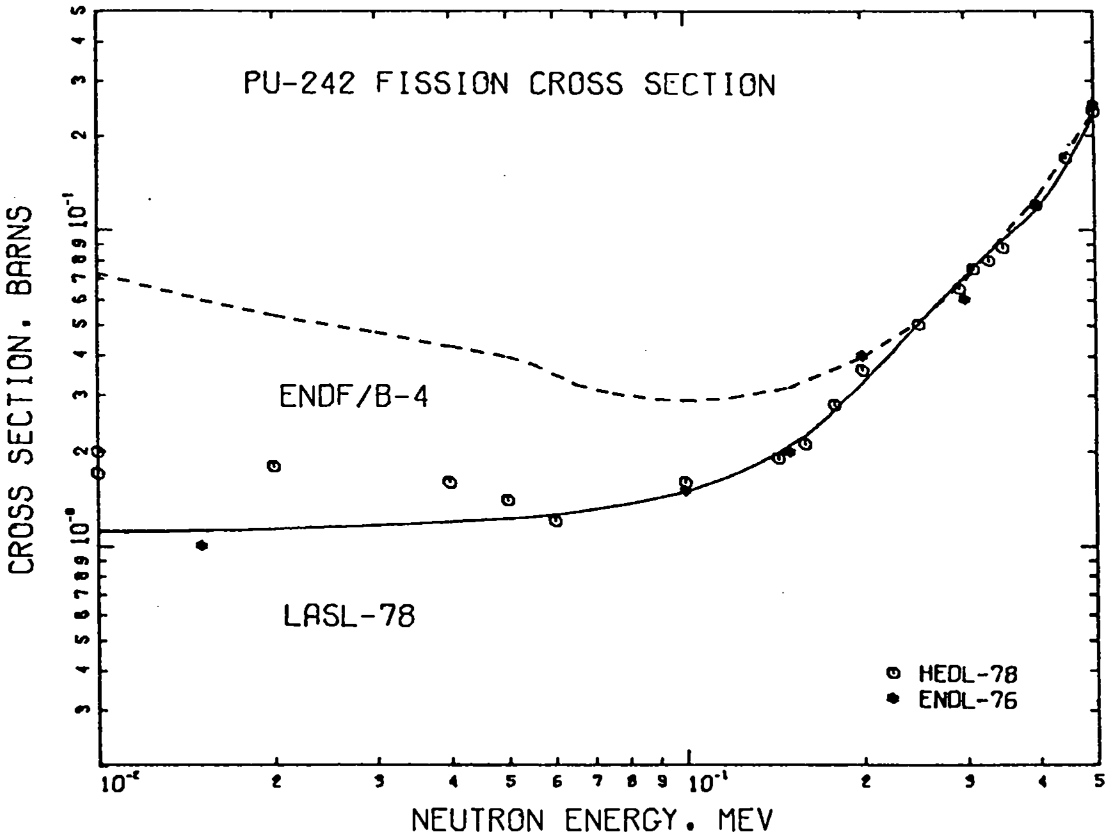

Fig. 8.

Evaluated ^{242}Pu(n,f) cross sections from 0.1 to 20 MeV.

2. Average Number of Neutrons Emitted Per Fission ($\bar{\nu}$). There were no ^{242}Pu experimental data available for the determination of $\bar{\nu}_p$, the average number of prompt neutrons emitted per fission. To determine $\bar{\nu}_p$, the substantial experimental data available for the case of neutrons incident on ^{240}Pu were analyzed, and the resulting data were corrected to ^{242}Pu by adjusting for the systematic variation of $\bar{\nu}_p$ with mass number.

A comparison of the different evaluations of $\bar{\nu}_p(E_n)$ is given in Fig. 10. Below 6 MeV, the LASL-78, ENDL-76, and ENDF/B-IV evaluations are in good agreement, whereas the HEDL-78 values, which are based upon a phenomenological model given in the Manero and Konshin[27] review article, are 3-4% higher than the other data.

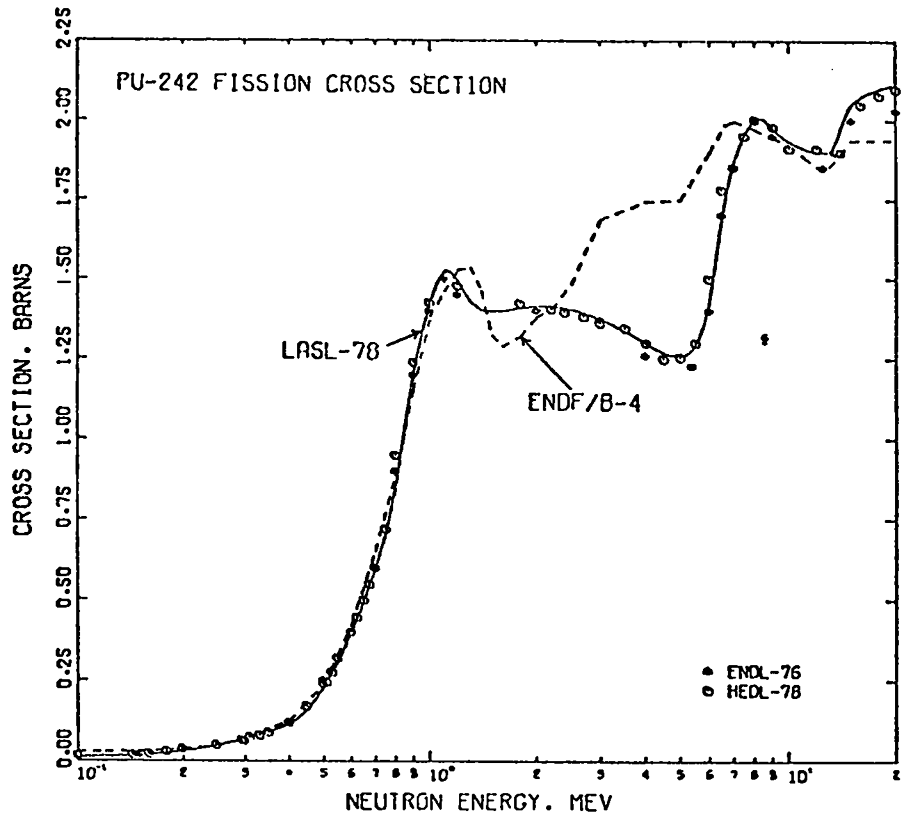

Fig. 9.
Evaluated $\bar{\nu}_p$ (^{242}Pu) for neutron energies between 0.1 to 20 MeV.

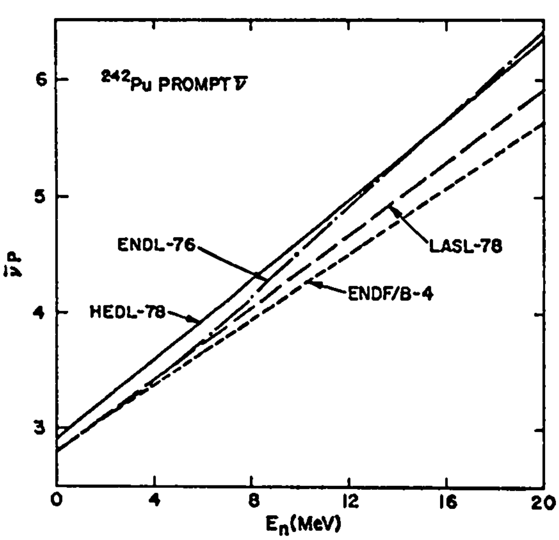

Fig. 10.
Evaluated $\bar{\nu}_p$ (^{242}Pu) for neutron energies between 0 and 20 MeV.

3. $^{242}Pu(n,\gamma)$ Reaction. The ^{242}Pu radiative capture cross section was calculated using the COMNUC model code and a gamma-ray strength function adjusted to agree with the measurements of Hockenbury.[28] For energies above 4 MeV, the capture cross section was calculated using a preequilibrium cascade process with gamma-ray emission probabilities calculated at each stage.

The evaluated cross section is compared to the Hockenbury data and to other evaluations in Fig. 11. Large differences exist, particularly above 3 MeV. A value of $\sigma_{n;} \approx 1$ mb near 14 MeV, is supported by recent ^{238}U measurements at the Los Alamos Scientific Laboratory.[29]

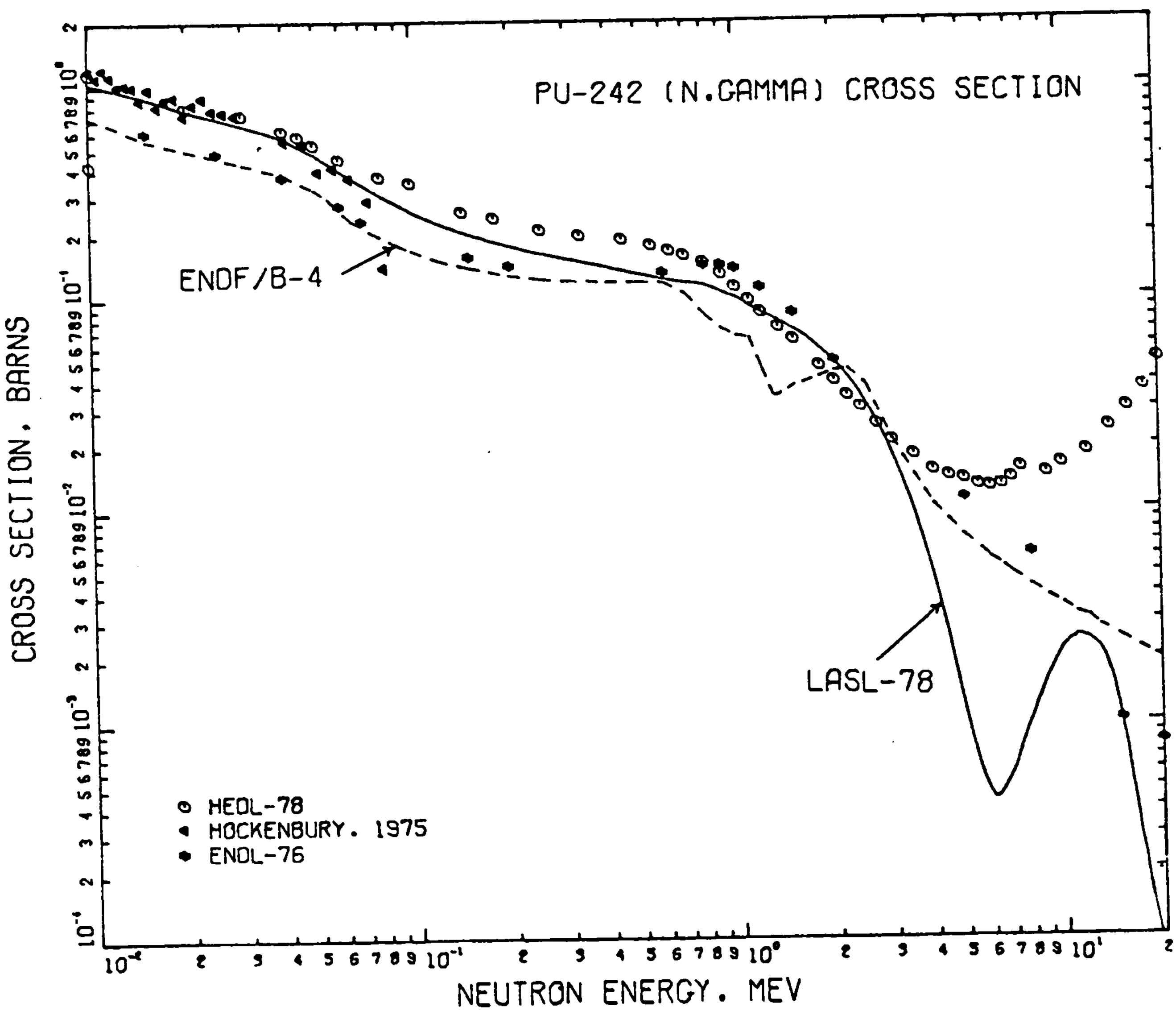

Fig. 11.

Evaluated $^{242}Pu(n,\gamma)$ cross section from 10 keV to 20 MeV.

4. ^{242}Pu(n,n') Reaction. Hauser-Feshbach calculations were carried out for the discrete compound inelastic scattering for 19 levels up to an excitation energy of 1.152 MeV. Above this excitation, continuum compound inelastic scattering was calculated using a deformed nucleus level density. Direct coupled-channel inelastic scattering was calculated for the first five members of the ground state rotational band assuming an axially symmetric rotor model. Quadrupole and hexadecapole deformations were taken from Ref. 30.

Figure 12 compares the total inelastic cross section from the various evaluations. Numerous differences exist among the data sets; one of the more significant is the fact that the maximum in the ENDL-76 cross section is broader and occurs some 1-3 MeV lower in energy than for the other data sets. The average emitted neutron energy from inelastic scattering is given in Fig. 13 for each of the evaluations. The ENDL-76 (n,n') spectrum is significantly softer below 1 MeV than the other evaluations, and large differences exist among all the evaluations above 1 MeV.

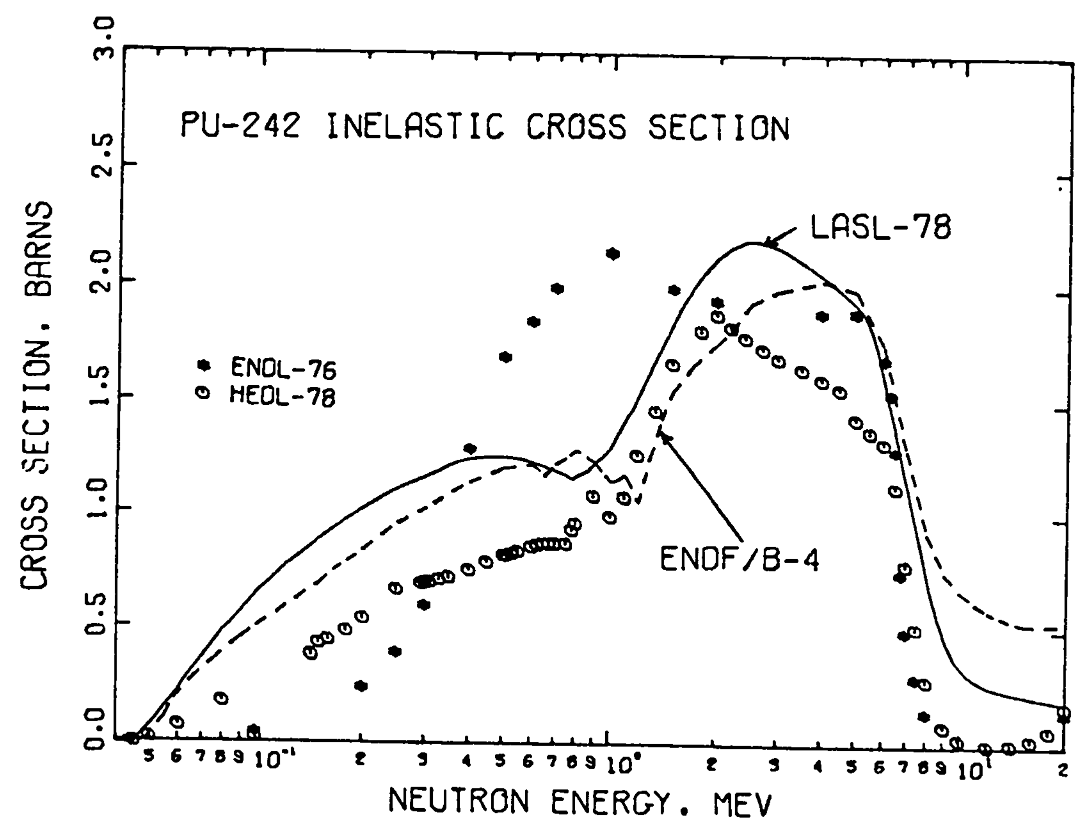

Fig. 12.

Evaluated ^{242}Pu inelastic cross sections from threshold to 20 MeV.

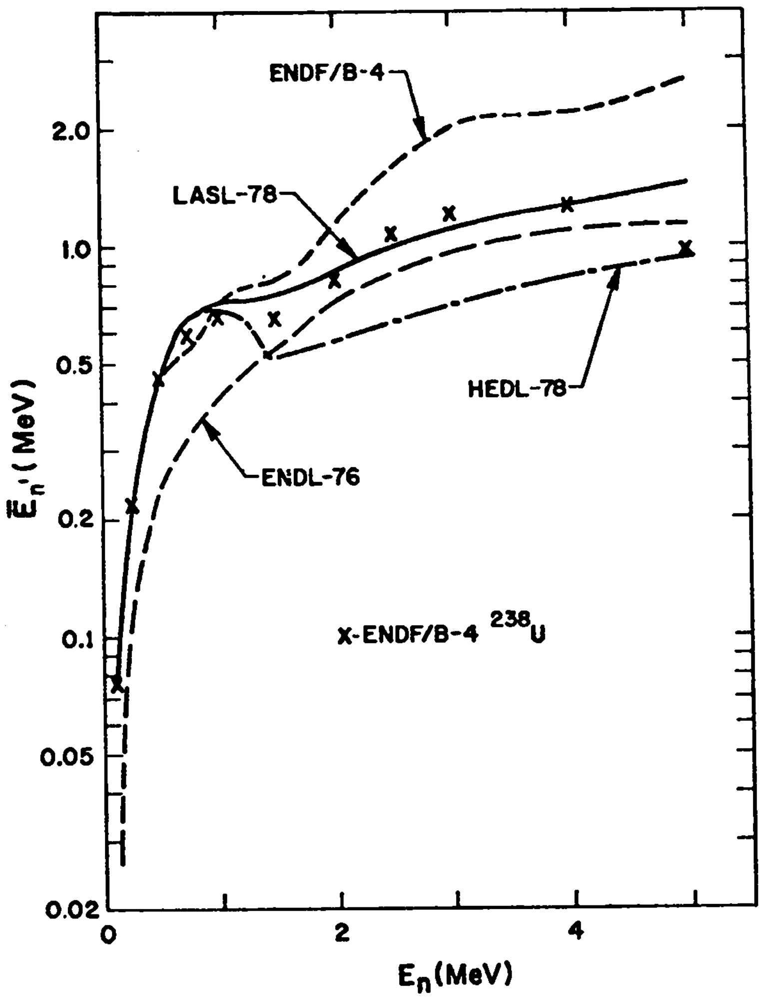

Fig. 13.

The average emitted neutron energy from ^{242}Pu inelastic scattering calculated from several evaluations for incident neutron energies between 0 and 5 MeV.

5. ^{242}Pu Elastic Cross Section. The elastic cross section was determined by subtracting the sum of the evaluated nonelastic cross sections from the evaluated total cross section. The evaluated elastic cross sections from 10 keV to 20 MeV are compared in Fig. 14. The present (LASL-78) evaluation differs from the calculation by at most $\pm$ 100 mb. The LASL-78 elastic and inelastic angular distributions include both compound and direct contributions.

6. ^{242}Pu(n,2n) and ^{242}Pu(n,3n) Reactions. Hauser-Feshbach calculations of the (n,2n) and (n,3n) reactions were carried out with discrete (10 levels) and continuum (deformed level density) contributions included in each case. The calculations are compared to other evaluations in Figs. 15 and 16.

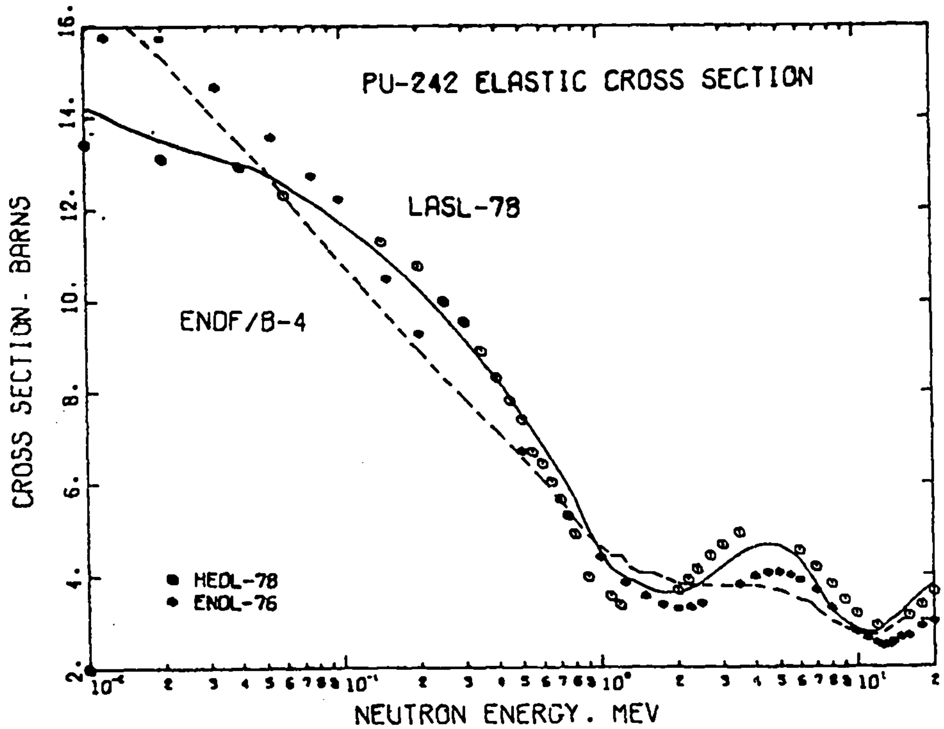

Fig. 14.

Evaluated ^{242}Pu elastic cross section from 10 keV to 20 MeV.

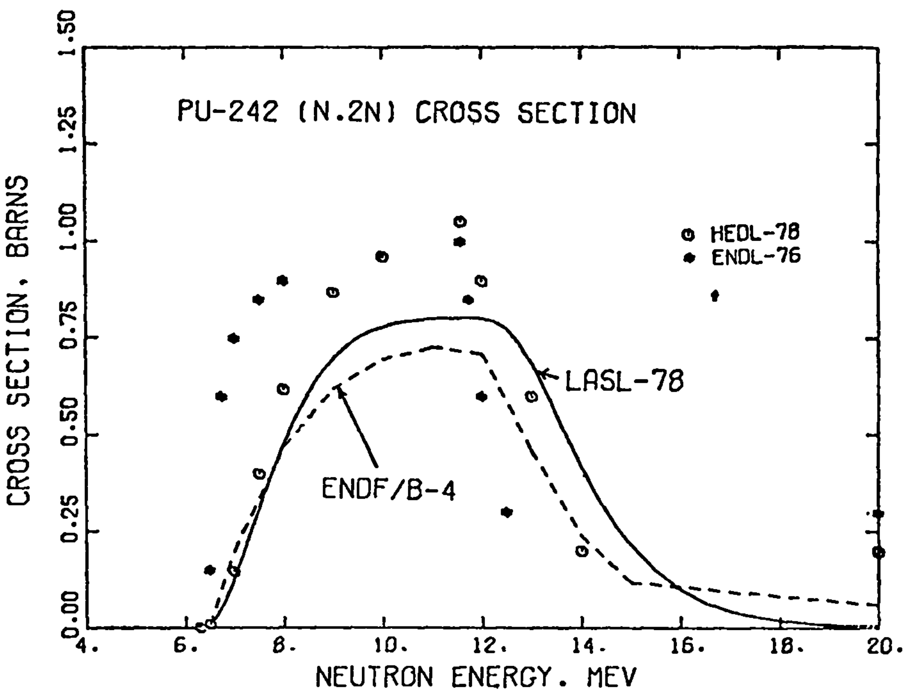

Fig. 15.

Evaluated ^{242}Pu(n,2n) cross sections from threshold to 20 MeV.

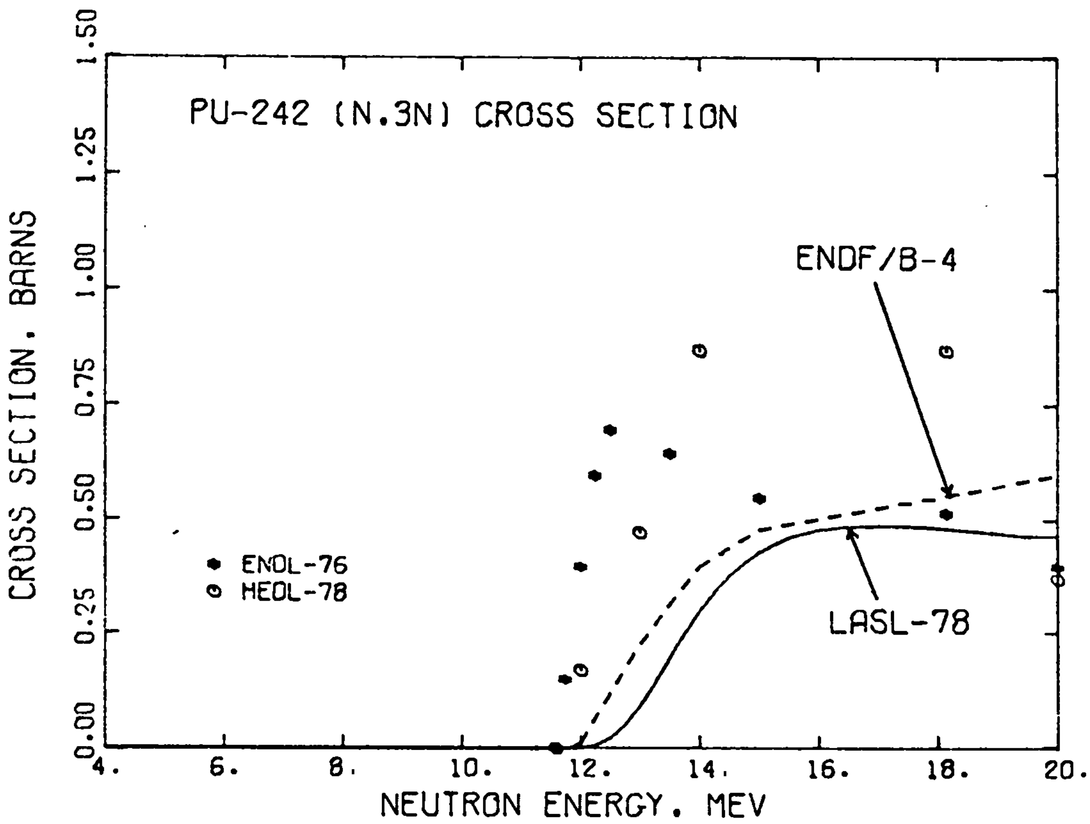

Fig. 16.

Evaluated ^{242}Pu(n,3n) cross sections from threshold to 20 MeV.

7. ^{242}Pu Total Cross Section. The ^{242}Pu total cross section was obtained in an ad hoc fashion. The deformation effects (inelastic scattering in the coupled-channels formalism) were combined with the total cross section calculated with the preliminary LASL (spherical) global actinide potential[15] in the following manner. Calculations with this potential for actinides (uranium isotopes) of measured total cross sections showed that the differences between calculation and experiment were approximately equal to the calculated total direct inelastic scattering using the coupled-channels method without modification of the absorptive potential. Since no inelastic scattering data exist by which the change in the absorptive potential could be determined, the total direct inelastic scattering was simply added to the calculated (spherical) total cross section to obtain the final total cross section. [The LASL preliminary (spherical) global optical potential[15] for the actinides is presently being used as the starting parameter set to obtain a global (deformed) potential in coupled-channel calculations that include inelastic scattering data.]

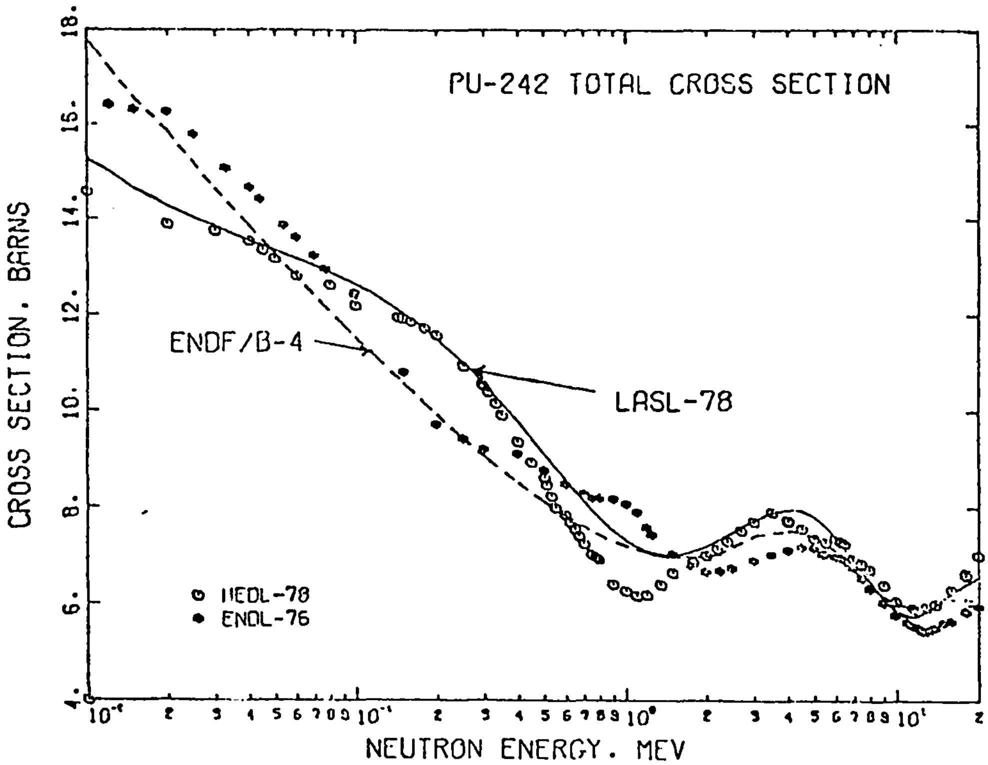

Fig. 17.
Evaluated ^{242}Pu total cross section from 10 keV to 20 MeV.

The total cross sections from 10 keV to 20 MeV for four evaluations are compared in Fig. 17. The peak in the ENDL-76 total near 1 MeV results from the peak in the (n,n') cross section shown in Fig. 12.

I. Addition of the Fission Channel to the GNASH Code (E. D. Arthur)

As part of a program to upgrade the preequilibrium-statistical model code GNASH[1] we have incorporated a fission channel so that multistep particle emission cross sections and spectra can be calculated for nuclei in which fission occurs. The fission barrier is represented by a harmonic oscillator height E_B and curvature $\hbar\omega$. The fission transmission coefficients are then given in the Hill-Wheeler[31] formulation as

$$T_F(E) = \frac{1}{1 + \exp\,[2\pi(E-E_B)/\hbar\omega]} \quad .$$

For each fissioning system, up to 50 discrete fission channels can be included. These can be supplied by the user or, as a default, the levels of the compound system compressed by a given input factor can be used. Above the last discrete fission channel, a continuum level density based on constant temperature and Fermi-gas forms is used. Barrier heights and curvatures are generally supplied as input, although the option exists for default values based on systematics to be used.

Comparisons have been made between GNASH and the statistical code COMNUC with identical parameter sets for n + ^{242}Pu, and good agreement was obtained for the (n,f) cross section. We are presently using GNASH to calculate (n,xn) reactions on ^{235}U and ^{238}U, to provide spectral efficiency correction data for recent measurements of Lynn Veeser of LASL Group P-3, and to compare with other available (n,xn) data. Using neutron transmission coefficients based on a recent actinide optical-model parameter set of Madland,[32] the fission-barrier parameters of Back et al.,[33] and the preequilibrium model of Kalbach,[34] we have calculated the ^{235}U and ^{238}U fission cross section from 4 to 21 MeV. The calculated curve is compared in Fig. 18 to recent measurements of the ^{235}U and ^{238}U fission cross sections by Leugers et al.[35] in the energy range from 1 to 20 MeV.

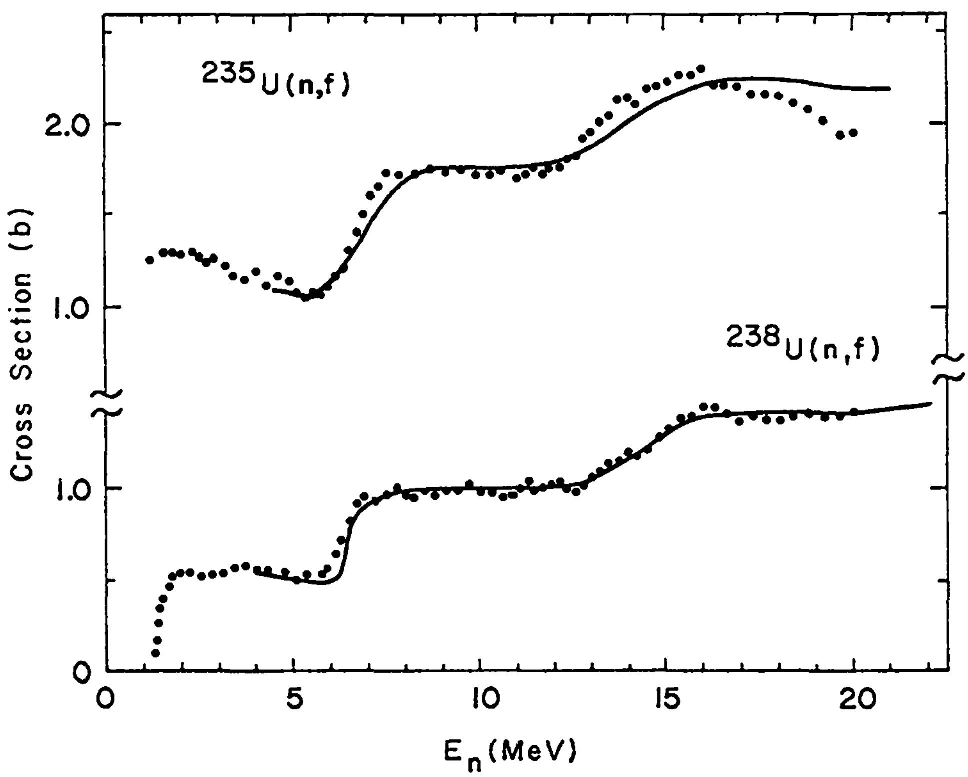

Fig. 18.
The GNASH calculated fission cross sections are compared with the experimental data of Leugers for ^{235}U and ^{238}U.

J. Gas Production and Activation Cross Sections (L. Stewart and E. D. Arthur)

Many of the cross sections required for ENDF/B-V have not been measured, and a few are virtually impossible to determine experimentally. For example, hydrogen and helium production cross sections for structural materials such as stainless steel have not been measured above a few MeV except at 14 MeV.

A paper[36] discussing the problems associated with providing gas production and activation data for ENDF/B was presented at the June San Diego American Nuclear Society Meeting. Examples of calculations of hydrogen and helium production cross sections with the GNASH nuclear model code were presented.

II. NUCLEAR CROSS-SECTION PROCESSING

A. Integral Testing of Methods and Data (R. B. Kidman)

The 50-group library LIB-IV,[37] generated with the MINX[38] processing code using ENDF/B-IV[39] data, has been extensively tested on all 17 of the Cross Section Evaluation Working Group fast reactor benchmarks.[40] Results from this testing have been compiled in a LASL report.[41] Every experimental measurement is compared to 1-D and 2-D diffusion theory and $S_{16}P_{1/2}$ transport theory results. Several comparisons with other laboratories are also presented. In general, the results do not show any outstanding improvements or discrepancies over previous calculations. The main benefits of the study are the introduction of the packaged bench mark concept, which provides a convenient tool for rather complete testing of data and methods, and the establishment of a reference set of calculations that can be used to assess MINX and measure future data and code improvements.

B. Phase II Testing of Preliminary ENDF/B-V Data (R. B. Kidman)

Phase II testing of preliminary ENDF/B-V data consists of having several laboratories process the data into multigroup cross sections and then to test the processed data in the calculation of several assigned benchmark problems.

LASL has just recently received the preliminary ENDF/B-V data tapes. We have decided to process the data with the new code NJOY. Also, in order to make the processed cross sections applicable to fast and thermal reactors, fusion, weapons, and shield calculations, new 185-group neutron and 48-group photon structures and a new weighting function were programmed into NJOY. This processing is currently under way with high priority. It will require setting up, debugging, and "pushing" through the computer approximately 100 runs.

When Phase II testing of ENDF/B-IV was carried out, LASL provided 50-group cross sections to several laboratories. We intend to collapse the 180-group data to 50-groups to minimize any changes required to repeat the bench mark calculations.

C. Power Reactor Cross-Section Processing Methods (R. E. MacFarlane)

The new generation of thermal reactor codes sponsored by the Electic Power Reseach Institute (EPRI-CELL, EPRI-CPM) use the same background cross-section approach to self-shielding as is used in fast-reactor codes. A detailed investigation of the effects of the approximations used in this method on thermal reactor problems is now under way with the goal of improving both the libraries and the analysis codes. Some early results were reported in a paper[42] entitled "Data Processing for Power Reactor Fuel Cycle Codes," presented at a symposium on Nuclear Data for Thermal Reactors held at Brookhaven National Laboratory. Some effects of non-1/E flux, intermediate resonance parameters, elastic scattering self-shielding, transport correction, and heterogeneity were discussed.

D. The MATXS/TRANSX Cross-Section System (R. E. MacFarlane, R. J. Barrett, and R. B. Kidman)

The MATXS cross-section interface file is under development as a comprehensive file for use in the CCCC system. Recently, capabilities to store and retrieve thermal cross sections and self-shielding information have been added to the format, to the MATSXR formatting module of NJOY, and to the TRANSX retrieval code.

Thermal data are stored in a special "data type" that allows for free-gas and bound-scatterer incoherent and coherent group-to-group matrices of arbitrary Legendre order. For each nuclide, several different binding states can be included in the same library. This would allow, for example, the construction of cross sections for both water and polyethelene without having to duplicate the high-energy cross sections of hydrogen, which are not altered by the binding. In practice, the TRANSX user specifies the number of thermal groups desired (e.g., 40) and the names of the thermal coherent and incoherent scattering reactions desired (e.g., "H20"). The code then replaces the static ^{1}H elastic scattering group-to-group cross sections for the lowest 40 groups with the cross sections for ^{1}H in H_2O and adjusts the total cross section accordingly. This requires setting "NUP" greater than zero; TRANSX will consistently truncate both up and down scattering if necessary in forming the transport tables.

The traditional method of representing resonance self-shielding effects has been to use "f-factors," defined as the ratio of the cross section for one particular temperature T and background cross section σ_0 to a reference case (often $T = 0$ and $\sigma_0 = \infty$). MATXS departs from this tradition by storing $\Delta\sigma = \sigma(T,\sigma_0) - \sigma(\text{ref})$. This representation requires less storage in the retrieval code since only the accumulating cross section and $\Delta\sigma$ are in memory at once, whereas the traditional method requires the accumulating cross section, the f-factor, and the reference cross section. The $\Delta\sigma$ method allows TRANSX to shield each element of the scattering matrix without excessive use of memory. Provisions are included to shield the heat production cross section and the photon production matrix.

TRANSX allows for group and nuclide dependent σ_0 values for each mixture. The values can be determined by iterating the total cross section of a mixture to convergence (the σ_0-iteration), by using a simple buckling, or by specifying a single escape cross section.

Once T and σ_0 have been determined for each nuclide, the code interpolates using multipoint Lagrangian interpolation with special branches for very large and very small σ_0 values. This approach requires only one material to be in memory at any time and is therefore well suited to reading through a material-order file like MATXS. These new schemes have been investigated with the use of an auxiliary plotting program that has graphically caught several errors. The latest iteration is still under investigation.

To make use of the new thermal and shielding capabilities, the TRANSX user must supply some additional information. An example for a simple three-region pin cell follows.

```
TRANSX
MATXS TO TRANSPORT                                 39.445S

OPTIONS
-------
IPRINT      0    (0/1=LONG/SHORT)
IOUT        0    (0/1/2/3/4=NONE/LASL/TD/FIDO/ANISN)
IPROB       0    (0/1=DIRECT/ADJOINT)
ISET        1    (1/2/3=NN/GG/COUPLED)
IFORM       1    (1/2=MATWISE/GROUPWISE)
ITIME       1    (1/2=STEADY-STATE/PROMPT)
IFPART      0    (0/1=NO/YES)
ITRC        0    (0/1/2/3/4=NO TRANSPORT CORR/CONS.P/DIAG/B-H-S/INFLOW)
ICOLL      -1    (-1/0/NFINE=LIB FLUX/NO COLLAPSE/READ FLUX)
IFLUX       0    (0/1/2=NO FLUX CALCULATION/B0/B1)

PARAMETERS
----------
NGN         2    NEUTRON GROUPS
NGG         0    GAMMA GROUPS
```

```
NL              4    TABLES
NTABL          10    POSITIONS IN TABLE
NUP             1    UP SCATTER GROUPS
NMIX            3    MIXES OR MATERIALS
NMIXS           5    MIXTURE SPECIFICATIONS
NED             4    EXTRA EDIT POSITIONS
NEDS            3    EDIT SPECIFICATIONS

MIX NAMES          HETEROGENIETY
---------          -------------
(1) 1   FUEL          1      1.0173E+00   0.
    2   CLAD          0      0.           0.
    3   MOD           0      0.           0.

MIX SPECS          DENSITY     TEMP (K)     SIGZERO       REG      THERMAL
---------          -------     --------     -------       ---      -------
(2) 1   U235       6.253E-04   3.000E+02    0.             1       40   FREE
    1   U238       4.721E-02   3.000E+02    0.             1       40   FREE
    2   AL27       6.025E-02   3.000E+02    1.000E+10      2       40   FREE
(3) 3   H1         6.676E-02   3.000E+02    1.000E+10      3       40   H2O
    3   016        3.338E-02   3.000E+02    1.000E+10      3       40   FREE

EDIT NAMES
----------
 1    CHI
 2    F238
 3    F235
 4    C238

EDIT SPECIFICATIONS
-------------------
 2    NFTOT     1.000E+00    U238
 3    NFTOT     1.000E+00    U235
 4    NG        1.000E+00    U238

COLLAPSE SPECIFICATIONS
-----------------------
     45     24

FILE ID   MATXS T2LASL NJOY   VERS  1

THERMAL TEST
 .
 .
 .
COMPUTED SIGMA ZERO VALUES BY FINE GROUP
----------------------------------------
GROUP    1  U235      1  U238
-----    ---------    ---------
   1     2.13E+03     2.16E+01
   2     2.21E+03     2.17E+01
   .
   .
   .

** FUEL    P0 **

POSITION       GROUP   1     GROUP   2
--------       ---------     ---------
  1 CHI        1.000E+00     0.
  2 F238       4.317E-03     0.
  3 F235       5.669E-03     1.863E-01
  4 C238       3.032E-02     7.170E-02
  5 ABS        5.975E-02     7.228E-01
  6 NUSIGF     2.577E-02     4.499E-01
  7 TOTAL      5.209E-01     1.154E+00
  8            9.363E-04     0.
  9 INGRP      4.609E-01     4.307E-01
 10            0.            2.536E-04
  .
  .
  .
```

Line (1) indicates that mix 1 is to have an escape cross section corresponding to a mean chord of 4.915 mm. The other two regions are infinite and homogeneous. Line (2) specifies that in mix 1, ^{235}U is to have a given density and temperature, that σ_0 is to be calculated, that mix 1 is in region 1, and that 40 groups of free thermal scattering are to be used. In mix 2 and mix 3, $\sigma_0 = \infty$ is adequate. Note on line (3) that the thermal scattering appropriate to water is used for the hydrogen in the moderator region. The results are collapsed to two groups (0.625-eV break), and special activity edit cross sections for ^{235}U fission and capture and ^{238}U capture are provided for calculating the standard spectral indices ρ^{28}, δ^{25}, and δ^{28}. The resulting cross sections for the three mixes are directly available for use in a standard transport code.

E. Thermal Reactor Cross Sections (R. E. MacFarlane and R. M. Boicourt)

A library of multigroup cross sections for thermal reactor applications has been prepared from ENDF/B-IV evaluated nuclear data using the NJOY processing system. The library uses the 69-group structure of EPRI-CPM,[43] which has 27 fast groups (above 4.0 eV) and 43 thermal groups. The nuclides included are listed in Table I. Note that temperature and background-dependent self-shielding factors are included for the heavy isotopes. Most nuclides include complete sets of cross sections and P_3 group-to-group matrices versus temperature (usually 300 to 2100 K), although only transmutation cross sections are given for the indicated isotopes. All nuclides have had prompt heat production cross sections (KERMA factors) and free gas thermal scattering matrices constructed for them. In addition, bound thermal scattering matrices are included for ^{1}H in water, ^{1}H in polyethylene, ^{2}H in heavy water, ^{9}Be in beryllium metal, and ^{12}C in graphite. Coherent scattering is given for beryllium metal and graphite. Although this library was originally produced to be converted into a job library for the CPM code (a reactor cell code using the collision probability method), it can also be used in standard diffusion and transport codes after appropriate reformatting.

III. FISSION PRODUCTS AND ACTINIDES: YIELDS, YIELD THEORY, DECAY DATA, DEPLETION, AND BUILD-UP

A. Fission-Yield Theory [R. Pepping (University of Wisconsin), C. W. Maynard University of Wisconsin), D. G. Madland, T. R. England, and P. G. Young]

Fission-product yields have been computed, based on the assumption of oblate fragments at the scission point. This is done by constraining either the center-to-center or end-to-end separation. Such a constraint is consistent with the

TABLE I

ISOTOPES IN THERMAL POWER REACTOR CROSS-SECTION LIBRARY

Nuclide (complete)	Nuclide (with (transmutation only)	Nuclide (with resonance only)
H-1	Ru-103	Th-232
H-2	Ru-105	Pa-233
He-4	Rh-103	U-233
B-10	Rh-105	U-234
C-12	Ag-109	U-235
N-14	I-135	U-236
O-16	Xe-131	U-238
Na-23	Xe-133	Np-237
Mg	Xe-135	Pu-238
Al-27	Cs-133	Pu-239
Si	Cs-134	Pu-240
K	Pr-143	Pu-241
Ca	Nd-143	Pu-241
Cr	Nd-145	Pu-242
Mn-55	Nd-147	Am-241
Fe	Pm-147	Am-243
Ni	Pm-148	Cm-244
Zircalloy-2	Pm-148m	
Mo	Pm-149	
	Pm-151	
	Sm-149	
	Sm-150	
	Sm-151	
	Sm-152	
	Sm-153	
	Sm-154	
	Sm-155	

model proposed by Jensen and Dossing.[44] The general features of the yield do not differ greatly from those previously reported.[45] In some cases the space of allowed shapes appears to be too restricted, the minimum potential energy occurring for shapes of maximum allowed oblateness.

A persistent feature of the yields computed, assuming both oblate and prolate configurations, is an enhancement of the yield of fragments with odd Z. Recent measurements show an enhancement of about 25% of fragments with even Z.[46,47] There are two possible sources of this effect: the level density and the energetics. The level density, with the parameters reported previously,[48] shows an odd-Z enhancement, while the energetics (G-function) favor even-Z. The effect of energetics is then not sufficiently strong to overcome the level-density effect. As an independent check, level densities have been computed with a code developed by Moretto[49] for a few test cases, confirming the odd-particle number enhancement. A reevaluation of the shell and pairing terms is under way.

B. ENDF/B-V YIELDS [T. R. England, J. Liaw (University of Oklahoma), W. B, Wilson, D. G. Madland, and N. L. Whittemore]

Subject to data testing results, Version VE yields will be supplied to replace those values currently being used in ENDF/B-V. The target date for completion of this effort is August 15, 1978.

The new yields correct several known, but minor, errors in Version VD, and include more delayed neutron branching fractions (92 vs. 57) and measured data. Currently, the isobaric chains are being extended to include all nuclides in the decay data files, and the yields and their uncertainties put into the new ENDF/B-V format structure. Data testing will begin about August 1, and the results will determine whether or not the new values will be used.

C. Decay Heat Standard [T. R. England, R. E. Schenter (Hanford Engineering Development Lab), and F. Schmittroth (Hanford Engineering Development Lab)

An extensive report[50] on integral decay-heat comparisons with ENDF/B and generation of the nominal values for use in the ANS 5 Decay-Heat Standard has been prepared. The results were presented in an invited talk at the seminar on Nuclear Data Problems for Thermal Reactor Applications held at Brookhaven National Laboratory on May 22-24, 1978.

In this report, results from recent integral decay-power experiments are presented and compared with summation calculations. The experiments include the decay power following thermal fission of ^{233}U, ^{235}U, and ^{239}Pu. The summation calculations use ENDF/B-IV decay data and yields from Versions IV and V. Limited comparisons of experimental beta and gamma spectra with summation calculations using ENDF/B-IV are included. Generalized least-squares methods are applied to the recent ^{235}U and ^{239}Pu decay-power experiments and summation calculations to arrive at evaluated values and uncertainties. Results for ^{235}U imply uncertainties less than 2% (1 σ) for the "infinite" exposure case for all cooling times greater than 10 s. The uncertainties for ^{239}Pu are larger. Accurate analytical representations of the decay power are presented for ^{235}U, ^{238}U, and ^{239}Pu for use in light-water reactors and as the nominal values in the new

ANS 5.1 Standard, accepted by the ANS on June 21, 1978. Comparisons of the nominal values with ENDF/B-IV and the 1973 ANS Draft Standard in current use are included. Gas content, important to decay-heat experiments, and absorption effects on decay power are reviewed.

The importance of this report is that it documents all comparisons and contains a detailed summary of the nominal values and uncertainties used in the standard. Most of the effort toward understanding the ^{239}Pu decay-heat discrepancy between LASL and ORNL and calculations made during this quarter are discussed in the report.

D Spectral Comparisons (T. R. England, R. J. LaBauve, and N. L. Whittemore)

During this quarter, we have compared ^{239}Pu and ^{233}U gamma spectra recently measured at LASL by E. Jurney and P. Bendt with calculations using ENDF/B-IV data. The results are generally as good as the earlier ^{235}U comparisons.[51]

E. Status of Fission-Product Data for Absorption Calculations (W. B. Wilson and T. R. England)

The status of fission-product data for absorption calculations was described in a paper presented at the seminar on Nuclear Data Problems in Thermal Reactor Applications held at the Brookhaven National Laboratory on May 22-24, 1978. In addition to the summary of the development of methods and data, a study of the fission-product nuclides and parameters most significant to parasitic absorption calculations was described.[52] The sensitivity of the fission-product absorption rate to each of the nearly 300 nuclide parameters was examined at a number of irradiation periods of 33 GW days/MT light-water reactor fuel.

F. Library for Processed ENDF/B Aggregate Fission-Product Spectra (R. J. LaBauve, T. R. England, and D. C. George)

The library of processed ENDF/B aggregate fission product multigroup pulse spectra (PEFPYD), the code for collapsing to a broad-energy group structure and fitting the resulting broad-group pulse spectra with analytic functions (the code FITPULS), and the application of these fitted functions in the calculation of decay-energy spectra for finite irradiation times were described at the June American Nuclear Society Meeting.[53] To date, we have obtained parameters for pulse fits in 11 broad-energy groups for 5 ENDF/B-IV fission-yield sets.

The parameters for the fits, shown in Table II, are in an ENDF-like format and are for ^{233}U thermal, ^{235}U thermal, ^{238}U fast, ^{239}Pu thermal, and ^{232}Th fast neutron incident energy for both beta- and gamma-decay energy spectra.

In the ENDF-like format, columns 66-70 contain the "MAT-No." that is used to identify the target nucleus. The MAT-Nos. used in the listing are the same as those used in ENDF/B-IV and are as follows.

MAT No.	Target Nucleus
1260	^{233}U
1261	^{235}U
1262	^{238}U
1264	^{239}Pu
1296	^{232}Th

A zero in column 70 signifies the end of the data for that MAT. The next two columns, 71 and 72, are used for the MF-No., which identifies the energy of the incident neutron. Here only two numbers are used; MF=80 denotes "thermal" neutrons, and MF=81 denotes "fast" neutrons. A zero in column 72 signifies the end of the data for that MF.

Columns 73-75 contain the MT-No. that is used here to identify whether the parameters are for a fit for the beta decay energy spectrum (MT=802) or a fit for the gamma decay energy spectrum (MT=803). A zero in column 75 signifies the end of the data for that MT.

The data for a particular MAT, MF, MT combination are given in field widths of 11 and are organized as follows.

1. The sixth field on the first data card (number 11 in this case) gives the number of broad-energy groups for which the pulse fits are given.

2. On the next card, the first two fields give the energy bounds for the group in MeV; 0.1 to 0.9 MeV for group 1, for example. The sixth field gives the group number; 1, 2, 3, 4, etc.

3. The first two fields on the third data card give the cooling-time range in s over which the fit was made; 0.1 to 1 x 10^9 s for group 1, for example. The sixth field gives the number of pairs of parameters used in the fit; 16 for group 1, for example.

4. Next follows a number of cards containing the α_i and λ_i used for the pulse fit.

For example, for group 1, six cards are needed to contain the sixteen parameters needed for the pulse fit $fc(t) = \sum_{i=1}^{16} \alpha_i e^{-\lambda_i t}$.

TABLE II

USEFUL FITS IN 11 GROUPS

11 GROUP FITS FROM 2PT/TIME DECADE PEFPYD DATA,JUN78,RJL/DCG,LASL						-0-0 -0	0
0.	0.	0	0	0		11126080802	1
1.00000- 1	4.00000- 1	0	0	0		1126080802	2
1.00000- 1	1.00000+ 9	0	0	0		16126080802	3
1.17807- 3	1.31789+ 0	7.30423- 4	1.23996- 1	3.33156- 4	1.67269-	2126080802	4
4.18899- 5	3.14840- 3	2.95328- 5	1.09728- 3	8.50174- 6	4.16289-	4126080802	5
3.90218- 6	1.43197- 4	7.87240- 7	4.15921- 5	4.88582- 7	1.53794-	5126080802	6
6.28912- 8	4.52958- 6	3.25016- 8	1.27831- 6	7.57565- 9	4.98598-	7126080802	7
4.22761- 9	2.20467- 7	6.79934-10	7.57640- 8	3.61435-11	1.61480-	8126080802	8
1.82686-11	8.87199-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080802	9
4.00000- 1	9.00000- 1	0	0	0		2126080802	10
1.00000- 1	1.00000+ 9	0	0	0		17126080802	11
7.85016- 3	1.48645+ 0	1.69559- 3	2.99261- 1	3.95672- 3	1.22866-	1126080802	12
1.79803- 3	1.85960- 2	2.42225- 4	3.97993- 3	1.03123- 4	1.30779-	3126080802	13
3.45285- 5	4.54034- 4	1.23831- 5	1.67415- 4	2.10957- 6	4.42210-	5126080802	14
1.47045- 6	1.70484- 5	2.02086- 7	5.76043- 6	5.05940- 8	1.44126-	6126080802	15
9.84058- 9	4.62132- 7	6.85099- 9	2.03147- 7	1.23372- 9	8.09713-	8126080802	16
1.00093-10	2.11370- 8	1.52754-11	8.62735-10	0.00000+ 0	0.00000+	0126080802	17
9.00000- 1	1.35000+ 0	0	0	0		3126080802	18
1.00000- 1	1.00000+ 9	0	0	0		17126080802	19
1.57186- 2	1.60646+ 0	4.61113- 3	3.54381- 1	7.61468- 3	1.27400-	1126080802	20
2.95660- 3	2.01209- 2	3.61986- 4	4.49169- 3	1.22266- 4	1.40394-	3126080802	21
3.73673- 5	4.73914- 4	1.34546- 5	1.78053- 4	2.61936- 6	5.48139-	5126080802	22
1.48189- 6	2.31377- 5	1.27872- 7	7.06160- 6	1.19771- 8	1.33661-	6126080802	23
3.33251- 9	2.98222- 7	2.12419- 9	1.44930- 7	6.43493-10	5.93584-	8126080802	24
1.85600-10	2.19179- 8	1.89017-11	8.54770-10	0.00000+ 0	0.00000+	0126080802	25
1.35000+ 0	1.80000+ 0	0	0	0		4126080802	26
1.00000- 1	1.00000+ 9	0	0	0		17126080802	27
2.51541- 2	1.69336+ 0	8.17767- 3	3.24759- 1	1.05374- 2	1.36190-	1126080802	28
3.92872- 3	2.17891- 2	3.68696- 4	4.51814- 3	1.40071- 4	1.44406-	3126080802	29
3.60801- 5	4.75951- 4	1.03436- 5	1.71545- 4	1.73613- 6	5.04944-	5126080802	30
1.61758- 6	2.78985- 5	8.53165- 8	9.24376- 6	4.06210- 9	1.45389-	6126080802	31
4.34269-10	2.94410- 7	4.04202-11	5.85841- 8	4.19332-10	2.83529-	8126080802	32
4.22893-11	2.24316- 8	1.48324-11	7.82500-10	0.00000+ 0	0.00000+	0126080802	33
1.80000+ 0	2.20000+ 0	0	0	0		5126080802	34
1.00000- 1	1.00000+ 9	0	0	0		16126080802	35
2.67997- 2	1.75825+ 0	9.79129- 3	3.97575- 1	1.20350- 2	1.41739-	1126080802	36
3.68042- 3	2.38143- 2	3.81235- 4	5.11213- 3	1.15250- 4	1.53819-	3126080802	37
3.26646- 5	5.24278- 4	4.77670- 6	1.74888- 4	1.29386- 6	4.76461-	5126080802	38
1.18018- 6	3.13581- 5	6.46069- 8	1.13694- 5	5.21521-10	1.00596-	6126080802	39
2.33656-12	1.82662- 7	3.66427-10	2.77694- 8	2.63892-14	7.73440-	9126080802	40
4.12290-12	7.83200-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080802	41
2.20000+ 0	2.60000+ 0	0	0	0		6126080802	42
1.00000- 1	1.00000+ 9	0	0	0		16126080802	43
2.68443- 2	1.85815+ 0	1.20439- 2	5.25591- 1	1.37984- 2	1.41964-	1126080802	44
3.12400- 3	2.42660- 2	4.22520- 4	5.91974- 3	1.04156- 4	1.59896-	3126080802	45
2.61062- 5	5.65700- 4	3.24667- 6	1.84159- 4	5.24379- 7	4.99604-	5126080802	46
1.24884- 6	3.63646- 5	2.71195- 8	1.40884- 5	2.08737-11	6.87300-	8126080802	47
1.30354-10	2.68711- 8	3.70320-11	2.85321- 8	2.03500-11	2.45991-	8126080802	48
2.70470-14	7.80394-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080802	49
2.60000+ 0	3.00000+ 0	0	0	0		7126080802	50
1.00000- 1	1.00000+ 9	0	0	0		15126080802	51
2.47528- 2	2.09493+ 0	1.31971- 2	5.60221- 1	1.31090- 2	1.52802-	1126080802	52
2.87281- 3	2.60491- 2	3.68876- 4	5.95494- 3	8.54516- 5	1.67914-	3126080802	53

2.11128- 5	5.09142- 4	1.30756- 6	1.66618- 4	2.12659- 7	6.67863-	5126080802	54
1.43713- 6	4.76290- 5	3.82280- 9	1.41515- 5	1.23430-11	9.33799-	7126080802	55
2.51502-11	3.01380- 8	2.16852-11	2.36158- 8	6.07421-17	1.00000-	9126080802	56
3.00000+ 0	4.00000+ 8	0	0	0		8126080802	57
1.00000- 1	1.00000+ 9	0	0	0		15126080802	58
3.80203- 2	2.63620+ 0	3.32298- 2	6.19487- 1	2.11625- 2	1.35191-	1126080802	59
3.44896- 3	2.38179- 2	6.22859- 4	6.83902- 3	1.31045- 4	1.77137-	3126080802	60
2.1[illegible]49- 5	5.87194- 4	1.38031- 6	1.51939- 4	1.05890- 6	6.57357-	5126080802	61
1.51295- 6	5.84260- 5	3.57963- 9	1.69857- 5	1.91793-11	1.24070-	6126080802	62
4.05460-18	1.22381- 6	2.63993-12	2.21677- 8	4.61356-17	6.08415-	10126080802	63
4.00000+ 0	5.00000+ 0	0	0	0		9126080802	64
1.00000- 1	1.00000+ 9	0	0	0		14126080802	65
1.76502- 2	2.49308+ 0	9.36264- 3	5.21734- 1	1.25463- 2	1.44344-	1126080802	66
1.16599- 3	2.53475- 2	2.94050- 4	8.48785- 3	2.77222- 5	2.66519-	3126080802	67
7.16539- 7	3.92118- 4	4.73888- 8	6.24396- 5	9.85050- 7	6.92667-	5126080802	68
-2.31622-10	3.45321- 5	2.05706-12	1.03762- 6	6.47814-17	1.46374-	7126080802	69
2.66005-18	2.81795-11	2.47742-18	2.81298-12	0.00000+ 0	0.00000+	0126080802	70
5.00000+ 0	6.00000+ 0	0	0	0		10126080802	71
1.00000- 1	1.00000+ 9	0	0	0		13126080802	72
8.21597- 3	2.59379+ 0	4.51384- 3	3.86088- 1	6.33458- 3	1.31950-	1126080802	73
3.10320- 4	3.55307- 2	9.50091- 5	1.09562- 2	1.22664- 5	4.31053-	3126080802	74
9.49819- 8	1.14666- 3	1.93264- 8	6.85689- 5	1.01233-14	3.10931-	6126080802	75
2.90196-13	1.03353- 6	3.00223-19	1.29786- 7	2.11902-20	2.70455-	11126080802	76
5.87326-20	2.42474-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080802	77
6.00000+ 0	7.50000+ 0	0	0	0		11126080802	78
1.00000- 1	1.00000+ 7	0	0	0		11126080802	79
3.57554- 3	2.46348+ 0	1.40706- 3	4.70754- 1	2.80901- 3	1.47840-	1126080802	80
1.92368- 4	6.53921- 2	1.78010- 5	1.57095- 2	4.87805- 7	4.97659-	3126080802	81
3.22183- 9	1.74815- 3	3.14936-10	8.25306- 4	1.91498-14	2.29724-	4126080602	82
6.48365-15	1.03766- 6	6.25361-21	1.03413- 7	0.00000+ 0	0.00000+	0126080802	83
						126080 0	84
0.	0.	0	0	0		11126080803	85
1.00000- 1	4.00000- 1	0	0	0		1126080803	86
1.00000- 1	1.00000+ 9	0	0	0		17126080803	87
1.89325- 2	1.44703+ 0	7.05340- 3	1.52217- 1	1.30050- 3	2.43368-	2126080803	88
1.62580- 4	5.76486- 3	4.37230- 5	1.04581- 3	1.87770- 5	5.10305-	4126080803	89
6.90570- 6	2.47235- 4	3.56388- 7	3.74253- 5	2.33710- 7	1.05674-	5126080803	90
6.47575- 8	4.41987- 6	2.95853- 8	1.80254- 6	9.76673- 9	7.23884-	7126080803	91
1.41137- 9	3.23856- 7	1.31078-10	7.97996- 8	2.05209-13	2.66028-	8126080803	92
5.60422-12	1.45027- 8	2.96108-16	1.00000- 9	0.00000+ 0	0.00000+	0126080803	93
4.00000- 1	9.00000- 1	0	0	0		2126080803	94
1.00000- 1	1.00000+ 9	0	0	0		16126080803	95
8.22035- 2	2.23834+ 0	4.77789- 2	8.12574- 1	3.63471- 2	1.87581-	1126080803	96
3.02441- 3	2.31596- 2	5.83374- 4	4.43976- 3	1.81455- 4	1.39806-	3126080803	97
4.37608- 5	4.09459- 4	3.94794- 5	1.76089- 4	2.73226- 6	5.18154-	5126080803	98
1.88664- 6	1.26902- 5	1.41442- 7	4.88981- 6	2.02228- 7	1.91329-	6126080803	99
1.45733- 8	1.22653- 7	1.10403-10	3.31610- 8	-1.38468-15	8.74440-	9126080803	100
3.11532-11	7.47294-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080803	101
9.00000- 1	1.35000+ 0	0	0	0		3126080803	102
1.00000- 1	1.00000+ 9	0	0	0		16126080803	103
1.93238- 2	1.68138+ 0	7.17798- 3	3.04452- 1	8.73607- 3	1.11613-	1126080803	104
3.60909- 3	1.90921- 2	2.83618- 4	4.46986- 3	1.89610- 4	1.04538-	3126080803	105
6.82171- 5	5.43310- 4	2.23397- 5	2.29180- 4	2.14063- 6	5.00771-	5126080803	106
1.41774- 6	2.30521- 5	8.44283- 8	6.76027- 6	3.17869- 9	2.07499-	6126080803	107
1.11601-10	1.29775- 6	2.98279- 9	5.24921- 7	1.50406-12	2.21089-	8126080803	108
1.61223-16	4.53280-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080803	109
1.35000+ 0	1.80000+ 0	0	0	0		4126080803	110
1.00000- 1	1.00000+ 9	0	0	0		14126080803	111
9.73488- 3	1.32524+ 0	7.83103- 3	1.32085- 1	3.91782- 3	1.85826-	2126080803	112
6.03135- 4	5.50992- 3	4.94961- 5	1.29847- 3	4.93247- 5	3.37293-	4126080803	113
3.00866- 6	1.94123- 4	7.72826- 6	6.57317- 5	7.38599- 7	3.09610-	5126080803	114
-1.08645- 8	5.01894- 6	7.76564- 8	6.33444- 7	-8.71056-15	6.33579-	7126080803	115
6.17038-12	2.70810- 8	2.33063-16	3.57423-10	0.00000+ 0	0.00000+	0126080803	116
1.80000+ 0	2.20000+ 0	0	0	0		5126080803	117
1.00000- 1	1.00000+ 9	0	0	0		15126080803	118
2.47866- 3	1.35692+ 0	1.91617- 3	1.27042- 1	1.25692- 3	1.73512-	2126080803	119
9.01932- 5	4.63827- 3	6.67399- 5	9.53098- 4	8.93792- 6	4.45432-	4126080803	120
8.23795- 6	1.54208- 4	3.34213- 6	7.92945- 5	6.94403- 7	3.86097-	5126080803	121
5.24338- 9	5.08527- 6	9.06809- 9	2.58819- 6	3.35679-10	9.51548-	7126080803	122
-6.79091-12	4.64232- 8	2.77659-11	2.93285- 8	6.09736-17	3.31529-	10126080803	123

2.20000+ 0	2.60000+ 0	0	0	0		6126080803	124
1.00000- 1	1.00000+ 9	0	0	0		13126080803	125
4.23325- 3	1.38942+ 0	3.29307- 3	1.31796- 1	1.80627- 3	1.77436-	2126080803	126
2.23452- 4	5.95908- 3	2.43730- 5	6.02426- 4	1.17665- 5	2.81664-	4126080803	127
8.71145- 6	8.68231- 5	5.29131- 7	5.95306- 5	3.03421-10	1.25122-	6126080803	128
4.76826- 9	6.31576- 7	1.22792-13	8.14057- 8	7.09248-14	2.01521-	8126080803	129
5.79528-17	7.87233-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080803	130
2.60000+ 0	3.00000+ 0	0	0	0		7126080803	131
1.00000- 1	1.00000+ 9	0	0	0		14126080803	132
3.59237- 3	1.37718+ 0	2.86956- 3	1.31731- 1	1.05739- 3	2.07429-	2126080803	133
1.80551- 4	5.69092- 3	2.94412- 5	1.80819- 3	4.87394- 6	3.96467-	4126080803	134
3.90425- 6	1.95825- 4	4.80228- 7	1.11253- 4	4.81360- 7	7.20150-	5126080803	135
-6.79772-11	5.92597- 6	9.69156-11	6.41079- 7	1.54636-14	8.06270-	8126080803	136
8.37690-15	1.95412- 8	1.72686-17	2.96936-12	0.00000+ 0	0.00000+	0126080803	137
3.00000+ 0	4.00000+ 0	0	0	0		8126080803	138
1.00000- 1	1.00000+ 9	0	0	0		15126080803	139
2.64737- 3	1.26668+ 0	2.15189- 3	1.15420- 1	1.52309- 3	1.66084-	2126080803	140
2.92588- 4	5.37660- 3	1.35423- 4	2.52772- 3	5.62011- 6	5.41770-	4126080803	141
3.09498- 6	1.87804- 4	6.76027- 7	1.14637- 4	2.89359- 7	7.69293-	5126080803	142
-1.07323-11	1.45205- 5	5.24704-11	7.07436- 7	1.80487-13	2.28520-	7126080803	143
2.54002-19	4.91284- 9	7.82941-19	5.15033-11	1.02158-17	1.39532-	13126080803	144
4.00000+ 0	5.00000+ 0	0	0	0		9126080803	145
1.00000- 1	1.00000+ 9	0	0	0		13126080803	146
1.60747- 3	1.80160+ 0	1.52883- 3	2.25890- 1	9.83004- 4	3.77720-	2126080803	147
4.49906- 4	6.56220- 3	1.25744- 4	4.02700- 3	6.99651- 6	1.16040-	3126080803	148
3.08736- 8	2.06360- 4	2.67969- 8	8.24140- 5	9.73688- 9	6.18350-	5126080803	149
1.19193-11	1.16120- 6	5.46651-12	7.60220- 7	1.52415-13	4.36750-	7126080803	150
2.30121-19	3.78000-11	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126080803	151
5.00000+ 0	6.00000+ 0	0	0	0		10126080803	152
1.00000- 1	1.00000+ 7	0	0	0		12126080803	153
1.27454- 3	2.91445+ 0	8.78971- 4	8.01442- 1	1.44623- 3	1.78353-	1126080803	154
1.92093- 4	5.69186- 2	6.41882- 5	1.10420- 2	1.74079- 5	5.97661-	3126080803	155
2.31868- 5	4.12612- 3	5.69813- 7	1.58143- 3	4.10434- 8	7.85728-	4126080803	156
1.23318-13	1.36270- 7	4.11718-12	7.50078- 7	-5.08962-14	5.73601-	8126080803	157
6.00000+ 0	7.50000+ 0	0	0	0		11126080803	158
1.00000- 1	1.00000+ 7	0	0	0		11126080803	159
2.65368- 4	2.23454+ 0	1.11320- 4	5.36125- 1	2.37879- 8	1.53795-	1126080803	160
9.64569- 6	1.88410- 2	6.16453- 6	1.18887- 2	1.18051- 6	1.01567-	2126080803	161
5.03227-10	1.55458- 3	7.03880-14	8.19018- 5	-2.17311-13	8.43794-	7126080803	162
6.41982-13	6.80326- 7	1.14132-15	1.80848- 7	0.00000+ 0	0.00000+	0126080803	163
						126080 0	164
						1260 0 0	165
						0 0 0	166
0.	0.	0	0	0		11126180802	1
1.00000- 1	4.00000- 1	0	0	0		1126180802	2
1.00000- 1	1.00000+ 9	0	0	0		16126180802	3
2.76879- 3	1.45381+ 0	1.28097- 3	1.38592- 1	4.76613- 4	1.70696-	2126180802	4
5.01187- 5	2.40758- 3	2.57695- 5	9.23360- 4	9.36897- 6	3.78094-	4126180802	5
3.80721- 6	1.47429- 4	6.97162- 7	4.22706- 5	5.25675- 7	1.47919-	5126180802	6
6.42172- 8	4.56836- 6	3.27577- 8	1.29054- 6	7.27157- 9	5.08353-	7126180802	7
4.04634- 9	2.30415- 7	7.20339-10	7.66225- 8	4.66955-11	1.58689-	8126180802	8
1.50326-11	8.01828-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180802	9
4.00000- 1	9.00000- 1	0	0	0		2126180802	10
1.00000- 1	1.00000+ 9	0	0	0		17126180802	11
1.82626- 2	1.66124+ 0	5.81826- 3	3.21188- 1	5.02635- 3	1.02291-	1126180802	12
2.41655- 3	1.84530- 2	2.47292- 4	3.88907- 3	1.10704- 4	1.25923-	3126180802	13
3.75435- 5	4.35588- 4	1.28235- 5	1.66976- 4	1.86468- 6	4.67802-	5126180802	14
1.59380- 6	1.70337- 5	2.33907- 7	5.93531- 6	5.02395- 0	1.48776-	6126180802	15
1.07640- 8	5.22256- 7	6.05622- 9	2.20085- 7	1.32156- 9	8.12784-	8126180802	16
1.24375-10	2.09389- 8	1.25056-11	7.91748-10	0.00000+ 0	0.00000+	0126180802	17
9.00000- 1	1.35000+ 0	0	0	0		3126180802	18
1.00000- 1	1.00000+ 9	0	0	0		17126180802	19
3.83659- 2	1.64979+ 0	1.20318- 2	3.21283- 1	9.60829- 3	1.05840-	1126180802	20
3.91077- 3	1.99022- 2	3.89244- 4	4.50680- 3	1.30117- 4	1.39059-	3126180802	21
4.08136- 5	4.64025- 4	1.38431- 5	1.77849- 4	2.41778- 6	5.86555-	5126180802	22
1.51009- 6	2.31590- 5	1.32817- 7	7.22542- 6	1.22656- 8	1.40600-	6126180802	23
2.75929- 9	3.66400- 7	2.16993- 9	1.58668- 7	7.13751-10	5.92765-	8126180802	24
2.26836-10	2.16017- 8	1.55507-11	7.80343-10	0.00000+ 0	0.00000+	0126180802	25
1.35000+ 0	1.80000+ 0	0	0	0		4126180802	26

1.00000- 1	1.00000+ 9	0	0	0		17126180802	27
5.65416- 2	1.89668+ 0	2.38913- 2	4.14764- 1	1.53936- 2	1.03639-	1126180802	28
4.59877- 3	2.01082- 2	4.07969- 4	4.42658- 3	1.44031- 4	1.42549-	3126180802	29
3.93732- 5	4.67963- 4	1.00242- 5	1.77740- 4	1.56505- 6	5.77599-	5126180802	30
1.63683- 6	2.79235- 5	7.92657- 8	9.64535- 6	4.39155- 9	1.50572-	6126180802	31
3.14023-10	2.38752- 7	8.58378-11	3.40681- 8	4.47296-10	2.76327-	8126180802	32
3.65979-11	2.22880- 8	1.30160-11	7.92748-10	0.00000+ 0	0.00000+	0126180802	33
1.80000+ 0	2.20000+ 0	0	0	0		5126180802	34
1.00000- 1	1.00000+ 9	0	0	0		16126180802	35
6.18952- 2	1.85587+ 0	2.63810- 2	4.44567- 1	1.70417- 2	1.13852-	1126180802	36
4.46878- 3	2.19628- 2	4.26161- 4	5.16312- 3	1.19508- 4	1.53095-	3126180802	37
3.70577- 5	5.23311- 4	4.31425- 6	1.90690- 4	1.08707- 6	5.18860-	5126180802	38
1.17447- 6	3.24598- 5	7.87866- 8	1.22247- 5	5.38424-10	1.15084-	6126180802	39
3.25314-11	3.98620- 7	4.33761-10	2.76019- 8	3.78592-13	2.96448-	8126180802	40
3.56902-12	7.92691-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180802	41
2.20000+ 0	2.60000+ 0	0	0	0		6126180802	42
1.00000- 1	1.00000+ 9	0	0	0		16126180802	43
5.68253- 2	2.60230+ 0	4.28895- 2	5.53390- 1	1.84235- 2	1.17430-	1126180802	44
4.08763- 3	2.29680- 2	4.68408- 4	5.76010- 3	1.09553- 4	1.59460-	3126180802	45
2.91333- 5	5.72220- 4	3.01788- 6	1.97920- 4	2.32268- 7	4.03530-	5126180802	46
1.15956- 6	3.61940- 5	1.10940- 8	1.16860- 5	2.66705-11	1.76488-	7126180802	47
1.76405-10	2.68330- 8	3.70529-11	2.75715- 8	2.96361-11	2.78522-	8126180802	48
2.41157-14	8.07920-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180802	49
2.60000+ 0	3.00000+ 0	0	0	0		7126180802	50
1.00000- 1	1.00000+ 9	0	0	0		15126180802	51
6.43156- 2	1.93066+ 0	2.65202- 2	5.46030- 1	1.99957- 2	1.38453-	1126180802	52
3.59701- 3	2.43432- 2	4.71405- 4	6.14342- 3	8.61565- 5	1.66642-	3126180802	53
2.60429- 5	6.04011- 4	4.25276- 7	2.57148- 4	4.13834- 8	7.12453-	5126180802	54
1.45412- 6	5.05745- 5	1.35054- 8	1.66286- 5	3.93246-11	1.06953-	6126180802	55
2.63822-11	3.17196- 8	3.17023-11	2.34170- 8	1.83652-17	1.18534-	9126180802	56
3.00000+ 0	4.00000+ 0	0	0	0		8126180802	57
1.00000- 1	1.00000+ 9	0	0	0		15126180802	58
1.23767- 1	1.81367+ 0	4.34200- 2	4.59880- 1	2.94350- 2	1.24126-	1126180802	59
4.83717- 3	2.33524- 2	7.18957- 4	6.69854- 3	1.35340- 4	1.76473-	3126180802	60
2.33256- 5	6.43176- 4	1.55786- 6	2.38478- 4	3.54762- 7	7.64934-	5126180802	61
1.67968- 6	6.02412- 5	6.39867- 9	1.78196- 5	5.07757-11	1.07271-	6126180802	62
3.62210-13	9.82652- 7	3.94038-12	2.18503- 8	1.43663-17	8.20427-1	0126180802	63
4.00000+ 0	5.00000+ 0	0	0	0		9126180802	64
1.00000- 1	1.00000+ 9	0	0	0		14126180802	65
5.21141- 2	1.77610+ 0	1.40632- 2	4.09978- 1	1.72253- 2	1.33428-	1126180802	66
1.44230- 3	2.70348- 2	3.68088- 4	8.67964- 3	2.81370- 5	2.69946-	3126180802	67
7.55437- 7	4.76599- 4	4.60218- 8	1.95245- 4	7.22653- 7	6.91984-	5126180802	68
-2.30797- 8	8.19106- 5	6.45734-12	1.03762- 6	1.57561-16	2.48808-	7126180802	69
5.34692-19	3.24376-11	7.58336-19	2.41889-12	0.00000+ 0	0.00000+	0126180802	70
5.00000+ 0	6.00000+ 0	0	0	0		10126180802	71
1.00000- 1	1.00000+ 9	0	0	0		13126180802	72
2.47958- 2	1.76149+ 0	7.73591- 3	2.83592- 1	7.31443- 3	1.22365-	1126180802	73
4.87547- 4	3.36318- 2	1.17944- 4	1.12570- 2	1.24718- 5	4.31053-	3126180802	74
1.25100- 7	1.48404- 3	1.32243- 8	6.87533- 5	2.93470-14	1.22893-	6126180802	75
8.93566-13	1.03353- 6	4.96936-19	1.53456- 7	4.16160-21	3.63928-1	1126180802	76
1.59919-20	1.80657-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180802	77
6.00000+ 0	7.50000+ 0	0	0	0		11126180802	78
1.00000- 1	1.00000+ 7	0	0	0		11126180802	79
1.86640- 2	1.84671+ 0	2.37762- 3	3.80248- 1	3.76743- 3	1.47464-	1126180802	80
2.80087- 4	6.18521- 2	2.57530- 5	1.56054- 2	4.51912- 7	4.99222-	3126180802	81
4.97950- 9	1.78649- 3	3.33028-10	8.25413- 4	4.79124-13	8.58480-	4126180802	82
2.02480-14	1.03610- 6	2.00667-21	2.06826- 7	0.00000+ 0	0.00000+	0126180802	83
						126180 0	84
0.	0.	0	0	0		11126180803	85
1.00000- 1	4.00000- 1	0	0	0		1126180803	86
1.00000- 1	1.00000+ 9	0	0	0		19126180803	87
2.81727- 2	2.82757+ 0	1.61475- 2	8.89029- 1	1.24735- 2	4.22587-	1126180803	88
6.96348- 3	1.08402- 1	1.87744- 3	4.33672- 2	9.71714- 4	1.60004-	2126180803	89
1.09923- 4	4.18209- 3	4.14073- 5	7.22565- 4	2.04980- 5	5.44143-	4126180803	90
5.83658- 6	2.11393- 4	3.46526- 8	1.37534- 5	3.74680- 7	1.37567-	5126180803	91
7.46642- 8	2.97704- 6	1.31237- 8	8.40208- 7	1.29305- 9	2.59565-	7126180803	92
2.25722-11	2.80274- 8	1.35579-12	2.80247- 8	7.68269-14	8.09492-	9126180803	93
1.09613-17	1.19086-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	94
4.00000- 1	9.00000- 1	0	0	0		2126180803	95

1.00000- 1	1.00000+ 9	0	0	0		19126180803	96
1.84161- 1	2.93360+ 0	1.01402- 1	1.03920+ 0	8.91371- 2	4.25680-	1126180803	97
2.68436- 2	1.36710- 1	6.38638- 3	4.83600- 2	2.05240- 3	1.49010-	2126180803	98
5.84780- 4	3.81150- 3	1.37557- 4	1.02160- 3	1.80822- 5	2.18250-	4126180803	99
4.74585- 5	1.73490- 4	1.53297- 6	3.49170- 5	1.70129- 6	1.19200-	5126180803	100
2.14785- 7	3.29030- 6	2.85053- 8	3.06010- 6	6.34009- 8	1.14770-	6126180803	101
1.47132- 8	1.14540- 7	1.86140-11	1.58230- 8	3.41440-13	1.58230-	8126180803	102
2.78360-11	7.20110-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	103
9.00000- 1	1.35200+ 0	0	0	0		3126180803	104
1.00000- 1	1.00000+ 9	0	0	0		19126180803	105
3.79060- 2	2.56030+ 0	2.97600- 2	5.12960- 1	1.38500- 2	1.30490-	1126180803	106
5.70730- 3	4.28240- 2	2.68260- 3	1.44110- 2	5.88940- 4	4.92420-	3126180803	107
1.53400- 4	1.04920- 3	9.49510- 5	5.90630- 4	2.19780- 5	1.97380-	4126180803	108
2.46670- 6	3.60340- 5	6.55250- 7	1.68960- 5	4.19120- 8	2.64920-	6126180803	109
3.25060- 9	6.91700- 7	1.07120- 9	5.69430- 7	2.92050-11	1.56540-	7126180803	110
1.92510-12	2.17630- 8	2.44020-13	2.17650- 8	2.17720-17	6.77520-	11126180803	111
5.41880-18	5.55460-11	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	112
1.35000+ 0	1.80000+ 0	0	0	0		4126180803	113
1.00000- 1	1.00000+ 9	0	0	0		14126180803	114
1.54224- 2	2.60302+ 0	1.50988- 2	5.01187- 1	8.18830- 3	1.36406-	1126180803	115
5.02757- 3	4.35751- 2	2.94196- 3	1.55072- 2	7.46236- 4	6.91643-	3126180803	116
9.33988- 5	2.51559- 3	6.77752- 5	3.78648- 4	9.79902- 6	1.29181-	4126180803	117
4.06647- 6	4.45812- 5	7.51465- 8	6.31631- 7	7.30439-12	2.70265-	8126180803	118
2.30393-16	9.05062- 9	4.36459-17	6.27813-11	0.00000+ 0	0.00000+	0126180803	119
1.80000+ 0	2.20000+ 0	0	0	0		5126180803	120
1.00000- 1	1.00000+ 9	0	0	0		18126180803	121
4.08810- 3	2.55790+ 0	3.77566- 3	4.94000- 1	1.83077- 3	1.34410-	1126180803	122
1.41679- 3	3.97650- 2	1.00882- 3	1.43250- 2	1.63591- 4	5.49880-	3126180803	123
6.12283- 5	9.39940- 4	1.86629- 5	5.98660- 4	6.57733- 6	1.73200-	4126180803	124
4.07153- 6	8.35760- 5	3.64684- 7	3.84700- 5	2.07467- 8	1.15070-	5126180803	125
9.06640- 9	2.45130- 6	5.35514-11	5.31110- 7	-4.17564-12	5.83268-	8126180803	126
2.82216-11	2.81100- 8	2.93299-15	1.64668- 8	1.27293-17	1.48020-	10126180803	127
2.20000+ 0	2.60000+ 0	0	0	0		6126180803	128
1.00000- 1	1.00000+ 9	0	0	0		16126180803	129
7.22591- 3	2.48000+ 0	6.79147- 3	4.53430- 1	3.49954- 3	1.03040-	1126180803	130
2.04670- 3	2.78320- 2	1.13840- 3	9.86430- 3	3.94452- 5	2.37020-	3126180803	131
2.42350- 5	3.97880- 4	7.90396- 6	1.27710- 4	2.39364- 6	6.64270-	5126180803	132
-4.22440- 9	8.47111- 6	2.09726-10	5.98080- 7	3.16494- 9	6.67160-	7126180803	133
1.53665- 9	5.97900- 7	1.23943-13	2.15960- 8	4.77990-20	9.38200-	11126180803	134
1.46640-17	1.04240-11	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	135
2.60000+ 0	3.00000+ 0	0	0	0		7126180803	136
1.00000- 1	1.00000+ 9	0	0	0		15126180803	137
5.89171- 3	2.66356+ 0	5.67017- 3	5.13407- 1	3.04804- 3	1.38354-	1126180803	138
1.68190- 3	4.75150- 2	7.27511- 4	1.60302- 2	2.65719- 4	7.90924-	3126180803	139
6.97154- 5	3.05388- 3	2.46474- 6	1.46808- 4	9.38050- 6	3.79582-	4126180803	140
4.27331- 7	7.59741- 5	7.20586-11	7.66677- 7	4.09786-11	5.82384-	7126180803	141
1.50575-14	2.12375- 8	1.78360-22	2.45925-11	4.33630-18	2.45775-	12126180803	142
3.00000+ 0	4.00000+ 0	0	0	0		8126180803	143
1.00000- 1	1.00000+ 9	0	0	0		16126180803	144
3.99571- 3	2.63674+ 0	3.92439- 3	5.08847- 1	2.13233- 3	1.47318-	1126180803	145
2.05007- 3	3.95919- 2	1.32325- 3	1.27392- 2	3.18426- 4	4.17817-	3126180803	146
2.66773- 5	1.46059- 3	5.77121- 6	4.67151- 4	1.84319- 6	1.31245-	4126180803	147
3.93096- 7	1.31190- 4	1.56163- 7	7.49333- 5	8.10831-11	9.56698-	7126180803	148
2.05073-11	5.97448- 7	7.37638-17	1.01114- 7	1.32823-18	3.42943-	11126180803	149
1.46853-18	3.16140-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	150
4.00000+ 0	5.00000+ 0	0	0	0		9126180803	151
1.00000- 1	1.00000+ 9	0	0	0		16126180803	152
3.18297- 3	2.56850+ 0	2.87557- 3	4.95990- 1	1.71152- 3	1.35710-	1126180803	153
1.07626- 3	3.95590- 2	5.61154- 4	1.30330- 2	1.39928- 4	5.95610-	3126180803	154
1.93785- 4	3.91180- 3	1.19133- 6	9.26650- 4	8.09801- 8	[illegible]	4126180803	155
1.98030- 8	5.40180- 5	6.39300- 9	6.09890- 5	4.66038-11	1.03750-	6126180803	156
2.47843-14	5.06180- 7	4.98744-17	1.72020- 7	1.59311-21	8.82550-	9126180803	157
5.61784-20	3.35125-13	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	158
5.00000+ 0	6.00000+ 0	0	0	0		10126180803	159
1.00000- 1	1.00000+ 7	0	0	0		12126180803	160
4.34812- 3	2.10807+ 0	2.76970- 3	3.51749- 1	1.28471- 3	1.07055-	1126180803	161
1.16145- 4	1.65795- 2	3.57022- 5	4.87315- 3	5.59007- 6	3.18480-	3126180803	162
7.51496- 8	8.68416- 4	2.92101- 9	6.78993- 4	4.09410-13	1.67665-	4126180803	163
5.39912-12	1.00071- 6	1.15456-13	6.16916- 7	9.99597-24	4.87660-	8126180803	164

6.00000+ 0	7.50000+ 0	0	0	0		11126180803	165
1.00000- 1	1.00000+ 7	0	0	0		10126180803	166
8.05801- 4	1.85017+ 0	4.59189- 4	2.69962- 1	1.28026- 4	8.55785-	2126180803	167
1.36264- 5	1.36426- 2	4.33460- 7	8.13130- 3	4.58608-10	1.54721-	3126180803	168
5.41038-12	7.82246- 4	2.32383-14	1.06090- 6	1.94953-14	6.17850-	7126180803	169
8.30431-23	6.23540- 9	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126180803	170
						126180 0	171
						1261 0 0	172
						0 0 0	173
0.	0.	0	0	0		11126281802	1
1.00000- 1	4.00000- 1	0	0	0		1126281802	2
1.00000- 1	1.00000+ 9	0	0	0		16126281802	3
5.75904- 3	1.37225+ 0	2.13591- 3	1.55452- 1	6.33889- 4	1.73561-	2126281802	4
6.01283- 5	2.21289- 3	2.67481- 5	7.88411- 4	8.81022- 6	3.84409-	4126281802	5
3.68856- 6	1.58048- 4	6.94603- 7	9.48145- 5	5.31779- 7	1.51041-	5126281802	6
8.79017- 8	4.51967- 6	3.14593- 8	1.31992- 6	7.29102- 9	5.36790-	7126281802	7
3.66713- 9	2.52210- 7	6.96945-10	7.94211- 8	5.16569-11	1.62993-	8126281802	8
1.10908-11	7.99204-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281802	9
4.02000- 1	9.00000- 1	0	0	0		2126281802	10
1.00000- 1	1.00000+ 9	0	0	0		17126281802	11
3.53020- 2	1.67309+ 0	1.55163- 2	3.49760- 1	6.31286- 3	8.95714-	2126281802	12
2.98944- 3	1.79950- 2	2.60047- 4	3.85000- 3	1.23547- 4	1.16164-	3126281802	13
3.96978- 5	4.35883- 4	1.27932- 5	1.78100- 4	2.02064- 6	5.06741-	5126281802	14
1.55840- 6	1.81574- 5	2.71105- 7	6.00195- 6	5.15126- 8	1.47654-	6126281802	15
9.17927- 9	4.39845- 7	3.59384- 9	2.77465- 7	1.31058- 9	8.27631-	8126281802	16
1.64111-10	2.06302- 8	7.57229-12	7.93607-10	0.00000+ 0	0.00000+	0126281802	17
9.00000- 1	1.35000+ 0	0	0	0		3126281802	18
1.00000- 1	1.00000+ 9	0	0	0		17126281802	19
7.33239- 2	1.71121+ 0	3.28980- 2	3.76539- 1	1.27824- 2	9.17627-	2126281802	20
4.56182- 3	1.92011- 2	4.33347- 4	4.62747- 3	1.43255- 4	1.35405-	3126281802	21
4.46339- 5	4.77893- 4	1.38731- 5	1.88938- 4	2.23079- 6	6.49613-	5126281802	22
1.39700- 6	2.46101- 5	1.43645- 7	7.43250- 6	1.39004- 8	1.47760-	6126281802	23
2.02911- 9	3.99385- 7	1.63997- 9	2.01020- 7	7.15109-10	5.79491-	8126281802	24
2.86785-10	2.05529- 8	8.85739-12	7.78698-10	0.00000+ 0	0.00000+	0126281802	25
1.35000+ 0	1.80000+ 0	0	0	0		4126281802	26
1.00000- 1	1.00000+ 9	0	0	0		17126281802	27
1.13649- 1	1.75168+ 0	5.52199- 2	3.70291- 1	1.71660- 2	8.93023-	2126281802	28
5.30517- 3	1.92100- 2	4.36839- 4	4.47515- 3	1.56658- 4	1.35287-	3126281802	29
3.91669- 5	4.70143- 4	1.01817- 5	1.81796- 4	8.63550- 7	5.51538-	5126281802	30
1.37733- 6	3.00445- 5	9.57342- 8	9.71258- 6	5.04498- 9	1.53196-	6126281802	31
3.19176-10	2.37668- 7	1.93256-10	2.42312- 8	4.29600-10	2.63340-	8126281802	32
2.41377-11	2.41736- 8	7.34203-12	7.84026-10	0.00000+ 0	0.00000+	0126281802	33
1.80000+ 0	2.20000+ 0	0	0	0		5126281802	34
1.00000- 1	1.00000+ 9	0	0	0		16126281802	35
1.21822- 1	1.87484+ 0	6.71592- 2	4.44066- 1	2.12184- 2	9.79773-	2126281802	36
5.07381- 3	2.06433- 2	4.88552- 4	5.07128- 3	1.24747- 4	1.49232-	3126281802	37
3.83982- 5	5.43637- 4	4.88178- 6	1.98849- 4	5.54430- 7	4.24415-	5126281802	38
9.30670- 7	3.61740- 5	7.68902- 8	1.19993- 5	7.83048-10	1.37681-	6126281802	39
1.07515-10	4.38666- 7	5.26176-10	2.55611- 8	3.78392-12	1.48224-	8126281802	40
2.02893-12	7.83448-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281802	41
2.20000+ 0	2.60000+ 0	0	0	0		6126281802	42
1.00000- 1	1.00000+ 9	0	0	0		16126281802	43
1.18965- 1	2.72670+ 0	1.00788- 1	5.47410- 1	2.45609- 2	1.09130-	1126281802	44
4.94003- 3	2.21920- 2	5.65793- 4	5.70230- 3	1.12438- 4	1.55870-	3126281802	45
3.09993- 5	5.85090- 4	2.66004- 6	2.21130- 4	5.15608- 8	5.81060-	5126281802	46
9.89861- 7	3.82860- 5	2.43419- 8	1.20950- 5	1.16787-10	3.87879-	7126281802	47
2.91013-10	2.45370- 8	2.37260-11	2.69907- 8	2.01270-11	2.45360-	8126281802	48
1.76410-14	1.06030- 9	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281802	49
2.60000+ 0	3.00000+ 0	0	0	0		7126281802	50
1.00000- 1	1.00000+ 9	0	0	0		15126281802	51
1.28735- 1	1.89558+ 0	6.53667- 2	5.20294- 1	2.66055- 2	1.29667-	1126281802	52
4.47952- 3	2.37821- 2	5.67751- 4	6.12419- 3	8.42430- 5	1.70395-	3126281802	53
3.12943- 5	6.48673- 4	1.31266- 7	3.79941- 4	2.14065- 8	4.03091-	5126281802	54
1.08413- 6	5.30285- 5	1.27304- 8	1.47147- 5	1.60230-10	1.06127-	6126281802	55
1.04823-10	2.20906- 8	2.21337-11	3.32754- 8	2.27319-17	1.18774-	9126281802	56
3.00000+ 0	4.00000+ 0	0	0	0		8126281802	57
1.00000- 1	1.00000+ 9	0	0	0		15126281802	58
2.38413- 1	1.83185+ 0	1.17618- 1	4.79896- 1	3.79757- 2	1.15181-	1126281802	59
6.00884- 3	2.27090- 2	8.07918- 4	6.69526- 3	1.38865- 4	1.78724-	3126281802	60

2,24824- 5	6.22674- 4	4,18512- 7	4.03944- 4	1.33841- 7	6,82657-	5126281802	61
1.42450- 6	6.51991- 5	6,84070- 9	1.45006- 5	1,97417-10	1.05066-	6126281802	62
3.49536-12	1.04363- 6	2,74842-11	8.17635- 8	1,76944-17	8,20005-	10126281802	63
4.00000+ 0	5.00000+ 0	0	0	0		9126281802	64
1.00000- 1	1.00000+ 9	0	0	0		14126281802	65
1,03058- 1	1.81947+ 0	5,02733- 2	4.53802- 1	2,12876- 2	1.28099-	1126281802	66
2,04337- 3	2.62339- 2	3,79239- 4	9.15149- 3	2.64236- 5	2,77299-	3126281802	67
6,46653- 7	5.24921- 4	7,66641- 8	1.48026- 4	4,64498- 7	6,99928-	5126281802	68
-4,19106- 8	8.75553- 5	2,59827-11	1.03840- 6	3,62012-16	1.86140-	7126281802	69
8,24034-19	1.62273-11	7,58267-19	1.21034-12	0,00000+ 0	0,00000+	0126281802	70
5,80000+ 0	6.00000+ 0	0	0	0		10126281802	71
1,00000- 1	1.00000+ 9	0	0	0		13126281802	72
5,01843- 2	1.72907+ 0	2,61558- 2	3.98167- 1	9,40725- 3	1,12557-	1126281802	73
5,26350- 4	2.73328- 2	1,13993- 4	1.21143- 2	1,08385- 5	4,30592-	3126281802	74
7,57236- 8	1.53830- 3	8,56142- 9	6.88852- 5	1,16202-13	1,14260-	6126281802	75
3,58707-12	1.03413- 6	3,84163-19	1.25960- 7	8,58998-21	1,81964-	11126281802	76
1,60471-20	9,03285-13	0,00000+ 0	0,00000+ 0	0,00000+ 0	0,00000+	0126281802	77
6,00000+ 0	7,50000+ 0	0	0	0		11126281802	78
1,00000- 1	1,00000+ 7	0	0	0		11126281802	79
2,11323- 2	1,76891+ 0	1,24115- 2	4,78549- 1	4,27413- 3	1.29529-	1126281802	80
2,19466- 4	4,55402- 2	3,65313- 5	1,49796- 2	3,85746- 7	5.09169-	3126281802	81
8,16977- 9	1,62887- 3	3,01321-10	8,33882- 4	4,55698-12	8,55842-	4126281802	82
8,13952-14	1,03632- 6	2,00667-22	4,13692- 7	0,00000+ 0	0.00000+	0126281802	83
						126281 0	84
0.	0.	0	0	0		11126281803	85
1,00000- 1	4,00000- 1	0	0	0		1126281803	86
1,00000- 1	1.00000+ 9	0	0	0		19126281803	87
8,46910- 2	1.88862+ 0	2,99019- 2	6,07957- 1	2,05678- 2	2.85695-	1126281803	88
9,57417- 3	8.64709- 2	1,64060- 3	3,23554- 2	1,02484- 3	1.48350-	2126281803	89
8,11508- 5	3,41533- 3	5,80278- 5	6,74490- 4	1,87412- 5	5,30465-	4126281803	90
5,74489- 6	2.10049- 4	5,59763- 8	9,79809- 6	3,53688- 7	1.37587-	5126281803	91
8,34813- 8	2.96951- 6	1,39109- 8	8.64655- 7	1,21232- 9	2,65920-	7126281803	92
1,90514-11	2.83662- 8	1.32322-12	2.25852- 8	1,28241-13	8.09548-	9126281803	93
1,43220-17	1.17289-10	0,00000+ 0	0.00000+ 0	0,00000+ 0	0.00000+	0126281803	94
4,00000- 1	9.00000- 1	0	0	0		2126281803	95
1,00000- 1	1.00000+ 9	0	0	0		19126281803	96
5,26910- 1	2.11126+ 0	1,96162- 1	6.86305- 1	1.46895- 1	3.41199-	1126281803	97
3,10873- 2	1.03651- 1	6,84173- 3	4.18967- 2	2.57752- 3	1,33669-	2126281803	98
5,46734- 4	3.64916- 3	1,49483- 4	9.46105- 4	1,66970- 5	2,41379-	4126281803	99
4,88521- 5	1.75641- 4	2,45609- 6	4.22245- 5	1,52541- 6	1,28860-	5126281803	100
3,10599- 7	3.63885- 6	6,32504- 8	4.14714- 6	5,90003- 8	8,66236-	7126281803	101
1,37149- 8	1,13614- 7	6,08118-11	1.50845- 8	3,41440-12	1,78598-	8126281803	102
2,75226-11	7,35103-10	0,00000+ 0	0,00000+ 0	0,00000+ 0	0.00000+	0126281803	103
9,00000- 1	1,35000+ 0	0	0	0		3126281803	104
1,00000- 1	1,00000+ 9	0	0	0		19126281803	105
1,05106- 1	1.70053+ 0	5,98281- 2	3,97672- 1	2,25980- 2	1,11699-	1126281803	106
5,86919- 3	3.37099- 2	3,02614- 3	1,25887- 2	7,37095- 4	4,54185-	3126281803	107
1,38651- 4	1.13567- 3	9,31884- 5	6,15801- 4	1,91336- 5	2,08397-	4126281803	108
2,34910- 6	3.92186- 5	7,75070- 7	1,79362- 5	4,78540- 8	2,60335-	6126281803	109
3,77342- 9	7.32215- 7	1,02785- 9	5,49878- 7	2,28855-11	1,71546-	7126281803	110
1,44932-11	2,16636- 8	4,33608-14	2,23759- 8	2,82405-17	5,36277-	11126281803	111
5,04485-18	2,77730-11	0,00000+ 0	0,00000+ 0	0,00000+ 0	0,00000+	0126281803	112
1,35000+ 0	1,80000+ 0	0	0	0		4126281803	113
1,00000- 1	1.00000+ 9	0	0	0		14126281803	114
3,32479- 2	2.73515+ 0	4.46984- 2	4.87561- 1	1,53282- 2	1.15763-	1126281803	115
5,41368- 3	3.49792- 2	2,93057- 3	1,56268- 2	7,54360- 4	7,67282-	3126281803	116
1,17996- 4	2.46018- 3	6,79717- 5	3,96956- 4	1,16056- 5	1,53525-	4126281803	117
2,98589- 6	4.07339- 5	6,87086- 8	6,35132- 7	8,32146-12	2,51760-	8126281803	118
2,41599-15	9.05109- 9	5,27716-17	4.43663-11	0,00000+ 0	0.00000+	0126281803	119
1,80000+ 0	2.20000+ 0	0	0	0		5126281803	120
1,00000- 1	1.00000+ 9	0	0	0		18126281803	121
1,37801- 2	1.43343+ 0	5.35251- 3	2.96103- 1	3,40309- 3	1,27204-	1126281803	122
1,73103- 3	2.83300- 2	9,44486- 4	1,39569- 2	1,36912- 4	5,01941-	3126281803	123
6,57600- 5	9.49852- 4	1,47096- 5	5.52576- 4	4,92491- 6	1,98121-	4126281803	124
3,72281- 6	9.04812- 5	3,32471- 7	4,14675- 5	1,90021- 8	9,90620-	6126281803	125
1,05127- 8	2.35522- 6	2,11403-10	5,27219- 7	-9,22881-12	3,25351-	8126281803	126
3,11842-11	2.80343- 8	4,01780-15	1,18259- 8	1,81828-17	2,94831-	10126281803	127
2,20000+ 0	2.60000+ 0	0	0	0		6126281803	128
1,00000- 1	1,00000+ 9	0	0	0		16126281803	129

2.58851- 2	1.28697+ 0	8.75441- 3	8.63824- 1	5.16266- 3	9.73119-	2126281803	130
2.44169- 3	2.52449- 2	1.23109- 3	9.31485- 3	5.71229- 5	2.94643-	3126281803	131
2.12642- 5	4.13479- 4	7.36009- 6	1.46158- 4	1.90885- 6	6.88077-	5126281803	132
-3.43876- 9	9.04265- 6	4.18627-10	1.19616- 6	2.86544- 9	6.66865-	7126281803	133
1.58572- 9	5.96339- 7	8.52373-13	2.16747- 8	4.77990-10	4.69100-	11126281803	134
1.76868-17	5.36608-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281803	135
2.60000+ 0	3.00000+ 0	0	0	0		7126281803	136
1.00000- 1	1.00000+ 9	0	0	0		15126281803	137
1.96487- 2	1.39816+ 0	8.79956- 3	3.24869- 1	5.08760- 3	1.29099-	1126281803	138
1.86324- 3	3.83664- 2	8.11545- 4	1.47115- 2	2.64222- 4	7.66709-	3126281803	139
7.93780- 5	3.27213- 3	2.59854- 6	1.68287- 4	7.68430- 6	3.68298-	4126281803	140
3.24849- 7	7.54189- 5	1.29370-10	1.19587- 6	1.01696-10	6.62591-	7126281803	141
1.06436-13	2.16685- 8	3.48545-22	9.83700-11	5.38863-18	3.73610-	12126281803	142
3.00000+ 0	4.00000+ 0	0	0	0		8126281803	143
1.00000- 1	1.00000+ 9	0	0	0		16126281803	144
1.32471- 2	1.41975+ 0	5.85401- 3	3.29234- 1	4.00983- 3	1.27036-	1126281803	145
2.56201- 3	3.30429- 2	1.39542- 3	1.31015- 2	2.23585- 4	4.45143-	3126281803	146
2.91953- 5	1.50874- 3	6.11476- 6	5.14067- 4	1.40932- 6	1.40604-	4126281803	147
6.27415- 7	1.31276- 4	1.38711- 7	7.66330- 5	3.10267-10	1.02300-	6126281803	148
1.98393-11	5.98662- 7	1.29404-16	1.01114- 7	1.93062-10	1.79863-	11126281803	149
1.40024-10	2.21301-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281803	150
4.00000+ 0	5.00000+ 0	0	0	0		9126281803	151
1.00000- 1	1.00000+ 9	0	0	0		16126281803	152
1.09875- 2	1.34883+ 0	3.76431- 3	2.62959- 1	2.95240- 3	1.24255-	1126281803	153
1.31773- 3	2.62327- 2	4.32764- 4	1.30568- 2	7.58001- 5	8.75530-	3126281803	154
1.70549- 4	4.05170- 3	1.57962- 6	1.01725- 3	7.89368- 8	3.47493-	4126281803	155
1.50389- 8	9.75343- 5	6.23427- 9	6.24248- 5	1.87093-10	1.04411-	6126281803	156
2.03340-13	6.77242- 7	2.25972-16	1.72020- 7	1.31290-22	2.00000-	8126281803	157
6.87217-20	2.39375-13	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281803	158
5.00000+ 0	6.00000+ 0	0	0	0		10126281803	159
1.00000- 1	1.00000+ 7	0	0	0		12126281803	160
1.08529- 2	1.70909+ 0	6.54462- 3	3.45830- 1	1.52776- 3	8.70199-	2126281803	161
1.52357- 4	1.67706- 2	2.04631- 5	5.11245- 3	6.42499- 6	3.28140-	3126281803	162
7.61545- 8	8.69636- 4	2.47709- 8	1.17448- 3	4.44115-13	2.48870-	4126281803	163
2.16732-11	1.04218- 6	1.89161-14	5.90263- 7	9.99597-23	2.43830-	8126281803	164
6.00000+ 0	7.50000+ 0	0	0	0		11126281803	165
1.00000- 1	1.00000+ 7	0	0	0		10126281803	166
1.75179- 3	1.78076+ 0	1.15388- 3	3.63883- 1	2.52907- 4	8.45266-	2126281803	167
1.38943- 5	1.36583- 2	6.48457- 7	8.49691- 3	1.91878- 9	1.53165-	3126281803	168
8.60487-12	9.64726- 4	8.92896-14	1.03916- 6	2.63164-15	6.05244-	7126281803	169
6.52441-21	1.55885- 9	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126281803	170
						126281 0	171
						1262 0 0	172
						0 0 0	173
0.	0.	0	0	0		11126480802	1
1.00000- 1	4.00000- 1	0	0	0		1126480802	2
1.00000- 1	1.00000+ 9	0	0	0		16126480802	3
1.51520- 3	1.37216+ 0	8.28648- 4	1.27219- 1	3.81848- 4	1.58019-	2126480802	4
4.82923- 5	2.31047- 3	2.72643- 5	7.68549- 4	7.01046- 6	3.96417-	4126480802	5
3.34766- 6	1.62355- 4	6.66177- 7	4.43033- 5	5.33139- 7	1.45949-	5126480802	6
1.03116- 7	4.26015- 6	2.86511- 8	1.03135- 6	4.67937- 9	4.63108-	7126480802	7
3.08912- 9	2.48649- 7	5.82984-10	7.86038- 8	4.75823-11	1.70574-	8126480802	8
1.03176-11	8.52187-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480802	9
4.00000- 1	9.00000- 1	0	0	0		2126480802	10
1.00000- 1	1.00000+ 9	0	0	0		17126480802	11
1.04129- 2	1.42215+ 0	2.24530- 3	2.51811- 1	4.11135- 3	1.20100-	1126480802	12
1.94538- 3	1.81233- 2	2.55576- 4	4.22000- 3	1.13091- 4	1.19516-	3126480802	13
4.13869- 5	4.56191- 4	1.29300- 5	1.80159- 4	1.87301- 6	5.28654-	5126480802	14
1.45683- 6	1.83792- 5	3.66317- 7	6.06126- 6	3.51889- 8	8.99489-	7126480802	15
7.40331- 9	4.08754- 7	6.78442-10	3.23460- 7	1.06348- 9	8.00608-	8126480802	16
1.69868-10	1.98178- 8	5.19700-12	7.63802-10	0.00000+ 0	0.00000+	0126480802	17
9.00000- 1	1.35000+ 0	0	0	0		3126480802	18
1.00000- 1	1.00000+ 9	0	0	0		17126480802	19
2.16755- 2	1.44884+ 0	5.12548- 3	2.79765- 1	7.88359- 3	1.22001-	1126480802	20
3.22089- 3	1.95198- 2	3.69223- 4	4.68257- 3	1.39872- 4	1.32926-	3126480802	21
3.50762- 5	4.08969- 4	1.22334- 5	1.87526- 4	1.27662- 6	7.31064-	5126480802	22
1.49573- 6	2.49300- 5	1.00012- 7	6.11005- 6	1.01400- 8	1.10327-	6126480802	23
1.76339- 9	3.32517- 7	8.53121-10	8.60217- 7	5.98391-10	4.95692-	8126480802	24
2.73646-10	1.94852- 8	5.67346-12	7.86607-10	0.00000+ 0	0.00000+	0126480802	25

1.35000+ 0	1.80000+ 0	0	0	0		4126480802	26
1.00000- 1	1.00000+ 9	0	0	0		17126480802	27
3.43321- 2	1.47516+ 0	8.88618- 3	2.60270- 1	1.07152- 2	1.27154-	1126480802	28
4.19525- 3	2.09463- 2	4.42563- 4	4.46701- 3	1.39718- 4	1.02428-	3126480802	29
1.86643- 5	2.86359- 4	4.41573- 6	1.84640- 4	9.51[illegible]0- 7	6.03701-	5126480802	30
1.11970- 6	3.08207- 5	1.00004- 7	9.58474- 6	5.08164- 9	1.50877-	6126480802	31
2.71882-10	3.16885- 7	1.63938-10	3.08140- 8	5.13671-10	2.42641-	8126480802	32
1.51497-11	1.24954- 8	4.51176-12	7.54044-10	0.00000+ 0	0.00000+	0126480802	33
1.80000+ 0	2.20000+ 0	0	0	0		5126480802	34
1.00000- 1	1.00000+ 9	0	0	0		16126480802	35
3.74744- 2	1.53732+ 0	9.60065- 3	3.19116- 1	1.29727- 2	1.33231-	1126480802	36
3.95548- 3	2.24473- 2	4.42255- 4	5.00738- 3	1.26387- 4	1.24015-	3126480802	37
1.35999- 5	2.79734- 4	6.72376- 6	5.45202- 4	4.84580- 7	3.58105-	5126480802	38
5.32917- 7	3.54974- 5	5.05537- 8	1.12566- 5	7.75392-10	1.27626-	6126480802	39
1.08627-10	6.07899- 7	5.67226-10	2.48918- 8	2.55320-12	9.55175-	9126480802	40
1.23624-12	7.48560-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480802	41
2.20000+ 0	2.60000+ 0	0	0	0		6126480802	42
1.00000- 1	1.00000+ 9	0	0	0		16126480802	43
2.77469- 2	2.57636+ 0	2.51679- 2	5.95191- 1	1.44242- 2	1.26202-	1126480802	44
3.30486- 3	2.24170- 2	5.17911- 4	5.49068- 3	9.70473- 5	1.16297-	3126480802	45
9.86007- 6	4.58324- 4	4.51617- 6	3.06246- 4	2.00155- 7	3.05789-	5126480802	46
5.67330- 7	4.26260- 5	1.65890- 8	1.11047- 5	8.52570-11	2.55424-	7126480802	47
3.29834-10	2.36994- 8	7.55774-12	1.63724- 8	3.39814-11	2.36443-	8126480802	48
7.61533-15	6.73652-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480802	49
2.60000+ 0	3.00000+ 0	0	0	0		7126480602	50
1.00000- 1	1.00000+ 9	0	0	0		15126480802	51
3.72414- 2	1.57595+ 0	1.02751- 2	5.18554- 1	1.44335- 2	1.37728-	1126480802	52
2.78822- 3	2.22770- 2	4.32489- 4	5.61691- 3	7.00665- 5	1.23784-	3126480802	53
1.39692- 5	5.72721- 4	1.38028- 6	3.43703- 4	5.77862- 8	3.94645-	5126480802	54
6.38635- 7	5.11039- 5	6.27083- 9	1.17524- 5	1.15546-10	1.07719-	6126480802	55
1.64264-10	2.32279- 8	4.31920-12	1.65311- 8	5.14126-17	1.00002-	9126480802	56
3.00000+ 0	4.00000+ 0	0	0	0		8126480802	57
1.00000- 1	1.00000+ 9	0	0	0		15126480802	58
4.79771- 2	2.58547+ 0	4.34899- 2	6.40900- 1	2.08763- 2	1.30640-	1126480802	59
3.67583- 3	2.13151- 2	6.09773- 4	6.40119- 3	1.09437- 4	1.60053-	3126480802	60
1.89421- 5	6.11562- 4	2.27132- 7	6.74126- 4	4.00605- 7	7.01519-	5126480802	61
6.77823- 7	6.51629- 5	4.72546- 9	1.05291- 5	1.13418-10	7.94314-	7126480802	62
2.05920-13	6.46805- 7	4.17731-11	2.17147- 8	2.90672-17	2.97986-	10126480802	63
4.00000+ 0	5.00000+ 0	0	0	0		9126480802	64
1.00000- 1	1.00000+ 9	0	0	0		14126480802	65
2.44801- 2	1.87709+ 0	8.56555- 3	6.32676- 1	1.20413- 2	1.58806-	1126480802	66
1.05668- 3	2.42650- 2	2.56584- 4	9.45211- 3	2.12940- 5	2.77694-	3126480802	67
9.57515- 7	5.60872- 4	1.94668- 8	1.53248- 4	2.66584- 7	6.90789-	5126480802	68
-5.39435-10	7.53547- 5	1.90580-11	1.03762- 6	2.87114-16	1.79544-	7126480602	69
1.90933-18	7.19590-12	2.46078-18	7.18320-13	0.00000+ 0	0.00000+	0126480802	70
5.00000+ 0	6.00000+ 0	0	0	0		10126480802	71
1.00000- 1	1.00000+ 9	0	0	0		13126480802	72
1.19566- 2	1.87841+ 0	3.30170- 3	5.03159- 1	6.10431- 3	1.55015-	1126480802	73
2.69424- 4	3.24962- 2	1.00246- 4	1.20093- 2	7.04297- 6	4.47406-	3126480802	74
1.62689- 7	1.34414- 3	4.95008- 9	6.85689- 5	8.75369-14	1.22980-	6126480802	75
2.63581-12	1.03353- 6	1.53810-18	1.55652- 7	6.20351-21	7.46290-	12126480802	76
6.19234-20	2.04382-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480802	77
6.00000+ 0	7.50000+ 0	0	0	0		11126480802	78
1.00000- 1	1.00000+ 7	0	0	0		11126480802	79
5.65718- 3	1.64372+ 0	9.73995- 4	4.12405- 1	2.11320- 3	1.65144-	1126480802	80
2.67929- 4	6.85444- 2	1.52465- 5	1.41366- 2	3.71382- 7	5.14886-	3126480802	81
5.26709- 9	1.49507- 3	2.82328-10	8.31972- 4	2.05401-14	9.17090-	4126480802	82
5.99126-14	1.03766- 6	2.85070-20	5.86991- 8	0.00000+ 0	0.00000+	0126480802	83
						126480 0	84
0.	0.	0	0	0		11126480803	85
1.00000- 1	4.00000- 1	0	0	0		1126480803	86
1.00000- 1	1.00000+ 9	0	0	0		19126480803	87
1.67293- 2	2.29107+ 0	1.66008- 3	8.97830- 1	9.67546- 3	5.96817-	1126480803	88
5.95517- 3	1.34321- 1	1.81682- 3	5.52554- 2	9.76668- 4	1.71601-	2126480803	89
1.19397- 4	3.95341- 3	5.28369- 5	6.70283- 4	1.92828- 5	5.31679-	4126480803	90
5.73481- 6	2.15703- 4	9.69922- 8	1.19946- 5	3.59483- 7	1.40689-	5126480803	91
8.91766- 8	2.88749- 6	1.43142- 8	8.52413- 7	1.27377- 9	2.65480-	7126480803	92
1.44556-11	2.80274- 8	1.21362-12	2.25502- 8	2.68642-13	8.09492-	9126480803	93
3.86392-17	1.11927-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	94

4.00000- 1	9.00000- 1	0	0	0		2126480803	95
1.00000- 1	1.00000+ 9	0	0	0		19126480803	96
1.03631- 1	2.78069+ 0	2.00964- 2	8.96753- 1	7.23595- 2	5.41161-	1126480803	97
2.50547- 2	1.64704- 1	5.60799- 3	5.89620- 2	2.08150- 3	1.63670-	2126480803	98
5.59560- 4	4.48761- 3	1.63013- 4	9.47396- 4	2.03364- 5	3.35964-	4126480803	99
4.92001- 5	1.01557- 4	2.05059- 6	3.85392- 5	1.58735- 6	1.22766-	5126480803	100
2.87630- 7	3.11840- 6	5.64685- 8	4.80504- 6	5.14641- 8	7.88215-	7126480803	101
1.26341- 8	1.07459- 7	6.33332-11	1.09296- 8	4.68522-15	6.22488-	8126480803	102
2.99057-11	7.10924-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	103
9.00000- 1	1.35000+ 0	0	0	0		3126480803	104
1.00000- 1	1.00000+ 9	0	0	0		19126480803	105
2.12176- 2	1.97830+ 0	7.77144- 3	6.28700- 1	1.16178- 2	2.02977-	1126480803	106
6.10248- 3	6.21840- 2	2.72779- 3	1.58014- 2	5.90055- 4	5.67204-	3126480803	107
1.18777- 4	1.32547- 3	1.01579- 4	6.38315- 4	2.02291- 5	2.10015-	4126480803	108
2.14042- 6	3.97404- 5	6.68504- 7	1.78639- 5	5.09027- 8	2.79144-	6126480803	109
6.15193- 9	7.24779- 7	9.21518-10	6.17023- 7	1.43080-11	1.00616-	7126480803	110
1.93310-11	2.14163- 8	2.81505-12	2.34540- 8	8.81528-17	4.32278-11126480803		111
3.38170-10	1.42050-11	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	112
1.35000+ 0	1.80000+ 0	0	0	0		4126480803	113
1.00000- 1	1.00000+ 9	0	0	0		14126480803	114
7.39893- 3	2.62032+ 0	7.14888- 3	5.69664- 1	5.35551- 3	1.78300-	1126480803	115
4.30469- 3	6.30810- 2	2.68516- 3	1.79253- 2	7.15780- 4	8.07336-	3126480803	116
9.21053- 5	2.15623- 3	6.02749- 5	4.03454- 4	9.89939- 6	1.57134-	4126480803	117
2.42923- 6	3.90244- 5	6.88400- 8	6.35759- 7	8.45161-12	2.41681-	8126480803	118
1.09583-15	6.33652- 9	1.42691-16	3.40069-11	0.00000+ 0	0.00000+	0126480803	119
1.80000+ 0	2.20000+ 0	0	0	0		5126480803	120
1.00000- 1	1.00000+ 9	0	0	0		18126480803	121
2.89863- 3	1.52677+ 0	6.57198- 4	3.09237- 1	1.24121- 3	1.91651-	1126480803	122
1.09288- 3	5.55379- 2	9.86642- 4	1.60942- 2	1.39917- 4	6.18555-	3126480803	123
6.57845- 5	9.56878- 4	4.89346- 6	4.56740- 4	6.15332- 6	2.26552-	4126480803	124
3.22414- 6	1.00027- 4	3.15523- 7	4.31518- 5	1.99951- 8	8.81178-	6126480803	125
1.04258- 8	2.35617- 6	3.32507-10	5.32902- 7	-1.01008-11	2.92972-	8126480803	126
2.90498-11	2.76033- 8	6.46301-15	1.22794- 8	5.05007-17	2.96275-10126480803		127
2.20000+ 0	2.60000+ 0	0	0	0		6126480803	128
1.00000- 1	1.00000+ 9	0	0	0		13126480803	129
5.61566- 3	1.33510+ 0	3.83267- 3	1.37989- 1	1.70632- 3	2.13414-	2126480803	130
4.92543- 4	7.52495- 3	2.14155- 5	4.17945- 4	1.43048- 6	4.21932-	4126480803	131
5.61841- 6	9.85904- 5	8.93048- 8	9.77286- 5	1.93329- 9	7.70247-	7126480803	132
2.77722- 9	6.03301- 7	8.92693-13	2.30374- 8	4.54075-13	2.03019-	8126480803	133
5.02380-17	9.84050-13	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	134
2.60000+ 0	3.00000+ 0	0	0	0		7126480803	135
1.00000- 1	1.00000+ 9	0	0	0		15126480803	136
4.02401- 3	1.61870+ 0	1.05113- 3	4.72756- 1	2.17936- 3	1.75843-	1126480803	137
1.27079- 3	5.95966- 2	7.52267- 4	1.94178- 2	2.21919- 4	9.87965-	3126480803	138
6.52472- 5	3.18742- 3	2.16426- 5	1.72918- 4	6.16318- 6	3.15688-	4126480803	139
2.11732- 7	7.11792- 5	9.94987-11	1.26840- 6	1.00134-10	6.56296-	7126480803	140
1.61518-13	2.15580- 8	1.78360-19	1.22962-11	1.46873-17	1.22887-12126480803		141
3.00000+ 0	4.00000+ 0	0	0	0		8126480803	142
1.00000- 1	1.00000+ 9	0	0	0		16126480803	143
2.13116- 3	2.44880+ 0	1.90059- 3	4.39860- 1	9.42593- 4	1.99850-	1126480803	144
1.80295- 3	5.23980- 2	1.19143- 3	1.42490- 2	1.59508- 4	4.72552-	3126480803	145
2.56339- 5	1.55880- 3	6.10916- 6	5.33230- 4	1.40134- 6	1.32740-	4126480803	146
4.31043- 7	1.28909- 4	1.14614- 7	8.12580- 5	2.31118-10	1.03600-	6126480803	147
2.54040-11	6.15590- 7	1.55012-15	1.36730- 7	5.95081-18	4.42500-12126480803		148
3.37495-18	5.46850-13	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	149
4.00000+ 0	5.00000+ 0	0	0	0		9126480803	150
1.00000- 1	1.00000+ 9	0	0	0		16126480803	151
1.43917- 3	2.70852+ 0	1.32695- 3	6.43599- 1	1.22299- 3	1.86301-	1126480803	152
9.22539- 4	5.26222- 2	5.89351- 4	1.43259- 2	4.89011- 5	1.31195-	2126480803	153
1.00980- 4	3.96021- 3	1.47296- 6	9.50211- 4	3.31000- 8	3.94246-	4126480803	154
1.51179- 8	1.06781- 4	5.21701- 9	6.92828- 5	1.40502-10	1.03184-	6126480803	155
2.11107-13	4.07527- 7	1.13291-16	1.62875- 7	1.18450-22	7.70040-	8126480803	156
1.89738-19	7.18150-14	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0126480803	157
5.00000+ 0	6.00000+ 0	0	0	0		10126480803	158
1.00000- 1	1.00000+ 7	0	0	0		12126480803	159
2.52938- 3	1.61372+ 0	8.95921- 4	3.25133- 1	9.57559- 4	1.30443-	1126480803	160
1.16917- 4	1.93860- 2	1.07947- 5	5.76564- 3	5.82431- 6	3.32740-	3126480803	161
7.47639- 8	8.70382- 4	2.14500- 8	1.10014- 3	6.28010-16	9.49798-	4126480803	162
1.69835-11	9.91546- 7	1.12598-12	5.53587- 7	9.99562-22	1.23214-	8126480803	163

6.00000+ 0	7.50000+ 0	0	0	0		11126480803	164
1.00000- 1	1.00000+ 7	0	0	0		11126480803	165
4.28252- 4	1.56820+ 0	7.42251- 5	5.08214- 1	2.19076- 4	1.61246-	1126480803	166
1.42871- 5	3.79075- 2	4.51219- 6	1.25842- 2	1.50577- 6	1.00288-	2126480803	167
2.67359- 9	1.55458- 3	6.53115-14	1.87004- 4	-1.87905-13	7.98939-	7126480803	168
6.37619-13	6.90326- 7	9.44349-16	1.80848- 7	0.00000+ 0	0.00000+	0126480803	169
						126480 0	170
						1264 0 0	171
						0 0 0	172
0.	0.	0	0	0		11129681802	1
1.00000- 1	4.00000- 1	0	0	0		1129681802	2
1.00000- 1	1.00000+ 9	0	0	0		16129681802	3
4.57946- 3	1.41293+ 0	2.01568- 3	1.50306- 1	6.46628- 4	1.92261-	2129681802	4
6.19859- 5	3.05480- 3	3.05907- 5	1.08060- 3	8.58263- 6	3.91227-	4129681802	5
4.03743- 6	1.38033- 4	8.39213- 7	4.19515- 5	4.89821- 7	1.62210-	5129681802	6
3.99498- 8	5.39092- 6	2.92506- 8	1.32421- 6	8.75331- 9	4.73727-	7129681802	7
4.19256- 9	2.27947- 7	8.36457-10	7.22219- 8	5.93926-11	1.49243-	8129681802	8
2.02716-11	8.38997-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681802	9
4.00000- 1	9.00000- 1	0	0	0		2129681802	10
1.00000- 1	1.00000+ 9	0	0	0		17129681802	11
2.79681- 2	1.75010+ 0	1.25821- 2	3.62955- 1	6.70443- 3	9.72174-	2129681802	12
3.21602- 3	1.95608- 2	3.20899- 4	3.74446- 3	1.05774- 4	1.36151-	3129681802	13
3.55624- 5	4.70607- 4	1.37447- 5	1.66021- 4	2.13623- 6	4.42693-	5129681802	14
1.48834- 6	1.74859- 5	1.44013- 7	6.68604- 6	5.43088- 8	1.41296-	6129681802	15
1.74846- 8	3.57432- 7	6.00704- 9	1.88943- 7	1.54047- 9	7.57545-	8129681802	16
1.50761-10	2.01288- 8	1.77142-11	8.16460-10	0.00000+ 0	0.00000+	0129681802	17
9.00000- 1	1.35000+ 0	0	0	0		3129681802	18
1.00000- 1	1.00000+ 9	0	0	0		17129681802	19
5.95974- 2	1.76244+ 0	2.48471- 2	3.74639- 1	1.34222- 2	1.08991-	1129681802	20
5.18892- 3	2.35104- 2	4.60645- 4	4.24080- 3	1.24774- 4	1.42285-	3129681802	21
4.76257- 5	4.56748- 4	1.48179- 5	1.74792- 4	2.92006- 6	5.34068-	5129681802	22
1.54726- 6	2.31799- 5	1.01174- 7	7.96423- 6	1.25406- 8	1.32158-	6129681802	23
4.39625- 9	2.23761- 7	1.62727- 9	1.20417- 7	6.75687-10	4.36636-	8129681802	24
1.97028-10	1.93228- 8	2.17181-11	7.83411-10	0.00000+ 0	0.00000+	0129681802	25
1.35002+ 0	1.80000+ 0	0	0	0		4129681802	26
1.00000- 1	1.00000+ 9	0	0	0		17129681802	27
8.89320- 2	1.83720+ 0	4.22751- 2	3.98680- 1	1.93469- 2	1.14124-	1129681802	28
6.52324- 3	2.13741- 2	4.69550- 4	4.58269- 3	1.45895- 4	1.49459-	3129681802	29
4.77795- 5	4.61804- 4	1.30324- 5	1.69749- 4	1.76683- 6	4.74401-	5129681802	30
1.67744- 6	2.77311- 5	7.99722- 8	1.11247- 5	3.72433- 9	1.61815-	6129681802	31
5.65858-10	3.20143- 7	2.97839-10	3.53259- 8	4.75454-10	2.58066-	8129681802	32
3.47701-11	5.18983- 8	1.79689-11	7.80287-10	0.00000+ 0	0.00000+	0129681802	33
1.80000+ 0	2.20000+ 0	0	0	0		5129681802	34
1.00000- 1	1.00000+ 9	0	0	0		16129681802	35
1.03290- 1	1.86749+ 0	4.44396- 2	4.29400- 1	2.29205- 2	1.22229-	1129681802	36
5.84621- 3	2.23230- 2	4.79737- 4	4.90119- 3	1.02927- 4	1.59397-	3129681802	37
3.89764- 5	5.21673- 4	7.02425- 6	1.68510- 4	1.38864- 6	4.60997-	5129681802	38
1.19466- 6	3.16276- 5	8.86112- 8	1.29665- 5	4.37050-10	1.08090-	6129681802	39
1.12239-11	4.71536- 8	5.85272-10	2.80494- 8	6.82189-15	2.37744-	9129681802	40
4.97451-12	7.82128-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681802	41
2.20002+ 0	2.60000+ 0	0	0	0		6129681802	42
1.00000- 1	1.00000+ 9	0	0	0		16129681802	43
1.11323- 1	1.87437+ 0	4.61858- 2	4.53805- 1	2.63442- 2	1.35453-	1129681802	44
5.59879- 3	2.47262- 2	5.26593- 4	5.51676- 3	9.32899- 5	1.70055-	3129681802	45
3.21620- 5	5.54198- 4	4.46552- 6	1.66758- 4	7.63784- 7	4.82299-	5129681802	46
1.22937- 6	3.76700- 5	4.77537- 8	1.42569- 5	1.40644-10	2.96924-	8129681802	47
1.29416-10	2.72532- 8	3.43357-11	2.78271- 8	3.19147-11	2.56858-	8129681802	48
3.29644-14	7.89478-10	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681802	49
2.60000+ 0	3.00000+ 0	0	0	0		7129681802	50
1.00000- 1	1.00000+ 9	0	0	0		15129681802	51
1.01033- 1	1.99816+ 0	5.20837- 2	4.96799- 1	2.43232- 2	1.29902-	1129681802	52
4.61498- 3	2.42339- 2	4.96798- 4	5.79669- 3	7.26757- 5	1.80235-	3129681802	53
2.97493- 5	5.93167- 4	1.37521- 6	1.31516- 4	7.81538- 7	6.40569-	5129681802	54
1.34527- 6	4.79776- 5	8.02483- 9	1.32563- 5	4.34955-11	3.24965-	6129651802	55
6.29801-11	2.82888- 8	3.82178-12	2.39102- 8	1.84505-17	1.27640-	9129681802	56
3.20000+ 0	4.20000+ 0	0	0	0		6129681802	57
1.00000- 1	1.30000+ 9	0	0	0		15129681802	58
1.63305- 1	2.61797+ 0	1.28394- 1	5.05878- 1	3.59738- 2	1.05879-	1129681802	59

```
6.16752- 3 2.28199- 2 8.58122- 4 6.36582- 3 1.18263- 4 1.86514- 3129681802   60
3.11683- 5 6.00506- 4 2.59684- 6 6.99744- 5 2.79521- 7 6.90136- 5129681802   61
1.58668- 6 6.54781- 5 1.25729- 8 1.42418- 5 7.39312-12 1.26594- 6129681802   62
4.06468-14 3.00952- 7 4.40932-13 2.21333- 8 8.49384-18 3.81265-10129681802   63
4.00000+ 0 5.00000+ 0          0          0          0         9129681802   64
1.00000- 1 1.00000+ 9          0          0          0        14129681802   65
6.79765- 2 2.71128+ 0 5.41011- 2 5.14824- 1 2.47509- 2 1.21306- 1129681802   66
2.35525- 3 2.46201- 2 4.30295- 4 8.11014- 3 3.61006- 5 3.01364- 3129681802   67
1.18480- 6 5.34153- 4 4.14300- 7 6.41636- 5 1.00708- 6 7.22842- 5129681802   68
4.78207- 9 7.23151- 5 7.93591-13 1.04987- 6 6.48490-16 1.79138- 7129681802   69
5.28244-19 2.16883-11 6.54327-19 7.03245-13 0.00000+ 0 0.00000+ 0129681802   70
5.00000+ 0 6.00000+ 0          0          0          0        10129681802   71
1.00000- 1 1.00000+ 9          0          0          0        13129681802   72
4.24126- 2 1.69877+ 0 1.64049- 2 2.98114- 1 1.04532- 2 1.12123- 1129681802   73
6.75477- 4 2.88257- 2 1.62514- 4 1.09155- 2 1.68557- 5 4.27432- 3129681802   74
2.77764- 7 2.36536- 3 2.59924- 8 6.86112- 5 3.20931-14 1.22232- 6129681802   75
7.72785-14 9.96913- 7 9.15821-18 1.73032- 7 6.86056-21 2.48196-11129681802   76
1.15699-20 6.94295-13 0.00000+ 0 0.00000+ 0 0.00000+ 0 0.00000+ 0129681802   77
6.00000+ 0 7.50000+ 0          0          0          0        11129681802   78
1.00000- 1 1.00000+ 7          0          0          0        11129681802   79
1.83492- 2 1.70393+ 0 6.60448- 3 3.30171- 1 4.45520- 3 1.20398- 1129681802   80
2.17670- 4 4.50457- 2 3.27137- 5 1.40288- 2 7.38277- 7 4.97407- 3129681802   81
7.70688- 9 1.83977- 3 3.26129-10 8.25314- 4 1.66341-13 2.60513- 4129681802   82
2.34462-15 1.03613- 6 2.50144-22 1.63206- 7 0.00000+ 0 0.00000+ 0129681802   83
                                                               129681   0   84
0.         0.                  0          0          0        11129681803   85
1.00000- 1 4.00000- 1          0          0          0         1129681803   86
1.00000- 1 1.00000+ 9          0          0          0        19129681803   87
6.89434- 2 1.82056+ 0 1.75749- 2 4.42436- 1 1.79624- 2 3.15735- 1129681803   88
8.32862- 3 8.21851- 2 1.56763- 3 3.09693- 2 8.80714- 4 1.52913- 2129681803   89
1.08019- 4 4.08730- 3 4.07418- 5 9.15304- 4 2.26294- 5 6.63367- 4129681803   90
6.16562- 6 2.18661- 4 1.06044- 7 2.10246- 5 3.10642- 7 1.41375- 5129681803   91
5.64193- 8 3.59046- 6 1.18292- 9 8.13862- 7 1.53176- 9 2.58370- 7129681803   92
3.34892-11 2.82396- 8 1.39089-12 1.99297- 8 9.31669-14 8.09492- 9129681803   93
1.10218-17 1.19164-10 0.00000+ 0 0.00000+ 0 0.00000+ 0 0.00000+ 0129681803   94
4.00000- 1 9.00000- 1          0          0          0         2129681803   95
1.00000- 1 1.00000+ 9          0          0          0        19129681803   96
4.22820- 1 2.10816+ 0 1.11571- 1 6.58651- 1 1.18296- 1 3.25994- 1129681803   97
2.69752- 2 1.07296- 1 6.59664- 3 3.60240- 2 1.80204- 3 1.29727- 2129681803   98
7.09914- 4 3.74172- 3 1.23783- 4 1.06440- 3 1.43194- 5 3.08336- 4129681803   99
4.94374- 5 1.83772- 4 1.92624- 6 4.55693- 5 1.54430- 6 1.30698- 5129681803  100
1.10718- 7 3.68260- 6 3.37506- 8 3.10579- 6 6.95776- 8 1.18609- 6129681803  101
1.12169- 8 1.14540- 7 1.71843-11 1.99837- 8 8.34489-12 2.27629- 8129681803  102
3.13287-11 7.35785-10 0.00000+ 0 0.00000+ 0 0.00000+ 0 0.00000+ 0129681803  103
9.00000- 1 1.35000+ 0          0          0          0         3129681803  104
1.00000- 1 1.00000+ 9          0          0          0        19129681803  105
8.82611- 2 1.59021+ 0 4.79426- 2 3.26569- 1 1.99948- 2 1.15926- 1129681803  106
6.57171- 3 3.26515- 2 2.78555- 3 1.36895- 2 5.65112- 4 4.80501- 3129681803  107
1.78337- 4 9.85003- 4 9.28013- 5 5.85449- 4 1.79460- 5 2.10580- 4129681803  108
2.43757- 6 3.69557- 5 6.94203- 7 1.76903- 5 2.77845- 8 2.54538- 6129681803  109
2.91426- 9 6.58740- 7 1.07938- 9 5.11638- 7 4.52414-11 2.22774- 7129681803  110
4.50827-13 3.42242- 8 8.88773-14 1.98529- 8 1.93785-17 1.69380-11129681803  111
4.57749-18 1.66638-11 0.00000+ 0 0.00000+ 0 0.00000+ 0 0.00000+ 0129681803  112
1.35000+ 0 1.80000+ 0          0          0          0         4129681803  113
1.00000- 1 1.00000+ 9          0          0          0        14129681803  114
2.59581- 2 2.72284+ 0 3.76412- 2 4.63823- 1 1.42129- 2 1.21589- 1129681803  115
7.10408- 3 3.45432- 2 3.50375- 3 1.40187- 2 1.01534- 3 6.35400- 3129681803  116
4.26521- 5 4.46698- 3 8.31980- 5 3.70601- 4 7.41766- 6 7.87959- 5129681803  117
3.46411- 6 4.90359- 5 8.58748- 8 6.26207- 7 1.06890-11 2.80066- 8129681803  118
1.76502-17 2.80067- 8 3.82067-17 1.36227-11 0.00000+ 0 0.00000+ 0129681803  119
1.80000+ 0 2.20000+ 0          0          0          0         5129681803  120
1.00000- 1 1.00000+ 9          0          0          0        18129681803  121
1.02641- 2 1.43417+ 0 5.49348- 3 3.12535- 1 3.27115- 3 1.16749- 1129681803  122
1.95914- 3 2.84893- 2 1.08775- 3 1.32314- 2 1.21183- 4 4.07414- 3129681803  123
7.22380- 5 7.11862- 4 7.97283- 6 5.56282- 4 7.02073- 6 1.16591- 4129681803  124
3.87177- 6 7.07329- 5 4.46273- 7 3.82109- 5 1.70934- 8 1.37256- 5129681803  125
6.30656- 9 2.56804- 6 5.84567-11 7.53693- 7 6.28261-12 9.49260- 8129681803  126
4.22356-11 2.81962- 8 2.19957-16 2.97386- 8 1.11162-17 9.74859-11129681803  127
2.20000+ 0 2.60000+ 0          0          0          0         6129681803  128
```

1.00000- 1	1.00000+ 9	0	0	0		16129681803	129
1.63652- 2	1.64529+ 0	1.19676- 2	3.31730- 1	5.84222- 3	8.66136-	2129681803	130
3.08102- 3	1.91468- 2	6.72854- 4	8.42109- 3	4.77249- 5	1.58489-	3129681803	131
2.94421- 5	3.12173- 4	7.53301- 6	9.46752- 5	3.15826- 6	6.55706-	5129681803	132
-3.04424- 9	5.46552- 6	9.24803-10	6.01924- 7	3.12416 9	6.67984-	7129681803	133
1.59106- 9	5.97900- 7	1.49186-14	2.23878- 8	3.11605-20	9.39200-	11129681803	134
1.36267-17	1.88319-11	0.00002+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681803	135
2.60000+ 0	3.00000+ 0	0	0	0		7129681803	136
1.00000- 1	1.00000+ 9	0	0	0		15129681803	137
1.01100- 2	2.70385+ 0	1.43796- 2	4.52980- 1	5.27646- 3	1.17694-	1129681803	138
1.91182- 3	4.03913- 2	1.11924- 3	1.37541- 2	1.72261- 4	7.43558-	3129681803	139
9.14350- 5	2.98837- 3	4.03110- 6	1.82696- 4	8.71789- 6	3.70106-	4129681803	140
6.20691- 7	7.07612- 5	5.19358-11	6.27173- 7	4.63066-11	6.25146-	7129681803	141
1.75777-15	2.17128- 8	1.78360-24	2.45928-11	4.00728-18	2.35789-	12129681803	142
3.00000+ 0	4.00000+ 0	0	0	0		8129681803	143
1.00000- 1	1.00000+ 9	0	0	0		16129681803	144
6.71745- 3	2.75492+ 0	9.48800- 3	4.72103- 1	4.16736- 3	1.22448-	1129681803	145
3.22394- 3	3.12021- 2	1.13289- 3	9.75701- 3	3.71700- 4	4.00920-	3129681803	146
3.39868- 5	1.36580- 3	9.40002- 6	3.71200- 4	2.73865- 6	1.62437-	4129681803	147
2.39705- 7	8.68151- 5	2.40287- 7	7.42730- 5	2.66404-11	7.09598-	7129681803	148
1.46425-11	5.76721- 7	4.13482-17	6.49378- 8	1.00789-18	1.43143-	11129681803	149
1.53238-16	1.28915-12	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681803	150
4.00000+ 0	5.00000+ 0	0	0	0		9129681803	151
1.00000- 1	1.00000+ 9	0	0	0		16129681803	152
8.36770- 3	1.39342+ 0	3.59519- 3	2.73349- 1	2.57283- 3	1.36271-	1129681803	153
1.84435- 3	3.26432- 2	6.32586- 4	8.67498- 3	1.71964- 4	4.40785-	3129681803	154
1.65977- 4	3.95829- 3	3.83334- 6	1.07777- 3	1.98496- 7	3.35828-	4129681803	155
3.69245- 8	7.88871- 5	8.84167- 9	5.94478- 5	5.45819-12	1.05237-	6129681803	156
1.82547-14	5.75028- 7	4.97833-16	1.71894- 7	8.11248-20	4.00000-	8129681803	157
5.15442-20	1.21066-13	0.00000+ 0	0.00000+ 0	0.00000+ 0	0.00000+	0129681803	158
5.00000+ 0	6.00000+ 0	0	0	0		10129681603	159
1.00000- 1	1.00000+ 7	0	0	0		12129681803	160
9.06700- 3	1.54310+ 0	4.60205- 3	2.66182- 1	1.49543- 3	1.03914-	1129681803	161
2.43663- 4	1.38061- 2	5.03207- 5	4.77039- 3	6.40819- 6	3.11276-	3129681803	162
7.13759- 8	8.66134- 4	6.42245- 9	7.03013- 4	7.15931-13	9.74764-	5129681803	163
6.19300-13	1.06165- 6	1.91366-14	7.53108- 7	1.08254-25	1.95064-	7129681803	164
6.00000+ 0	7.50000+ 0	0	0	0		11129681803	165
1.00000- 1	1.00000+ 7	0	0	0		11129681803	166
1.40319- 3	1.77094+ 0	5.58437- 4	3.94210- 1	5.25535- 4	1.79184-	1129681803	167
9.32301- 5	8.68275- 2	3.56183- 5	1.27709- 2	6.76887-10	1.76786-	3129681803	168
3.09687-13	3.98051- 4	2.54909-14	3.42285- 5	4.28676-16	2.11576-	6129681803	169
2.71249-15	8.64500- 7	1.79266-18	1.00334- 7	0.00000+ 0	0.00000+	0129681803	170
						129681 0	171
						1296 0 0	172
						0 0 0	173
						-1-0 -0	1

REFERENCES

1. P. G. Young and E. D. Arthur, "GNASH, A Preequilibrium, Statistical Nuclear-Model Code for Calculation of Cross Sections and Emission Spectra," Los Alamos Scientific Laboratory report LA-6947 (1977).

2. C. Kalbach, "The Griffin Model, Complex Particles, and Direct Nuclear Reactions, "Z. Phys. A283, 401 (1977).

3. C. M. Perey and F. G. Perey, "Compilation of Phenomenological Optical Model Parameters 1954-1975," Atomic Data and Nucl. Data Tables 17, 1 (1976). [Neutrons: Wilmore-Hodgson (14-40 MeV); Bechetti-Greenlees (40-100 MeV). Protons: Bechetti-Greenlees. Deuterons: Perey. Alphas: results from α + ^{39}K as listed in the compilation.]

4. J. Wilhelmy, Los Alamos Scientific Laboratory, personal communication.

5. E. D. Arthur and P. G. Young, "Neutron Cross Sections for Yttrium and Titanium Isotopes," in ""Applied Nuclear Data Research and Development April 1-June 30, 1977," compiled by C. I. Baxman and P. G. Young, Los Alamos Scientific Laboratory report LA-6971-PR, p. 6 (1977).

6. C. M. Perey and F. G. Perey, "Compilation of Phenomenological Optical Model Parameters 1954-1975," Atomic Data and Nucl. Data Tables 17, 1 (1976).

7. C. H. Johnson, A. Galonsky, and R. L. Kernell, "Anomalous Optical Model Potential for Sub-Coulomb Protons for 89 < A < 130," Phys. Rev. Lett. 39 1604 (1977).

8. C. H. Johnson, R. L. Kernell, and S. Ramavataram, "The ^{89}Y(p,n)^{89}ZR Cross Section Near the First Two Analogue Resonances," Nucl. Phys. A107, 21 (1968).

9. Ch. Lagrange, "Optical Model Parameterization between 10 keV and 20 MeV--Application to the ^{89}Y and ^{93}Nb Spherical Nuclei," Presented at the National Soviet Conference on Neutron Physics (1975).

10. J. Delaroche, G. Haouat, R. Shamu, J. Lachkar, M. Patin, J. Sigaud, and J. Chardine, "Study of Even-Even Tungsten Isotopes by Neutron Scattering," Proc. of the National Conf. on Neutron Physics, Kiev (1977).

11. P. T. Guenther, "The Elastic and Inelastic Scattering of Fast Neutrons from the Even Isotopes of Tungsten," Ph.D. thesis (1977).

12. J. Frehaut, Bruyères-le-Châtel, private communication (1978).

13. C. L. Dunford, "A Unified Model for Analysis of Compound Nucleus Reactions," Atomics International report AI-AEC-12931 (July 15, 1970).

14. H. Rebel and G. W. Schweimer, "Improved Version of Tamura's Code for Coupled-Channel Calculations: JUPITOR Karlsruhe Version," Gesellschatt fur Kernforschung M.B.H. report K.F.K. 133 (Feb. 1971).

15. D. Madland, "Neutron Optical Potential for Uranium Isotopes," in "Applied Nuclear Data Research and Development July 1 - September 30, 1977,"compiled by C. I. Baxman and P. G. Young, Los Alamos Scientific Laboratory report LA-7066-PR, p. 12 (Dec. 1977).

16. G. F. Auchampaugh, J. A. Farrell, and D. W. Bergen, "Neutron-Induced Fission Cross Sections of ^{242}Pu and ^{244}Pu," Nucl. Phys. A171, 31 (1971).

17. J. W. Behrens, R. S. Newbury, and J. W. Magana, "Measurements of the Neutron-Induced Fission Cross Sections for ^{240}Pu, ^{242}Pu, and ^{244}Pu Relative to ^{235}U from 0.1 to 30 MeV," Nucl. Sci. Eng. 66, 433 (1978).

18. M. Bhat, Brookhaven National Laboratory, personal communication (1977).

19. D. W. Bergen and R. R. Fullwood, "Neutron Induced Fission Cross Section of ^{242}Pu," Nucl. Phys. A163, 577 (1971).

20. D. K. Butler, "Neutron Induced Fission Cross Sections of Pu^{242} from 0.1 to 1.5 MeV," Bull. Am. Phys. Soc. 4, 234 (1959).

21. E. F. Formushkin, E. K. Gutnikova, Yu. S. Zamustrin, B. K. Moslennikov, V. N. Belov, V. M. Surin, F. Nasyrov, and N. F. Paskin, "Cross Sections and Fragment Angular Anisotropy in Fast-Neutron Fission of Some Isotopes of Plutonium, Americium, and Currium," Yad. Fiz. [Sov. J. Nucl. Phys.] 5, 689 (1967).

22. E. F. Formushkin and E. F. Gutnikova, "Cross-Sections and Angular Distributions of Fragments in the fission of ^{238}Pu, ^{242}Pu and ^{241}Am by Neutrons of Energy of 0.45-3.6 MeV," International Nuclear Data Committee report INDC (CCP)-7/u, p. 28 (1970).

23. J. Terrell, "Prompt Neutrons from Fission," Proc. of the IAEA Symposium on the Physics and Chemistry of Fission, Salzburg (1965).

24. F. Mann and R. E. Schenter, "HEDL Evaluation of Actinide Cross Sections for ENDF/B-V," Hanford Engineering Development Laboratory report HEDL-TME-77-54 (1977).

25. R. J. Howerton, D. E. Cullen, R. C. Haight, M. H. MacGregor, S. T. Perkins, and E. F. Plechaty, "The LLL Evaluated Nuclear Data Library (ENDL) Evaluation Techniques, Reaction Index and Descriptions of Individual Evaluations," Lawrence Livermore Laboratory report UCRL-50400, Vol. 15 (1975).

26. H. Alter and C. Dunford, Brookhaven National Laboratory, personal communication (1974).

27. F. Manero and V. A. Konshin, "Status of the Energy Dependent $\bar{\nu}$-Values for the Heavy Isotopes (Z > 90) from Thermal to 15 MeV and of ν-Values for Spontaneous Fission," Atomic Energy Review 10, 637 (1972).

28. R. W. Hockenbury, A. J. Sanislo, and N. N. Kaushal, "keV Capture Cross Section of ^{242}Pu," in Nuclear Cross Sections and Technology Volume II, NBS Special Publication 425, p. 584 (1975).

29. D. Drake, Los Alamos Scientific Laboratory, personal communication (1978).

30. C. E. Bemis, F. K. McGowan, J. L. C. Ford, W. T. Milner, P. H. Stelson, and R. L. Robinson, "E2 and E4 Transition Moments and Equilibrium Deformation in the Actinide Nuclei," Phys. Rev. C8, 1466 (1973).

31. David L. Hill and J. A. Wheeler, "Nuclear Constitution and the Interpretation of Fission Phenomena," Phys. Rev. 89, 1102 (1953).

32. D. G. Madland, Los Alamos Scientific Laboratory, personal communication (1978).

33. B. B. Back, H. C. Britt, O. Hansen, B. Leroux, and J. D. Garrett, "Fission of Odd-A and Doubly Odd Actinide Nuclei Induced by Direct Reactions," Phys. Rev. C10, 1948 (1974).

34. C. Kalbach, "The Griffin Model, Complex Particles and Direct Nuclear Reactions," Z. Phys. A283, 401 (1977).

35. B. Leugers, S. Cierjacks, P. Brotz, D. Erbe, D. Groschel, G. Schmalz, and F. Voss, "The ^{235}U and ^{238}U Neutron-Induced Fission Cross Section Relative to the H(n,p) Cross Section," Argonne National Laboratory report ANL-76-90, p. 246 (1976).

36. Leona Stewart, "Hydrogen and Helium Production Cross Sections for ENDF/B-V," Trans. Am. Nucl. Soc. 28, 740 (1978).

37. R. B. Kidman and R. E. MacFarlane, "LIB-IV, A Library of Group Constants for Nuclear Reactor Calculations," Los Alamos Scientific Laboratory report LA-6260-MS (1976).

38. C. R. Weisbin, P. D. Soran, R. E. MacFarlane, D. R. Harris, R. J. LaBauve, J. S. Hendricks, J. E. White, and R. B. Kidman, "MINX, A Multigroup Interpretation of Nuclear X-Sections from ENDF/B." Los Alamos Scientific Laboratory report LA-6486-MS (1976).

39. D. Garber, Ed., "Data Formats and Procedures for the ENDF Neutron Cross Section Library," Brookhaven National Laboratory report BNL-50274 (1976).

40. H. Alter, R. B. Kidman, R. LaBauve, R. Protsik, and B. A. Zolatar, "ENDF-202 Cross Section Evaluation Working Group Benchmark Specifications," Brookhaven National Laboratory report BNL-19302 (1974).

41. R. B. Kidman, "ENDF/B-IV, LIB-IV, and CSEWG Benchmarks," Los Alamos Scientific Laboratory report LA-7355-MS (July 1978).

42. R. E. MacFarlane, "Data Processing for Power Reactor Fuel Cycle Codes," Proc. of the BNL/EPRI Seminar on Nuclear Data for Thermal Reactor Applications at Brookhaven National Laboratory (May 1978).

43. EPRI-CPM is part of the proprietary Advanced Recycle Methods Program (ARMP) developed for the Electric Power Research Institute (EPRI) by Nuclear Associates International and AB Atomenergie, Studsvik. Additional information can be obtained from EPRI.

44. A. S. Jensen and T. J. Dossing, "Statistical Calculation of the Mass Distribution in Fission," in Proc. of the Third International Atomic Energy Symposium on the Physics and Chemistry of Fission, Rochester, 1973, Vol. I, p. 409.

45. R. E. Pepping, D. G. Madland, C. W. Maynard, T. R. England, and P. G. Young, "Fission Yield Theory," in "Applied Nuclear Data Research and Development January 1-March 31, 1978," compiled by C. I. Baxman and P. G. Young, Los Alamos Scientific Laboratory report LA-7301-PR, p. 12 (June 1978).

46. H. G. Clerc, "The Influence of Pairing and Nuclear Structure on the Thermal Neutron Induced Fission of ^{235}U," Institut fur Kernphysik Technische Hochschule Darmstadt report IKDA 75/10 (June 1975).

47. B. L. Wehring, University of Illinois, personal communication.

48. R. E. Pepping, D. G. Madland, C. W. Maynard, T. R. England, and P. G. Young, "Fission-Yield Theory," in "Applied Nuclear Data Research and Development July 1-September 30, 1978," compiled by C. I. Baxman and P. G. Young, Los Alamos Scientific Laboratory report LA-7066-PR, p. 24 (December 1977).

49. L. G. Moretto, "Statistical Description of Deformation in Excited Nuclei and Disappearance of Shell Effects with Excitation Energy," Nucl. Phys. A182, 641 (1972).

50. T. R. England, R. E. Schenter, and F. Schmittroth, "Integral Decay-Heat Measurements and Comparisons to ENDF/B-IV and V," Los Alamos Scientific Laboratory report LA-7422-MS (NUREG/CR-0305) (1978).

51. T. R. England and M. G. Stamatelatos, "Comparisons of Calculated and Experimental Delayed Fission-Product Beta and Gamma Spectra from ^{235}U," Los Alamos Scientific Laboratory report LA-NUREG-6846-MS (July 1977).

52. W. B. Wilson and T. R. England, "Status of Fission-Product Data For Absorption Calculations," Proc. of the Seminar on Nuclear Data Problems for Thermal Reactor Problems, Brookhaven National Laboratory (May 1978).

53. R. J. LaBauve and T. R. England, "Rapid Spectral and Decay-Heat Calculations Using Processed ENDF/B Fission Product Data," Trans. Am. Nucl. Soc. 28, 749 (1978).