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NEUTRON NUCLEAR DATA OF ^{7}Li ADOPTED IN JENDL-2

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Japan Atomic Energy Research Institute

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Neutron Nuclear Data of ^{7}Li Adopted in JENDL-2

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Neutron nuclear data of ^{7}Li were evaluated for JENDL-2 in the energy range from 10^{-5} eV to 20 MeV. Evaluated quantities are the total, elastic and inelastic scattering, (n,γ), (n,n')αt reaction cross sections and the angular distributions of neutrons. The present evaluation was completely based on available experimental data.

Keywords: Evaluation, Neutron Nuclear Data, Lithium-7, Cross Section, JENDL-2, 10^{-5} eV ∿ 20 MeV

JENDL−2に採用された ^{7}Liの中性子核データ

日本原子力研究所東海研究所物理部
柴田　恵一

（1984年8月15日受理）

JENDL−2のために ^{7}Liの中性子核データを 10^{-5} eVから20 MeVのエネルギーにわたって評価した。評価した量は全断面積，弾性散乱断面積，非弾性散乱断面積，（n, γ）反応断面積，（n, n′）αt反応断面積および中性子の角度分布である。今回の評価は全面的に実験値に基づいて行われた。

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1. Introduction

Neutron nuclear data of ^{7}Li are important for fusion neutronics calculations. In particular the (n,n')αt reaction cross section has much influence on the tritium breeding ratio in fusion blankets. However the data of ^{7}Li were not included in the first version of Japanese Evaluated Nuclear Data Library (JENDL-1) which was released in autumn 1977. The data of ^{7}Li in ENDF/B-IV are mainly based on the evaluation by Pendlebury[1] which was made in 1964. The ENDF/B-V data, which are not available in the countries other than USA and Canada, are known[2] to be almost the same as those of ENDF/B-IV. Thus, in such a situation, the evaluation of ^{7}Li for the second version of JENDL (JENDL-2) was planned in spring 1982, and was completed in July 1982. The present evaluation was completely based on available experimental data.

This report describes the evaluation methods and results. The problems left for future work are also written. The presently evaluated data are listed in Appendix.

2. Total Cross Section

For the evaluation the following experimental data are available:

Hibdon and Langsdorf, Jr.[3]	(1954),	1 keV ∿ 0.34 MeV,
Hibdon and Mooring[4]	(1968),	10 keV ∿ 1.2 MeV,
Meadows and Whalen[5]	(1970),	0.1 MeV ∿ 1.5 MeV,
Foster, Jr. and Glasgow[6]	(1971),	2.5 MeV ∿ 15 MeV,
Goulding et al.[7]	(1972),	0.7 MeV ∿ 30 MeV,
Lemaze et al.[8]	(1979),	3 MeV ∿ 50 MeV.

As seen in Fig. 1, the data of Meadows and Whalen[5] are inconsistent with those of Hibdon and Langsdorf, Jr.[3] and of Hibdon and Mooring[4] in the resonance region around 260 keV, but are consistent in the off-resonance region. The reason for this difference is not obvious. In the two earlier measurements, the total cross sections of natural Li and ^{6}Li (99.3% purity) were measured and then that of ^{7}Li was deduced. On the other hand, Meadows and Whalen[5] measured the total cross section using 99.991% ^{7}Li samples. Moreover they made correction for the background due to the in-scattering, and estimated possible errors. Hence, in the present evaluation, the data of Meadows and Whalen[5] were adopted in the resonance region around 260 keV. In the other energy region there is no remarkable difference among the above experimental data.

The evaluated data were obtained with a least-squares fit using the spline function. This operation was performed by using Neutron Data Evaluation System (NDES)[9]. Below 1 keV where no experimental data are available, the cross section was given by

$$\sigma_{tot} = 1.04894 + \sigma_{n,\gamma} \quad \text{(barns)},$$

where $\sigma_{n,\gamma}$ is the radiative capture cross section described in the following section.

The results are shown in Figs. 2-4. The peak values of the P-wave resonance around 260 keV are given as follows:

JENDL-2	262 keV	12.0 barns,
ENDF/B-IV	258 keV	10.9 barns.

It should be noted that ENDF/B-IV took account of the data of Meadows and Whalen[5] in the energy region from 0.5 to 1.3 MeV, but did not in the resonance region around 260 keV.

3. Elastic Scattering

In the present evaluation the elastic scattering cross section was obtained by subtracting the reaction cross section from the total cross section. Figure 5 shows the result.

The elastic angular distribution was assumed to be isotropic in the center-of-mass system below 50 keV. Between 50 keV and 14 MeV the Legendre coefficients were obtained from the experimental data of Lane et al.[10], Hogue et al.[11] and Knox et al.[12]. Above 14 MeV no experimental data are available, and the optical-model calculation was performed. In the calculation the optical potential parameters of Watson et al.[13] were used, and they are given in Table 1. Figure 6 shows the present results at four incident energies.

4. Inelastic Scattering

In JENDL-2, only the first excited level (0.477 MeV) was taken into consideration as a discrete level, because other levels contribute to the (n,n')αt reaction. The first level is known to decay by emitting γ-rays which have isotropic angular distributions, and the (n,n'γ) data are available for the evaluation. In the present work we adopted the (n,n'γ) data measured by Presser and Bass[14] and by Benveniste et

al.[15], which were smoothly joined with each other. Figure 7 shows the result.

The neutrons from the inelastic scattering to the first excited level cannot be identified experimentally, because the excitation energy is small. Thus we have no experimental information on the angular distribution of the neutrons. In the evaluation, it was assumed to be isotropic in the center-of-mass system.

5. The (n,n')αt Reaction

The experimental data given in Table 2 were available when the evaluation was made. The data of Rosen and Stewart[18], Batchelor and Towle[20], Cookson et al.[21] and Swinhoe et al.[23] deviate from the other data. Disregarding these four measurements, we evaluated the (n,n')αt cross section by the eye-guide method. As seen in Fig. 8, the present result is by 10% smaller than the ENDF/B-IV data at 10 MeV. After the present evaluation, the activation data measured by Liskien et al.[28] became available. It should be noted that their data show smaller values than those of JENDL-2 around 14 MeV. We should take account of their data in the next evaluation for the third version (JENDL-3).

The angular distribution of neutrons from the (n,n')αt reaction was assumed to be isotropic in the laboratory system.

6. The (n,γ) Reaction

As the thermal cross section we adopted a value of 45.4 mb measured by Jurney[29]. The same value is also recommended by Mughabghab et al.[30] The cross section was extrapolated by assuming a form of 1/v up to 20 MeV, i.e.,

$$\sigma_{n,\gamma} = 7.22 \times 10^{-3}[E_n(\mathrm{eV})]^{-1/2} \text{ barns.}$$

In higher energy region this evaluation is not appropriate naturally. However, the cross section is expected to be extremely small in that regin, and thus no problem arises practically. The result is shown in Fig. 9.

7. Other Quantities

As to the (n,2n), (n,2nα) and (n,d) reactions, experimental data are very scarce. Thus, at this time, the ENDF/B-IV data were recommended for these reactions. The nuclear temperatures which specify the neutron spectra from the (n,2n), (n,2nα) and (n,n')αt reactions were also taken from ENDF/B-IV.

8. Concluding Remarks

Evaluation of neutron nuclear data for ^{7}Li was performed in the energy range from 10^{-5} eV to 20 MeV, and the result was adopted in JENDL-2. The present evaluation was completely based on available experimental data.

There remain some problems in the present evaluation as follows:

1) For the inelastic scattering only the first excited level was treated as a discrete level. For transport calculations, however, it is required to include the second excited level.
2) As to the (n,n')αt reaction the most recent experimental data of Liskien et al.[28] were not taken into consideration, because they were published after the present evaluation.
3) Concerning the (n,2n), (n,2nα) and (n,d) reactions, we took the cross sections from ENDF/B-IV without any examinations.

These problems should be resolved in the next evaluation for JENDL-3.

Acknowledgments

The author wishes to acknowledge valuable discussion with Dr. S. Igarasi. He also thanks Mr. T. Narita for his aid in making graphs. He is also grateful to Miss T. Maejima for her typewriting.

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Table 1 Optical potential parameters used in the calculation of the elastic angular distribution above 14 MeV.

V	$= 56.14 - 0.3 \times E_{CM}$	(MeV)
W_s	$= 8.17 - 0.06 \times E_{CM}$	(MeV)
V_{so}	$= 5.5$	(MeV)
r_0	$= r_s = 1.15 - 0.001 \times E_{CM}$	(fm)
a	$= 0.57$	(fm)
b	$= 0.5$	(fm)

The potential form is given by the following expression:

$$U(r) = -V/(1 + f_v(r)) - 4iW_s f_w(r)/(1 + f_w(r))^2$$
$$- (\hbar/m_\pi c)^2 V_{so}(r_0 A^{1/3})^{-1} a^{-1} f_v(r)/(1 + f_v(r))^2 \vec{\ell}\cdot\vec{\sigma},$$

where $f_v(r) = \exp\{(r - r_0 A^{1/3})/a\}$,

and $f_w(r) = \exp\{(r - r_s A^{1/3})/b\}$.

Table 2 Measurements of the (n,n')αt cross section.

Author	Year	Energy(MeV)	Method
Wyman and Thorpe[16]	1958	4 ∿ 14.8	Activation
Osborn and Wilson[17]	1961	14	Activation
Rosen and Stewart[18]	1961	5 ∿ 14	Detection of α-t stars
Brown et al.[19]	1963	3.5 ∿ 15	Activation
Batchelor and Towle[20]	1963	1.5 ∿ 7.5	Detection of neutrons
Cookson et al.[21]	1967	10	Detection of neutrons
Hopkins et al.[22]	1968	4.83, 5.74, 7.5	Detection of neutrons
Swinhoe and Uttley[23]	1980	4 ∿ 14	Activation
Baba et al.[24]	1980	5.1, 6.6, 15.4	Detection of neutrons
Lisowski et al.[25]	1980	5.96, 9.83	Detection of neutrons
Liskien and Paulsen[26]	1980	6 ∿ 10	Direct detection of tritons
Smith et al.[27]	1981	6.89, 7.86, 8.88	Activation

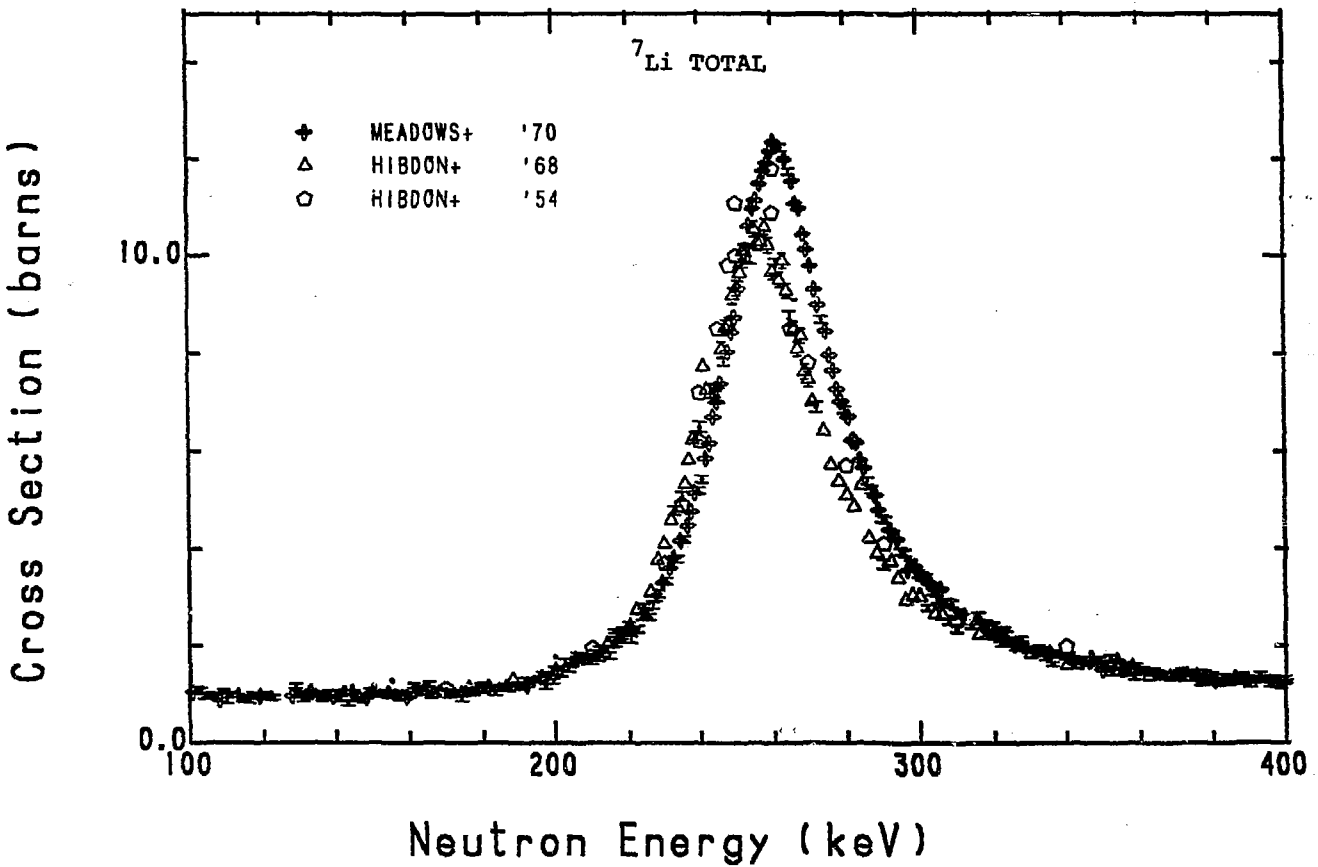

Fig. 1 Measurements of the total cross section between 100 keV and 400 keV.

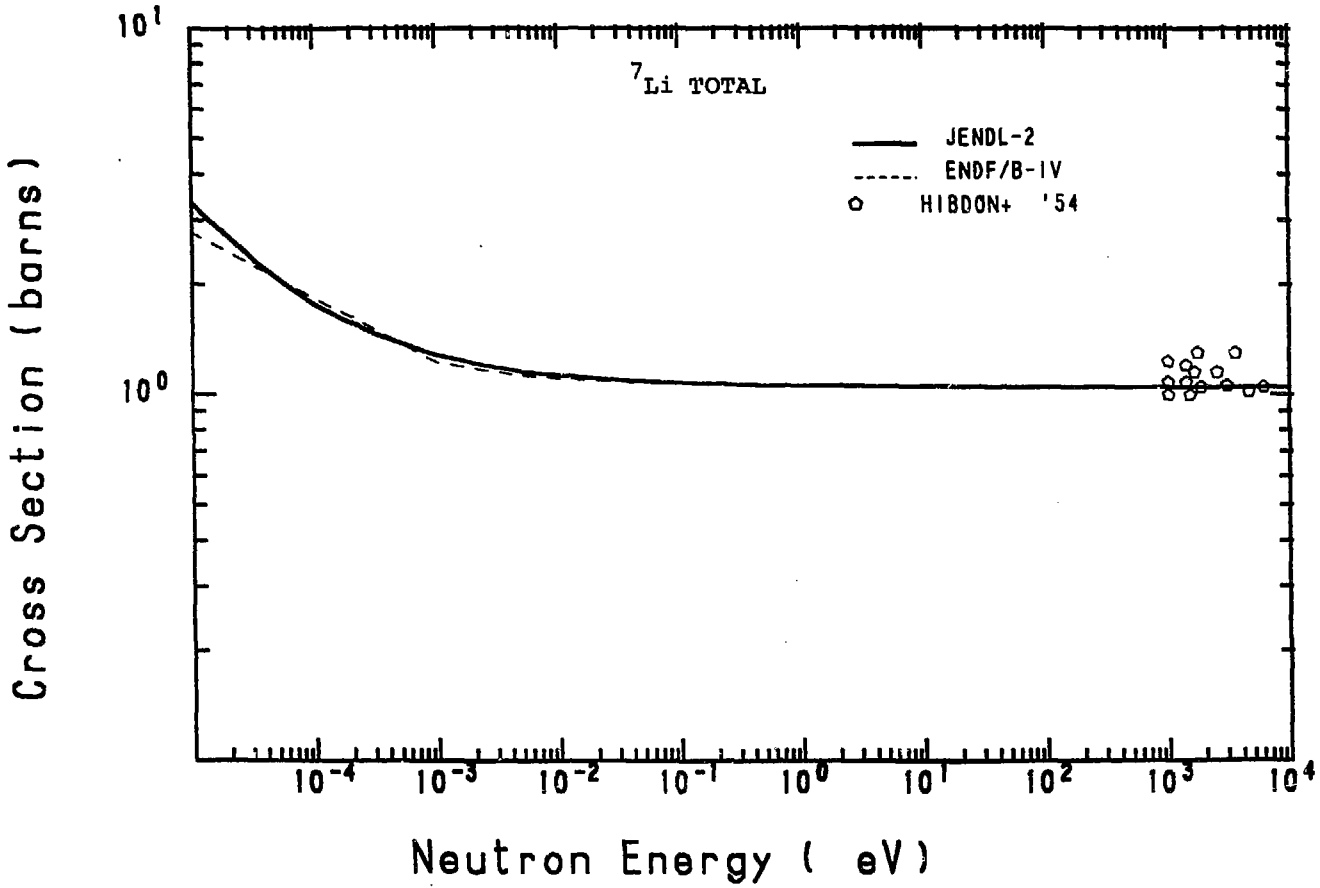

Fig. 2 Measured and evaluated total cross sections from 10^{-5} eV to 10^4 eV.

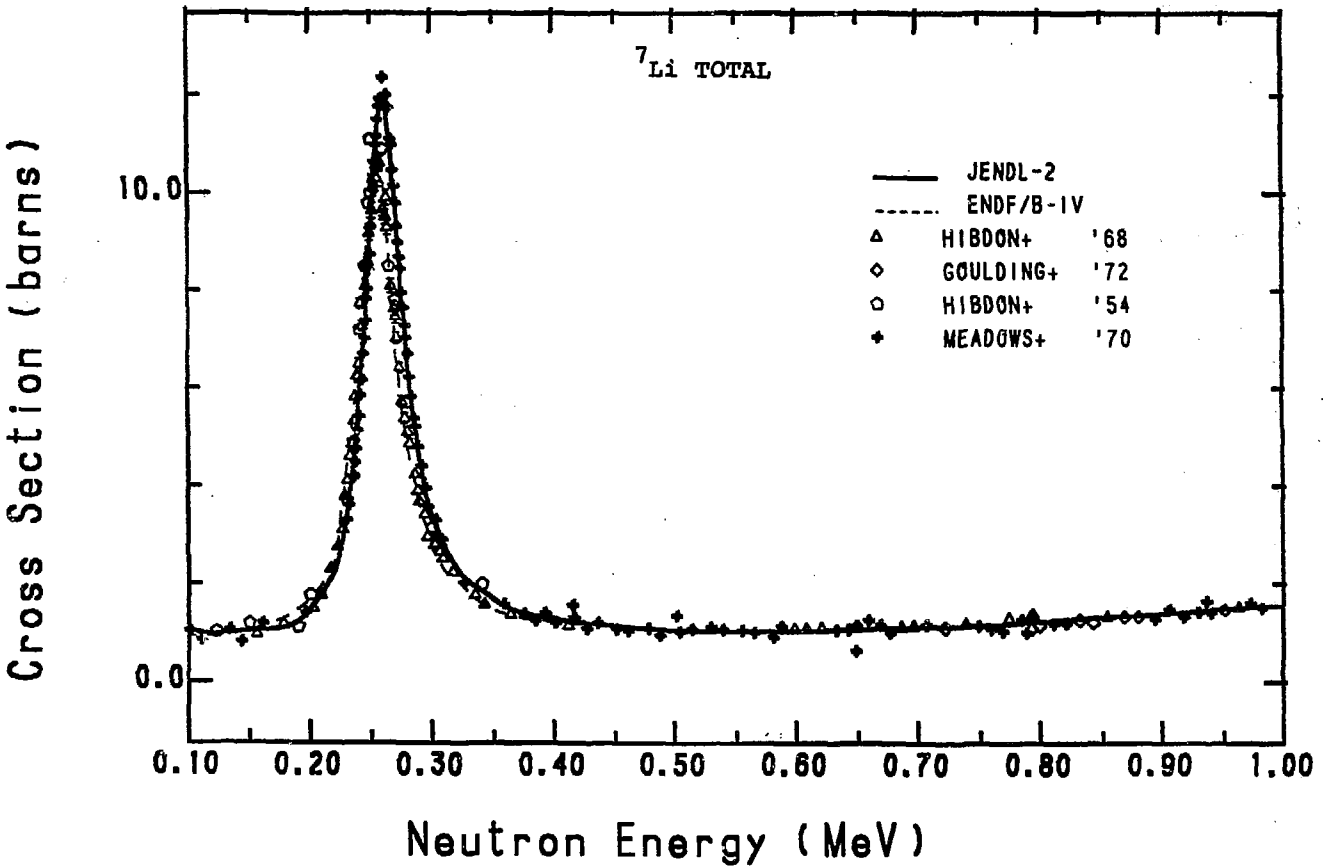

Fig. 3 Measured and evaluated total cross sections from 0.1 MeV to 1 MeV.

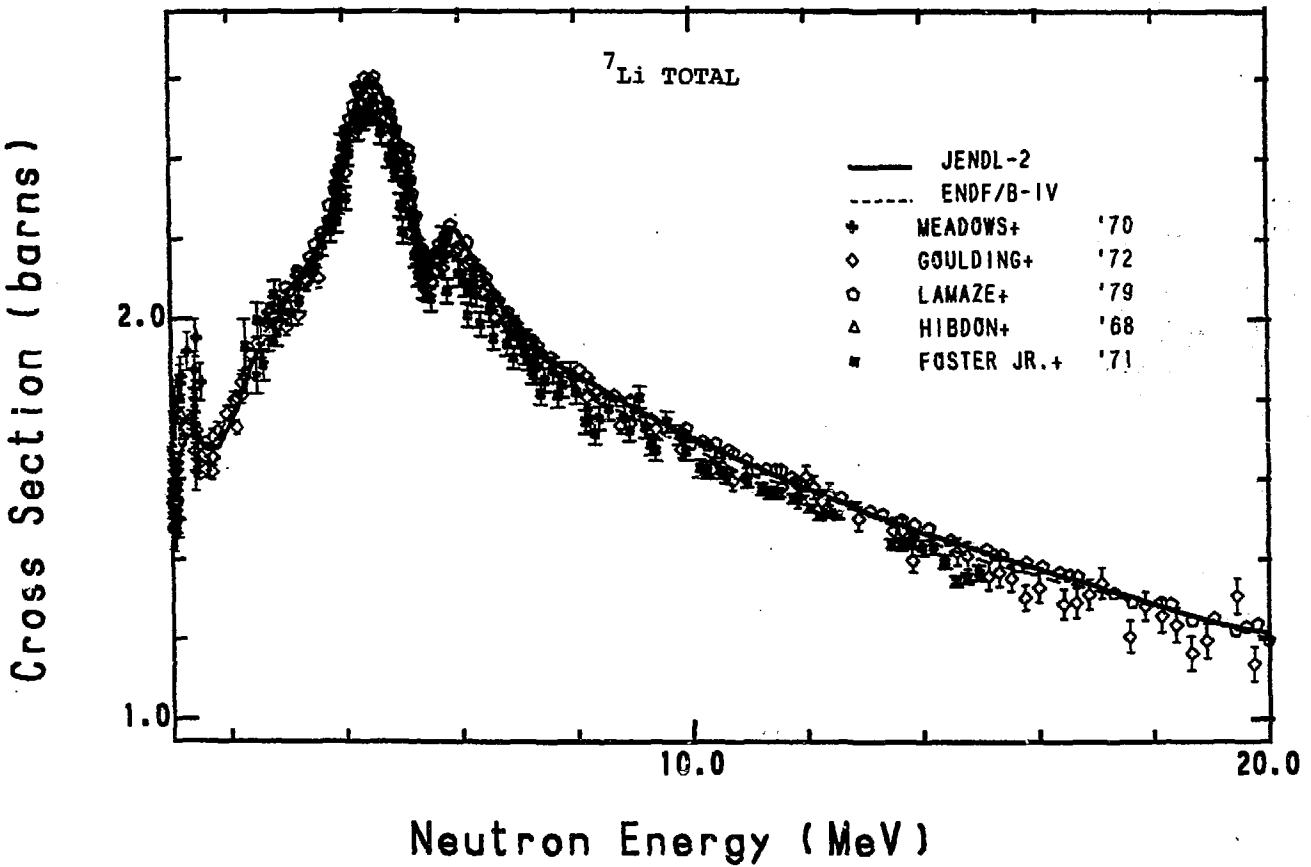

Fig. 4 Measured and evaluated total cross sections from 1 MeV to 20 MeV.

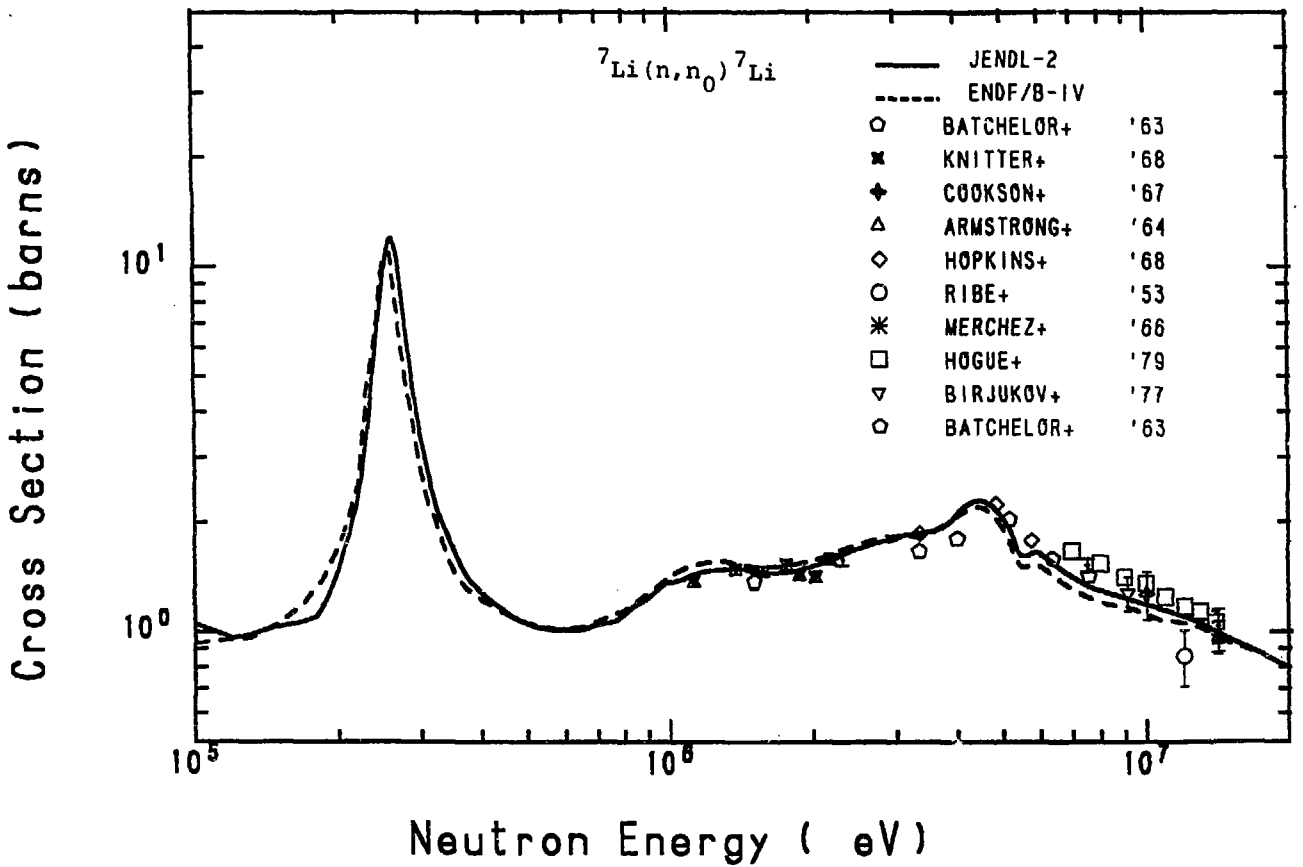

Fig. 5 Measured and evaluated elastic scattering cross sections from 0.1 MeV to 20 MeV.

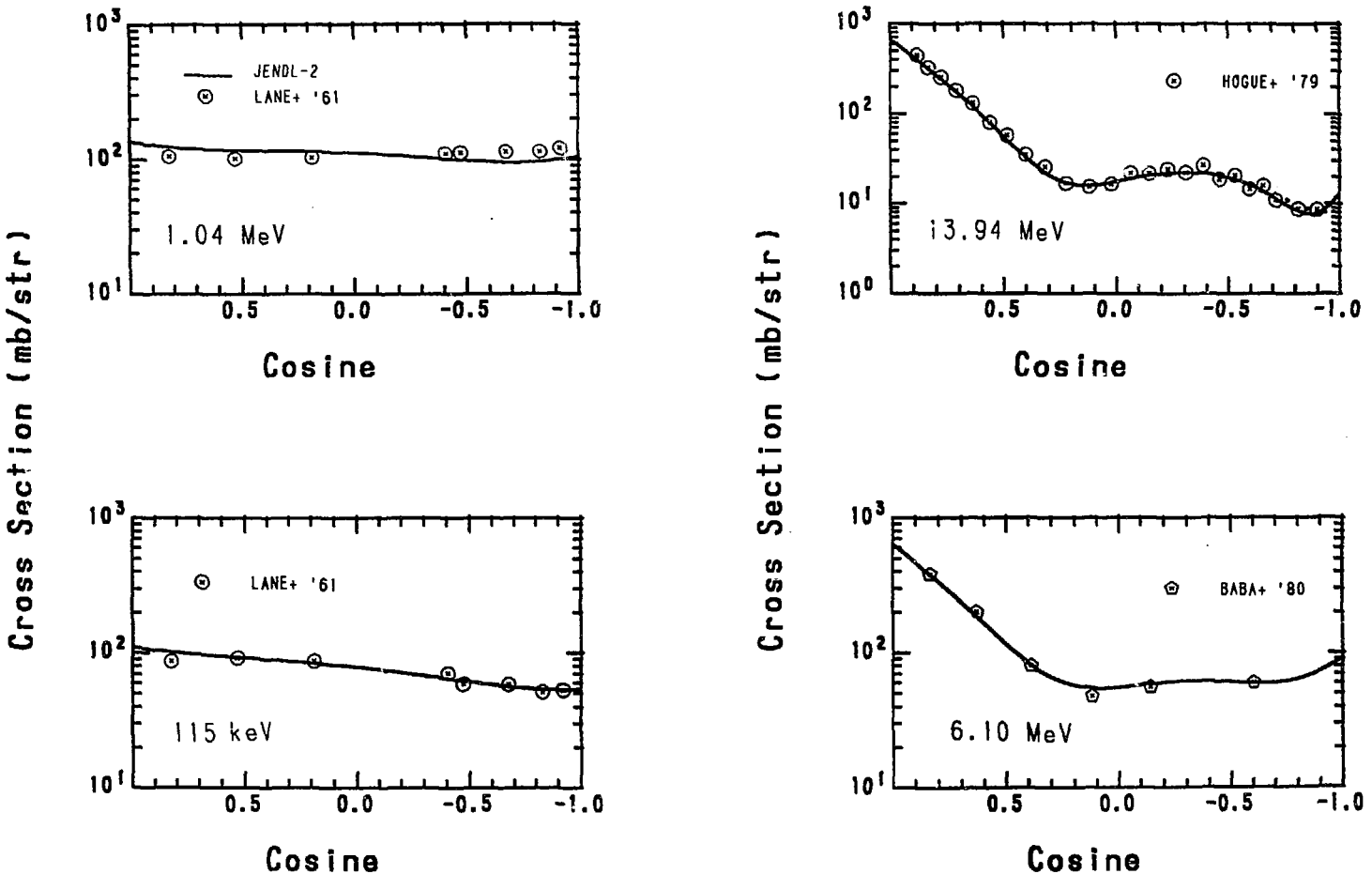

Fig. 6 Measured and evaluated elastic anguler distributions.

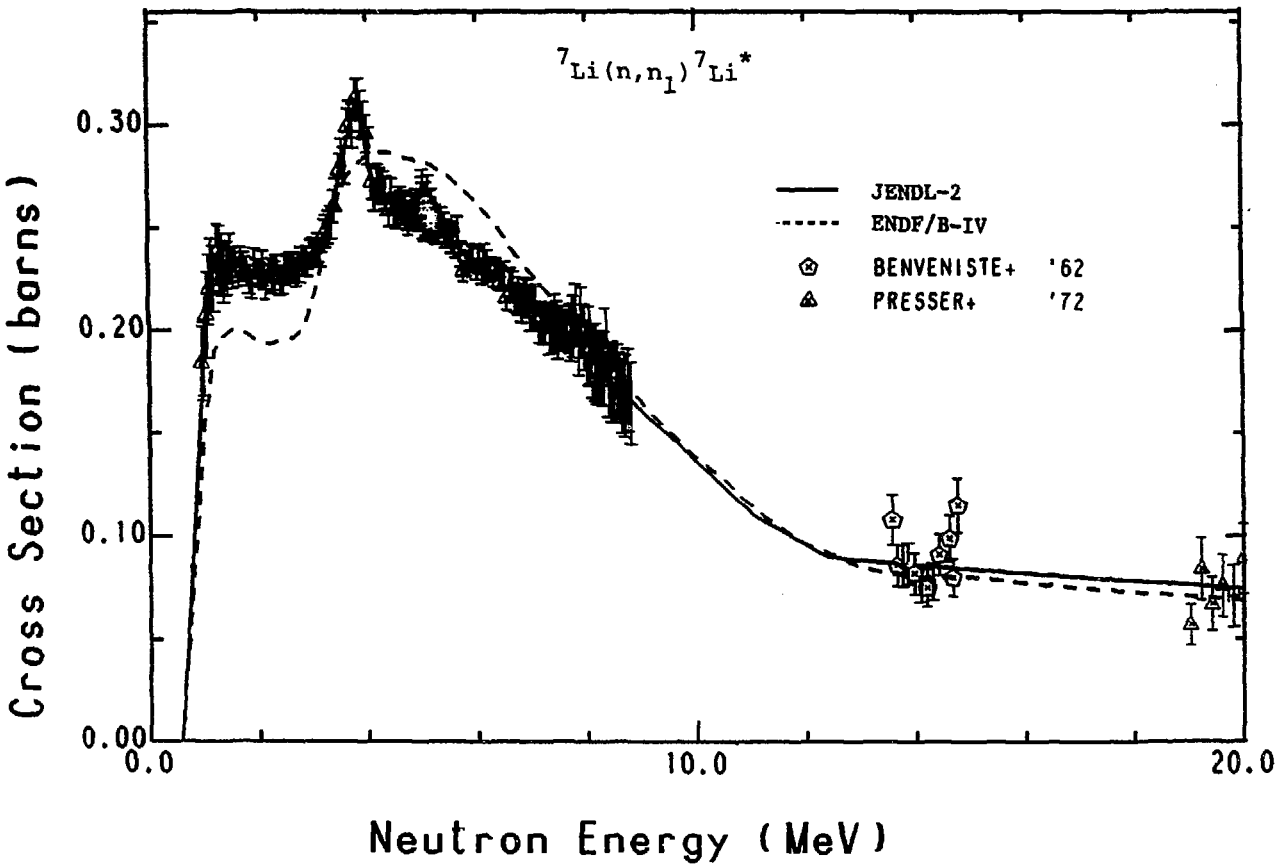

Fig. 7 Measured and evaluated (n,n_1) cross sections.

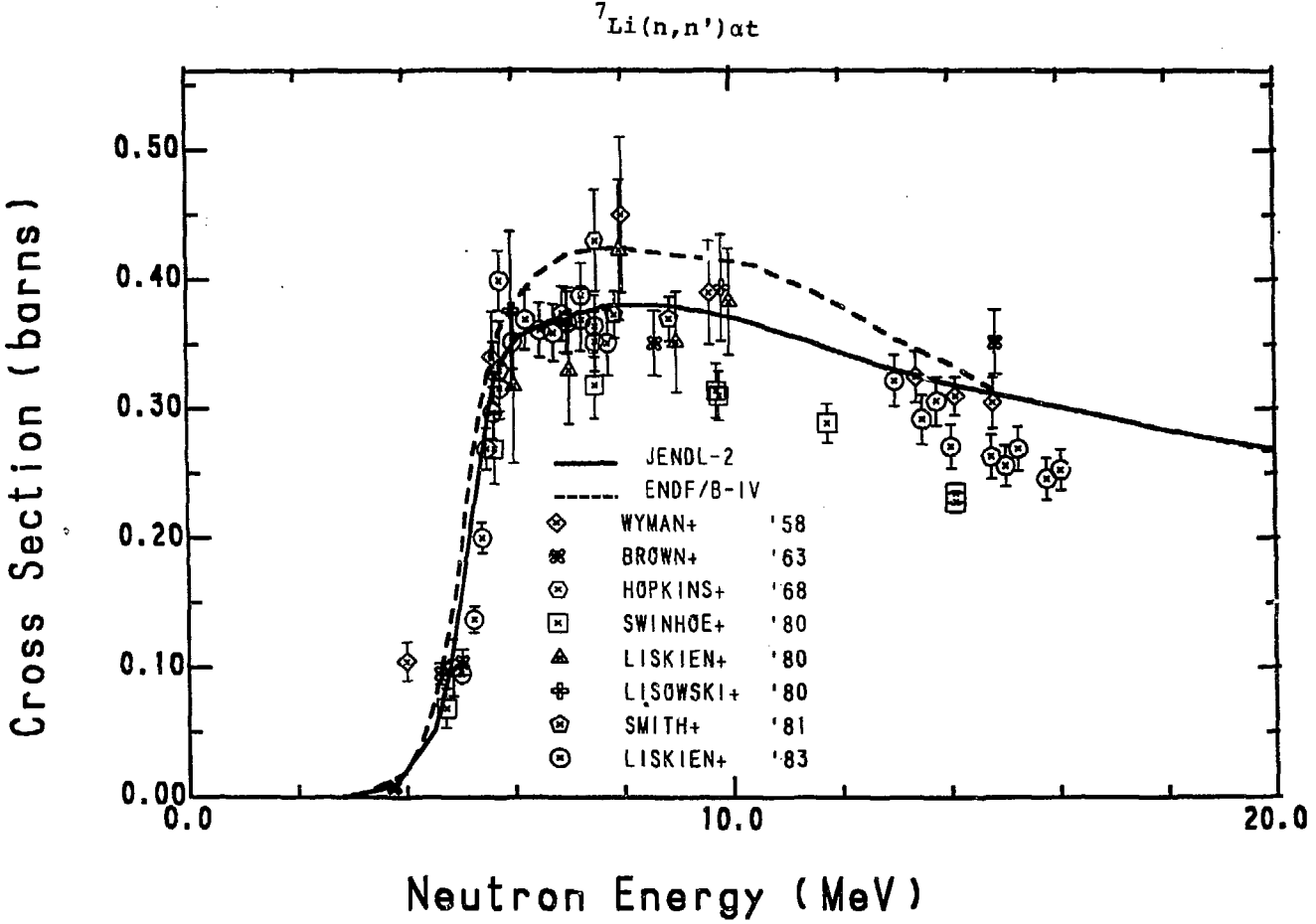

Fig. 8 Measured and evaluated (n,n')αt cross sections.

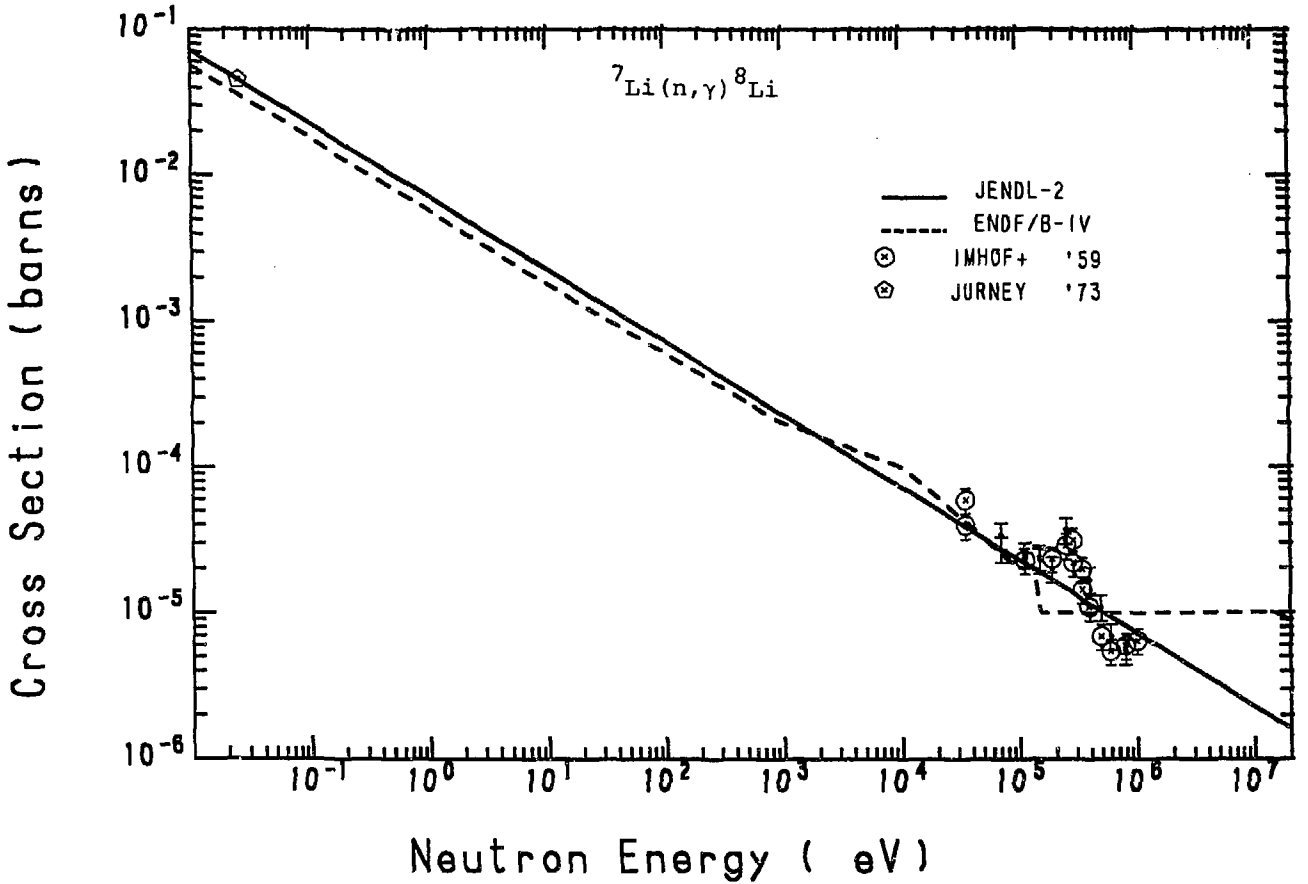

Fig. 9 Measured and evaluated (n,γ) cross sections.

Appendix

List with ENDF/B-IV format

```
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 3.00700+ 3 6.95573+ 0          0          0          0          202032 1451   1
 0.0    + 0 0.0    + 0          0          0         80           02032 1451   2
  3-LI-  7 JAERI        EVAL-JUL82 K.SHIBATA                       2032 1451   3
                        DIST-MAR83 REV1-NOV83                      2032 1451   4
HISTORY                                                            2032 1451   5
82-01 NEW EVALUATION FOR JENDL-2 BY K.SHIBATA.                     2032 1451   6
83-11 MF=2 WAS ADDED.  SOME Q VALUES AND TRANSFORMATION MATRIX OF  2032 1451   7
      MT=2 IN MF=4 WERE MODIFIED.                                  2032 1451   8
                                                                   2032 1451   9
MF=1  GENERAL INFORMATION                                          2032 1451  10
  MT=451   DESCRIPTIVE DATA AND DICTIONARY                         2032 1451  11
                                                                   2032 1451  12
MF=2  RESONANCE PARAMETERS                                         2032 1451  13
  MT=151   SCATTERING RADIUS ONLY                                  2032 1451  14
                                                                   2032 1451  15
      2200-M/S CROSS SECTIONS AND CALCULATED RES. INTEGRALS.       2032 1451  16
                        2200-M/S     RES. INTEG.                   2032 1451  17
         ELASTIC        1.049  B        -                          2032 1451  18
         CAPTURE        0.0454 B       0.0204 B                    2032 1451  19
         TOTAL          1.094  B        -                          2032 1451  20
                                                                   2032 1451  21
MF=3  NEUTRON CROSS SECTIONS                                       2032 1451  22
  MT=1      TOTAL                                                  2032 1451  23
       BELOW 1 KEV, TOTAL = 1.04894 + CAPTURE (B).                 2032 1451  24
       ABOVE 1 KEV, DATA LISTED IN /1/-/6/ WERE USED.              2032 1451  25
  MT=2      ELASTIC                                                2032 1451  26
       ELASTIC = TOTAL - REACTION.                                 2032 1451  27
  MT=4      TOTAL INELASTIC                                        2032 1451  28
       SUM OF MT=51 AND 91.                                        2032 1451  29
  MT=16     (N,2N)LI-6                                             2032 1451  30
       ENDF/B-IV RECOMMENDED.                                      2032 1451  31
  MT=24     (N,2N)ALPHA-D                                          2032 1451  32
       ENDF/B-IV RECOMMENDED.                                      2032 1451  33
  MT=51     (N,N')                                                 2032 1451  34
       LEADING TO THE 1ST LEVEL (0.47748  MEV) IN LI-7.            2032 1451  35
       DATA LISTED IN /7/,/8/ WERE USED.                           2032 1451  36
  MT=91     (N,N')ALPHA-T                                          2032 1451  37
       DATA LISTED IN /9/-/14/ WERE USED.                          2032 1451  38
  MT=102   CAPTURE                                                 2032 1451  39
       1/V FORM NORMALIZED TO THE DATA OF JURNEY /15/.             2032 1451  40
  MT=104   (N,D)HE-6                                               2032 1451  41
       ENDF/B-IV RECOMMENDED.                                      2032 1451  42
  MT=251   MU-BAR                                                  2032 1451  43
       CALCULATED FROM THE DATA IN FILE4.                          2032 1451  44
                                                                   2032 1451  45
MF=4  ANGULAR DISTRIBUTIONS OF SECONDARY NEUTRONS                  2032 1451  46
  MT=2                                                             2032 1451  47
       1.0E-5 EV TO 40 KEV :    ISOTROPIC.                         2032 1451  48
       50 KEV TO 14 MEV    :    DATA LISTED IN /16/-/18/ USED.     2032 1451  49
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........10........20........30........40........50........60......MAT MF MT  SEQ
        14 MEV TO 20 MEV    :    OPTICAL MODEL CALCULATION        2032 1451  50
                                 WITH PARAMETERS OF /19/.         2032 1451  51
  MT=16,24,91                                                     2032 1451  52
        ISOTROPIC IN THE LABORATORY SYSTEM.                       2032 1451  53
  MT=51                                                           2032 1451  54
        ISOTROPIC IN THE CENTER OF MASS SYSTEM.                   2032 1451  55
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MF=5  ENERGY DISTRIBUTIONS OF SECONDARY NEUTRONS                  2032 1451  57
  MT=16,24,91                                                     2032 1451  58
        EVAPORATION SPECTRUM.                                     2032 1451  59
        VALUES OF NUCLEAR TEMPERATURE TAKEN FROM ENDF/B-IV.       2032 1451  60
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 1) HIBDON, C.T. AND LANGSDORF, JR., A. : ANL-5171, P.7 (1954).   2032 1451  63
 2) HIBDON, C.T. AND MOORING, F.P. : '68 WASHINGTON CONF.         2032 1451  64
 3) MEADOWS, J.W. AND WHALEN, J.F. : NUCL. SCI. ENG. 41(1970)351. 2032 1451  65
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 8) PRESSER, G. AND BASS, R. : NUCL. PHYS. A182 (1972) 321.       2032 1451  70
 9) WYMAN, M.E. AND THORPE, M.M. : LA-2235 (1958).                2032 1451  71
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13) SMITH, D.L. ET AL. : NUCL. SCI. ENG. 78 (1981) 359.           2032 1451  75
14) LISKIEN, H. AND PAULSEN, A. : INDC(EUR) 014/G, P.14 (1980).   2032 1451  76
15) JURNEY, E.T. : USNDC-9, P.109 (1973).                         2032 1451  77
16) LANE, R.O. ET AL. : ANN. PHYS. 12 (1961) 135.                 2032 1451  78
17) HOGUE, H.H. ET AL. : NUCL. SCI. ENG. 69 (1979) 22.            2032 1451  79
18) KNOX, H.D. ET AL. : NUCL. SCI. ENG.69 (1979) 223.             2032 1451  80
19) WATSON, B.A. ET AL. : PHYS. REV. 182 (1969) 977.              2032 1451  81
                                                                  2032 1451  82
                                 1       451       102            2032 1451  83
                                 2       151         4            2032 1451  84
                                 3         1        80            2032 1451  85
                                 3         2        80            2032 1451  86
                                 3         4        20            2032 1451  87
                                 3        16         8            2032 1451  88
                                 3        24         7            2032 1451  89
                                 3        51        15            2032 1451  90
                                 3        91         9            2032 1451  91
                                 3       102         8            2032 1451  92
                                 3       104         8            2032 1451  93
                                 3       251        25            2032 1451  94
                                 4         2       156            2032 1451  95
                                 4        16        10            2032 1451  96
                                 4        24        10            2032 1451  97
                                 4        51        10            2032 1451  98
                                 4        91        10            2032 1451  99
                                 5        16         7            2032 1451 100
                                 5        24         7            2032 1451 101
                                 5        91         8            2032 1451 102
```

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........10........20........30........40........50........60......MAT MF MT  SEQ
                                                                  2032 1  0  103
                                                                  2032 0  0  104
 3.00700+ 3 6.95573+ 0          0          0          1          02032 2151 105
 3.00700+ 3 1.00000+ 0          0          0          1          02032 2151 106
 1.00000- 5 2.00000+ 7          0          0          0          02032 2151 107
 1.50000+ 0 2.89000- 1          0          0          0          02032 2151 108
                                                                  2032 2  0  109
                                                                  2032 0  0  110
 3.00700+ 3 6.95573+ 0          0         99          0          02032 3  1  111
 0.0    + 0 0.0    + 0          0          0          1         2292032 3  1  112
       229             5          0          0          0          02032 3  1  113
 1.00000- 5 3.33252+ 0 1.33352- 5 3.02644+ 0 1.77827- 5 2.76139+ 02032 3  1  114
 3.16227- 5 2.33309+ 0 5.62339- 5 2.01192+ 0 1.00000- 4 1.77107+ 02032 3  1  115
 1.77828- 4 1.59046+ 0 3.16227- 4 1.45502+ 0 1.00000- 3 1.27730+ 02032 3  1  116
 2.24274- 3 1.20142+ 0 5.02990- 3 1.15076+ 0 2.53000- 2 1.09434+ 02032 3  1  117
 1.00000- 1 1.07178+ 0 1.00000+ 0 1.05610+ 0 1.00000+ 1 1.05122+ 02032 3  1  118
 1.00000+ 2 1.04966+ 0 1.00000+ 3 1.04917+ 0 1.00000+ 4 1.04894+ 02032 3  1  119
 1.00000+ 5 1.04894+ 0 1.20000+ 5 9.58032- 1 1.31000+ 5 9.83367- 12032 3  1  120
 1.45000+ 5 1.02390+ 0 1.60000+ 5 1.04894+ 0 1.70000+ 5 1.07028+ 02032 3  1  121
 1.80000+ 5 1.10298+ 0 1.90000+ 5 1.22796+ 0 2.00000+ 5 1.47772+ 02032 3  1  122
 2.10000+ 5 1.82240+ 0 2.15109+ 5 2.06423+ 0 2.18045+ 5 2.18972+ 02032 3  1  123
 2.20981+ 5 2.37640+ 0 2.23918+ 5 2.63618+ 0 2.26854+ 5 2.98093+ 02032 3  1  124
 2.29791+ 5 3.42261+ 0 2.32727+ 5 3.97311+ 0 2.35663+ 5 4.64435+ 02032 3  1  125
 2.38719+ 5 5.43440+ 0 2.41774+ 5 6.29896+ 0 2.44829+ 5 7.27571+ 02032 3  1  126
 2.47884+ 5 8.40237+ 0 2.51352+ 5 9.80158+ 0 2.54820+ 5 1.10518+ 12032 3  1  127
 2.58288+ 5 1.18663+ 1 2.61755+ 5 1.19579+ 1 2.66500+ 5 1.10052+ 12032 3  1  128
 2.71245+ 5 9.45139+ 0 2.75991+ 5 7.75242+ 0 2.80736+ 5 6.36439+ 02032 3  1  129
 2.85242+ 5 5.39258+ 0 2.89748+ 5 4.55663+ 0 2.94254+ 5 3.89766+ 02032 3  1  130
 2.98760+ 5 3.45675+ 0 3.06707+ 5 2.93736+ 0 3.14654+ 5 2.51159+ 02032 3  1  131
 3.22602+ 5 2.19455+ 0 3.30549+ 5 2.00135+ 0 3.42232+ 5 1.80932+ 02032 3  1  132
 3.53914+ 5 1.62273+ 0 3.65597+ 5 1.46909+ 0 3.77279+ 5 1.37589+ 02032 3  1  133
 3.96196+ 5 1.29600+ 0 4.15112+ 5 1.22903+ 0 4.34029+ 5 1.17263+ 02032 3  1  134
 4.52946+ 5 1.12442+ 0 4.69963+ 5 1.09023+ 0 4.86981+ 5 1.06593+ 02032 3  1  135
 5.03998+ 5 1.04783+ 0 5.21016+ 5 1.03224+ 0 5.45928+ 5 1.01994+ 02032 3  1  136
 5.46130+ 5 1.01996+ 0 5.70840+ 5 1.02284+ 0 5.95752+ 5 1.03230+ 02032 3  1  137
 6.20664+ 5 1.03967+ 0 6.48197+ 5 1.05558+ 0 6.75729+ 5 1.08591+ 02032 3  1  138
 7.03262+ 5 1.11600+ 0 7.30794+ 5 1.13114+ 0 7.64051+ 5 1.15915+ 02032 3  1  139
 7.97307+ 5 1.21947+ 0 8.30563+ 5 1.28660+ 0 8.63819+ 5 1.33502+ 02032 3  1  140
 8.91489+ 5 1.37066+ 0 9.19160+ 5 1.42079+ 0 9.46830+ 5 1.47659+ 02032 3  1  141
 9.74501+ 5 1.52923+ 0 9.89130+ 5 1.55151+ 0 1.00000+ 6 1.55551+ 02032 3  1  142
 1.00450+ 6 1.55717+ 0 1.05795+ 6 1.60492+ 0 1.06140+ 6 1.60778+ 02032 3  1  143
 1.11141+ 6 1.64879+ 0 1.16486+ 6 1.68256+ 0 1.21832+ 6 1.70001+ 02032 3  1  144
 1.26410+ 6 1.70795+ 0 1.28178+ 6 1.71095+ 0 1.34524+ 6 1.72089+ 02032 3  1  145
 1.40871+ 6 1.72128+ 0 1.47217+ 6 1.70352+ 0 1.53665+ 6 1.68282+ 02032 3  1  146
 1.60113+ 6 1.67644+ 0 1.66561+ 6 1.67736+ 0 1.73009+ 6 1.67860+ 02032 3  1  147
 1.79467+ 6 1.68476+ 0 1.85925+ 6 1.70061+ 0 1.92384+ 6 1.71940+ 02032 3  1  148
 1.93970+ 6 1.72311+ 0 1.98842+ 6 1.73439+ 0 2.09089+ 6 1.76165+ 02032 3  1  149
 2.19335+ 6 1.80250+ 0 2.29436+ 6 1.84658+ 0 2.29582+ 6 1.84721+ 02032 3  1  150
 2.39828+ 6 1.88603+ 0 2.48015+ 6 1.91166+ 0 2.53815+ 6 1.92952+ 02032 3  1  151
 2.66594+ 6 1.96554+ 0 2.67802+ 6 1.96889+ 0 2.81789+ 6 2.00107+ 02032 3  1  152
 2.81910+ 6 2.00127+ 0 2.85173+ 6 2.00647+ 0 2.95776+ 6 2.02306+ 02032 3  1  153
 2.99530+ 6 2.04308+ 0 3.05044+ 6 2.07241+ 0 3.13886+ 6 2.08821+ 02032 3  1  154
 3.20745+ 6 2.10025+ 0 3.28243+ 6 2.11384+ 0 3.36446+ 6 2.12847+ 02032 3  1  155
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........10........20........30........40........50........60......MAT MF MT  SEQ
 3.42600+ 6 2.14292+ 0 3.51889+ 6 2.16444+ 0 3.53147+ 6 2.16503+ 02032 3  1  156
 3.61179+ 6 2.19555+ 0 3.67848+ 6 2.21786+ 0 3.70468+ 6 2.23065+ 02032 3  1  157
 3.76380+ 6 2.25949+ 0 3.77642+ 6 2.26563+ 0 3.79758+ 6 2.27839+ 02032 3  1  158
 3.87435+ 6 2.32469+ 0 3.89047+ 6 2.33506+ 0 3.97229+ 6 2.38776+ 02032 3  1  159
 3.98337+ 6 2.39452+ 0 4.07022+ 6 2.44752+ 0 4.07627+ 6 2.45084+ 02032 3  1  160
 4.16162+ 6 2.49764+ 0 4.16916+ 6 2.50119+ 0 4.25303+ 6 2.54051+ 02032 3  1  161
 4.27050+ 6 2.54629+ 0 4.34443+ 6 2.57066+ 0 4.37184+ 6 2.57428+ 02032 3  1  162
 4.43583+ 6 2.58268+ 0 4.47318+ 6 2.58285+ 0 4.50697+ 6 2.58299+ 02032 3  1  163
 4.51724+ 6 2.58304+ 0 4.57453+ 6 2.58038+ 0 4.59864+ 6 2.57928+ 02032 3  1  164
 4.68005+ 6 2.56725+ 0 4.68431+ 6 2.56597+ 0 4.76145+ 6 2.54286+ 02032 3  1  165
 4.77721+ 6 2.53666+ 0 4.85531+ 6 2.50646+ 0 4.94917+ 6 2.46872+ 02032 3  1  166
 5.01370+ 6 2.43932+ 0 5.04304+ 6 2.42620+ 0 5.13690+ 6 2.37549+ 02032 3  1  167
 5.21635+ 6 2.30969+ 0 5.22421+ 6 2.30333+ 0 5.31153+ 6 2.21504+ 02032 3  1  168
 5.39884+ 6 2.14675+ 0 5.48615+ 6 2.13462+ 0 5.56466+ 6 2.15666+ 02032 3  1  169
 5.64316+ 6 2.17492+ 0 5.65549+ 6 2.17779+ 0 5.72166+ 6 2.19318+ 02032 3  1  170
 5.80016+ 6 2.21518+ 0 5.88316+ 6 2.22746+ 0 5.96615+ 6 2.21836+ 02032 3  1  171
 6.04915+ 6 2.19861+ 0 6.09464+ 6 2.18781+ 0 6.12840+ 6 2.17988+ 02032 3  1  172
 6.13214+ 6 2.17900+ 0 6.33886+ 6 2.13327+ 0 6.54558+ 6 2.08148+ 02032 3  1  173
 6.75231+ 6 2.03239+ 0 6.80402+ 6 2.02281+ 0 6.90540+ 6 2.00430+ 02032 3  1  174
 6.95903+ 6 1.99471+ 0 7.14430+ 6 1.96562+ 0 7.32958+ 6 1.93402+ 02032 3  1  175
 7.51485+ 6 1.90536+ 0 7.70012+ 6 1.88507+ 0 7.78370+ 6 1.87815+ 02032 3  1  176
 7.81743+ 6 1.87542+ 0 8.21694+ 6 1.84383+ 0 8.30000+ 6 1.83678+ 02032 3  1  177
 8.69570+ 6 1.80450+ 0 8.73375+ 6 1.80150+ 0 8.86462+ 6 1.79076+ 02032 3  1  178
 8.88000+ 6 1.78951+ 0 9.00000+ 6 1.77987+ 0 9.25057+ 6 1.76032+ 02032 3  1  179
 9.76738+ 6 1.72247+ 0 1.00000+ 7 1.70611+ 0 1.01145+ 7 1.69819+ 02032 3  1  180
 1.05000+ 7 1.67267+ 0 1.06168+ 7 1.66519+ 0 1.10000+ 7 1.63972+ 02032 3  1  181
 1.10270+ 7 1.63792+ 0 1.13981+ 7 1.61448+ 0 1.14663+ 7 1.61039+ 02032 3  1  182
 1.15000+ 7 1.60825+ 0 1.20000+ 7 1.57753+ 0 1.23157+ 7 1.55909+ 02032 3  1  183
 1.23780+ 7 1.55546+ 0 1.25000+ 7 1.54853+ 0 1.27493+ 7 1.53445+ 02032 3  1  184
 1.30000+ 7 1.52100+ 0 1.31652+ 7 1.51225+ 0 1.35000+ 7 1.49466+ 02032 3  1  185
 1.40000+ 7 1.46956+ 0 1.40668+ 7 1.46625+ 0 1.42690+ 7 1.45647+ 02032 3  1  186
 1.45000+ 7 1.44574+ 0 1.46600+ 7 1.43837+ 0 1.50000+ 7 1.42198+ 02032 3  1  187
 1.54518+ 7 1.40109+ 0 1.61547+ 7 1.37024+ 0 1.69381+ 7 1.33465+ 02032 3  1  188
 1.76495+ 7 1.30432+ 0 1.83231+ 7 1.27296+ 0 1.91443+ 7 1.23704+ 02032 3  1  189
 2.00000+ 7 1.21500+ 0                                          2032 3  1  190
                                                                2032 3  0  191
 3.00700+ 3 6.95573+ 0          0          0          0        02032 3  2  192
 0.0    + 0 0.0    + 0          0          0          1      2292032 3  2  193
        229            5          0          0          0        02032 3  2  194
 1.00000- 5 1.04894+ 0 1.33352- 5 1.04894+ 0 1.77827- 5 1.04894+ 02032 3  2  195
 3.16227- 5 1.04894+ 0 5.62339- 5 1.04894+ 0 1.00000- 4 1.04894+ 02032 3  2  196
 1.77828- 4 1.04894+ 0 3.16227- 4 1.04894+ 0 1.00000- 3 1.04894+ 02032 3  2  197
 2.24274- 3 1.04894+ 0 5.02990- 3 1.04894+ 0 2.53000- 2 1.04894+ 02032 3  2  198
 1.00000- 1 1.04894+ 0 1.00000+ 0 1.04894+ 0 1.00000+ 1 1.04894+ 02032 3  2  199
 1.00000+ 2 1.04894+ 0 1.00000+ 3 1.04894+ 0 1.00000+ 4 1.04887+ 02032 3  2  200
 1.00000+ 5 1.04892+ 0 1.20000+ 5 9.58011- 1 1.31000+ 5 9.83347- 12032 3  2  201
 1.45000+ 5 1.02388+ 0 1.60000+ 5 1.04892+ 0 1.70000+ 5 1.07026+ 02032 3  2  202
 1.80000+ 5 1.10296+ 0 1.90000+ 5 1.22794+ 0 2.00000+ 5 1.47770+ 02032 3  2  203
 2.10000+ 5 1.82238+ 0 2.15109+ 5 2.06421+ 0 2.18045+ 5 2.18970+ 02032 3  2  204
 2.20981+ 5 2.37638+ 0 2.23918+ 5 2.63616+ 0 2.26854+ 5 2.98092+ 02032 3  2  205
 2.29791+ 5 3.42260+ 0 2.32727+ 5 3.97310+ 0 2.35663+ 5 4.64434+ 02032 3  2  206
 2.38719+ 5 5.43439+ 0 2.41774+ 5 6.29895+ 0 2.44829+ 5 7.27570+ 02032 3  2  207
 2.47884+ 5 8.40236+ 0 2.51352+ 5 9.80157+ 0 2.54820+ 5 1.10518+ 12032 3  2  208
```

.....10	20	30	40	50	60	MAT	MF	MT	SEQ
2.58288+ 5	1.18663+ 1	2.61755+ 5	1.19579+ 1	2.66500+ 5	1.10052+	12032	3	2	209
2.71245+ 5	9.45138+ 0	2.75991+ 5	7.75241+ 0	2.80736+ 5	6.36438+	02032	3	2	210
2.85242+ 5	5.39257+ 0	2.89748+ 5	4.55662+ 0	2.94254+ 5	3.89765+	02032	3	2	211
2.98760+ 5	3.45874+ 0	3.06707+ 5	2.93735+ 0	3.14654+ 5	2.51158+	02032	3	2	212
3.22602+ 5	2.19454+ 0	3.30549+ 5	2.00134+ 0	3.42232+ 5	1.80931+	02032	3	2	213
3.53914+ 5	1.62272+ 0	3.65597+ 5	1.46908+ 0	3.77279+ 5	1.37588+	02032	3	2	214
3.96196+ 5	1.29599+ 0	4.15112+ 5	1.22902+ 0	4.34029+ 5	1.17262+	02032	3	2	215
4.52946+ 5	1.12441+ 0	4.69963+ 5	1.09022+ 0	4.86981+ 5	1.06592+	02032	3	2	216
5.03998+ 5	1.04782+ 0	5.21016+ 5	1.03223+ 0	5.45928+ 5	1.01993+	02032	3	2	217
5.46130+ 5	1.01995+ 0	5.70840+ 5	1.01233+ 0	5.95752+ 5	1.01121+	02032	3	2	218
6.20664+ 5	1.00799+ 0	6.48197+ 5	1.01220+ 0	6.75729+ 5	1.03084+	02032	3	2	219
7.03262+ 5	1.04923+ 0	7.30794+ 5	1.05267+ 0	7.64051+ 5	1.06655+	02032	3	2	220
7.97307+ 5	1.11274+ 0	8.30563+ 5	1.16574+ 0	8.63819+ 5	1.20003+	02032	3	2	221
8.91489+ 5	1.22391+ 0	9.19160+ 5	1.26228+ 0	9.46830+ 5	1.30632+	02032	3	2	222
9.74501+ 5	1.34721+ 0	9.89130+ 5	1.36327+ 0	1.00000+ 6	1.36265+	02032	3	2	223
1.00450+ 6	1.36240+ 0	1.05795+ 6	1.38744+ 0	1.06140+ 6	1.38883+	02032	3	2	224
1.11141+ 6	1.42584+ 0	1.16486+ 6	1.45533+ 0	1.21832+ 6	1.46851+	02032	3	2	225
1.26410+ 6	1.47278+ 0	1.28178+ 6	1.47598+ 0	1.34524+ 6	1.48662+	02032	3	2	226
1.40871+ 6	1.48771+ 0	1.47217+ 6	1.47064+ 0	1.53665+ 6	1.45065+	02032	3	2	227
1.60113+ 6	1.44498+ 0	1.66561+ 6	1.44661+ 0	1.73009+ 6	1.44856+	02032	3	2	228
1.79467+ 6	1.45543+ 0	1.85925+ 6	1.47199+ 0	1.92384+ 6	1.49149+	02032	3	2	229
1.93970+ 6	1.49538+ 0	1.98842+ 6	1.50676+ 0	2.09089+ 6	1.53422+	02032	3	2	230
2.19335+ 6	1.57528+ 0	2.29436+ 6	1.61957+ 0	2.29582+ 6	1.62020+	02032	3	2	231
2.39828+ 6	1.65876+ 0	2.48015+ 6	1.68419+ 0	2.53815+ 6	1.70139+	02032	3	2	232
2.66594+ 6	1.73596+ 0	2.67802+ 6	1.73904+ 0	2.81789+ 6	1.76801+	02032	3	2	233
2.81910+ 6	1.76818+ 0	2.85173+ 6	1.77235+ 0	2.95776+ 6	1.78573+	02032	3	2	234
2.99530+ 6	1.80462+ 0	3.05044+ 6	1.83213+ 0	3.13886+ 6	1.84502+	02032	3	2	235
3.20745+ 6	1.85266+ 0	3.28243+ 6	1.86145+ 0	3.36446+ 6	1.86593+	02032	3	2	236
3.42600+ 6	1.87277+ 0	3.51889+ 6	1.88050+ 0	3.52147+ 6	1.88076+	02032	3	2	237
3.61179+ 6	1.89971+ 0	3.67848+ 6	1.91393+ 0	3.70468+ 6	1.92355+	02032	3	2	238
3.76380+ 6	1.94483+ 0	3.77642+ 6	1.94873+ 0	3.79758+ 6	1.95773+	02032	3	2	239
3.87435+ 6	1.99918+ 0	3.89047+ 6	2.00853+ 0	3.97229+ 6	2.06913+	02032	3	2	240
3.98337+ 6	2.07696+ 0	4.07022+ 6	2.14113+ 0	4.07627+ 6	2.14523+	02032	3	2	241
4.16162+ 6	2.19486+ 0	4.16916+ 6	2.19866+ 0	4.25303+ 6	2.23437+	02032	3	2	242
4.27050+ 6	2.23940+ 0	4.34443+ 6	2.26199+ 0	4.37184+ 6	2.26495+	02032	3	2	243
4.43583+ 6	2.27211+ 0	4.47318+ 6	2.27155+ 0	4.50697+ 6	2.27071+	02032	3	2	244
4.51724+ 6	2.26929+ 0	4.57453+ 6	2.25845+ 0	4.59864+ 6	2.25336+	02032	3	2	245
4.68005+ 6	2.22788+ 0	4.68431+ 6	2.22589+ 0	4.76145+ 6	2.19065+	02032	3	2	246
4.77721+ 6	2.18197+ 0	4.85531+ 6	2.13205+ 0	4.94917+ 6	2.07061+	02032	3	2	247
5.01370+ 6	2.02492+ 0	5.04304+ 6	2.00451+ 0	5.13690+ 6	1.93050+	02032	3	2	248
5.21635+ 6	1.84497+ 0	5.22421+ 6	1.83675+ 0	5.31153+ 6	1.72778+	02032	3	2	249
5.39884+ 6	1.63882+ 0	5.48615+ 6	1.60602+ 0	5.56466+ 6	1.60947+	02032	3	2	250
5.54316+ 6	1.60914+ 0	5.65549+ 6	1.60909+ 0	5.72166+ 6	1.62164+	02032	3	2	251
5.80016+ 6	1.64027+ 0	5.88316+ 6	1.64899+ 0	5.96615+ 6	1.63633+	02032	3	2	252
6.04915+ 6	1.61302+ 0	6.09464+ 6	1.60026+ 0	6.12840+ 6	1.59231+	02032	3	2	253
6.13214+ 6	1.59145+ 0	6.33886+ 6	1.54662+ 0	6.54558+ 6	1.49573+	02032	3	2	254
6.75231+ 6	1.44754+ 0	6.80402+ 6	1.43818+ 0	6.90540+ 6	1.42113+	02032	3	2	255
6.95903+ 6	1.41203+ 0	7.14430+ 6	1.38465+ 0	7.32958+ 6	1.35477+	02032	3	2	256
7.51485+ 6	1.32782+ 0	7.70012+ 6	1.30923+ 0	7.78370+ 6	1.30309+	02032	3	2	257
7.81743+ 6	1.30102+ 0	8.21694+ 6	1.28127+ 0	8.30000+ 6	1.27668+	02032	3	2	258
8.69570+ 6	1.25545+ 0	8.73375+ 6	1.25332+ 0	8.86462+ 6	1.24558+	02032	3	2	259
8.88000+ 6	1.24480+ 0	9.00000+ 6	1.23809+ 0	9.25057+ 6	1.22545+	02032	3	2	260
9.76738+ 6	1.20007+ 0	1.00000+ 7	1.18807+ 0	1.01145+ 7	1.18245+	02032	3	2	261

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........10........20........30........40........50........60......MAT MF MT  SEQ
 1.05000+ 7 1.16605+ 0 1.06168+ 7 1.16187+ 0 1.10000+ 7 1.14612+ 02032 3  2  262
 1.10270+ 7 1.14508+ 0 1.13981+ 7 1.12811+ 0 1.14663+ 7 1.12515+ 02032 3  2  263
 1.15000+ 7 1.12355+ 0 1.20000+ 7 1.10061+ 0 1.23157+ 7 1.08714+ 02032 3  2  264
 1.23780+ 7 1.08642+ 0 1.25000+ 7 1.07759+ 0 1.27493+ 7 1.06448+ 02032 3  2  265
 1.30000+ 7 1.05106+ 0 1.31652+ 7 1.04243+ 0 1.35000+ 7 1.02474+ 02032 3  2  266
 1.40000+ 7 9.99657- 1 1.40668+ 7 9.96439- 1 1.42690+ 7 9.86312- 12032 3  2  267
 1.45000+ 7 9.74918- 1 1.46600+ 7 9.67261- 1 1.50000+ 7 9.50093- 12032 3  2  268
 1.54518+ 7 9.35022- 1 1.61547+ 7 9.13265- 1 1.69381+ 7 8.87816- 12032 3  2  269
 1.76495+ 7 8.66638- 1 1.83231+ 7 8.43944- 1 1.91443+ 7 8.17330- 12032 3  2  270
 2.00000+ 7 8.04990- 1                                            2032 3  2  271
                                                                  2032 3  0  272
 3.00700+ 3 6.95573+ 0          0          99          0          02032 3  4  273
 0.0    + 0-4.77484+ 5          0           0          1         512032 3  4  274
        51          2           0           0          0          02032 3  4  275
 5.46130+ 5 0.0    + 0 1.06140+ 6 2.18940- 1 1.26410+ 6 2.35160- 12032 3  4  276
 1.93970+ 6 2.27730- 1 2.29436+ 6 2.27005- 1 2.48015+ 6 2.27465- 12032 3  4  277
 2.66594+ 6 2.29572- 1 2.81910+ 6 2.33088- 1 2.85173+ 6 2.34119- 12032 3  4  278
 2.99530+ 6 2.38459- 1 3.13886+ 6 2.43188- 1 3.28243+ 6 2.52392- 12032 3  4  279
 3.42600+ 6 2.70150- 1 3.51889+ 6 2.83933- 1 3.61179+ 6 2.95835- 12032 3  4  280
 3.70468+ 6 3.07101- 1 3.76380+ 6 3.14655- 1 3.79758+ 6 3.20659- 12032 3  4  281
 3.89047+ 6 3.26523- 1 3.98337+ 6 3.17554- 1 4.07627+ 6 3.05608- 12032 3  4  282
 4.16916+ 6 3.02532- 1 4.27050+ 6 3.06888- 1 4.37184+ 6 3.09330- 12032 3  4  283
 4.47318+ 6 3.11298- 1 4.50697+ 6 3.12278- 1 4.57453+ 6 3.21931- 12032 3  4  284
 4.68431+ 6 3.40075- 1 4.77721+ 6 3.54688- 1 5.01370+ 6 4.14400- 12032 3  4  285
 5.21635+ 6 4.64719- 1 5.65549+ 6 5.68695- 1 6.09464+ 6 5.87543- 12032 3  4  286
 6.12840+ 6 5.87564- 1 6.80402+ 6 5.84624- 1 6.90540+ 6 5.83170- 12032 3  4  287
 7.78370+ 6 5.75063- 1 7.81743+ 6 5.74400- 1 8.69570+ 6 5.48370- 12032 3  4  288
 8.86462+ 6 5.44209- 1 1.01145+ 7 5.03291- 1 1.10270+ 7 4.68569- 12032 3  4  289
 1.13981+ 7 4.57834- 1 1.23780+ 7 4.28679- 1 1.27493+ 7 4.22459- 12032 3  4  290
 1.40668+ 7 4.03964- 1 1.42690+ 7 4.01682- 1 1.54518+ 7 3.89066- 12032 3  4  291
 1.69381+ 7 3.73087- 1 1.83231+ 7 3.58314- 1 2.00000+ 7 3.42991- 12032 3  4  292
                                                                  2032 3  0  293
 3.00700+ 3 6.95573+ 0          0          99          0          02032 3 16  294
 0.0    + 0-7.25673+ 6          0           0          3         152032 3 16  295
        2           2          14           5         15          22032 3 16  296
 8.30000+ 6 0.0    + 0 8.88000+ 6 1.00000- 3 9.00000+ 6 2.00000- 32032 3 16  297
 1.00000+ 7 1.00000- 2 1.05000+ 7 1.40000- 2 1.10000+ 7 1.60000- 22032 3 16  298
 1.15000+ 7 1.77000- 2 1.20000+ 7 1.90000- 2 1.25000+ 7 2.00000- 22032 3 16  299
 1.30000+ 7 2.10000- 2 1.35000+ 7 2.16000- 2 1.40000+ 7 2.20000- 22032 3 16  300
 1.45000+ 7 2.26000- 2 1.50000+ 7 2.30000- 2 2.00000+ 7 1.97610- 22032 3 16  301
                                                                  2032 3  0  302
 3.00700+ 3 6.95573+ 0          0          99          0          02032 3 24  303
 0.0    + 0-8.74304+ 6          0           0          3         122032 3 24  304
        2           2          11           5         12          22032 3 24  305
 1.00000+ 7 0.0    + 0 1.05000+ 7 2.00000- 3 1.10000+ 7 5.00000- 32032 3 24  306
 1.15000+ 7 8.60000- 3 1.20000+ 7 1.30000- 2 1.25000+ 7 1.75000- 22032 3 24  307
 1.30000+ 7 2.20000- 2 1.35000+ 7 2.74000- 2 1.40000+ 7 3.30000- 22032 3 24  308
 1.45000+ 7 3.80000- 2 1.50000+ 7 4.30000- 2 2.00000+ 7 3.69450- 22032 3 24  309
                                                                  2032 3  0  310
 3.00700+ 3 6.95573+ 0          0           1          0          02032 3 51  311
 0.0    + 0-4.77484+ 5          0           0          1         342032 3 51  312
        34          2           0           0          0          02032 3 51  313
 5.46130+ 5 0.0    + 0 1.06140+ 6 2.18940- 1 1.26410+ 6 2.35160- 12032 3 51  314
```

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........10........20........30........40........50........60......MAT MF MT  SEQ
 1.93970+ 6 2.27730- 1 2.29436+ 6 2.27005- 1 2.48015+ 6 2.27465- 12032 3 51  315
 2.66594+ 6 2.29572- 1 2.85173+ 6 2.33837- 1 2.99530+ 6 2.36933- 12032 3 51  316
 3.13886+ 6 2.40420- 1 3.28243+ 6 2.48380- 1 3.42600+ 6 2.64895- 12032 3 51  317
 3.51889+ 6 2.77874- 1 3.61179+ 6 2.88972- 1 3.70468+ 6 2.99433- 12032 3 51  318
 3.79758+ 6 3.10499- 1 3.89047+ 6 3.10916- 1 3.98337+ 6 2.96500- 12032 3 51  319
 4.07627+ 6 2.79106- 1 4.16916+ 6 2.70584- 1 4.27050+ 6 2.68998- 12032 3 51  320
 4.37184+ 6 2.65497- 1 4.47318+ 6 2.61523- 1 4.57453+ 6 2.58521- 12032 3 51  321
 4.68431+ 6 2.57728- 1 5.01370+ 6 2.52720- 1 6.12840+ 6 2.31110- 12032 3 51  322
 6.90540+ 6 2.12190- 1 7.78370+ 6 1.95300- 1 8.69570+ 6 1.68270- 12032 3 51  323
 1.10270+ 7 1.10850- 1 1.23780+ 7 8.99039- 2 1.42690+ 7 8.51750- 22032 3 51  324
 2.00000+ 7 7.43650- 2                                            2032 3 51  325
                                                                  2032 3  0  326
 3.00700+ 3 6.95573+ 0          0          98          0          02032 3 91  327
 0.0    + 0-2.46475+ 6          0           0          1         182032 3 91  328
        18          2          0           0          0          02032 3 91  329
 2.81910+ 6 0.0    + 0 3.76380+ 6 8.17962- 3 4.50697+ 6 5.17562- 22032 3 91  330
 4.77721+ 6 9.83729- 2 5.21635+ 6 2.15928- 1 5.65549+ 6 3.28417- 12032 3 91  331
 6.09464+ 6 3.55779- 1 6.80402+ 6 3.69966- 1 7.81743+ 6 3.80100- 12032 3 91  332
 8.86462+ 6 3.80100- 1 1.01145+ 7 3.69966- 1 1.13981+ 7 3.52738- 12032 3 91  333
 1.27493+ 7 3.33484- 1 1.40668+ 7 3.18283- 1 1.54518+ 7 3.06122- 12032 3 91  334
 1.69381+ 7 2.92947- 1 1.83231+ 7 2.80786- 1 2.00000+ 7 2.68626- 12032 3 91  335
                                                                  2032 3  0  336
 3.00700+ 3 6.95573+ 0          0          99          0          02032 3102  337
 0.0    + 0 2.03300+ 6          0           0          1         142032 3102  338
        14          5          0           0          0          02032 3102  339
 1.00000- 5 2.28358+ 0 1.00000- 4 7.22131- 1 1.00000- 3 2.28358- 12032 3102  340
 2.53000- 2 4.54000- 2 1.00000- 1 2.28358- 2 1.00000+ 0 7.22131- 32032 3102  341
 1.00000+ 1 2.28358- 3 1.00000+ 2 7.22131- 4 1.00000+ 3 2.28358- 42032 3102  342
 1.00000+ 4 7.22131- 5 1.00000+ 5 2.28358- 5 1.00000+ 6 7.22131- 62032 3102  343
 1.00000+ 7 2.28358- 6 2.00000+ 7 1.61473- 6                      2032 3102  344
                                                                  2032 3  0  345
 3.00700+ 3 6.95573+ 0          0          99          0          02032 3104  346
 0.0    + 0-7.76382+ 6          0           0          3         142032 3104  347
         3          2         13           5         14          22032 3104  348
 8.88000+ 6 0.0    + 0 9.00000+ 6 0.0    + 0 1.00000+ 7 1.00000- 32032 3104  349
 1.05000+ 7 2.00000- 3 1.10000+ 7 3.00000- 3 1.15000+ 7 3.60000- 32032 3104  350
 1.20000+ 7 5.00000- 3 1.25000+ 7 6.80000- 3 1.30000+ 7 8.00000- 32032 3104  351
 1.35000+ 7 9.00000- 3 1.40000+ 7 1.00000- 2 1.45000+ 7 1.10000- 22032 3104  352
 1.50000+ 7 1.20000- 2 2.00000+ 7 1.03100- 2                      2032 3104  353
                                                                  2032 3  0  354
 3.00700+ 3 6.95573+ 0          0           0          0          02032 3251  355
 0.0    + 0 0.0    + 0          0           0          1         662032 3251  356
        66          2          0           0          0          02032 3251  357
 1.00000- 5 9.56665- 2 1.00000- 4 9.56665- 2 1.00000- 3 9.56665- 22032 3251  358
 2.53000- 2 9.56665- 2 1.00000- 1 9.56665- 2 1.00000+ 0 9.56665- 22032 3251  359
 1.00000+ 1 9.56665- 2 1.00000+ 2 9.56665- 2 1.00000+ 3 9.56665- 22032 3251  360
 1.00000+ 4 9.56665- 2 4.00000+ 4 9.56665- 2 5.00000+ 4 1.67115- 12032 3251  361
 7.00000+ 4 1.78072- 1 8.50000+ 4 2.06725- 1 1.00000+ 5 2.07095- 12032 3251  362
 1.20000+ 5 2.23745- 1 2.07000+ 5 4.67142- 1 2.57000+ 5 2.73338- 12032 3251  363
 3.07000+ 5 5.73441- 2 3.57000+ 5-7.11497- 2 4.07000+ 5-7.21089- 22032 3251  364
 4.30000+ 5-4.78710- 2 4.57000+ 5-6.19093- 2 5.07000+ 5-5.33020- 22032 3251  365
 5.30000+ 5-4.88582- 2 6.30000+ 5-1.65423- 3 7.30000+ 5 5.68853- 22032 3251  366
 8.30000+ 5 9.45490- 2 9.30000+ 5 1.26220- 1 1.04000+ 6 1.47888- 12032 3251  367
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........10........20........30........40........50........60......MAT MF MT  SEQ
 1.14000+ 6 1.82715- 1 1.24000+ 6 1.80384- 1 1.34000+ 6 1.87263- 12032 3251  368
 1.44000+ 6 1.91232- 1 1.54000+ 6 1.96400- 1 1.65000+ 6 2.02884- 12032 3251  369
 1.75000+ 6 2.14513- 1 1.85000+ 6 2.12933- 1 1.95000+ 6 2.22634- 12032 3251  370
 2.25000+ 6 2.36603- 1 4.08000+ 6 2.06686- 1 4.26000+ 6 2.19447- 12032 3251  371
 4.57000+ 6 2.57713- 1 4.83000+ 6 3.16061- 1 5.05000+ 6 3.19910- 12032 3251  372
 5.29000+ 6 3.44803- 1 5.54000+ 6 3.79034- 1 5.74000+ 6 4.37308- 12032 3251  373
 6.05000+ 6 4.74042- 1 6.37000+ 6 5.06844- 1 6.66000+ 6 5.14650- 12032 3251  374
 6.94000+ 6 5.29589- 1 6.97000+ 6 5.23785- 1 7.97000+ 6 5.53646- 12032 3251  375
 8.96000+ 6 5.89747- 1 9.96000+ 6 6.32777- 1 1.09500+ 7 6.51730- 12032 3251  376
 1.20400+ 7 6.72309- 1 1.29400+ 7 7.03481- 1 1.39400+ 7 7.19514- 12032 3251  377
 1.50000+ 7 7.50406- 1 1.60000+ 7 7.62380- 1 1.70000+ 7 7.73449- 12032 3251  378
 1.80000+ 7 7.84974- 1 1.90000+ 7 7.94312- 1 2.00000+ 7 8.02947- 12032 3251  379
                                                                     2032 3  0  380
                                                                     2032 0  0  381
 3.00700+ 3 6.95573+ 0          1          1          0          02032 4  2  382
 0.0    + 0 6.95573+ 0          0          2         81          82032 4  2  383
 1.00000+ 0 9.58442- 2 4.14604- 3 4.20187-14 0.0    + 0 0.0    + 02032 4  2  384
 0.0    + 0 0.0    + 0 0.0    + 0 0.0    + 0 9.87599- 1 1.71497- 12032 4  2  385
 1.41729- 2 5.69216- 4 1.21917- 5-4.26374- 7 0.0    + 0 0.0    + 02032 4  2  386
 0.0    + 0-9.41463- 2 9.67704- 1 2.42495- 1 2.93164- 2 2.05700- 32032 4  2  387
 8.99586- 5 1.45003- 6 1.53502- 7 0.0    + 0 1.21639- 2-1.67004- 12032 4  2  388
 9.37457- 1 3.09449- 1 4.92299- 2 4.80782- 3 3.13488- 4 1.25821- 52032 4  2  389
 0.0    + 0-1.66448- 3 2.74452- 2-2.33650- 1 8.97772- 1 3.71857- 12032 4  2  390
 7.35196- 2 9.13548- 3 7.85108- 4 0.0    + 0 2.32578- 4-4.38476- 32032 4  2  391
 4.68300- 2-2.94968- 1 8.49307- 1 4.28961- 1 1.01717- 1 1.53161- 22032 4  2  392
 0.0    + 0-3.28230- 5 6.87761- 4-8.58502- 3 7.00335- 2-3.50555- 12032 4  2  393
 7.92820- 1 4.79983- 1 1.33274- 1 0.0    + 0 4.65781- 6-1.06487- 42032 4  2  394
 1.49694- 3-1.45237- 2 9.65710- 2-3.99796- 1 7.29186- 1 5.24206- 12032 4  2  395
 0.0    + 0-6.63208- 7 1.62643- 5-2.52727- 4 2.79148- 3-2.23973- 22032 4  2  396
 1.25860- 1-4.42076- 1 6.59383- 1                                   2032 4  2  397
 0.0    + 0 0.0    + 0          0          0          1         662032 4  2  398
        66             2          0          0          0          02032 4  2  399
 0.0    + 0 1.00000- 5          0          0          2          02032 4  2  400
 0.0    + 0 0.0    + 0                                              2032 4  2  401
 0.0    + 0 1.00000- 4          0          0          2          02032 4  2  402
 0.0    + 0 0.0    + 0                                              2032 4  2  403
 0.0    + 0 1.00000- 3          0          0          2          02032 4  2  404
 0.0    + 0 0.0    + 0                                              2032 4  2  405
 0.0    + 0 2.53000- 2          0          0          2          02032 4  2  406
 0.0    + 0 0.0    + 0                                              2032 4  2  407
 0.0    + 0 1.00000- 1          0          0          2          02032 4  2  408
 0.0    + 0 0.0    + 0                                              2032 4  2  409
 0.0    + 0 1.00000+ 0          0          0          2          02032 4  2  410
 0.0    + 0 0.0    + 0                                              2032 4  2  411
 0.0    + 0 1.00000+ 1          0          0          2          02032 4  2  412
 0.0    + 0 0.0    + 0                                              2032 4  2  413
 0.0    + 0 1.00000+ 2          0          0          2          02032 4  2  414
 0.0    + 0 0.0    + 0                                              2032 4  2  415
 0.0    + 0 1.00000+ 3          0          0          2          02032 4  2  416
 0.0    + 0 0.0    + 0                                              2032 4  2  417
 0.0    + 0 1.00000+ 4          0          0          2          02032 4  2  418
 0.0    + 0 0.0    + 0                                              2032 4  2  419
 0.0    + 0 4.00000+ 4          0          0          2          02032 4  2  420
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........10........20........30........40........50........60......MAT MF MT  SEQ
 0.0    + 0 0.0    + 0                                              2032 4  2  421
 0.0    + 0 5.00000+ 4          0          0          4           02032 4  2  422
 7.17054- 2-7.26744- 3-1.03821- 3 1.01744- 2                        2032 4  2  423
 0.0    + 0 7.00000+ 4          0          0          4           02032 4  2  424
 8.28516- 2-5.78035- 3 2.68373- 3 4.97752- 3                        2032 4  2  425
 0.0    + 0 8.50000+ 4          0          0          4           02032 4  2  426
 1.12245- 1-1.45773- 3 3.95669- 3 3.37253- 3                        2032 4  2  427
 0.0    + 0 1.00000+ 5          0          0          4           02032 4  2  428
 1.12099- 1-5.92593- 3 8.25397- 3 1.31687- 3                        2032 4  2  429
 0.0    + 0 1.20000+ 5          0          0          4           02032 4  2  430
 1.30224- 1 4.37318- 3-5.62266- 3 6.15484- 3                        2032 4  2  431
 0.0    + 0 2.07000+ 5          0          0          4           02032 4  2  432
 3.84688- 1 9.05482- 2 1.01269- 2 3.57068- 3                        2032 4  2  433
 0.0    + 0 2.57000+ 5          0          0          4           02032 4  2  434
 1.87587- 1 8.20995- 2 1.33696- 2 1.73310- 3                        2032 4  2  435
 0.0    + 0 3.07000+ 5          0          0          4           02032 4  2  436
-3.47086- 2 4.54486- 2 1.67930- 2 5.31180- 3                        2032 4  2  437
 0.0    + 0 3.57000+ 5          0          0          4           02032 4  2  438
-1.67959- 1 1.08527- 2 6.42303- 3 2.41171- 3                        2032 4  2  439
 0.0    + 0 4.07000+ 5          0          0          4           02032 4  2  440
-1.71076- 1-1.37566- 2-3.47695- 3 9.99412- 3                        2032 4  2  441
 0.0    + 0 4.30000+ 5          0          0          4           02032 4  2  442
-1.47547- 1-2.17259- 2 9.28209- 3-7.89622- 4                        2032 4  2  443
 0.0    + 0 4.57000+ 5          0          0          4           02032 4  2  444
-1.63314- 1-3.85799- 2 7.60778- 3 2.36686- 3                        2032 4  2  445
 0.0    + 0 5.07000+ 5          0          0          4           02032 4  2  446
-1.52829- 1-1.93309- 2 1.11524- 2 1.07394- 2                        2032 4  2  447
 0.0    + 0 5.30000+ 5          0          0          4           02032 4  2  448
-1.48764- 1-2.60870- 2-7.30727- 4 0.0    + 0                       2032 4  2  449
 0.0    + 0 6.30000+ 5          0          0          4           02032 4  2  450
-1.00785- 1-2.38220- 2-3.73972- 4 1.45433- 4                        2032 4  2  451
 0.0    + 0 7.30000+ 5          0          0          4           02032 4  2  452
-4.08576- 2-1.77184- 2-4.16089- 3 7.95577- 3                        2032 4  2  453
 0.0    + 0 8.30000+ 5          0          0          4           02032 4  2  454
-2.86123- 3-1.84549- 2-1.53280- 3 2.74201- 3                        2032 4  2  455
 0.0    + 0 9.30000+ 5          0          0          4           02032 4  2  456
 2.98977- 2-1.07692- 2 1.09890- 3 4.16667- 3                        2032 4  2  457
 0.0    + 0 1.04000+ 6          0          0          4           02032 4  2  458
 5.33923- 2 4.60177- 3-2.40202- 3 8.16126- 3                        2032 4  2  459
 0.0    + 0 1.14000+ 6          0          0          4           02032 4  2  460
 8.86403- 2 6.19621- 3 6.02410- 3 3.82482- 3                        2032 4  2  461
 0.0    + 0 1.24000+ 6          0          0          4           02032 4  2  462
 8.70668- 2 1.38631- 2 3.86427- 3 5.72931- 3                        2032 4  2  463
 0.0    + 0 1.34000+ 6          0          0          4           02032 4  2  464
 9.45315- 2 1.92910- 2 5.41750- 3 6.32042- 3                        2032 4  2  465
 0.0    + 0 1.44000+ 6          0          0          4           02032 4  2  466
 9.95636- 2 2.96236- 2 3.97475- 3 5.09183- 3                        2032 4  2  467
 0.0    + 0 1.54000+ 6          0          0          4           02032 4  2  468
 1.05833- 1 4.06667- 2 5.95238- 3 6.11111- 3                        2032 4  2  469
 0.0    + 0 1.65000+ 6          0          0          4           02032 4  2  470
 1.11844- 1 3.42951- 2 1.53103- 3 3.29761- 3                        2032 4  2  471
 0.0    + 0 1.75000+ 6          0          0          4           02032 4  2  472
 1.24548- 1 4.57048- 2 1.16764- 2 3.52145- 3                        2032 4  2  473
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........10........20........30........40........50........60......MAT MF MT  SEQ
 0.0    + 0 1.85000+ 6          0          0          4          02032 4  2  474
 1.23678- 1 5.22376- 2 8.13670- 3 1.03969- 2                      2032 4  2  475
 0.0    + 0 1.95000+ 6          0          0          4          02032 4  2  476
 1.34621- 1 6.41995- 2 9.53913- 3 8.31322- 3                      2032 4  2  477
 0.0    + 0 2.25000+ 6          0          0          4          02032 4  2  478
 1.49555- 1 7.34034- 2 1.60527- 2 9.43142- 3                      2032 4  2  479
 0.0    + 0 4.08000+ 6          0          0          4          02032 4  2  480
 1.32046- 1 2.09190- 1 4.32900- 2 3.01518- 2                      2032 4  2  481
 0.0    + 0 4.26000+ 6          0          0          4          02032 4  2  482
 1.45365- 1 2.14938- 1 5.58305- 2 3.35275- 2                      2032 4  2  483
 0.0    + 0 4.57000+ 6          0          0          4          02032 4  2  484
 1.85408- 1 2.32106- 1 8.32671- 2 3.78551- 2                      2032 4  2  485
 0.0    + 0 4.83000+ 6          0          0          4          02032 4  2  486
 2.45571- 1 2.44539- 1 1.00001- 1 5.34423- 2                      2032 4  2  487
 0.0    + 0 5.05000+ 6          0          0          4          02032 4  2  488
 2.48950- 1 2.41999- 1 1.08894- 1 3.55290- 2                      2032 4  2  489
 0.0    + 0 5.29000+ 6          0          0          4          02032 4  2  490
 2.73461- 1 2.34592- 1 1.05923- 1 3.26698- 2                      2032 4  2  491
 0.0    + 0 5.54000+ 6          0          0          4          02032 4  2  492
 3.08415- 1 2.38876- 1 1.17067- 1 3.83134- 2                      2032 4  2  493
 0.0    + 0 5.74000+ 6          0          0          4          02032 4  2  494
 3.69159- 1 2.58880- 1 1.28136- 1 3.57284- 2                      2032 4  2  495
 0.0    + 0 6.05000+ 6          0          0          4          02032 4  2  496
 4.09533- 1 2.90556- 1 1.29278- 1 5.02029- 2                      2032 4  2  497
 0.0    + 0 6.37000+ 6          0          0          4          02032 4  2  498
 4.42804- 1 2.95634- 1 1.50549- 1 3.99168- 2                      2032 4  2  499
 0.0    + 0 6.66000+ 6          0          0          4          02032 4  2  500
 4.50496- 1 2.92324- 1 1.43388- 1 3.92226- 2                      2032 4  2  501
 0.0    + 0 6.94000+ 6          0          0          4          02032 4  2  502
 4.66897- 1 3.06669- 1 1.54929- 1 4.62866- 2                      2032 4  2  503
 0.0    + 0 6.97000+ 6          0          0          6          02032 4  2  504
 4.61771- 1 3.15216- 1 1.59079- 1 4.77753- 2 3.85383- 3 1.97985- 32032 4  2  505
 0.0    + 0 7.97000+ 6          0          0          6          02032 4  2  506
 4.92375- 1 3.20425- 1 1.67250- 1 5.17429- 2 3.63933- 3 0.0    + 02032 4  2  507
 0.0    + 0 8.96000+ 6          0          0          6          02032 4  2  508
 5.31612- 1 3.48709- 1 1.76186- 1 5.70891- 2 0.0    + 0-1.16446- 32032 4  2  509
 0.0    + 0 9.96000+ 6          0          0          6          02032 4  2  510
 5.76852- 1 3.69630- 1 2.01323- 1 6.72840- 2 7.57576- 3 3.06268- 32032 4  2  511
 0.0    + 0 1.09500+ 7          0          0          8          02032 4  2  512
 5.96985- 1 3.80302- 1 2.08758- 1 6.901[illegible]7- 2 5.93878- 3 1.54619- 42032 4  2  513
-1.20603- 3 0.0    + 0                                             2032 4  2  514
 0.0    + 0 1.20400+ 7          0          0          8          02032 4  2  515
 6.20014- 1 4.07265- 1 2.35958- 1 8.98623- 2 1.90365- 2 8.13609- 32032 4  2  516
 1.99430- 3 0.0    + 0                                             2032 4  2  517
 0.0    + 0 1.29400+ 7          0          0          6          02032 4  2  518
 6.53392- 1 4.27434- 1 2.47946- 1 9.52557- 2 1.90064- 2 4.76515- 32032 4  2  519
 0.0    + 0 1.39400+ 7          0          0          6          02032 4  2  520
 6.70996- 1 4.42975- 1 2.60584- 1 1.05208- 1 2.23248- 2 6.26646- 32032 4  2  521
 0.0    + 0 1.50000+ 7          0          0          6          02032 4  2  522
 7.04626- 1 4.67632- 1 2.55400- 1 1.00161- 1 2.64489- 2 5.98540- 32032 4  2  523
 0.0    + 0 1.60000+ 7          0          0          6          02032 4  2  524
 7.17631- 1 4.78343- 1 2.68029- 1 1.09354- 1 3.11370- 2 7.46669- 32032 4  2  525
 0.0    + 0 1.70000+ 7          0          0          8          02032 4  2  526
```

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........10........20........30........40........50........60......MAT MF MT   SEQ
 7.29635- 1 4.89039- 1 2.80047- 1 1.18827- 1 3.62237- 2 9.15646- 32032 4  2  527
 1.89916- 3 0.0    + 0                                            2032 4  2  528
 0.0    + 0 1.80000+ 7           0           0           8       02032 4  2  529
 7.42211- 1 4.99881- 1 2.89938- 1 1.26401- 1 4.05877- 2 1.06253- 22032 4  2  530
 2.27914- 3 0.0    + 0                                            2032 4  2  531
 0.0    + 0 1.90000+ 7           0           0           8       02032 4  2  532
 7.52553- 1 5.10666- 1 3.01441- 1 1.36314- 1 4.62499- 2 1.26687- 22032 4  2  533
 2.84769- 3 0.0    + 0                                            2032 4  2  534
 0.0    + 0 2.00000+ 7           0           0           8       02032 4  2  535
 7.62176- 1 5.21351- 1 3.12649- 1 1.46325- 1 5.21684- 2 1.49034- 22032 4  2  536
 3.49192- 3 0.0    + 0                                            2032 4  2  537
                                                                  2032 4  0  538
 3.00700+ 3 6.95573+ 0           0           2           0       02032 4 16  539
 0.0    + 0 6.95573+ 0           0           1           0       02032 4 16  540
 0.0    + 0 0.0    + 0           0           0           1       22032 4 16  541
          2           2           0           0           0       02032 4 16  542
 0.0    + 0 8.30000+ 6           0           0           1       22032 4 16  543
          2           2           0           0           0       02032 4 16  544
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 16  545
 0.0    + 0 2.00000+ 7           0           0           1       22032 4 16  546
          2           2           0           0           0       02032 4 16  547
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 16  548
                                                                  2032 4  0  549
 3.00700+ 3 6.95573+ 0           0           2           0       02032 4 24  550
 0.0    + 0 6.95573+ 0           0           1           0       02032 4 24  551
 0.0    + 0 0.0    + 0           0           0           1       22032 4 24  552
          2           2           0           0           0       02032 4 24  553
 0.0    + 0 1.00000+ 7           0           0           1       22032 4 24  554
          2           2           0           0           0       02032 4 24  555
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 24  556
 0.0    + 0 2.00000+ 7           0           0           1       22032 4 24  557
          2           2           0           0           0       02032 4 24  558
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 24  559
                                                                  2032 4  0  560
 3.00700+ 3 6.95573+ 0           0           2           0       02032 4 51  561
 0.0    + 0 6.95573+ 0           0           2           0       02032 4 51  562
 0.0    + 0 0.0    + 0           0           0           1       22032 4 51  563
          2           2           0           0           0       02032 4 51  564
 0.0    + 0 5.46130+ 5           0           0           1       22032 4 51  565
          2           2           0           0           0       02032 4 51  566
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 51  567
 0.0    + 0 2.00000+ 7           0           0           1       22032 4 51  568
          2           2           0           0           0       02032 4 51  569
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 51  570
                                                                  2032 4  0  571
 3.00700+ 3 6.95573+ 0           0           2           0       02032 4 91  572
 0.0    + 0 6.95573+ 0           0           1           0       02032 4 91  573
 0.0    + 0 0.0    + 0           0           0           1       22032 4 91  574
          2           2           0           0           0       02032 4 91  575
 0.0    + 0 2.81910+ 6           0           0           1       22032 4 91  576
          2           2           0           0           0       02032 4 91  577
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                      2032 4 91  578
 0.0    + 0 2.00000+ 7           0           0           1       22032 4 91  579
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........10........20........30........40........50........60......MAT MF.MT  SEQ
          2          2          0          0          0          02032 4 91  580
-1.00000+ 0 5.00000- 1 1.00000+ 0 5.00000- 1                       2032 4 91  581
                                                                   2032 4  0  582
                                                                   2032 0  0  583
 3.00700+ 3 6.95573+ 0          0          0          1          02032 5 16  584
 7.25673+ 6 0.0     + 0          0          9          1          22032 5 16  585
          2          2          0          0          0          02032 5 16  586
 8.30000+ 6 1.00000+ 0 2.00000+ 7 1.00000+ 0                       2032 5 16  587
 0.0    + 0 0.0     + 0          0          0          1          22032 5 16  588
          2          5          0          0          0          02032 5 16  589
 8.30000+ 6 6.05000+ 5 2.00000+ 7 9.39110+ 5                       2032 5 16  590
                                                                   2032 5  0  591
 3.00700+ 3 6.95573+ 0          0          0          1          02032 5 24  592
 8.74304+ 6 0.0     + 0          0          9          1          22032 5 24  593
          2          2          0          0          0          02032 5 24  594
 1.00000+ 7 1.00000+ 0 2.00000+ 7 1.00000+ 0                       2032 5 24  595
 0.0    + 0 0.0     + 0          0          0          1          22032 5 24  596
          2          5          0          0          0          02032 5 24  597
 1.00000+ 7 3.58300+ 5 2.00000+ 7 5.06660+ 5                       2032 5 24  598
                                                                   2032 5  0  599
 3.00700+ 3 6.95573+ 0          0          0          1          02032 5 91  600
 2.46475+ 6 0.0     + 0          0          9          1          22032 5 91  601
          2          2          0          0          0          02032 5 91  602
 2.81910+ 6 1.00000+ 0 2.00000+ 7 1.00000+ 0                       2032 5 91  603
 0.0    + 0 0.0     + 0          0          0          1          42032 5 91  604
          4          2          0          0          0          02032 5 91  605
 2.81910+ 6 1.00000+ 5 5.80000+ 6 7.00000+ 5 8.00000+ 6 2.80000+ 62032 5 91  606
 2.00000+ 7 7.17140+ 6                                             2032 5 91  607
                                                                   2032 5  0  608
                                                                   2032 0  0  609
                                                                      0 0  0  610
                                                                     -1 0  0    0
```