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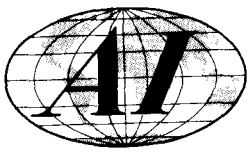

ATOMICS INTERNATIONAL

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Printed in the United States of America
Available from
Clearinghouse for Federal Scientific and Technical Information
National Bureau of Standards, U.S. Department of Commerce
Springfield, Virginia 22151
Price: Printed Copy $3.00; Microfiche $0.65

AI-AEC-12741
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PHYSICS

EVALUATED NEUTRON CROSS SECTIONS FOR COPPER-63, COPPER-65, AND NATURAL COPPER

By

J. M. OTTER
R. S. HUBNER
R. W. CAMPBELL*
C. L. DUNFORD
H. ALTER

*Present Address – Jet Propulsion Laboratory, Pasadena, California

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CONTRACT: AT(04–3)–701
ISSUED: DECEMBER 15, 1968

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ABSTRACT

Evaluated neutron cross-section data for copper-63, copper-65, and naturally occurring copper have been prepared for the ENDF/B nuclear data file. Calculations, based on nuclear systematics, were used to augment available experiment data, where required. A complete set of neutron cross-section data was prepared for each nuclide, for incident neutron energies between 10^{-3} and 1.5×10^{7} ev. These data, in ENDF/B format, have been forwarded to the National Neutron Cross Section Center, at Brookhaven National Laboratory, for distribution.

I. INTRODUCTION

An evaluation of available measured cross sections, resonance parameters, differential angular distributions, and other pertinent data for the two naturally occurring isotopes of copper and for natural copper has been completed. Measured values were selected when they were available, even though some wide discrepancies between measured values for natural copper and values calculated by combining values for the isotopes, weighted by their relative abundances, were found. Calculations were made to obtain parameters for negative energy resonances which provided matches to low-energy absorption and scattering cross sections. The evaluated resolved and unresolved resonance parameters were checked by comparing calculations of absorption cross sections and resonance integrals from the TRIX-1 code[1] with measurements. Adequate agreement was found. The unresolved parameters were used to calculate background cross sections in the resolved resonance region from p-wave neutrons.

Above the resonance region, the main source of data was the UKAEA Nuclear Data Library files for copper, as compiled by Offord and Parker.[2] These files combined the evaluations of Benzi and Haggblom, along with several improvements. An analysis of this evaluation indicated that little improvement would be obtained by another complete evaluation at this time; thus, the UKAEA results above 100 kev were used, essentially as is. One area of improvement was the use of more recent experimental angular distributions in the evaluation of elastic neutron scattering in terms of Legendre expansion coefficients.

II. EVALUATION OF THE NEUTRON CROSS SECTIONS OF COPPER FOR THE ENDF/B LIBRARY

A. LOW-ENERGY CROSS-SECTION DATA

1. Energy Ranges and Reaction Types

The low-energy region was defined to be 0.001 ev to 100 kev. The range was divided into three parts, in each of which the cross sections are presented somewhat differently. The ranges are 0.001 to 10 ev, 10 ev to 30 kev, and 30 to 100 kev.

The significant neutron reactions in the low-energy range are radiative capture and elastic scattering. The total cross section is taken to be equal to the sum of the partial cross sections for consistency.

2. Energy Range, 0.001 to 10 ev

The evaluated cross-section data are entered as smooth data only. The data for each isotope were calculated from the resolved resonance parameters, using the Breit-Wigner multilevel scattering formula.[4-7] No crystal binding effects are included. The absorption cross section of natural copper was obtained from the abundance-weighted isotopic values. The scattering cross section for natural copper, 7.7 b, was obtained from an evaluation of reported measurements, and differs from the isotopically combined value of 8.6 b by more than 10%.

3. Energy Range, 10 ev to 30 kev

Both File 3 smooth data and resolved resonance parameters are provided. All the resolved resonances are treated as $\ell = 0$ resonances. Components of both the radiative capture and elastic scattering cross sections from neutrons with $\ell > 0$ were calculated from unresolved resonance parameters, using the TRIX-1 code,[1] and were entered in File 3 as smooth data.

4. Energy Range, 30 to 100 kev

Cross sections are specified for the smooth data file only. The total cross sections for the isotopes, and for natural copper, were taken to be equal. The elastic scattering cross section was defined to be the difference between the total and radiative capture cross sections, with the radiative capture cross sections

taken from the evaluation of measured values in Section II-D. The radiative capture cross section of natural copper is not equal to the abundance-weighted sum of the isotopic values. The latter is from 45 to 75% larger than measured values for natural copper in this energy range, and constitutes a discrepancy which has not been resolved.

Unresolved resonance parameters for this region are not given explicitly in the ENDF/B library, since the capture cross sections are entered as smooth data, rather than being produced from resonance parameters; however, unresolved resonance parameters are given in this report. They may be used to obtain an alternate set of data, in which the natural copper capture cross section is the abundance-weighted sum of its isotopes, and to calculate self-shielded cross sections.

B. RESONANCE PARAMETERS

1. Resolved Resonances

The recommended parameters of Reference 8 were adopted for the resolved resonances with positive energies. All resolved resonances were treated as $\ell = 0$ resonances. The top of the resolved resonance range was chosen as 30 kev; since, below that energy, nearly every sizable resonance has been assigned to a particular isotope. Most of the resonances below 30 kev occurring in the total cross-section curves for natural copper in Reference 8 appear to exhibit the scattering interference characteristic of $\ell = 0$ resonances.

Although some large $\ell = 1$ resonances are probably included in the resolved resonances, particularly at the higher energies, some small $\ell = 0$ resonances are probably unresolved. Thus, the assumption that the number of resolved resonances is the number of $\ell = 0$ resonances below 30 kev is plausible. Furthermore, the observation of $\ell = 1$ resonances has an appreciable probability only in the high-energy portion of the range, so only small errors in the resonance scattering cross section below 10 ev should be introduced by using the $\ell = 0$ formula for all resonances (See also the discussion of Section II-D).

Parameters for one bound level for each isotope were determined by matching the evaluated scattering and absorption cross sections at v = 2200 m/sec. Positive energy parameters contribute only 11 and 4% of the absorption cross section, and 64 and 30% of the scattering cross section, for Cu^{63} and Cu^{65}, respectively.

TABLE 1

RESOLVED RESONANCE PARAMETERS FOR Cu^{63}

E_r (kev)	Γ_n (ev)	J	E_r (kev)	Γ_n (ev)	J
- 0.3069	4.553	2	13.70	39.44	2*
0.557	0.86	2	14.90	27.76	2*
2.06	4.35	1	15.60	17.68	2*
2.66	4.5	2	16.10	11.04	2*
4.86	14.	1	17.88	133.	1*
5.39	40.	2	18.12	133.	1*
5.82	10.4	2	21.04	200.	1*
7.64	6.8	2*	21.25	120.	2*
7.94	80.	2	22.82	112.	2*
9.20	36.	2	24.80	60.4	2*
9.93	87.	1	25.60	165.6	2*
10.85	58.	2	26.50	96.8	2*
12.54	23.	1	28.20	68.66	1*
13.17	66.	2	29.30	322.3	1*

*J value assigned, ($2g\,\Gamma_n$) preserved.

TABLE 2

RESOLVED RESONANCE PARAMETERS FOR Cu^{65}

E_r (kev)	Γ_n (ev)	J	E_r (kev)	Γ_n (ev)	J
- 0.9476	92.07	2	8.549	7.56	1
0.229	0.016	2*	13.66	75.	2
2.55	16.8	2	14.23	41.6	2*
3.92	24.	1	15.09	7.62	2*
4.40	7.	2	15.82	32.0	2*
4.50	16.	1	17.8	244.4	2*
6.48	26.	2	20.0	253.	1*
7.60	23.	2	21.8	36.53	1*
7.65	33.	1	24.1	112.	1*
7.94	50.	2	25.0	204.8	2*

*J value assigned, ($2g\,\Gamma_n$) preserved.

Resonance energies and scattering level widths are listed in Tables 1 and 2. Where the value of the compound nucleus spin quantum number (J) is unknown, one of the two possible $\ell = 0$ values was assigned to facilitate use of the Breit-Wigner multilevel scattering formula.[4] In these cases, Γ_n was adjusted to preserve $(2g\,\Gamma_n)$. The frequency of assignment of each J value was approximately proportional to $(2J + 1)$. The chosen values of the radiative capture widths are 0.55 and 0.24 ev for Cu^{63} and Cu^{65}, respectively.[8] Values of 0.65 and 0.6 ev have also been given,[9] but the chosen values appear substantially confirmed by the results of calculations presented in Sections II-D and II-E.

The resonance energies in the compilation of Reference 8 indicate a peculiarly large amount of overlap between Cu^{63} and Cu^{65} resonances. Below 30 kev, eight such coincidences, which appear as single resonances in the total cross-section curves of natural copper, are found. These are listed in Table 3. Assuming that the average level spacing in natural copper is $\sim$0.6 kev, and that the average reduced neutron width is $\sim$0.4 ev, the expected percentage of resonances involved in overlap between isotopes is $\sim$15%. The observed percentage is >30%. Whether this observation is related to the discrepancies between measured natural copper values and the abundance-weighted sum of the isotopic values for some quantities (See Section II-D) is yet to be resolved.

2. Unresolved Resonances

A set of unresolved resonance parameters were formed, in the usual manner, by an averaging over the resolved resonances. Because J values were assigned to only a few resonances of each isotope, parameters for the individual J states are not known confidently. The following assumptions were made:

1) Average level spacings are proportional to $(2J + 1)^{-1}$, and are independent of ℓ.

2) Strength functions for all the (ℓ,J) states with a particular ℓ value are equal. Some evidence exists that, for $\ell = 0$, the two J states may have significantly different strength functions.[10] However, the accuracy to which the cross sections are known does not seem to warrant a detailed study at this time.

TABLE 3

SETS OF OVERLAPPING RESONANCES BETWEEN Cu^{63} AND Cu^{65}

E_r (kev)	
Cu^{63}	Cu^{65}
6.452*	6.48
7.64	7.65
7.94	7.94
12.54	12.53*
14.9	15.09
15.6	15.82
16.1	16.15*
17.88	17.8

*These resonances were not used, because scattering level width parameters were not available.

TABLE 4

AVERAGE RESONANCE PARAMETERS OF RESOLVED RESONANCES

	Cu^{63}	Cu^{65}
Number of Resonances	27	19
E_{max} (kev)	29.3	25.0
E_{min} (kev)	0.6	0.2
$\langle D \rangle_{observed}$ (kev)	1.1	1.4
$\Sigma \Gamma_n^o$ (ev)	15.2	10.1
ΔE (kev)	30	30
s (b/ev at 1 ev)	5.1×10^{-4}	3.4×10^{-4}
s_J (b/ev at 1 ev)	2.55×10^{-4}	1.7×10^{-4}
$\langle \Gamma_n \rangle_1$ (ev)	0.747	0.634
$\langle D \rangle_1$ (kev)	2.93	3.73
$\langle \Gamma_n^o \rangle_2$ (ev)	0.449	0.381
$\langle D \rangle_2$ (kev)	1.76	2.24

3) Average radiative capture widths are independent of J and ℓ. The average resolved resonance parameters, and quantities used in calculating them, are given in Table 4. The formulas used are

$$\langle D \rangle_{\text{observed}} = \frac{E_{max} - E_{min}}{(\text{number of resonances}) - 1}$$

$$s = 2 s_J = \Sigma \Gamma_n^o / \Delta E = \langle \Gamma_n^o \rangle_J / \langle D \rangle_J$$

The calculated strength functions of 2.55×10^{-4} and 1.7×10^{-4} for Cu^{63} and Cu^{65}, respectively, compare fairly well with the ranges of values in the literature, which are 1.6 to 2.7×10^{-4} and 1.5 to 2.0×10^{-4}, respectively.[11,12] It is not clear, however, that all the resolved resonances are $\ell = 0$ resonances. The matter is investigated in Section II-D, and the parameters mentioned previously are adopted for $\ell = 0$ neutrons.

The $\ell = 1$ strength function was chosen to be 1.0×10^{-4}, based on the calculated values of Uttley et al.[13] for A = 64, which are $\sim$1.0 to 1.3×10^{-4}, and of Jain,[14] which are $\sim$0.5 to 1.0×10^{-4}. The $\ell = 2$ strength function was assumed to be 1.0×10^{-4}. The three assumptions listed previously were assumed to hold for $\ell > 0$.

3. Potential Scattering Cross Section

Values of the potential scattering cross section at low energies have been measured only for natural copper. Values for the separate isotopes were assumed to be the same as for natural copper. The measured data are given in Table 5. A value of 6.7 b was chosen. This infers a scattering length of 7.3 F.

TABLE 5

POTENTIAL SCATTERING CROSS-SECTION MEASUREMENTS FOR NATURAL COPPER

σ_{pot} (b)	Reference
6.68	41
6.88	41
6.8 ± 0.5	42
6.6 ± 0.2	43

C. THERMAL CROSS SECTIONS

1. 2200 m/sec Capture Cross Section

Measurements for the 2200 m/sec radiative capture cross sections are presented in Table 6, for both natural copper and its isotopes. The values chosen from which to derive negative energy resonance parameters were 4.5 and 2.7 b for Cu^{63} and Cu^{65}, respectively. These values give a value for natural copper of 3.79 b, in good agreement with natural copper measurements.

TABLE 6

2200-m/sec RADIATIVE CAPTURE CROSS-SECTION MEASUREMENTS FOR Cu^{63}, Cu^{65}, AND NATURAL COPPER

σ_c(2200 m/sec) (b)	Comment	Reference
	Cu^{63}	
5.0 ± 1	Adjusted for 43% K capture	16
4.47 ± 0.36	Renormalized to $\sigma_{a2200}^{Au^{197}} = 98.8$ b	17
4.54	Renormalized to $\sigma_{a2200}^{nat\ Cu} = 3.75$ b	18
4.44 ± 0.26		19
4.52 ± 0.10	$\sigma_a = (2.512 \pm 0.058)\lambda^*$ extrapolated 1/v	15
4.66 ± 0.47		20
5.4	Adjusted for 43% K capture	21
4.03 ± 0.17		22
	Cu^{65}	
1.82 ± 0.36		16
2.19 ± 0.18	Renormalized to $\sigma_{a2200}^{Au^{197}} = 98.8$ b	17
2.63 ± 0.26	$\sigma_a = (1.459 \pm 0.144)\lambda^*$ extrapolated 1/v	15
	Ratio Cu^{63}/Cu^{65}	
2.32 ± 0.11		23
	Natural Cu	
3.8 ± 0.1	Evaluation to 1966	8
3.76 ± 0.03		24

*λ is neutron wave length (Å)

2. 2200 m/sec Scattering Cross Section

The low-energy scattering cross sections are nearly constant below 10 ev. For the individual isotopes, Keating et al.[15] have obtained free atom scattering lengths of 6.72 and 11.09 F for Cu^{63} and Cu^{65}, respectively. Incoherent scattering was determined to be zero, within the limits of error. The scattering cross sections for Cu^{63} and Cu^{65} are 5.67 and 15.46 b, respectively. The negative energy resonance parameters give acceptably close scattering cross-section values of 5.58 and 15.42 b, using the multilevel scattering formula.

The isotopic values infer a cross section of 8.62 b for natural copper. Measurements of the low-energy scattering cross section for natural copper are given in Table 7. Based on these measurements, the scattering cross section is indicated to be probably in the range of 7 to 8 b, which is well below the isotopically combined value. The value of 7.7 b was adopted for the natural copper data file below 10 ev.

TABLE 7

LOW-ENERGY SCATTERING CROSS SECTION OF NATURAL COPPER

σ_s (b)	Remarks	Reference
	From σ_t measurements from which σ_a is subtracted as 1/v with $\sigma_{a2200} = 3.8$ b	
8.1	σ_t = 11.9 b at 0.0253 ev	25
7.7[5]	From transmission curve and $T = \exp(-\sigma_n)$ σ_t = 7.94 b at 10 ev	26
7.55 ± 0.4	2 to 20 ev	27
7.72 ± 0.03	σ_t = 8.21 b at 1.44 ev	28
7.7 ± 0.3	0.1 to 1 ev	29
	Scattering	
8.4	Adjusted to σ_s^c = 4.71 b	25
7.3 ± 0.6		30
7.84 ± 0.32		15
7.0 ± 0.2		31

D. UNRESOLVED RESONANCE RANGE

The capture cross sections in the range 30 to 100 kev were taken from qualitative fits to experimental data shown in Figures 1 and 2. The notable inconsistency between the isotopic combination for natural copper and measurement is shown in Figure 2 also. The former values are from 35 to 75% higher than the latter, between 10 and 300 kev. Each set of experimental points represents at least three separate measurements, so the discrepancy is not easily resolved.

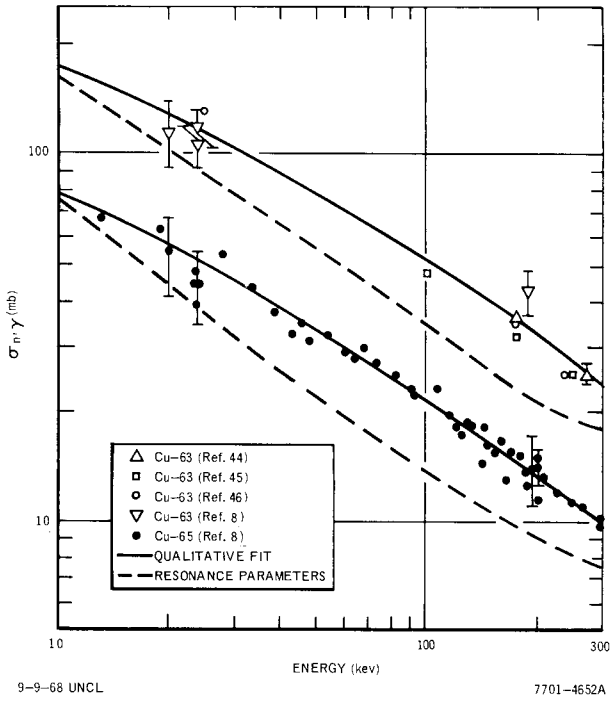

Figure 1.
Radiative Capture Cross Section vs Energy for Cu^{63} and Cu^{65}

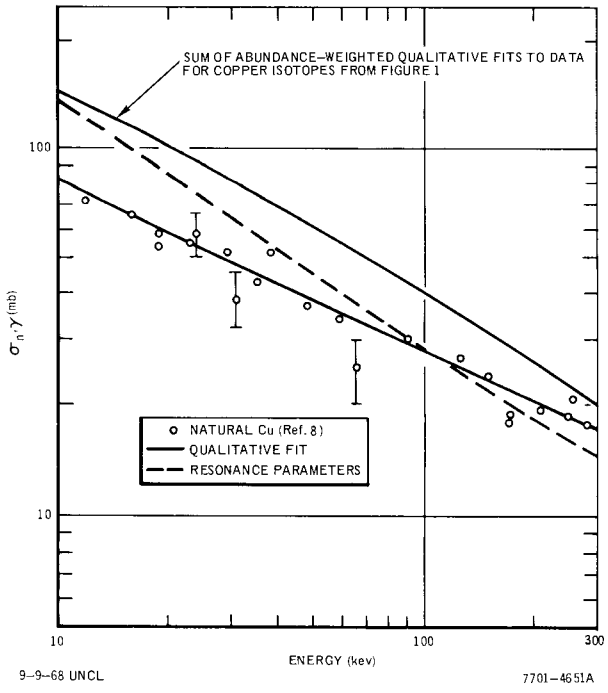

Figure 2.
Radiative Capture Cross Section vs Energy for Natural Copper

The total cross section for natural copper has been measured in the 30 to 100 kev range.[8] In order to represent the data accurately with a reasonable number of points, 130 points were selected. The isotopic total cross sections were assumed to be equal to natural copper. Elastic scattering cross sections were defined to be equal to the total minus the capture cross sections.

Capture cross sections, calculated with the TRIX-I[1] code, using the unresolved resonance parameters of Section II-B-2, are shown in Figures 1 and 2. The energy dependence of the potential scattering was included in the calculation. The calculated average total cross section, which is nearly all scattering, was about 20% higher than measurement. The large majority of the scattering cross section is $\ell = 0$ potential scattering, so the value of 6.7 b for the low-energy $\ell = 0$ potential scattering cross section may be too large, as well as perhaps the $\ell = 0$ strength function. Changes in the scattering level width (Γ_n) would not affect calculated capture cross sections appreciably, since $\Gamma_n \cong \Gamma$.

At 30 kev, more than 50% of the calculated capture cross section arises from neutrons with $\ell > 0$. Since the large majority of resolved resonances exhibit $\ell = 0$ line shapes, a high level of $\ell > 0$ unresolved background is indicated. Below 100 kev, the calculated capture cross section for natural copper falls between the isotopic combined and directly measured values, thus lending support to the resonance parameters used.

E. RESONANCE INTEGRALS

Measured values of the resonance integral for Cu^{63}, Cu^{65}, and natural copper are listed in Table 8. The most probable values for the isotopes appear to be about 5.1 b for Cu^{63} and 2.4 b for Cu^{65}. They yield a combined isotope value for natural copper of 4.3 b, which compares fairly well with a most probable measured value of about 3.9 b.

The isotopic resonance integrals were calculated, with the TRIX code,[1] from the resolved and unresolved resonance parameters. A breakdown of the results by resolution and angular momentum is given in Table 9. The values of 5.35, 2.10, and 4.35 b for Cu^{63}, Cu^{65}, and natural copper, respectively, agree well enough with the measured values, to lend some confidence to the chosen parameters.

TABLE 8

MEASURED RESONANCE INTEGRALS OF COPPER

Measured Value (b)	Cutoff Energy, E_c (ev)	Remarks	I_∞, Adjusted to E_c = 0.5 ev Including 1/v (b)	Reference
		Cu^{63}		
4.4	0.52	1/v included	4.4	32
3.09 ± 0.15	0.5	No 1/v, restored using σ_{a2200} = 4.5 b	5.11 ± 0.2	33
3.17 ± 0.18	0.62	No 1/v, restored using σ_{a2200} = 4.5 b	4.99 ± 0.2	34
4.2 ± 0.2	0.62	5 mil foil	5.3 ± 0.2	35
		Cu^{65}		
2.2	0.52	1/v included	2.2	32
1.52 ± 0.25	0.5	No 1/v, restored using σ_{a2200} = 2.2 b	2.51 ± 0.25	33
1.53 ± 0.24	0.62	No 1/v, restored using σ_{a2200} = 2.2 b	2.42 ± 0.24	34
		Natural Cu		
3.3 ± 0.3	0.5	1/v included	3.3 ± 0.3	36
4.0	0.52	1/v included	4.0	32
3.7 ± 0.8	0.49	1/v included	3.7 ± 0.8	37
4.96		1/v included	4.96	38
1.2 ± 0.5	0.5	No 1/v, restored using σ_{a2200} = 3.8 b	2.9 ± 0.5	39
2.6 ± 0.3	0.52	No 1/v, restored using σ_{a2200} = 3.8 b	4.25 ± 0.3	9
1.7 ± 0.4		No 1/v	3.7 ± 0.4	40
3.8 ± 0.3	0.55		3.9 ± 0.3	24

TABLE 9

RESONANCE INTEGRALS FOR COPPER ISOTOPES, CALCULATED FROM RESONANCE PARAMETERS

Description	Cu^{63}	Cu^{65}
$\ell = 0$ resolved	3.22	0.95
$\ell = 0$ unresolved	0.02	0.01
"1/v" positive energy resonances	0.21	0.04
$\ell = 0$ Total	3.45	1.00
$\ell > 0$	0.32	0.24
Total positive energy resonances	3.77	1.24
Negative energy resonance	1.58	0.86
Total	5.35	2.10

F. CROSS-SECTION DATA ABOVE 100 kev

1. Neutron Reaction Data

Above 100 kev, the main source of data were the UKAEA Nuclear Data Library files for copper, as compiled by Offord and Parker.[2] These files combined the evaluations of Benzi[47] and Häggblom,[48] along with several improvements. An analysis of this evaluation indicated that little improvement would be obtained by another complete evaluation at this time; thus, the evaluated copper data for ENDF/B essentially were derived from their results, above 100 kev.

Where given, the cross sections for the separate isotopes were used. This included data for the (n,γ), (n,n'), (n,p), and (n,α) reactions. These were abundance weighted to obtain values for the naturally occurring element.

The following reactions have been specified for copper and its isotopes:

Reaction	Cu^{63}	Cu^{65}	Natural Copper
Total	X	X	X
Elastic	X	X	X
Inelastic	X	X	X
First inelastic level	X	X	X
Second inelastic level	X	X	X
Third inelastic level	X	X	X
Fourth inelastic level	X	X	X

Reaction	Cu^{63}	Cu^{65}	Natural Copper
Fifth inelastic level	X		X
Sixth inelastic level			X
Seventh inelastic level			X
Eighth inelastic level			X
Ninth inelastic level			X
(n,2n)	X	X	X
(n,γ)	X	X	X
(n,p)	X	X	X
(n,α)	X	X	X
$\bar{\mu}_L$	X	X	X
ξ	X	X	X
γ	X	X	X

2. Differential Elastic Data

Secondary angular distributions may be expressed in terms of Legendre coefficients, $f_\ell(E)$, where the $f_\ell(E)$ are defined by

$$\frac{d\sigma(\mu,E)}{d\Omega} = \frac{\sigma_s(E)}{2\pi} \sum_{\ell=0}^{NL} \frac{2\ell+1}{2} f_\ell(E) P_\ell(\mu) \qquad \ldots(1)$$

Since $f_0(E) = 1$, only values for $\ell = 1, 2, \ldots NL$ are specified. The angular variable (μ) may refer to either the laboratory (L) or center-of-mass (C) coordinate system.

Data expressed as Legendre coefficients for elastic scattering above thermal energies, in either the (C) or (L) system, can be transformed to the other system with energy-independent transformation matrices ($U_{\ell m}$) or ($U^{-1}_{\ell m}$), respectively.

$$f^L_\ell(E) = \sum_{m=0}^{NM} U_{\ell m} f^C_m(E) \quad , \quad \ell = 0, NM \qquad \ldots(2)$$

$$f^C_\ell(E) = \sum_{m=0}^{NM} U^{-1}_{\ell m} f^L_m(E) \quad , \quad \ell = 0, NM \qquad \ldots(3)$$

where NM is the maximum value of NL. The appropriate transformation matrix can be included in File 4 as an array of numbers V_k, $k = 1, 2, \ldots NK$. V_k denotes either $U_{\ell m}$ or $U^{-1}_{\ell m}$, with $k = 1 + \ell + m(NM + 1)$ and $NK = (NM + 1)^2$.

Differential elastic scattering cross sections were obtained from the recent measurements of Smith,[49] and Holmqvist and Wiedling,[50] as well as from BNL-400[51]. The data was processed with the code CHAD[52] to produce center-of-mass Legendre expansion coefficients to order 20.

Legendre coefficients, as defined by Equation 1, were specified for copper and its isotopes. Since the coefficients were defined in the center-of-mass system, the transformation matrix, given by Equation 2, was specified.

The Legendre coefficients were then used to reproduce the original angular distributions and to check the criteria of non-negative differential elastic values. A single set of Legendre data was used for Cu^{63}, Cu^{65}, and natural copper. The Legendre data is given at 45 energies, over the range 10 kev to 15 Mev. Below 10 kev, the angular data is assumed isotropic, and has the 10-kev value.

3. Secondary Energy Distributions

Secondary energy distributions are expressed as normalized probability distributions. The energy distributions, $p(E' \leftarrow E)$, are normalized such that

$$\int_0^\infty dE\, p(E' \leftarrow E) = 1 \qquad \ldots(4)$$

with the differential cross section being obtained from

$$\frac{d\sigma(E' \leftarrow E)}{dE} = \sigma(E)\, p(E' \leftarrow E) \qquad \ldots(5)$$

The energy distribution is further expressed as

$$p(E' \leftarrow E) = \sum_{k=1}^{NK} p_k(E)\, f_k(E' \leftarrow E) \qquad \ldots(6)$$

so that both partial distributions or different distributions in different energy ranges can be accommodated. The $f_k(E' \leftarrow E)$ are normalized in the same way as the $p(E' \leftarrow E)$.

The inelastic discrete level data are given as separate subsections for each level; LF = 3, discrete energy loss, is the method of specification. The discrete energy loss, θ, is taken to be the absolute value of Q, the level excitation energy.

The $p_k(E)$ are defined above the reaction threshold; however, the $p_k(E)$ are zero above 1.75 Mev. The sum of the $p_k(E)$ over k is 1.0, for threshold < E < 1.75 Mev.

The secondary energy distribution for continuum inelastic neutrons is given by a Maxwellian with an energy dependent temperature, LF = 9, and is assumed to be the same for natural copper and both its constituents, i.e.,

$$f_k(E' \leftarrow E) = \left[\frac{E'}{\theta^2(E)}\right] \exp\left[\frac{-E'}{\theta(E)}\right] \qquad \ldots(7)$$

and

$$\theta_{inel}(E) = \left(\frac{E}{a}\right)^{1/2} \qquad \ldots(8)$$

where

$a = 4.8\ \text{Mev}^{-1}$

E is in Mev

$p_k(E) = 1.0$ for 1.75 Mev < E < 15.0 Mev

$p_k(E) = 0.0$ for E < 1.75 Mev.

For an (n,2n) reaction, it is assumed that the first neutron has an evaporation spectrum which is identical to that for continuum inelastic neutrons and $p_k(E) = 0.5$. The second neutron also obeys a Maxwellian distribution, with the following expression for the temperature,

$$\theta_{n,2n}(E) = \left(\frac{E - E_{threshold}}{a}\right)^{1/2} \qquad \ldots(9)$$

where

$a = 4.8\ \text{Mev}^{-1}$

$p_k(E) = 0.5$.

The (n,2n) threshold for Cu^{63} is 11.01 Mev; and, for Cu^{65}, it is 10.06 Mev. For natural copper, the second neutron appears as a separate subsection for each isotope, and the $p_k(E)$ for each subsection is weighted by the appropriate abundance.

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APPENDIX I
GRAPHICAL DISPLAY OF COPPER-65 ENDF/B DATA

Copper-65 was chosen to graphically illustrate the ENDF/B copper data. The computer program EDIT[53] was used to automatically plot the ENDF/B Files 1, 3, 4, and 5.

The character of the plotted output depends upon the contents of each file. Except for File 4 and for log abscissa interpolation regions, there will be one plot per interpolation region; for log abscissa interpolation regions containing more than 10 decades, there will be two plots.

The plotted results are described for each file.

A. FILE 1

The literal information, MT = 451, is printed. There is one line per record, with the first 66 columns of the record printed, and with 25 lines (or less) printed per CRT frame. An example of File 1 plotted output is given in Figures 3 through 5.

B. FILE 3

The type of grid for the plots of File 3 "smooth" cross sections depends upon the interpolation code specified in the TAB1 record. At the top of the grid appears a title, consisting of the first 48 characters of the first literal record in File 1. The abscissa title is ENERGY (EV). The ordinate title depends upon the reaction type (the MT number). For example, it might be TOTAL or (N,2N), meaning the total or the (n,2n) cross section. Figures 6 through 28 illustrate the File 3 data for Cu^{65}.

C. FILE 4

Angular distribution data in File 4 are given either as energy-dependent Legendre coefficients or as tabulated functions of the cosine of the scattering angle for various energies. The ordinate and the abscissa are linear and logarithmic, respectively, for the coefficient data and are logarithmic and linear, respectively, for the tabulated data. At the top of the grid appears a title, consisting of the first 48 characters of the first literal record in File 1. For

Legendre coefficient data, the abscissa title is ENERGY (EV). The ordinate title depends upon the reaction type (MT) and the index of the coefficient. For example, ELASTIC LEGENDRE COEFFICIENT F 12 means that the data plotted is the twelfth Legendre coefficient for the angular distribution of elastic scattering. There will be one plot for each coefficient. Figures 29 through 48 are examples of this type of data.

D. FILE 5

Plots of the energy distribution data in File 5 depend upon the $f_k(E' \leftarrow E)$, which may be specified in a variety of ways; the parameter LF is used to denote the method used. A reaction type may consist of sets of data for one or more values of LF.

The first plot for any value of LF contains the $p_k(E)$. As in Files 3 and 4, a title, consisting of the first 48 characters of the first literal record in File 1, is printed at the top of each curve. The abscissa title is ENERGY (EV), and the ordinate title depends upon the reaction type (MT), the value of LF (the subsection), and a constant which may appear in the expression for $f_k(E' \leftarrow E)$. For example, it might be

INELASTIC P(E) LF = 3 CONS = 1.114 + 06,

which means that the $p_k(E)$ data is for a discrete inelastic level reaction, and the $f_k(E' \leftarrow E)$ uses the third method of specification; the constant (θ) for the distribution is the discrete energy loss, 1.114×10^6 ev.

For copper, two values of LF are used; they are

LF	Description	CONS
3	Discrete energy loss	The discrete energy loss (ev)
9	Maxwellian distribution, $\theta = \theta(E)$, and is tabulated	Undefined; value will be 0.0

LF subsection requires no further plotting; however, additional plotting is done for LF = 9. Comments on File 3 plots apply here, except as noted. For LF = 9, a plot of a tabulated $\theta(E)$ is produced. The ordinate might read

(N,2N) THETA(E) TAB. FOR MAXWELLIAN DISTRIB

Examples of File 5 plotting are given in Figures 49 through 52 for LF = 3, and in Figures 53 through 59 for LF = 9.

-AEC-12741 SEPT. 1968

NFORMATION

FOR A NEUTRON MASS OF 1.008665

FROM REF. 1

PARAMETERS

TREATED AS L=0 RESONANCES

METERS FROM REF.2.

ND ABOVE 14KEV ASSIGNED

CE GAMMA-N AND E0 OBTAINED FROM

=2.28 AT 2200M/S. ASSUMED GAMMA-

CE PARAMETERS FROM AVERAGED

METERS. OBSERVED LEVEL SPACING

NCTION/J STATE=S0J=1.7E-04, FOR

DJ=D0/DJ, GAMMA-GAMMA=0.24EV

LBW REF. 10) ARE USED.

S SECTIONS

E FOR SEPERATE CU ISOTOPES. THE

SUM OF ITS PARTS,EXCEPT FOR 30

ASSUMED TO BE EQUAL TO A

PPER GIVEN IN REF.2

VALUES WERE CALCULATED FROM

METERS USING UNICORN-REF. 3. IN

re 3

THE RESOLVED RESONANCE RANGE THE SMOOTH DATA IS THE CONTRIBUTION FROM L .GT. 0 CALCULATED FROM UNRESOLVED RESONANCE PARAMETERS USING TRIX-REF.4.

FROM 30 TO 100 KEV VALUES ARE THE DIFFERENCE BETWEEN THE TOTAL AND NON-ELASTIC CROSS SECTIONS. ABOVE 100 KEV, VALUES WERE ASSUMED TO BE IDENTICAL TO NATURALLY OCCURING CU-REF.5.

MT=4-8 LEVEL DATA FROM REF.5, ABOVE 1.75MEV CONTINUUM WAS USED WHICH WAS MATCHED TO LEVEL DATA AND WHEN WEIGHTED ALONG WITH CU-63 GAVE CONTINUUM OF NATURAL CU FROM REF.5.

MT=16 REF.5

MT=251 MUBAR CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING CHAD-REF.6.

MT=252 XI CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING CHAD -REF.6.

MT=253 GAMMA CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING CHAD-REF.6.

MT=102 BELOW RESONANCE REGION CALCULATED AS PER MT=2. FOR RESOLVED RESONANCE RANGE,L.GT.0 CONTRIBUTION CALCULATED FROM UNRESOLVED RESONANCE PARAMETERS USING TRIX-REF.4. THE 30 TO 100 KEV RANGE FROM EVALUATION OF REFERENCE DOCUMENT. ABOVE 100 KEV-REF.5.

MT=103 REF.5

MT=107 REF.5

MF=4 SECONDARY ANGULAR DISTRIBUTIONS

MT

MF=5

MT

MT

Figure 4

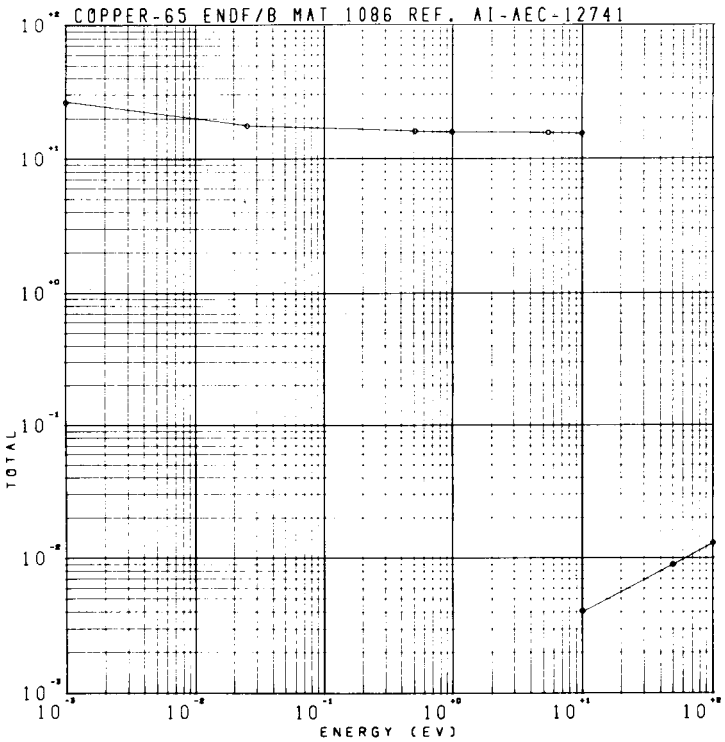
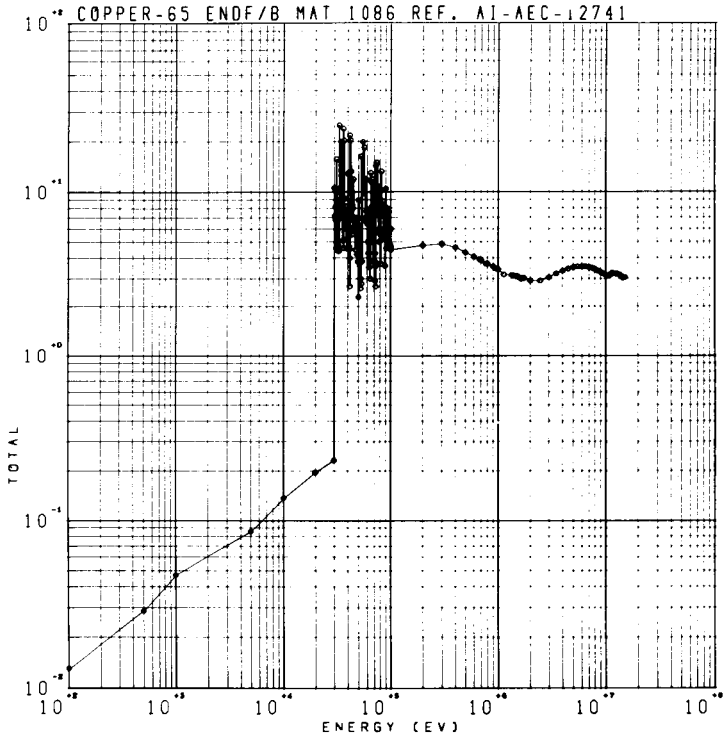


Figure 6

Figure 7



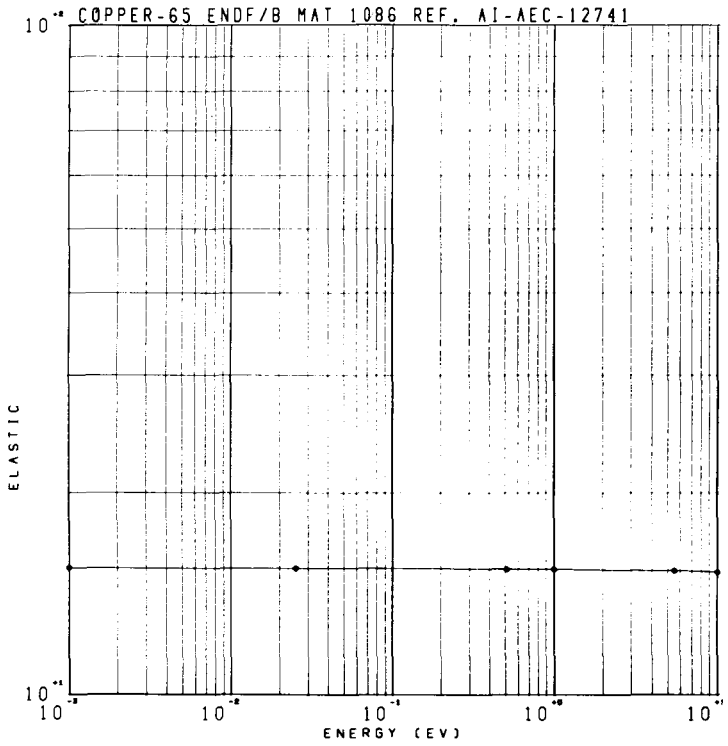
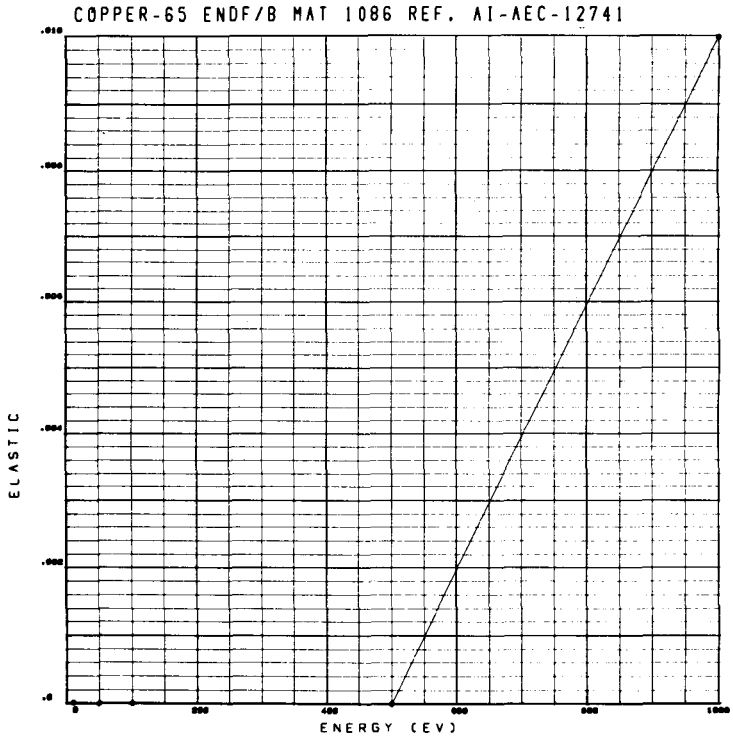
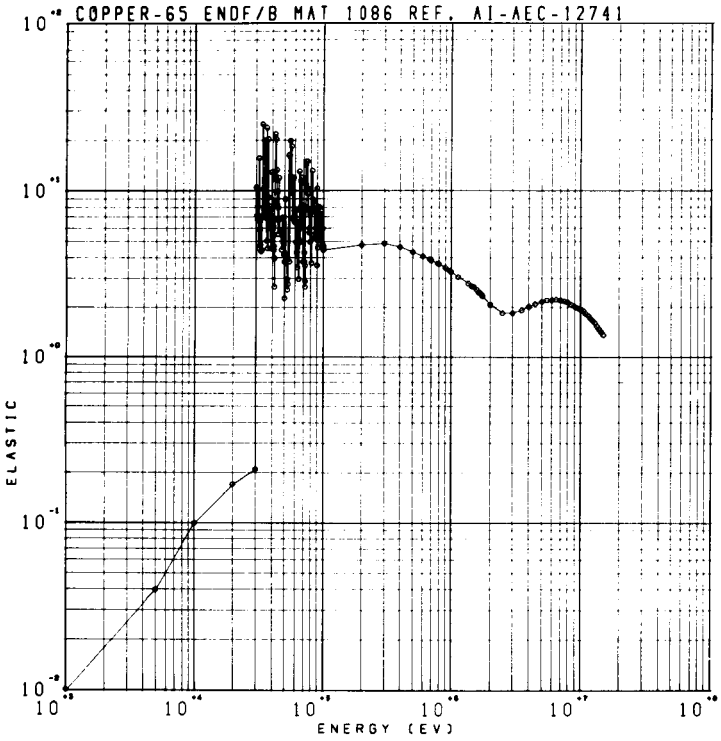


Figure 8

Figure 9





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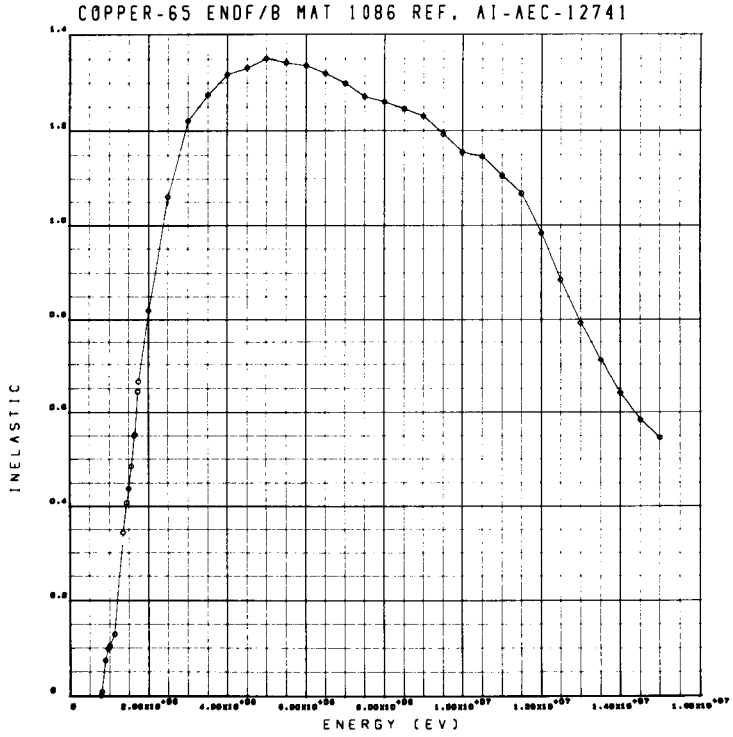

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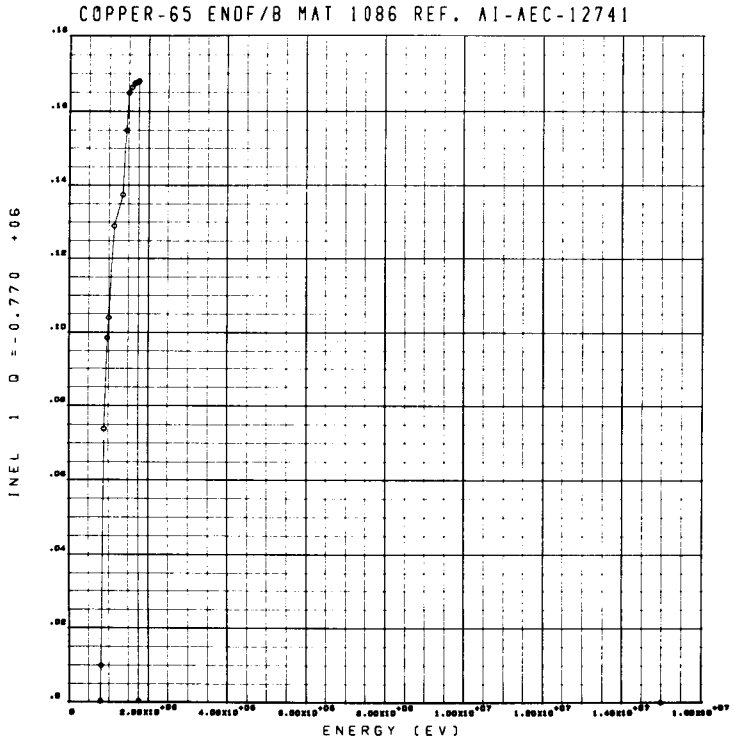

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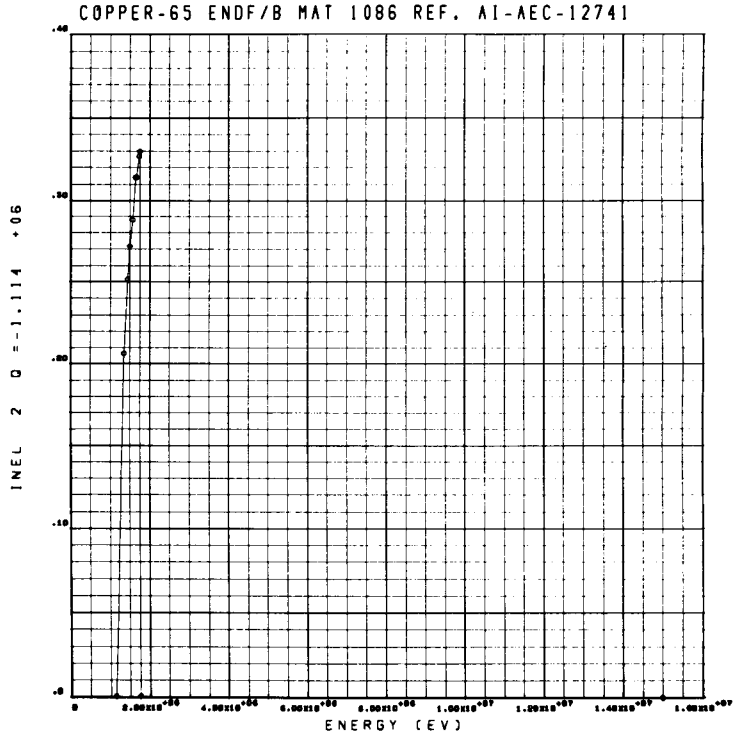

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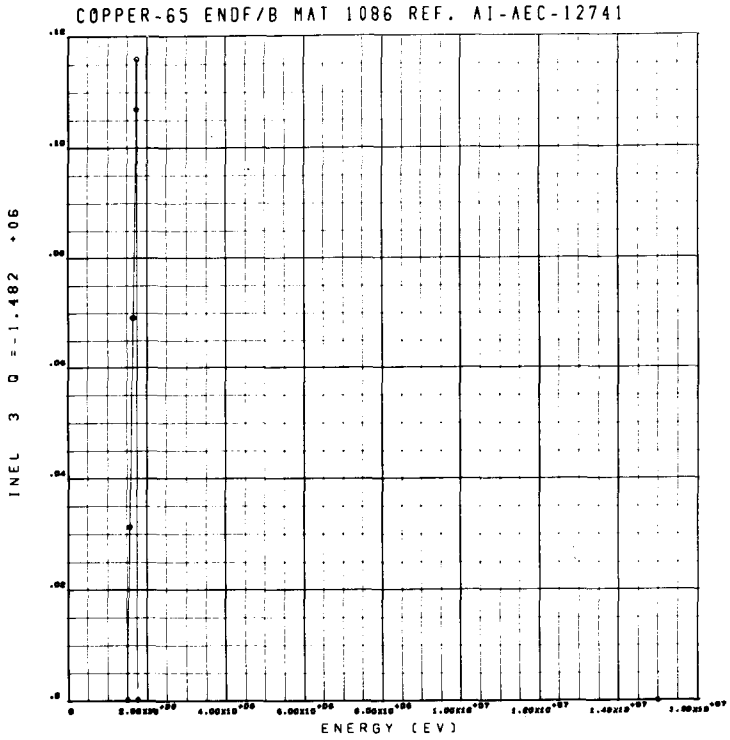

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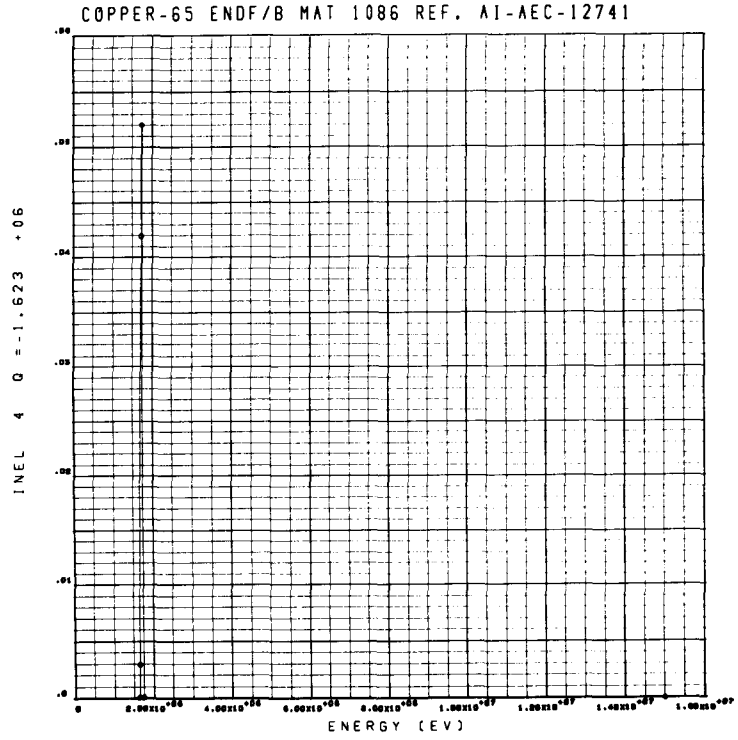

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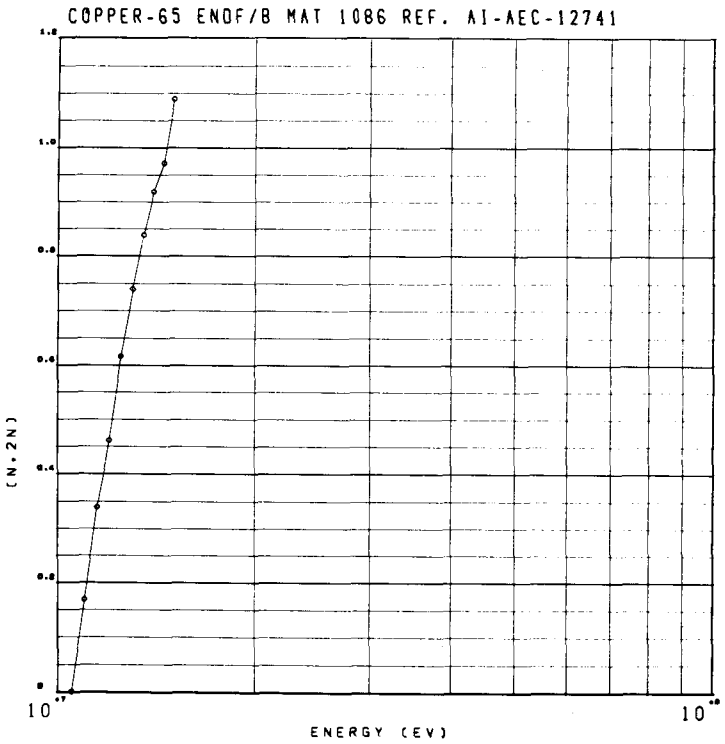
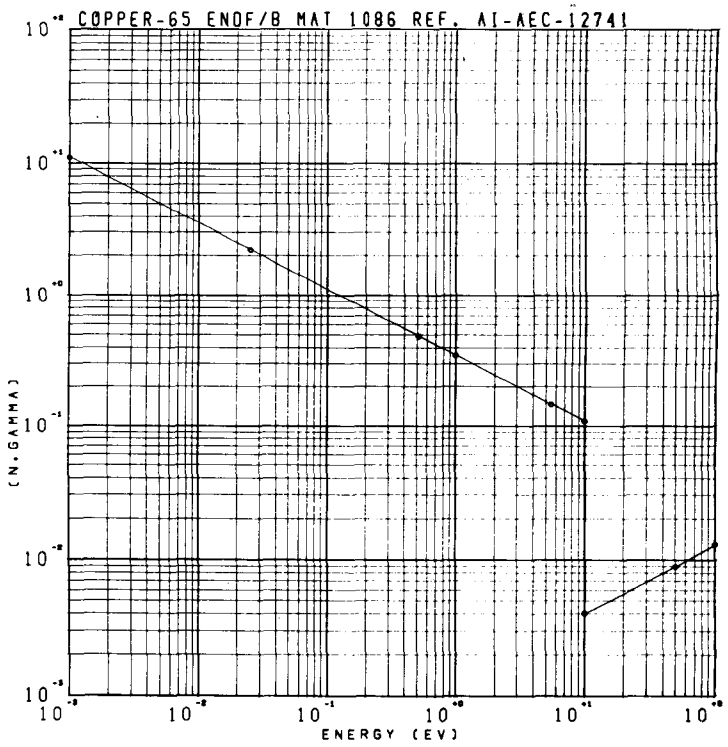
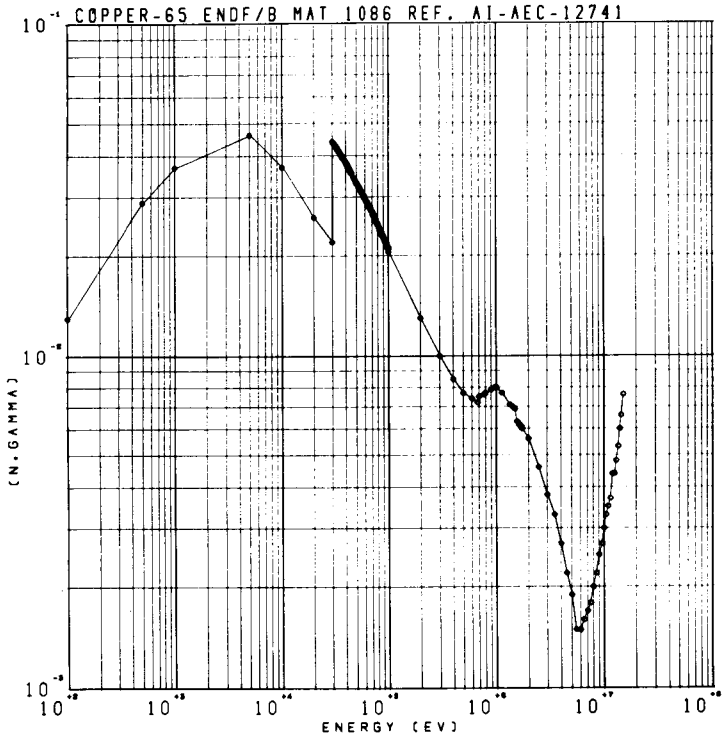


Figure 16

Figure 17





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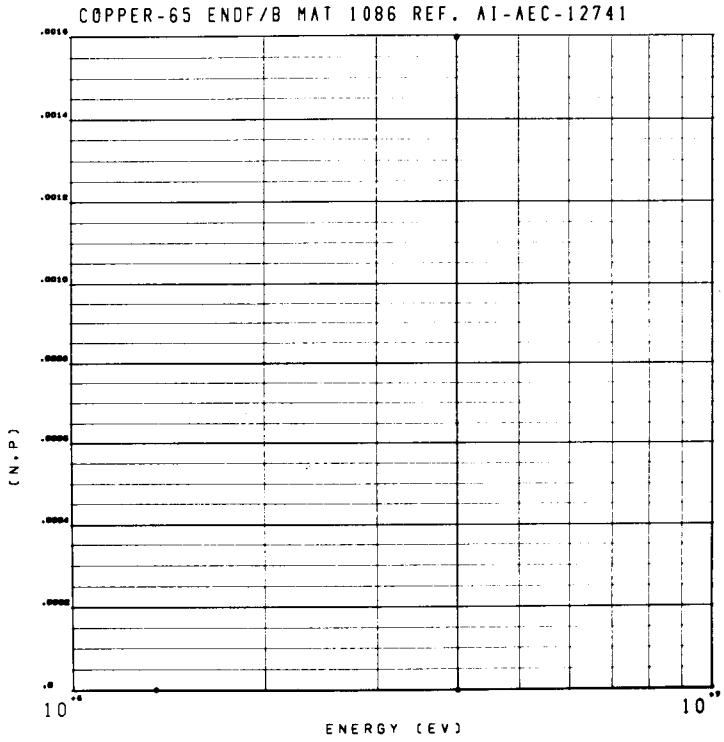

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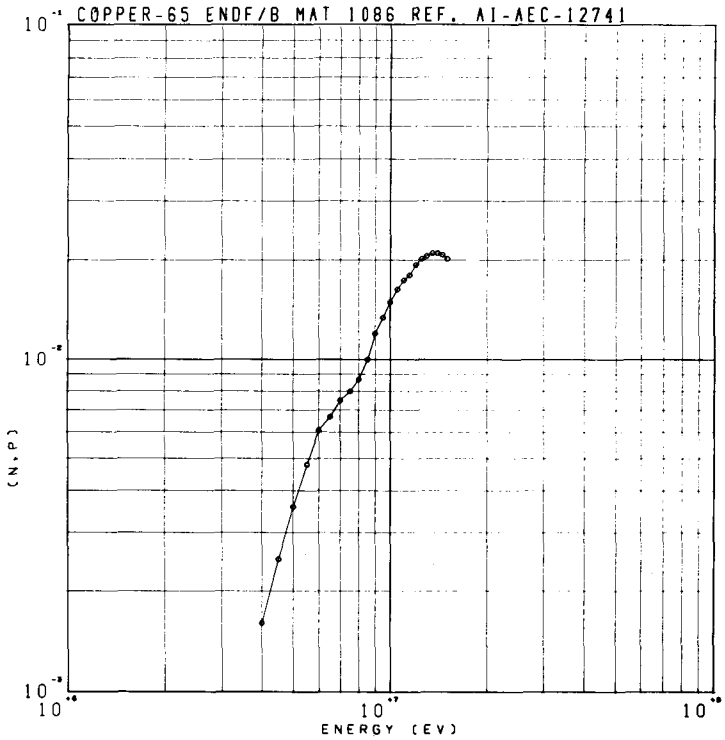
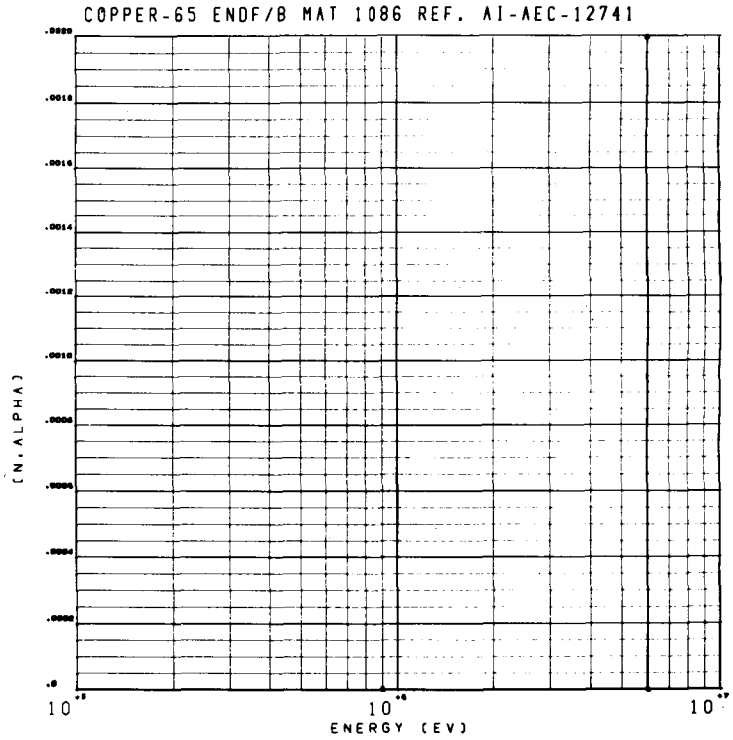


Figure 20

Figure 21



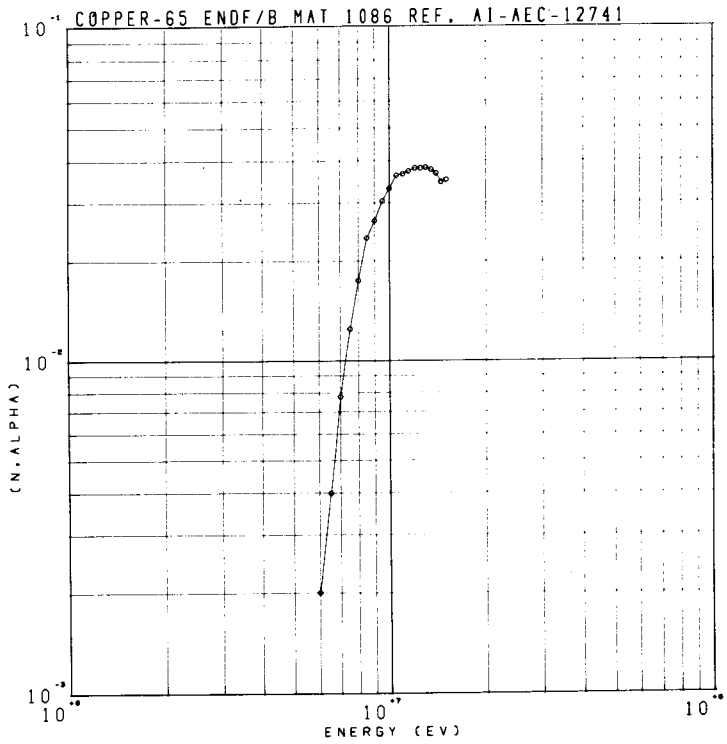
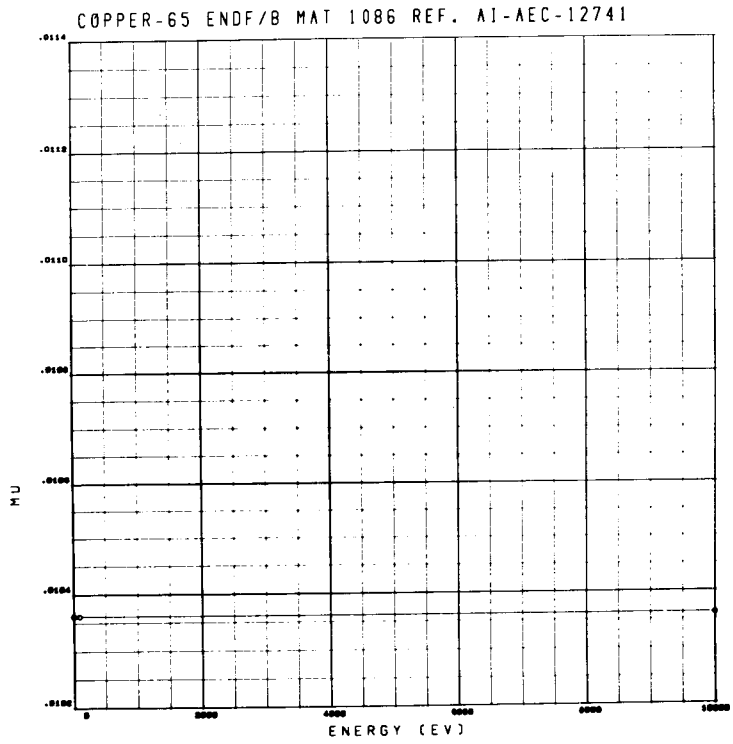
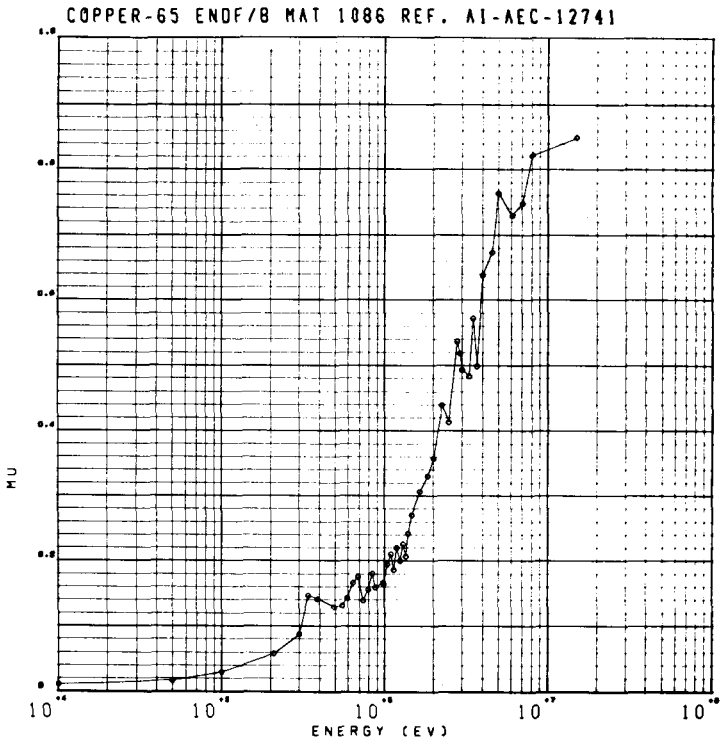


Figure 22

Figure 23





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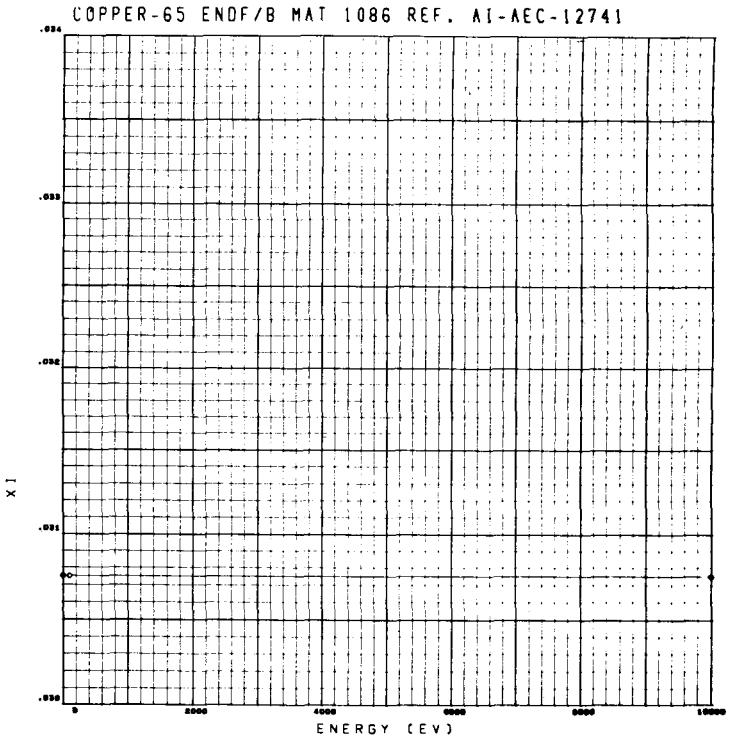

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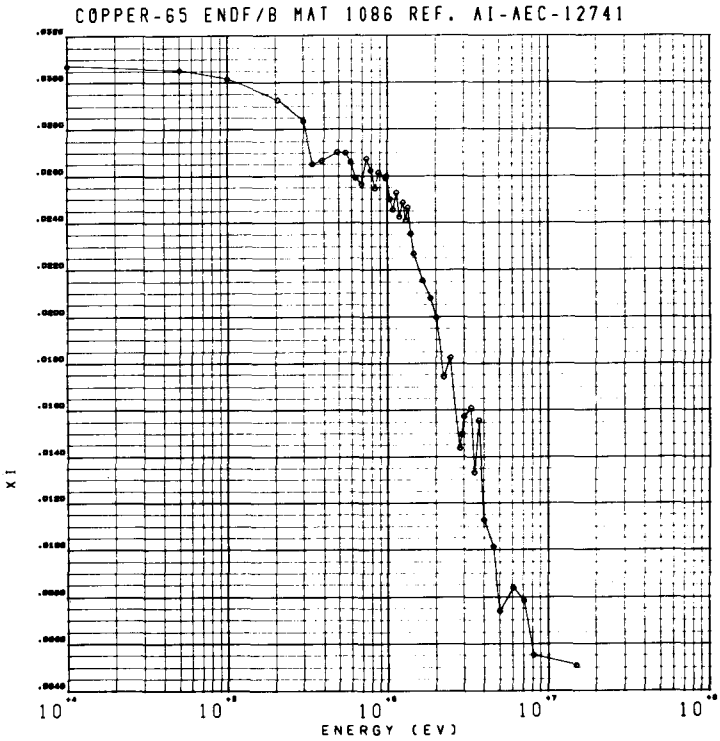

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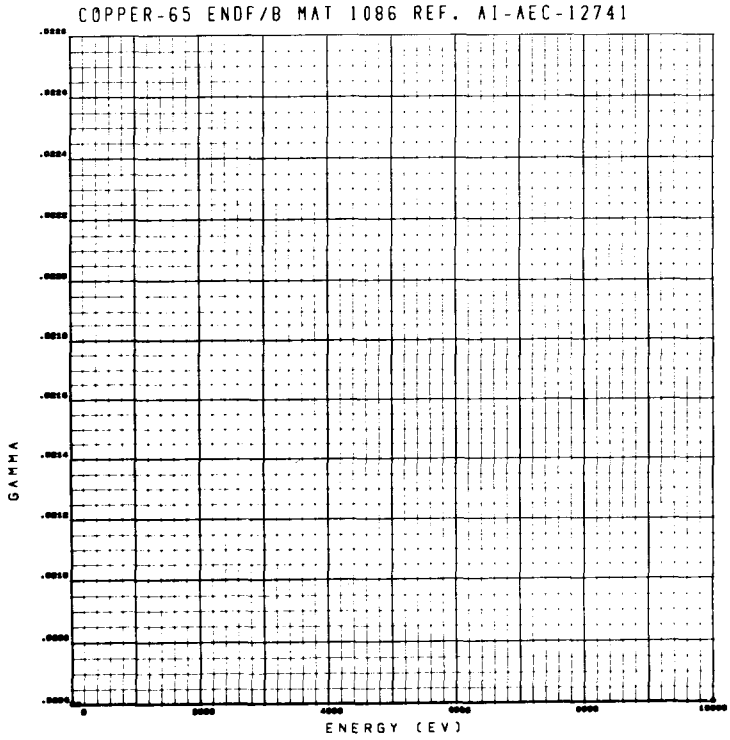

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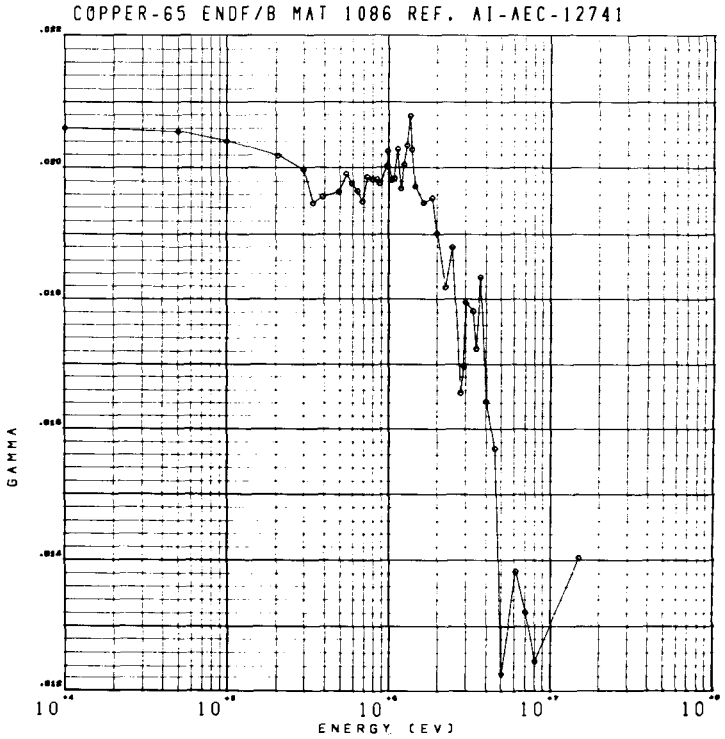

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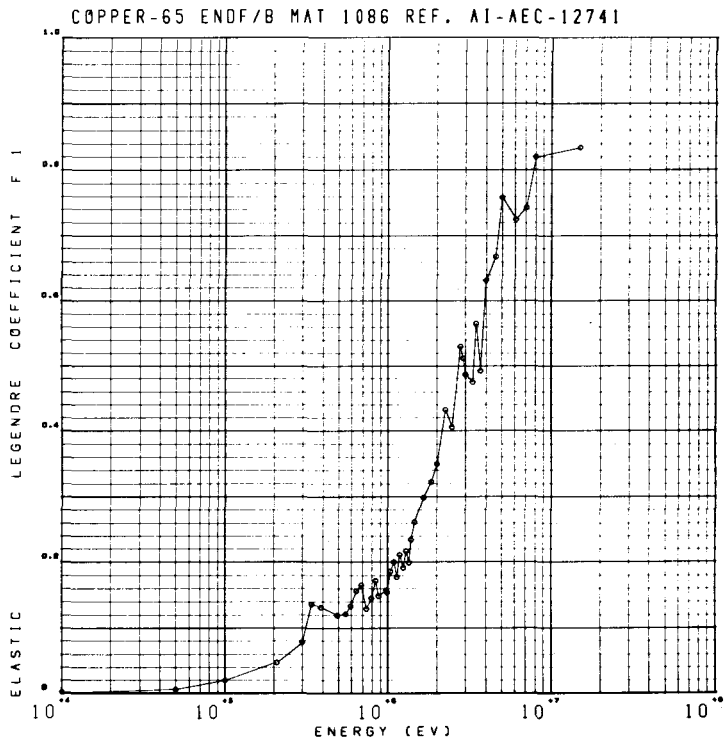

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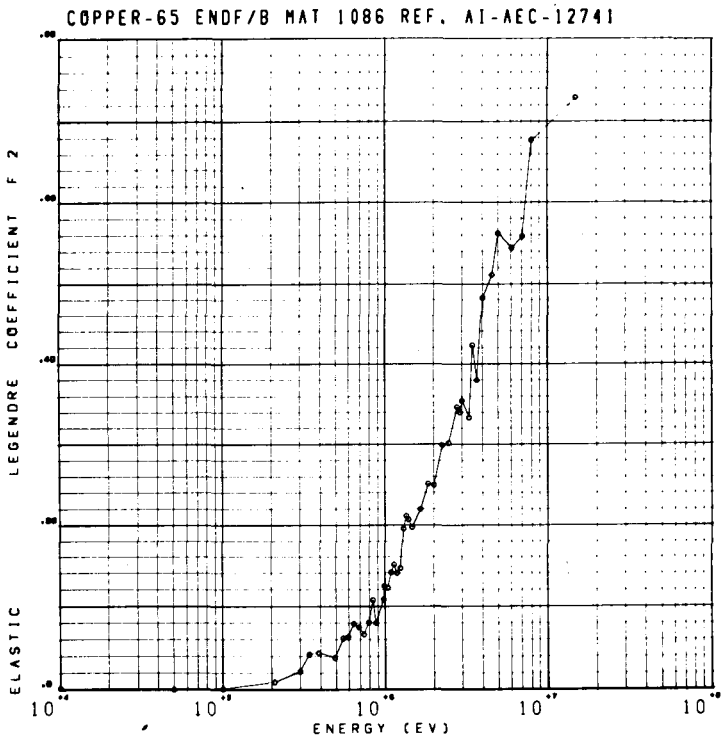

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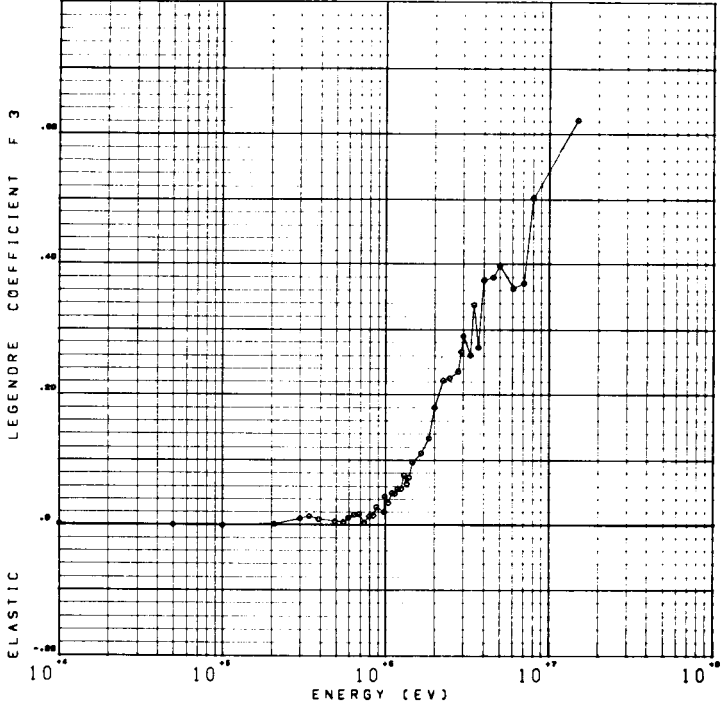

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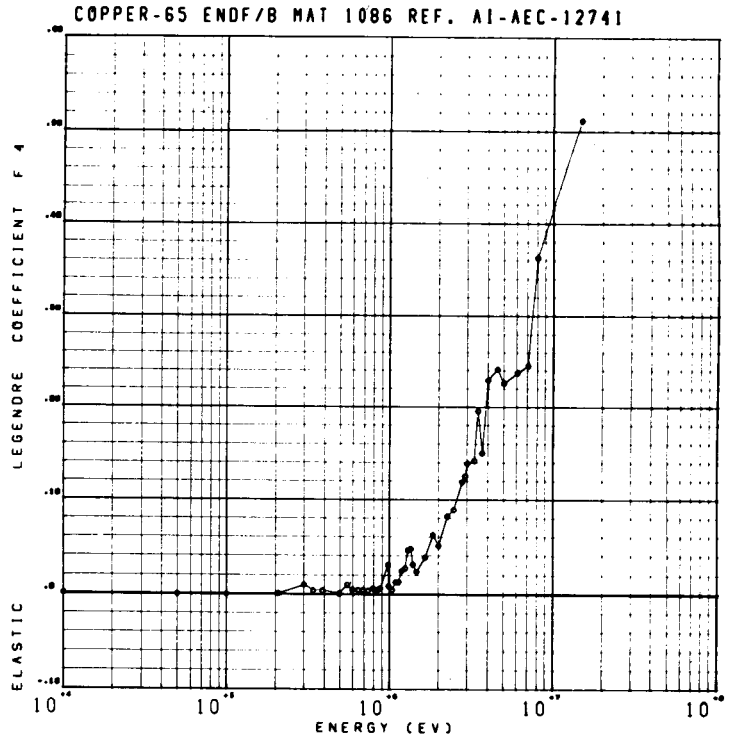

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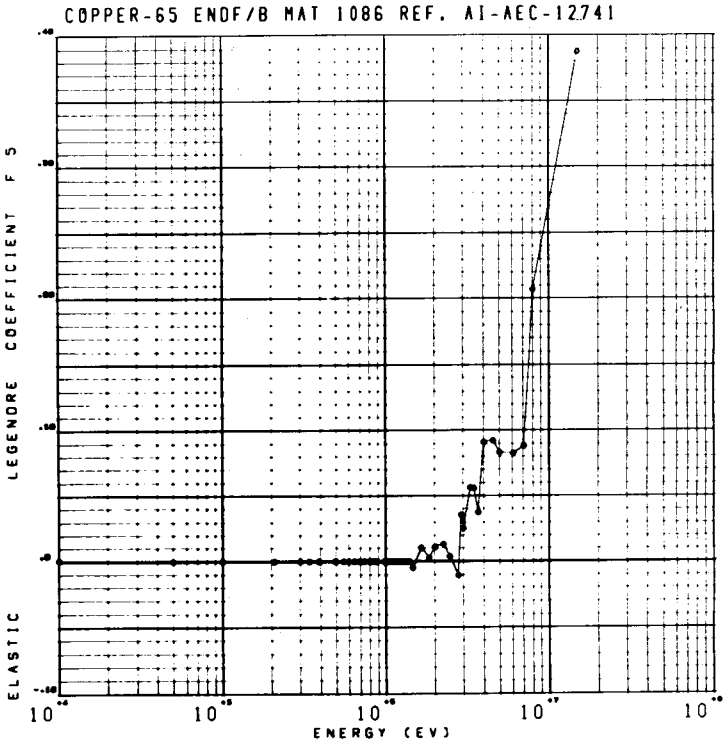

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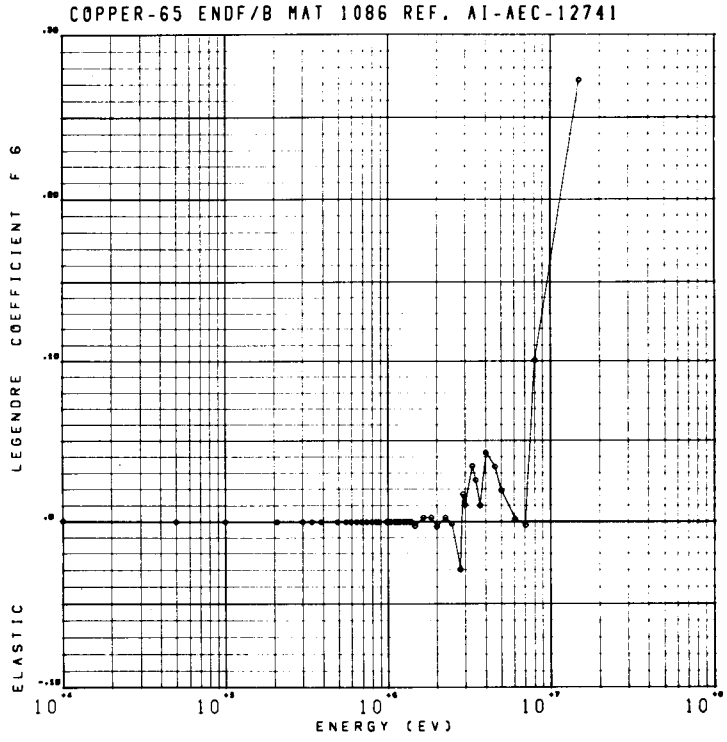

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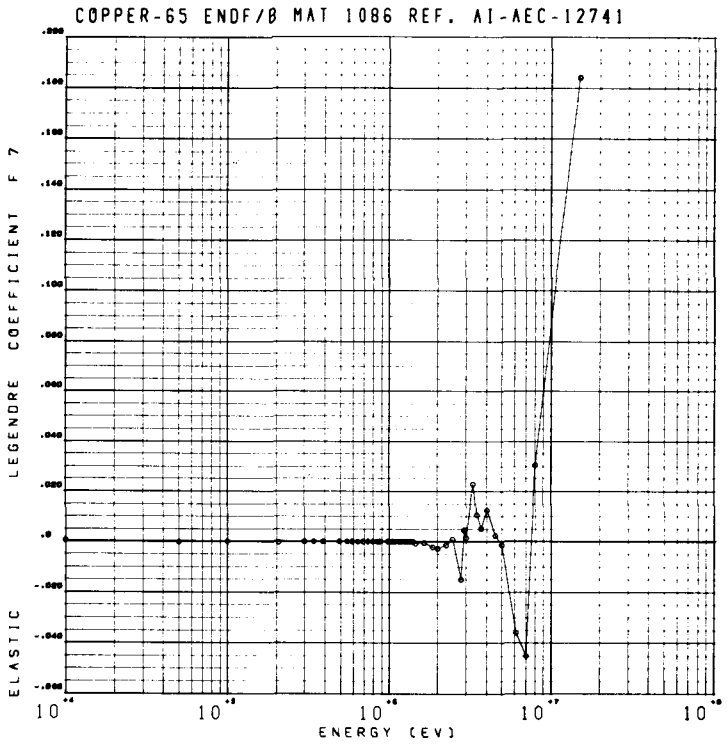
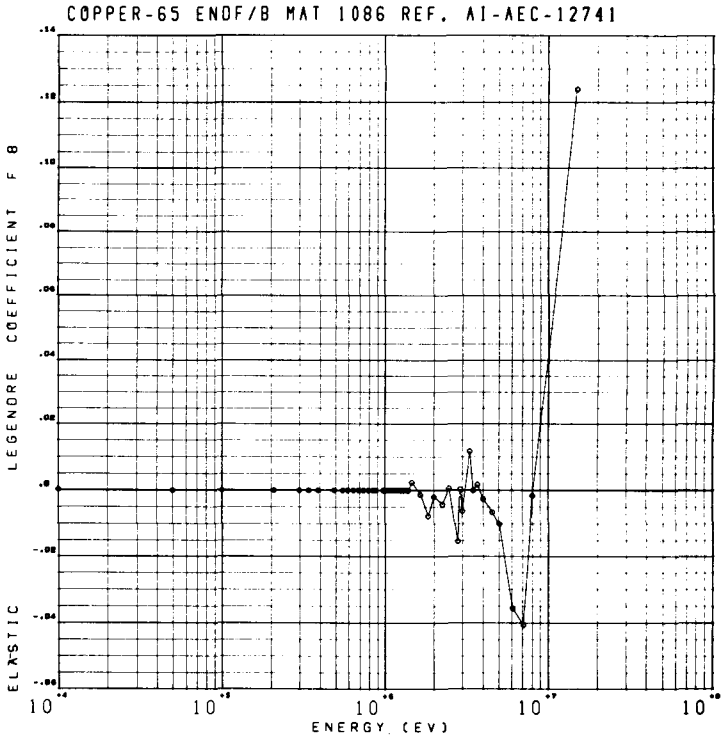
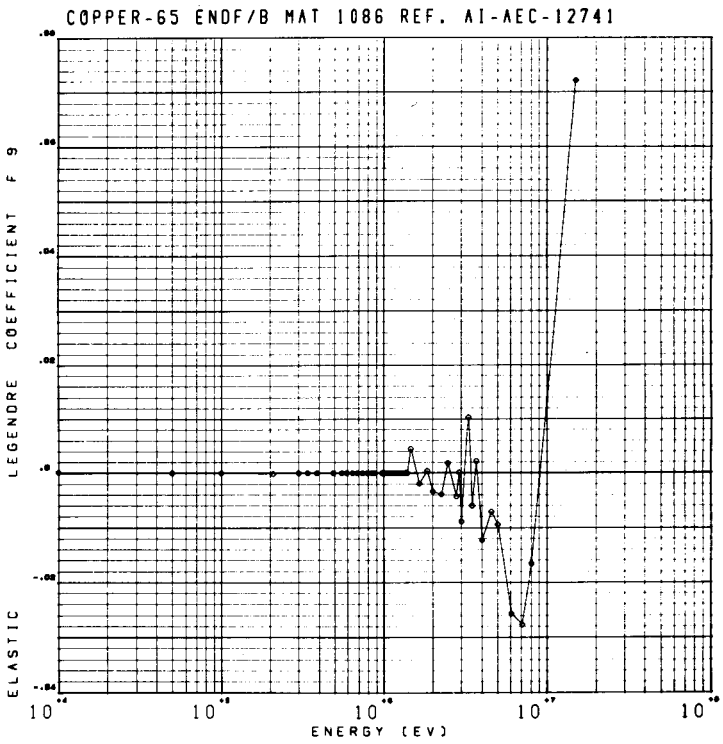


Figure 35

Figure 36





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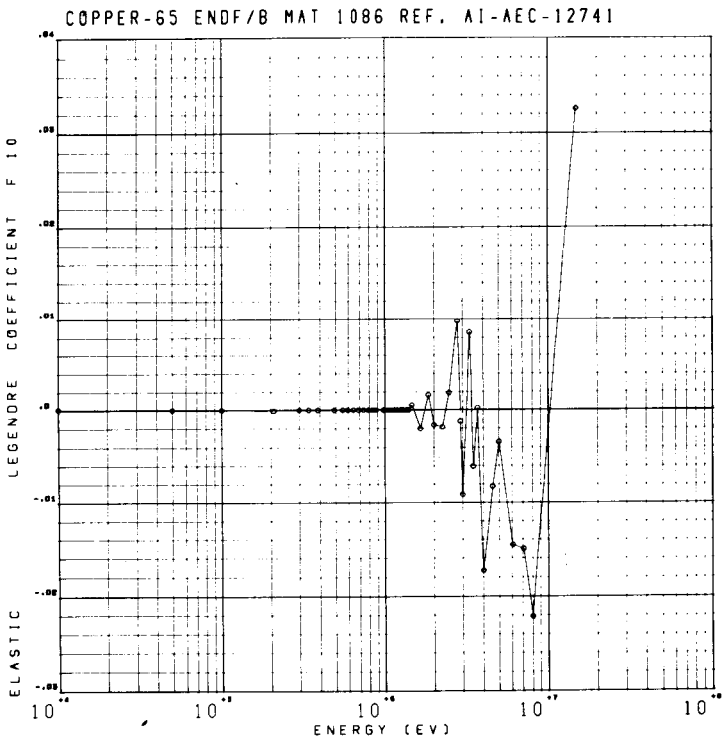

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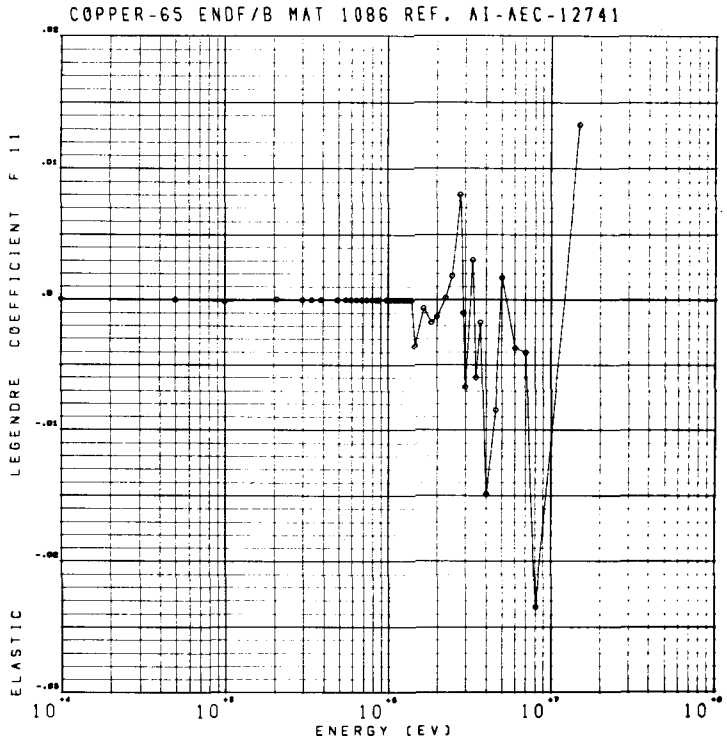

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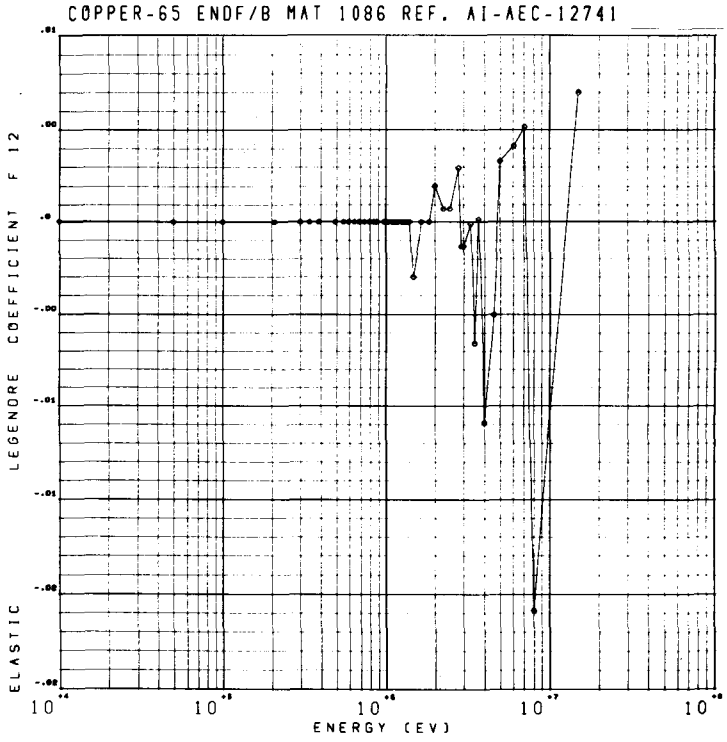


Figure 40

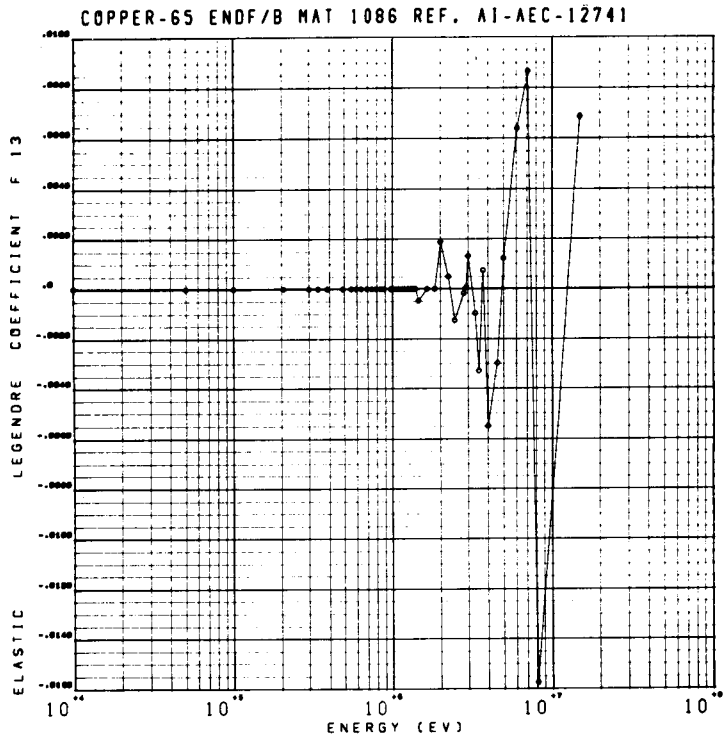


Figure 41

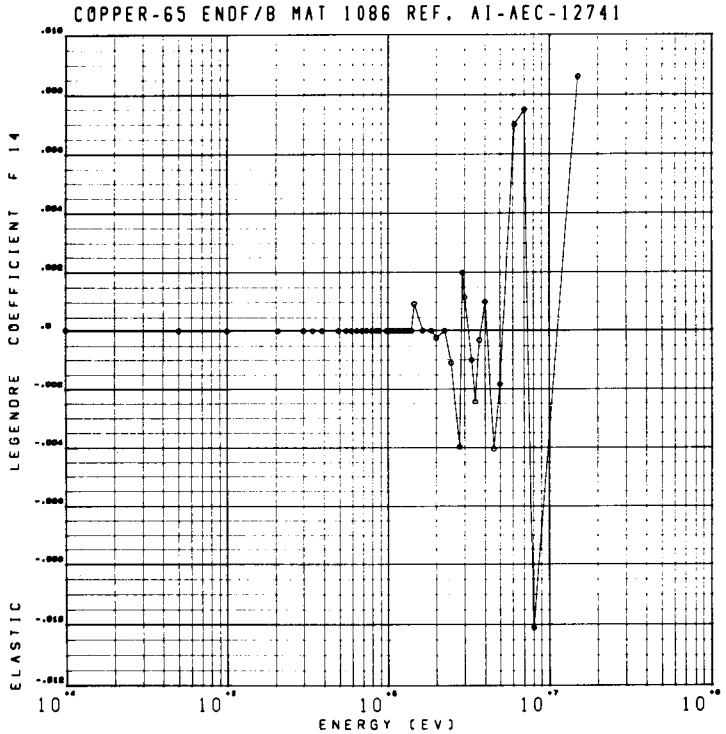


Figure 42

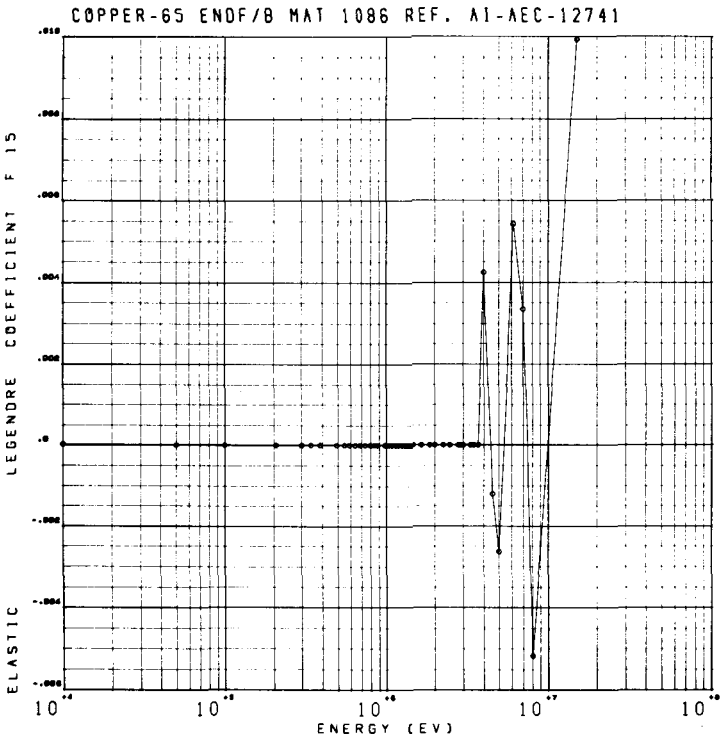


Figure 43

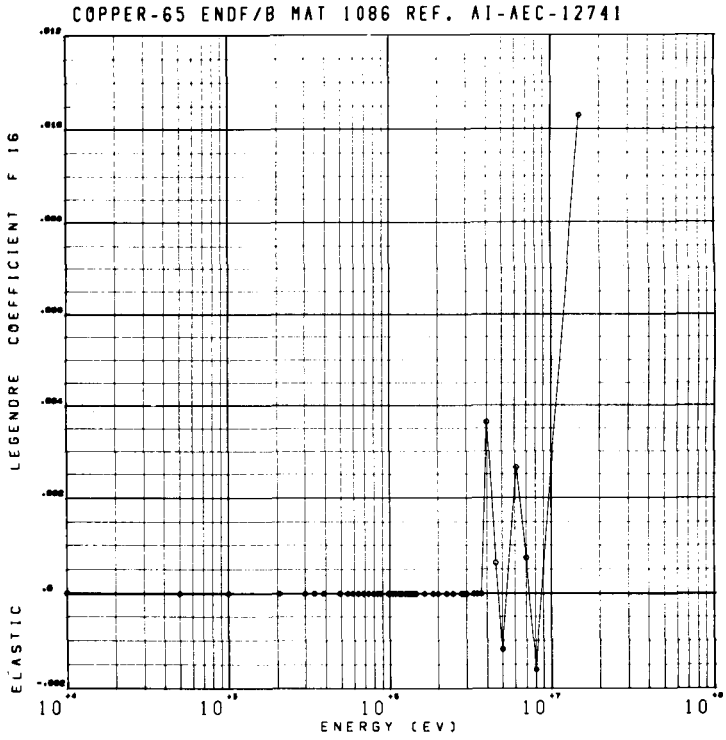


Figure 44

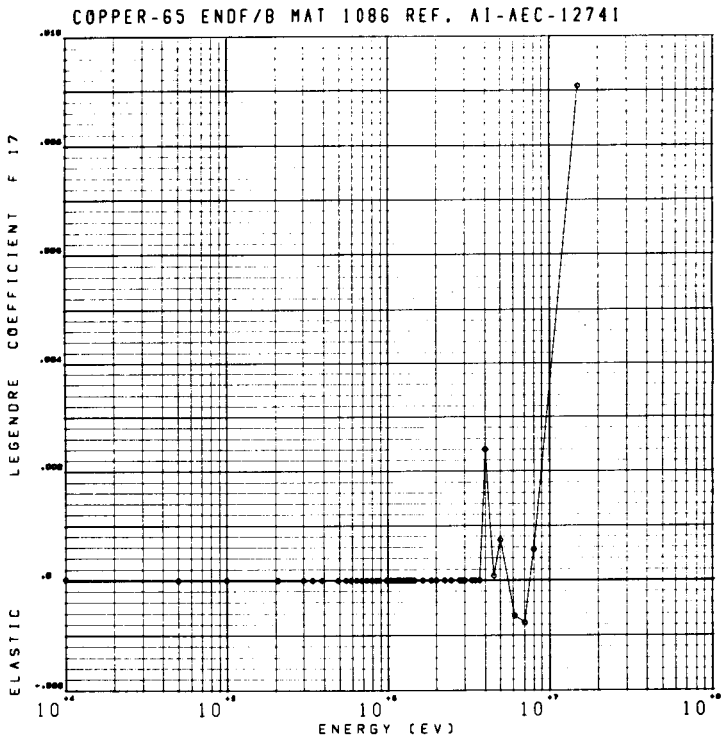


Figure 45

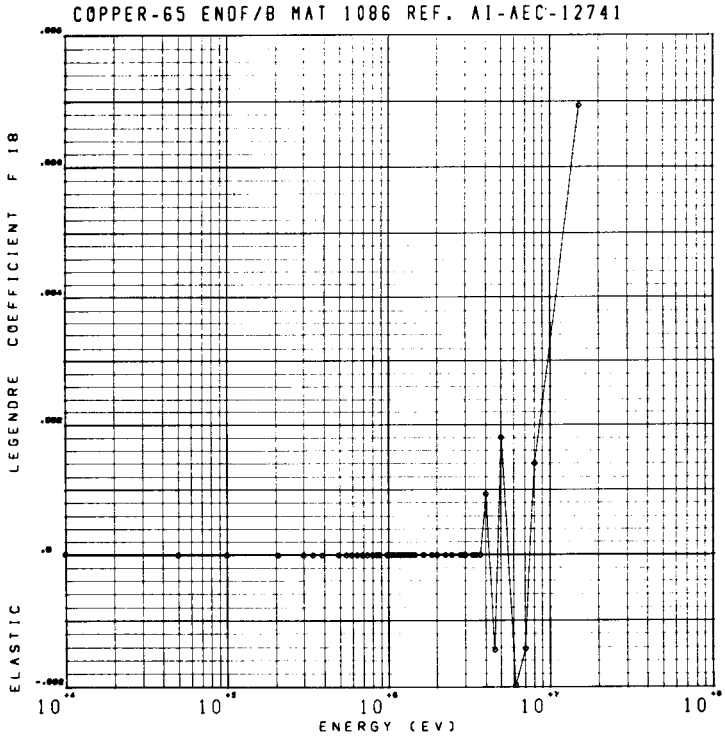


Figure 46

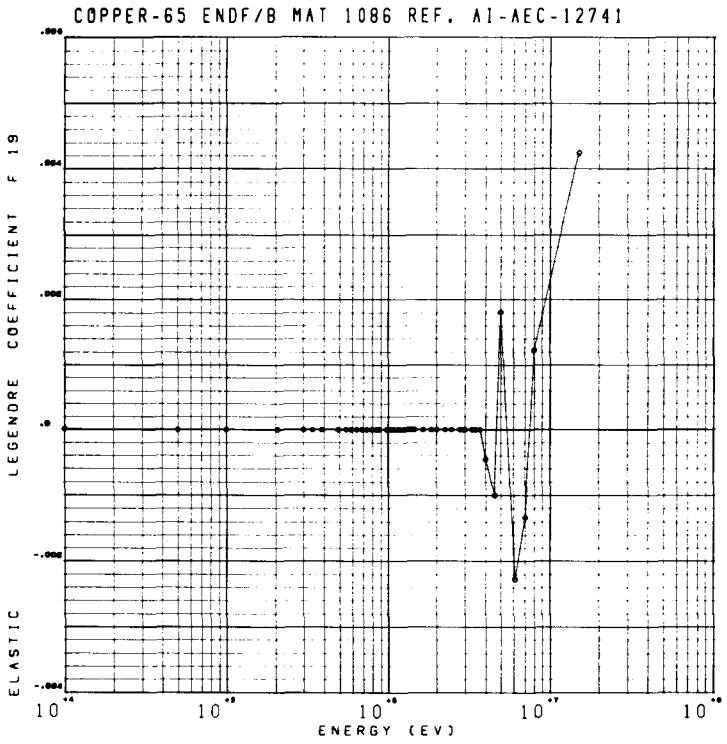


Figure 47

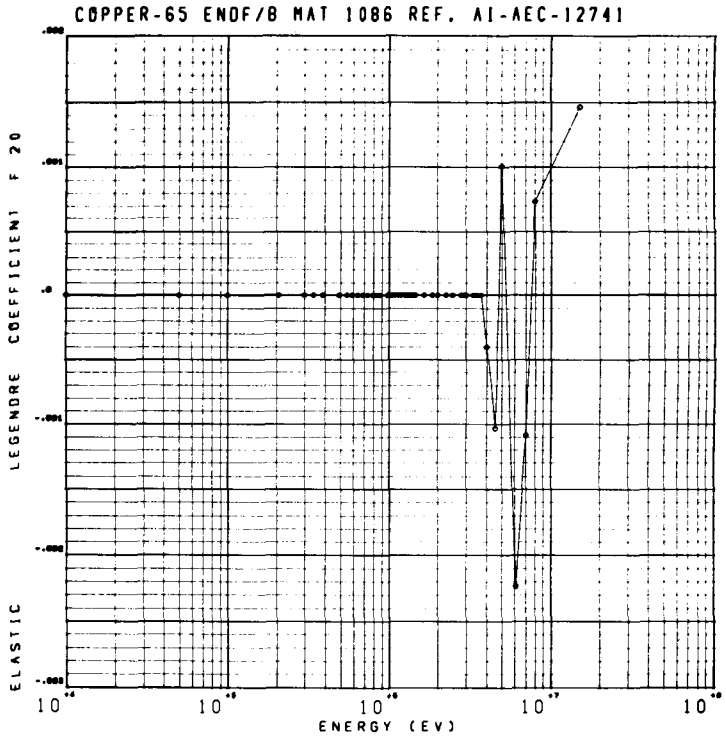


Figure 48

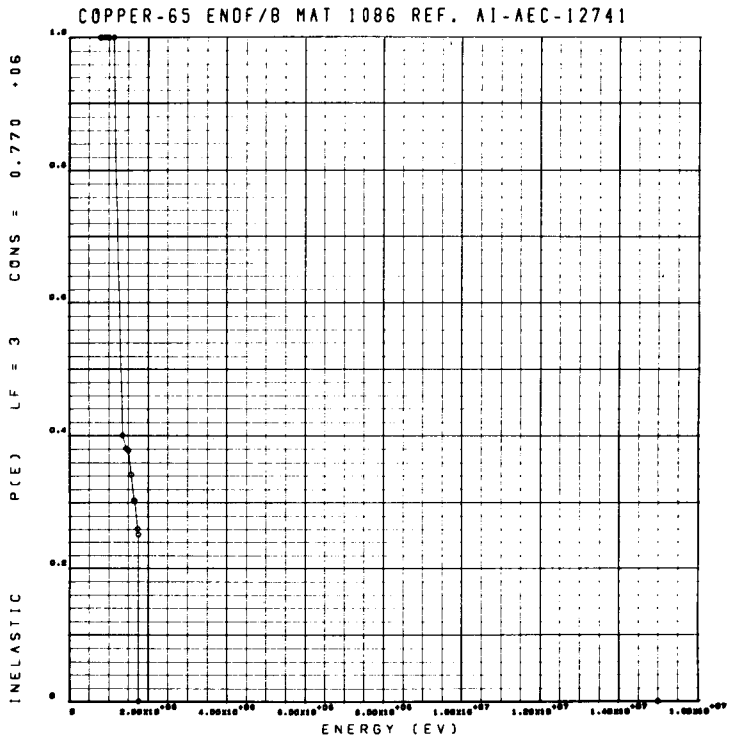


Figure 49

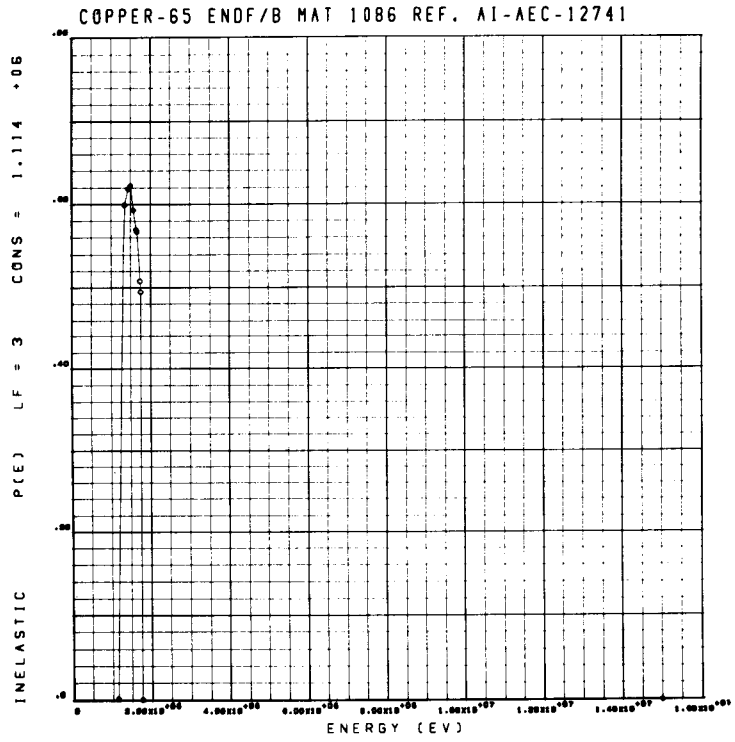


Figure 50

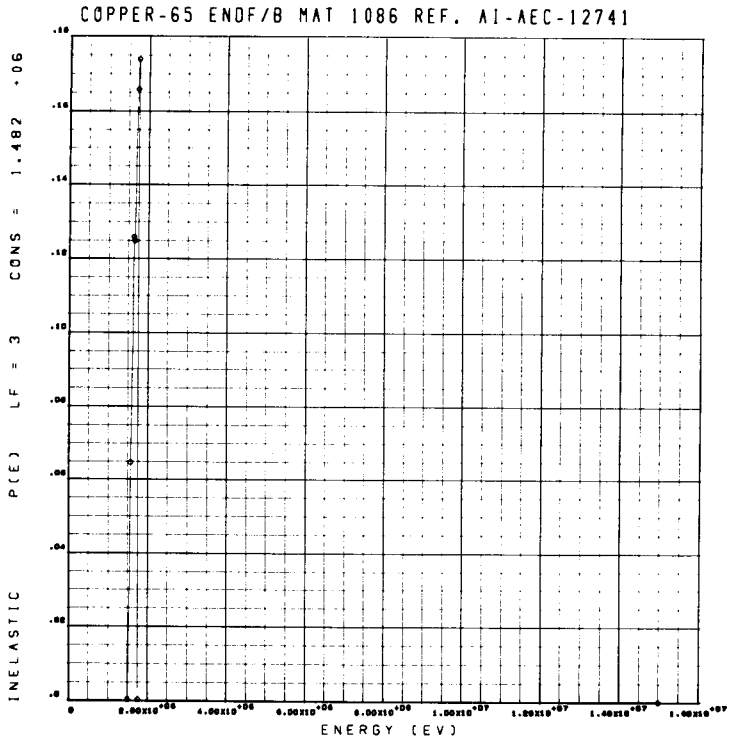


Figure 51

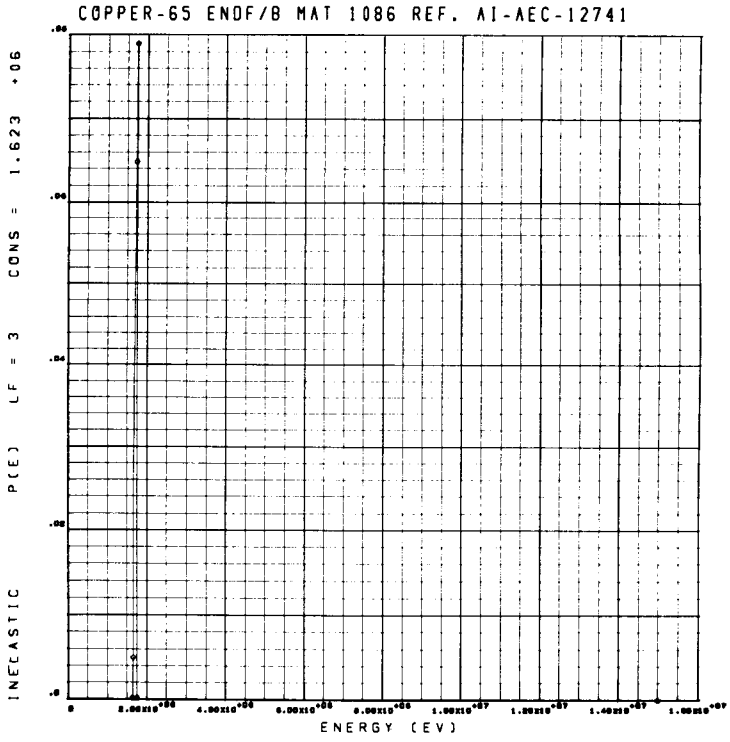


Figure 52

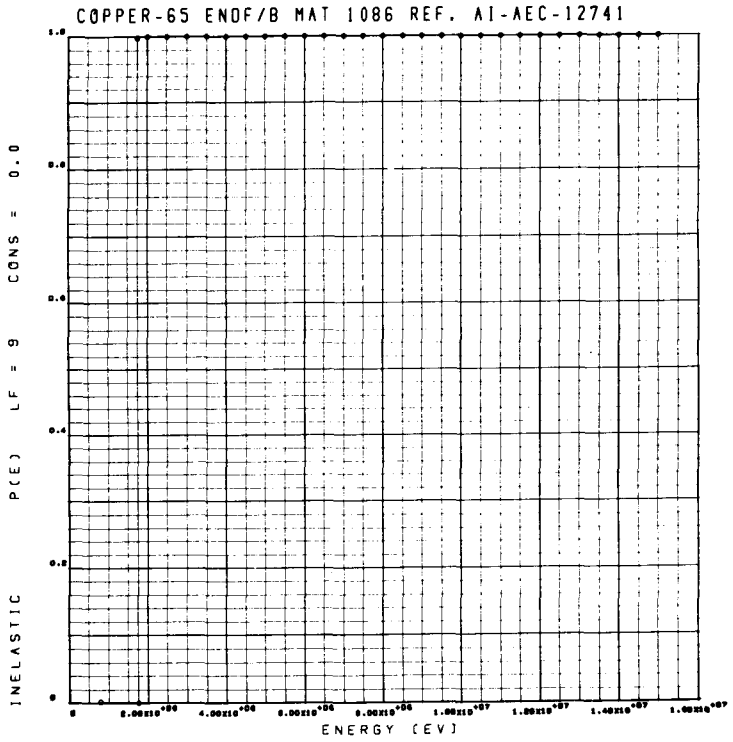


Figure 53

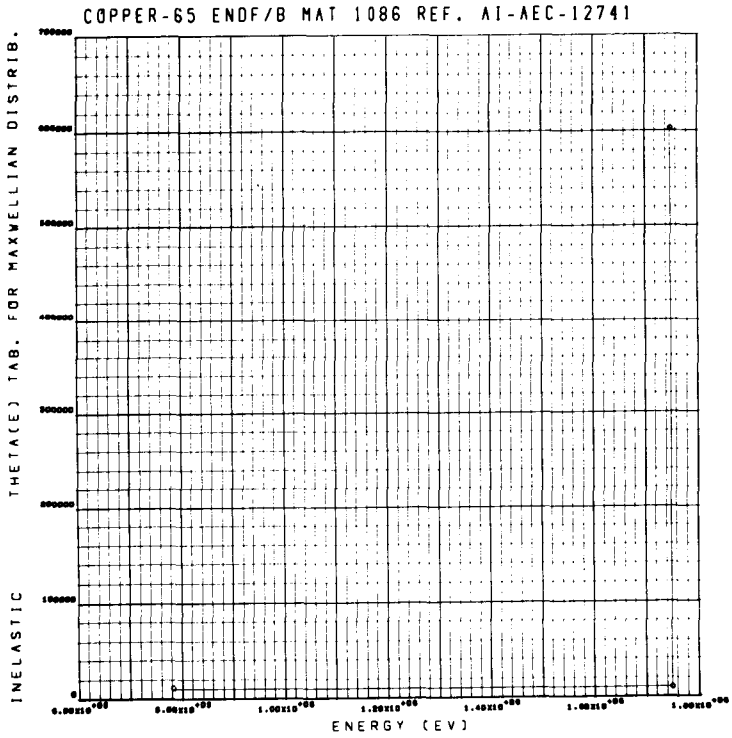


Figure 54

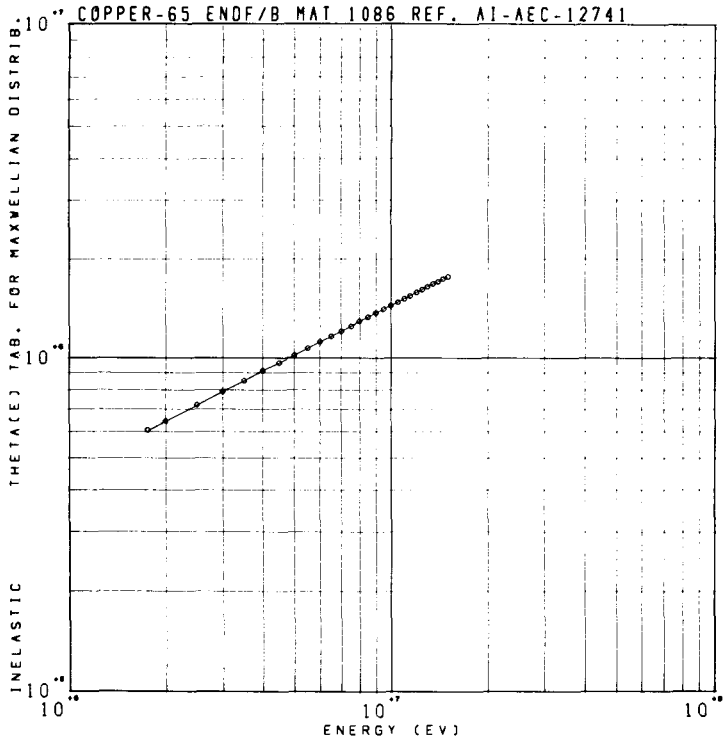
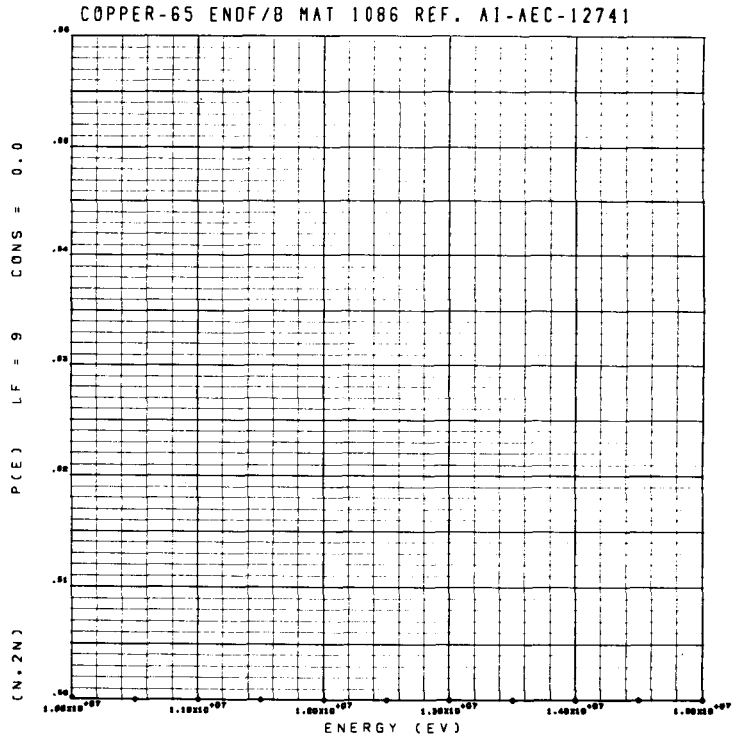


Figure 55

Figure 56



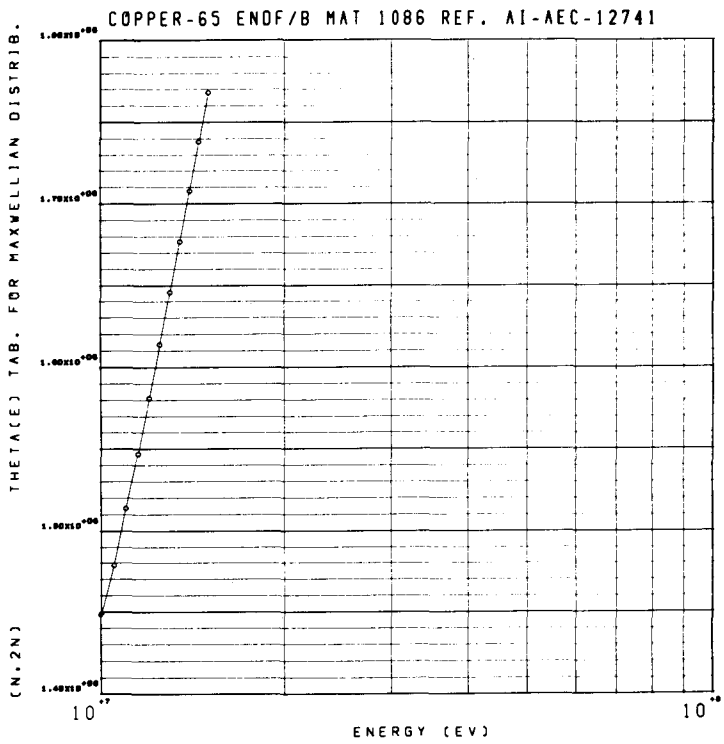


Figure 57

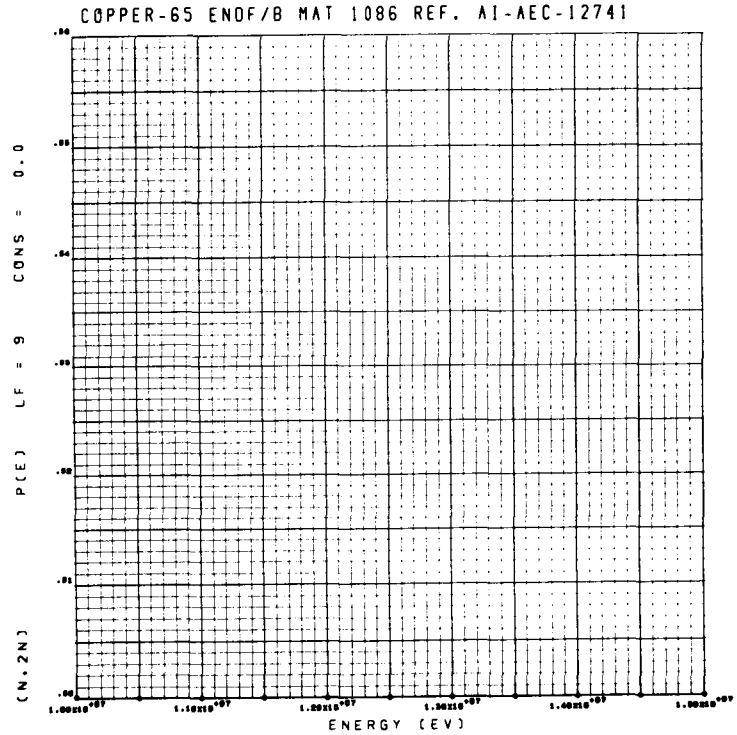


Figure 58

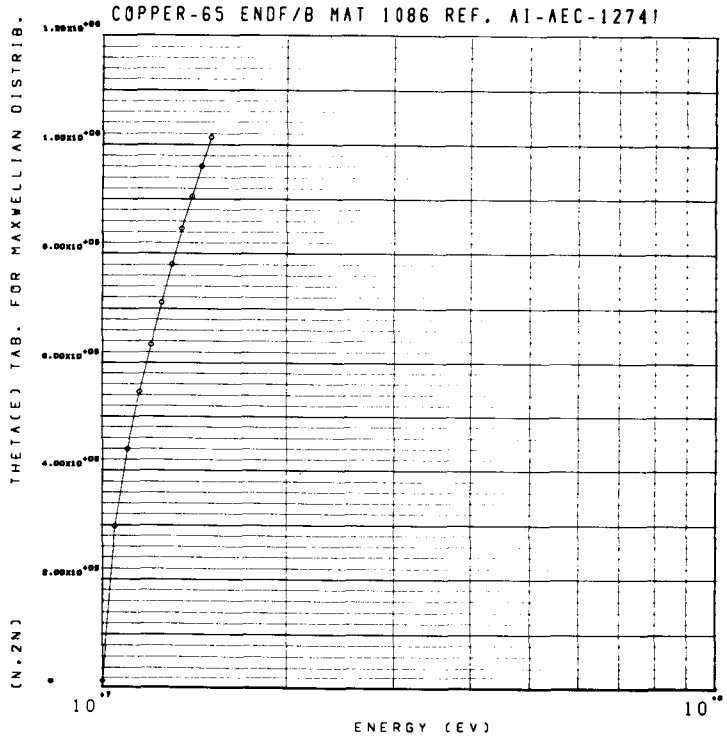

COPPER-65 ENDF/B MAT 1086 REF. AI-AEC-12741
THETA(E) TAB. FOR MAXWELLIAN DISTRIB.
(N,2N)
ENERGY (EV)

Figure 59

APPENDIX II
LISTING OF COPPER-65 ENDF/B DATA

A listing of the data plotted in Appendix I is presented, along with the data files for copper-63 and natural copper.

```
OPTION CARD FOLLOWS
$OPT L                                                              9            00000007

0.0         0.0                 0          0          0           0   1 0  0      0
2.9063 +C4 6.2389 +01           1          0          0          211085 1451      1
0.0         0.0                 1          0         72          01085 1451      2
COPPER-63 ENDF/B MAT 1085 REF. AI-AEC-12741      SEPT. 1968       1085 1451      3
MF=1                   GENERAL  INFORMATION                       1085 1451      4
     ATOMIC MASS GIVEN AS 62.9296 FOR A NEUTRON MASS OF 1.008665 1085 1451      5
  MT=453  RADIOACTIVE DECAY DATA FROM REF. 1                      1085 1451      6
MF=2                    RESONANCE PARAMETERS                      1085 1451      7
  MT=1511.ALL RESOLVED RESONANCES TREATED AS L=0 RESONANCES       1085 1451      8
        2.RESOLVED RESONANCE PARAMETERS FROM REF.2.               1085 1451      9
        3.G VALUES FOR 7.64KEV AND ABOVE 13.5KEV ASSIGNED.        1085 1451     10
        4.NEGATIVE ENERGY RESONANCE GAMMA-N AND E0 OBTAINED FROM  1085 1451     11
          FIT TO SIGS=5.6B, SIGA=4.5B AT 2200M/S. ASSUMED GAMMA-  1085 1451     12
          GAMMA=0.55EV.                                           1085 1451     13
        5.L=C  UNRESOLVED RESONANCE PARAMETERS FROM AVERAGED      1085 1451     14
          RESOLVED RESONANCE PARAMETERS. OBSERVED LEVEL SPACING   1085 1451     15
          =DC=1.1KEV, STRENGTH FUNCTION/J STATE=(S0 J)=2.55E-04,  1085 1451     16
          FOR EACH J STATE D=D0/G                                 1085 1451     17
        6.L=1,2  S1J=S2J=1.CE-04, DJ=D0/GJ, GAMMA-GAMMA=0.55EV    1085 1451     18
          ASSUMED.                                                1085 1451     19
        7.OPTIONS LRU=1, LRF=2 (MLBW REF. 10) ARE USED.           1085 1451     20
MF=3                  SMOOTH CROSS SECTIONS                       1085 1451     21
  MT=1    NO EXP. VALUES AVAILABLE FOR SEPERATE CU ISOTOPES. THE 1085 1451     22
          TOTAL WAS SET EQUAL TO SUM OF ITS PARTS,EXCEPT FOR 30   1085 1451     23
          TO 10C KEV WHERE IT WAS ASSUMED TO BE EQUAL TO A        1085 1451     24
          SMOOTHING OF NATURAL CCPPER GIVEN IN REF.2              1085 1451     25
  MT=2    BELOW RESONANCE REGION VALUES WERE CALCULATED FROM      1085 1451     26
          RESOLVED RESONANCE PARAMETERS USING UNICORN-REF. 3. IN 1085 1451     27
          THE RESOLVED RESONANCE RANGE THE SMOOTH DATA IS THE     1085 1451     28
          CONTRIBUTION FROM L .GT. 0 CALCULATED FROM UNRESOLVED   1085 1451     29
          RESONANCE PARAMETERS USING TRIX-REF.4.                  1085 1451     30
                           FROM 30 TO 100 KEV VALUES ARE THE      1085 1451     31
          DIFFERENCE BETWEEN THE TOTAL AND NON-ELASTIC CROSS      1085 1451     32
          SECTIONS. ABOVE 100 KEV, VALUES WERE                    1085 1451     33
          ASSUMED TO BE IDENTICAL TO NATURALLY CCCURING CU-REF.5.1085 1451     34
  MT=4-9  LEVEL DATA FROM REF.5, ABOVE 1.75MEV CONTINUUM WAS USED1085 1451     35
          WHICH WAS MATCHED TO LEVEL DATA AND WHEN WEIGHTED ALONG1085 1451     36
          WITH CU-65 GAVE CONTINUUM OF NATURAL CU FROM REF.5.     1085 1451     37
  MT=16   REF.5                                                   1085 1451     38
  MT=251  MUBAR CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING   1085 1451     39
          CHAD-REF.6.                                             1085 1451     40
  MT=252  XI CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING CHAD1085 1451     41
```

```
          -REF.6.                                                    1085 1451   42
  MT=253  GAMMA CALCULATED FROM LEGENDRE COEFF. IN FILE 4 JSING      1085 1451   43
          CHAD-REF.6.                                                1085 1451   44
  MT=102  BELOW RESONANCE REGION CALCULATED AS PER MT=2.  FOR        1085 1451   45
          RESOLVED RESONANCE RANGE,L.GT.0 CONTRIBUTION CALCULATED1085 1451   46
          FROM UNRESOLVED RESONANCE PARAMETERS USING TRIX-REF.4.     1085 1451   47
          THE 30 TO 100 KEV RANGE FROM EVALUATION OF REFERENCE       1085 1451   48
          DOCUMENT. ABOVE 100 KEV-REF.5.                             1085 1451   49
  MT=103  REF.5                                                      1085 1451   50
  MT=107  REF.5                                                      1085 1451   51
MF=4              SECONDARY ANGULAR DISTRIBUTIONS                    1085 1451   52
  MT=2    LEGENDRE COEFF. FOR ELASTIC SCATT. ARE GIVEN. DATA ARE     1085 1451   53
          AVAILABLE FOR NATURALLY OCCURING CU AND ARE ASSUMED TO     1085 1451   54
          BE THE SAME FOR THE SEPERATE ISOTOPES. DATA OBTAINED       1085 1451   55
          FROM REFERANCES 7,8,9. WHERE LEGENDRE COEFF. WERE NOT      1085 1451   56
          GIVEN THEY WERE OBTAINED FROM THE DATA POINTS BY USING     1085 1451   57
          CHAD-REF.6.                                                1085 1451   58
MF=5              SECONDARY ENERGY DISTRIBUTIONS                     1085 1451   59
  MT=4    REF. 5                                                     1085 1451   60
  MT=16    REF. 5                                                    1085 1451   61
                          REFERENCES                                 1085 1451   62
     1. GOLDMAN,DAVID T.,CHART OF THE NUCLIDES,KAPL(1966)            1085 1451   63
     2. GOLDBERG,M.D.,ET. AL., BNL 325 2ND. ED. SUPPL. NO.2 VOL.     1085 1451   64
        IIA (1966)                                                   1085 1451   65
     3.  OTTER,J., NAA-SR-11980 VOL.6(1966)                          1085 1451   66
     4. OTTER,J.,NAA-SR-MEMO-11538 (1965)                            1085 1451   67
     5. OFFORD,SUSAN M.,PARKER,K.,AWRE O-63/67 (1967)                1085 1451   68
     6. BERLAND,R.F.,NAA-SR-11231 (1965)                             1085 1451   69
     7. GOLDBERG,M.D.,ET. AL., BNL 400 2ND ED. VOL. II (1962)        1085 1451   70
     8. HOLMQVIST,B.,WIEDLING,T., NUCLEAR DATA FOR REACTORS, VOL.1085 1451   71
        I, IAEA,VIENNA (1967)                                        1085 1451   72
     9. SMITH,A.B.,ET. AL., PHY. REV. 135, B76 (1964)                1085 1451   73
    10. OTTER,J.M., NSE 28, 149 (1967)                               1085 1451   74
0.0         0.0                  1          451          93          01085 1451   75
0.0         0.0                  1          453           6          01085 1451   76
0.0         0.0                  2          151          33          01085 1451   77
0.0         0.0                  3            1          68          01085 1451   78
0.0         0.0                  3            2          58          01085 1451   79
0.0         0.0                  3            4          18          01085 1451   80
0.0         0.0                  3            5           9          01085 1451   81
0.0         0.0                  3            6           8          01085 1451   82
0.0         0.0                  3            7           7          01085 1451   83
```

0.0		0.0			3		8		6	01085	1451	84
0.0		0.0			3		9		6	01085	1451	85
0.0		0.0			3		16		6	01085	1451	86
0.0		0.0			3		102		58	01085	1451	87
0.0		0.0			3		103		15	01085	1451	88
0.0		0.0			3		107		10	01085	1451	89
0.0		0.0			3		251		19	01085	1451	90
0.0		0.0			3		252		19	01085	1451	91
0.0		0.0			3		253		19	01085	1451	92
0.0		0.0			4		2		303	01085	1451	93
0.0		0.0			5		4		56	01085	1451	94
0.0		0.0			5		16		21	01085	1451	95
0.0		0.0			0		0		0	01085	1 0	96
2.9063	+04	6.2389	+01		0		0		0	01085	1453	97
0.0		0.0			0		0		24	41085	1453	98
16.0		2.9062	+04	1.162	-03	2.8062	+04			1085	1453	99
102.0		2.9064	+04	1.488	-05	2.8064	+04			1085	1453	100
103.0		2.8063	+04	2.380	-10	2.9063	+04			1085	1453	101
105.0		2.7060	+04	1.095	-03	2.8060	+04			1085	1453	102
0.0		0.0			0		0		0	01085	1 0	103
0.0		0.0			0		0		0	01085	0 0	104
2.9063	+04	6.2389	+01		0		0		1	01085	2151	105
2.9063	+04	1.0			0		0		1	01085	2151	106
1.0	+01	3.0	+04		1		2		0	01085	2151	107
1.5		0.7302			0		0		1	01085	2151	108
1.078	-03	0.0			0		0		168	281085	2151	109
-3.069	+02	2.0		5.103	+00	4.553	+00	0.55	+00	1085	2151	110
5.777	+02	2.0		1.410	+00	0.860	+0	0.55	+00	1085	2151	111
2.060	+03	1.0		4.405	+01	4.35	+01	0.55	+00	1085	2151	112
2.660	+03	2.0		5.05	+00	4.5	+00	0.55	+00	1085	2151	113
4.860	+03	1.0		1.455	+01	1.4	+01	0.55	+00	1085	2151	114
5.390	+03	2.0		4.055	+01	4.0	+01	0.55	+00	1085	2151	115
5.820	+03	2.0		1.095	+01	1.04	+01	0.55	+00	1085	2151	116
7.640	+03	2.0		0.735	+01	0.68	+01	0.55	+00	1085	2151	117
7.94	+03	2.0		8.055	+01	8.0	+01	0.55	+00	1085	2151	118
9.20	+03	2.0		3.715	+01	3.66	+01	0.55	+00	1085	2151	119
9.93	+03	1.0		8.755	+01	8.7	+01	0.55	+00	1085	2151	120
1.085	+04	2.0		5.855	+01	5.8	+01	0.55	+00	1085	2151	121
1.254	+04	1.0		2.355	+01	2.3	+01	0.55	+00	1085	2151	122
1.317	+04	2.0		6.655	+01	6.6	+01	0.55	+00	1085	2151	123
1.370	+04	2.0		3.999	+01	3.944	+01	0.55	+00	1085	2151	124
1.490	+04	2.0		2.831	+01	2.776	+01	0.55	+00	1085	2151	125

```
1.560   +04 2.0          1.823  +01 1.768  +01 0.55   +00              1085 2151   126
1.610   +04 2.0          1.159  +01 1.104  +01 0.55   +00              1085 2151   127
1.788   +04 1.0          1.3355 +02 1.33   +02 0.55   +00              1085 2151   128
1.812   +04 1.0          13.355 +01 13.30  +01 0.55   +00              1085 2151   129
2.104   +04 1.0          2.0055 +02 2.00   +02 0.55   +00              1085 2151   130
2.125   +04 2.0          1.2055 +02 1.20   +02 0.55   +00              1085 2151   131
2.282   +04 2.0          1.1255 +02 1.12   +02 0.55   +00              1085 2151   132
2.480   +04 2.0          0.6095 +02 0.604  +02 0.55   +00              1085 2151   133
2.560   +04 2.0          1.6615 +02 1.656  +02 0.55   +00              1085 2151   134
2.650   +04 2.0          9.735  +01 9.68   +01 0.55   +00              1085 2151   135
2.82    +04 1.0          6.921  +01 6.866  +01 0.55   +00              1085 2151   136
2.93    +04 1.0          32.285 +01 32.23  +01 0.55   +00              1085 2151   137
0.0          0.0                 0          0          0             01085 2   0   138
0.0          0.0                 0          0          0             01085 0   0   139
2.9063  +04 6.2389 +01           0          0          0             01085 3   1   140
0.0          0.0                 0          0          1           1951085 3   1   141
        195             5        0          0          0             01085 3   1   142
1.0000E-03 2.8204E 01 2.5300E-02 1.0076E 01 5.1265E-01 6.5704E 001085 3   1   143
1.0000E 00 6.2816E 00 5.5000E 00 5.8299E 00 1.0000E 01 5.7130E 001085 3   1   144
1.0000E 01 4.0000E-03 5.0000E 01 9.0000E-03 1.0000E 02 1.3000E-021085 3   1   145
5.0000E 02 2.9000E-02 1.0000E 03 3.8000E-02 5.0000E 03 8.2000E-021085 3   1   146
1.0000E 04 1.3600E-01 2.0000E 04 1.9800E-01 3.0000E 04 2.2800E-011085 3   1   147
3.0000E 04 1.0700E 01 3.0400E 04 7.1999E 00 3.0550E 04 1.0400E 011085 3   1   148
3.0600E 04 8.2000E 00 3.0800E 04 6.8000E 00 3.1000E 04 7.0000E 001085 3   1   149
3.1300E 04 4.6000E 00 3.1400E 04 1.5800E 01 3.1600E 04 6.7000E 001085 3   1   150
3.1900E 04 5.9000E 00 3.2100E 04 4.8000E 00 3.2300E 04 7.0000E 001085 3   1   151
3.2650E 04 4.4000E 00 3.3000E 04 4.5000E 00 3.3400E 04 2.5200E 011085 3   1   152
3.4000E 04 7.2000E 00 3.4300E 04 1.0500E 01 3.4700E 04 7.0000E 001085 3   1   153
3.5000E 04 1.9999E 01 3.5400E 04 8.0000E 00 3.6000E 04 5.1000E 001085 3   1   154
3.6200E 04 2.4000E 01 3.6700E 04 4.6000E 00 3.6900E 04 2.0500E 011085 3   1   155
3.7100E 04 9.2000E 00 3.7800E 04 6.1000E 00 3.8100E 04 8.2000E 001085 3   1   156
3.8200E 04 6.1000E 00 3.9300E 04 4.6000E 00 3.9700E 04 1.3000E 011085 3   1   157
4.0100E 04 6.0000E 00 4.0300E 04 7.0000E 00 4.0500E 04 5.4000E 001085 3   1   158
4.0600E 04 6.2000E 00 4.0900E 04 4.7000E 00 4.1100E 04 6.8000E 001085 3   1   159
4.1300E 04 4.5000E 00 4.1500E 04 3.9999E 00 4.1800E 04 2.7000E 001085 3   1   160
4.2000E 04 2.2000E 01 4.2300E 04 1.2000E 01 4.2600E 04 2.0500E 011085 3   1   161
4.2900E 04 1.1700E 01 4.3200E 04 1.3400E 01 4.3500E 04 8.4000E 001085 3   1   162
4.3800E 04 1.0000E 01 4.4000E 04 6.8000E 00 4.4300E 04 8.0000E 001085 3   1   163
4.4600E 04 5.6000E 00 4.4800E 04 1.2000E 01 4.5000E 04 6.8000E 001085 3   1   164
4.7300E 04 4.5000E 00 4.7900E 04 7.0000E 00 4.9000E 04 4.2000E 001085 3   1   165
4.9800E 04 3.8000E 00 5.0000E 04 2.3000E 00 5.0400E 04 9.0000E 001085 3   1   166
5.1000E 04 4.2000E 00 5.2400E 04 3.0000E 00 5.2700E 04 2.6000E 001085 3   1   167
```

```
5.3000E 04 2.8000E 00 5.3800E 04 1.6500E 01 5.4600E 04 3.8000E 001085 3  1  168
5.5000E 04 2.0000E 01 5.6000E 04 9.8000E 00 5.6500E 04 1.8600E 011085 3  1  169
5.6600E 04 1.2000E 01 5.8200E 04 7.0000E 00 5.8600E 04 1.2000E 011085 3  1  170
5.9000E 04 6.8000E 00 5.9600E 04 7.7000E 00 5.9800E 04 6.6000E 001085 3  1  171
6.0600E 04 6.5000E 00 6.1200E 04 5.0000E 00 6.1800E 04 4.3000E 001085 3  1  172
6.2200E 04 7.8000E 00 6.3000E 04 3.5000E 00 6.3300E 04 6.6000E 001085 3  1  173
6.4200E 04 3.0000E 00 6.4700E 04 5.0000E 00 6.5400E 04 1.3100E 011085 3  1  174
6.6000E 04 5.0000E 00 6.6500E 04 1.1500E 01 6.6800E 04 8.2000E 001085 3  1  175
6.7200E 04 1.2000E 01 6.7900E 04 6.2000E 00 6.8200E 04 7.2000E 001085 3  1  176
6.9200E 04 3.8000E 00 6.9800E 04 8.1000E 00 7.1000E 04 3.8000E 001085 3  1  177
7.1500E 04 4.3000E 00 7.1700E 04 2.9000E 00 7.2200E 04 3.6000E 001085 3  1  178
7.2500E 04 2.7000E 00 7.3000E 04 1.4500E 01 7.3300E 04 1.1000E 011085 3  1  179
7.4000E 04 1.5000E 01 7.4400E 04 1.0500E 01 7.5000E 04 1.5000E 011085 3  1  180
7.5800E 04 7.8000E 00 7.6100E 04 9.7000E 00 7.7600E 04 5.7000E 001085 3  1  181
7.8000E 04 5.9999E 00 7.8500E 04 5.0000E 00 7.9200E 04 7.3000E 001085 3  1  182
8.0600E 04 3.7000E 00 8.2000E 04 1.3300E 01 8.3800E 04 7.7000E 001085 3  1  183
8.4200E 04 8.8000E 00 8.5600E 04 5.3000E 00 8.6300E 04 8.2000E 001085 3  1  184
8.7300E 04 5.6000E 00 8.7600E 04 6.0000E 00 8.8400E 04 5.3000E 001085 3  1  185
8.9000E 04 3.6000E 00 9.0000E 04 1.0500E 01 9.0800E 04 4.6000E 001085 3  1  186
9.1500E 04 8.1000E 00 9.2000E 04 6.7000E 00 9.2500E 04 8.0000E 001085 3  1  187
9.3000E 04 5.9000E 00 9.4000E 04 5.2000E 00 9.5000E 04 6.0000E 001085 3  1  188
9.5600E 04 5.1000E 00 9.6200E 04 7.6000E 00 9.7700E 04 4.7000E 001085 3  1  189
9.8400E 04 6.0000E 00 9.9000E 04 4.8000E 00 9.9500E 04 6.0000E 001085 3  1  190
9.9900E 04 4.7000E 00 1.0000E 05 4.7000E 00 1.0000E 05 4.5177E 001085 3  1  191
2.0000E 05 4.8086E 00 3.0000E 05 4.9040E 00 4.0000E 05 4.6532E 001085 3  1  192
5.0000E 05 4.3532E 00 6.0000E 05 4.1030E 00 6.7900E 05 3.9167E 001085 3  1  193
7.0000E 05 3.9164E 00 7.8200E 05 3.7972E 00 8.0000E 05 3.7946E 001085 3  1  194
9.0000E 05 3.6477E 00 9.7600E 05 3.5160E 00 1.0000E 06 3.5766E 001085 3  1  195
1.1310E 06 3.5206E 00 1.3480E 06 3.3706E 00 1.4350E 06 3.3008E 001085 3  1  196
1.5000E 06 3.3150E 00 1.5720E 06 3.2523E 00 1.6480E 06 3.2353E 001085 3  1  197
1.6500E 06 3.2355E 00 1.7300E 06 3.2380E 00 1.7500E 06 3.2257E 001085 3  1  198
2.0000E 06 3.1594E 00 2.5000E 06 3.2561E 00 3.0000E 06 3.4754E 001085 3  1  199
3.5000E 06 3.6344E 00 4.0000E 06 3.7919E 00 4.5000E 06 3.9178E 001085 3  1  200
5.0000E 06 4.0008E 00 5.5000E 06 4.0420E 00 6.0000E 06 4.0553E 001085 3  1  201
6.5000E 06 4.0436E 00 7.0000E 06 4.0141E 00 7.5000E 06 3.9473E 001085 3  1  202
8.0000E 06 3.8969E 00 8.5000E 06 3.8209E 00 9.0000E 06 3.7425E 001085 3  1  203
9.5000E 06 3.6589E 00 1.0000E 07 3.5841E 00 1.0500E 07 3.5322E 001085 3  1  204
1.1000E 07 3.4057E 00 1.1500E 07 3.3341E 00 1.2000E 07 3.1973E 001085 3  1  205
1.2500E 07 3.1236E 00 1.3000E 07 3.0576E 00 1.3500E 07 2.9654E 001085 3  1  206
1.4000E 07 2.9027E 00 1.4500E 07 2.8565E 00 1.5000E 07 2.8048E 001085 3  1  207
0.0        0.0                     0          0          0          01085 3  0  208
2.9063 +04 6.2389 +01              0          0          0          01085 3  2  209
```

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        6          5         12         2        195         51085 3  2  211
1.0     -03 5.5782     2.53   -02 5.5780    5.1265 -01 5.5740    1085 3  2  212
1.0     +00 5.57C1     5.5    +00 5.5340    1.0    +01 5.4989    1085 3  2  213
1.0     E+01 0.0       5.0    E+01 0.0      1.0    E+02 0.0      1085 3  2  214
5.0     E+02 0.0       1.0    E+03 0.0      5.0    E+03 0.020    1085 3  2  215
1.0     E+04 0.C7C     2.0    E+04 0.140    3.0    E+04 0.180    1085 3  2  216
3.0000E 04 1.0595E C1 3.0400E 04 7.0958E 00 3.0550E 04 1.0296E 011085 3  2  217
3.0600E 04 8.0963E CC 3.080CE 04 6.6967E 00 3.1000E 04 6.8971E 001085 3  2  218
3.1300E 04 4.4977E CC 3.140CE 04 1.5698E 01 3.1600E 04 6.5983E 001085 3  2  219
3.1900E 04 5.7989E CC 3.21CCE 04 4.6993E 00 3.2300E 04 6.8997E 001085 3  2  220
3.2650E 04 4.30C3E 00 3.3000E 04 4.4010E 00 3.3400E 04 2.5102E 011085 3  2  221
3.4000E C4 7.1028E 00 3.4300E 04 1.0403E 01 3.4700E 04 6.9040E 001085 3  2  222
3.5000E 04 1.99C4E 01 3.5400E 04 7.9051E 00 3.6000E 04 5.0061E 001085 3  2  223
3.6200E 04 2.3906E C1 3.6700E 04 4.5072E 00 3.6900E 04 2.0408E 011085 3  2  224
3.7100E C4 9.1078E CC 3.78CCE 04 6.C089E 00 3.8100E 04 8.1093E 001085 3  2  225
3.8200E 04 6.0095E 00 3.930CE 04 4.5110E 00 3.9700E 04 1.2912E 011085 3  2  226
4.0100E C4 5.9121E C0 4.0300E 04 6.9123E 00 4.0500E 04 5.3126E 001085 3  2  227
4.0600E 04 6.1127E 00 4.0900E 04 4.6130E 00 4.1100E 04 6.7132E 001085 3  2  228
4.13C0E C4 4.4134E C0 4.1500E 04 3.9136E 00 4.1800E 04 2.6140E 001085 3  2  229
4.2000E 04 2.1914E C1 4.2300E 04 1.1914E 01 4.2600E 04 2.0415E 011085 3  2  230
4.2900E 04 1.1615E C1 4.3200E 04 1.3315E 01 4.3500E 04 8.3157E 001085 3  2  231
4.3800E 04 9.9160E 00 4.400CE 04 6.7162E 00 4.4300E 04 7.9165E 001085 3  2  232
4.4600E 04 5.5168E 00 4.48C0E 04 1.1917E 01 4.5000E 04 6.7172E 001085 3  2  233
4.7300E 04 4.4193E 00 4.79CCE 04 6.9198E 00 4.9000E 04 4.1207E 001085 3  2  234
4.9800E 04 3.7214E CC 5.000CE 04 2.2215E 00 5.0400E 04 8.9219E 001085 3  2  235
5.1000E 04 4.1223E CC 5.240CE 04 2.9234E 00 5.2700E 04 2.5236E 001085 3  2  236
5.30C0E 04 2.7239E CC 5.380CE 04 1.6424E 01 5.4600E 04 3.7250E 001085 3  2  237
5.5000E 04 1.9925E C1 5.60CCE 04 9.7260E 00 5.6500E 04 1.8526E 011085 3  2  238
5.66C0E 04 1.1926E 01 5.82CCE 04 6.9274E 00 5.8600E 04 1.1928E 011085 3  2  239
5.9000E 04 6.7279E 00 5.960CE 04 7.6283E 00 5.9800E 04 6.5284E 001085 3  2  240
6.0600E C4 6.4289E C0 6.1200E 04 4.9293E 00 6.1800E 04 4.2296E 001085 3  2  241
6.2200E 04 7.7299E 0C 6.3000E 04 3.4303E 00 6.3300E 04 6.5305E 001085 3  2  242
6.4200E C4 2.9310E CC 6.4700E 04 4.9313E 00 6.5400E 04 1.3032E 011085 3  2  243
6.6000E 04 4.932CE 00 6.65CCE 04 1.1432E 01 6.6800E 04 8.1324E 001085 3  2  244
6.7200E 04 1.1933E C1 6.7900E 04 6.1330E 00 6.8200E 04 7.1331E 001085 3  2  245
6.9200E C4 3.7336E C0 6.98CCE 04 8.0339E 00 7.1000E 04 3.7346E 001085 3  2  246
7.1500E C4 4.2349E 00 7.170CE 04 2.8350E 00 7.2200E 04 3.5352E 001085 3  2  247
7.25C0E C4 2.6354E 00 7.3000E 04 1.4436E 01 7.3300E 04 1.0936E 011085 3  2  248
7.4000E 04 1.4936E C1 7.4400E 04 1.0436E 01 7.5000E 04 1.4937E 011085 3  2  249
7.5800E 04 7.7372E C0 7.61CCE 04 9.6373E 00 7.7600E 04 5.6381E 001085 3  2  250
7.8000E 04 5.9382E 00 7.85CCE 04 4.9385E 00 7.9200E 04 7.2388E 001085 3  2  251
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8.06C0E	C4	3.6395E	CC	8.20C0E	04	1.3240E	01	8.3800E	04	7.5409E	001085	3	2	252
8.4200E	04	8.7411E	00	8.5600E	04	5.2417E	00	8.6300E	04	8.1420E	001085	3	2	253
8.73C0E	04	5.5424E	CC	8.76CCE	04	5.9425E	00	8.8400E	04	5.2428E	001085	3	2	254
8.9000E	04	3.5431E	CC	9.C00CE	04	1.C443E	01	9.0800E	04	4.5438E	001085	3	2	255
9.1500E	C4	8.C44CE	0C	9.20CCE	04	6.6442E	00	9.2500E	04	7.9444E	001085	3	2	256
9.3000E	C4	5.8446E	C0	9.40C0E	04	5.1449E	00	9.5000E	04	5.9453E	001085	3	2	257
9.5600E	04	5.C455E	C0	9.6200E	04	7.5457E	00	9.7700E	04	4.6462E	001085	3	2	258
9.8400E	04	5.9465E	0C	9.9000E	04	4.7467E	00	9.9500E	04	5.9468E	001085	3	2	259
9.99	E+04	4.647		1.0	E+05	4.647		1.0	E+05	4.4647	1085	3	2	260
2.0	+05	4.774		3.C	+05	4.881		4.0	+05	4.6342	1085	3	2	261
5.0	+05	4.3352		6.C	+05	4.C86		6.79	+05	3.90	1085	3	2	262
7.C	+C5	3.8558		7.82	+05	3.68		8.0	+05	3.5656	1085	3	2	263
9.0	+05	3.476		9.76	+05	3.33		1.0	+06	3.282	1085	3	2	264
1.131	+C6	3.C5		1.348	+C6	2.80		1.435	+06	2.70	1085	3	2	265
1.50	+06	2.6615		1.572	+06	2.56		1.648	+06	2.45	1085	3	2	266
1.65	+06	2.45		1.73	+06	2.38		1.75	+06	2.35	1085	3	2	267
2.0	+06	2.C77		2.5	+06	1.847		3.0	+06	1.845	1085	3	2	268
3.5	+C6	1.92		4.0	+06	2.011		4.5	+06	2.108	1085	3	2	269
5.C	+06	2.157		5.5	+06	2.201		6.0	+06	2.214	1085	3	2	270
6.5	+06	2.221		7.0	+06	2.215		7.5	+06	2.176	1085	3	2	271
8.0	+C6	2.133		8.5	+06	2.072		9.0	+06	2.011	1085	3	2	272
9.5	+06	1.973		1.C	+07	1.945		1.05	+07	1.905	1085	3	2	273
1.10	+07	1.83		1.15	+07	1.77		1.20	+07	1.70	1085	3	2	274
1.25	+07	1.65		1.30	+07	1.60		1.35	+07	1.523	1085	3	2	275
1.40	+07	1.465		1.45	+07	1.415		1.50	+07	1.355	1085	3	2	276
0.0		0.0			0		0		0		01085	3	0	277
2.9063	+C4	6.2389	+C1		0		0		0		01085	3	4	278
0.0		-0.668	+06		0		0		1		431085	3	4	279
	43		2								1085	3	4	280
6.79	+05	0.0		7.C	+05	0.C441		7.82	+05	0.101	1085	3	4	281
8.0	+05	0.113		9.0	+05	0.1562		9.76	+05	0.1708	1085	3	4	282
1.C	+06	0.2796		1.131	+06	0.457		1.348	+06	0.559	1085	3	4	283
1.435	+C6	C.59C		1.50	+06	0.6377		1.572	+06	0.6757	1085	3	4	284
1.648	+06	0.7673		1.65	+06	0.7674		1.73	+06	0.8380	1085	3	4	285
1.75	+06	0.8553		2.0	+06	1.0551		2.5	+06	1.3655	1085	3	4	286
3.0	+06	1.5710		3.5	+06	1.6401		4.0	+06	1.6953	1085	3	4	287
4.5	+06	1.7116		5.C	+06	1.7376		5.5	+06	1.7272	1085	3	4	288
6.0	+06	1.7188		6.5	+06	1.6962		7.0	+06	1.6688	1085	3	4	289
7.5	+06	1.6347		8.0	+06	1.6218		8.5	+06	1.5020	1085	3	4	290
9.0	+C6	1.5821		9.5	+06	1.5338		1.0	+07	1.4854	1085	3	4	291
1.05	+07	1.4732		1.10	+07	1.4221		1.15	+07	1.3738	1085	3	4	292
1.20	+07	1.2659		1.25	+07	1.1379		1.30	+07	1.0185	1085	3	4	293

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1.35    +07 0.9142      1.40    +07 0.8233      1.45    +07 0.7509      1085 3  4  294
1.50    +07 0.7020                                                      1085 3  4  295
0.0         0.0                 0           0           0              01085 3  0  296
2.9063  +04 6.2389  +01         0           0           0              01085 3  5  297
0.0        -0.668   +06         0           0           1             181085 3  5  298
          18             2                                            1085 3  5  299
6.79    +05 0.0         7.0     +05 0.0441      7.82    +05 0.101       1085 3  5  300
8.0     +05 0.113       9.0     +05 0.1562      9.76    +05 0.1708      1085 3  5  301
1.0     +06 0.1722      1.131   +06 0.182       1.348   +06 0.204       1085 3  5  302
1.435   +06 0.2070      1.50    +06 0.2077      1.572   +06 0.2087      1085 3  5  303
1.648   +06 0.2099      1.65    +06 0.2100      1.73    +06 0.2110      1085 3  5  304
1.75    +06 0.2113      1.75    +06 0.0         1.50    +07 0.0         1085 3  5  305
0.0         0.0                 0           0           0              01085 3  0  306
2.9063  +04 6.2389  +01         0           0           0              01085 3  6  307
0.0        -0.961   +06         0           0           1             131085 3  6  308
          13             2                                            1085 3  6  309
9.76    +05 0.0         1.0     +06 0.1074      1.131   +06 0.2752      1085 3  6  310
1.348   +06 0.355       1.435   +06 0.369       1.50    +06 0.375       1085 3  6  311
1.572   +06 0.3770      1.648   +06 0.384       1.65    +06 0.384       1085 3  6  312
1.73    +06 0.389       1.75    +06 0.391       1.75    +06 0.0         1085 3  6  313
1.50    +07 0.0                                                         1085 3  6  314
0.0         0.0                 0           0           0              01085 3  0  315
2.9063  +04 6.2389  +01         0           0           0              01085 3  7  316
0.0        -1.327   +06         0           0           1             101085 3  7  317
          10             2                                            1085 3  7  318
1.348   +06 0.0         1.435   +06 0.014       1.50    +06 0.036       1085 3  7  319
1.572   +06 0.051       1.648   +06 0.101       1.65    +06 0.101       1085 3  7  320
1.73    +06 0.133       1.75    +06 0.139       1.75    +06 0.0         1085 3  7  321
1.50    +07 0.0                                                         1085 3  7  322
0.0         0.0                 0           0           0              01085 3  0  323
2.9063  +04 6.2389  +01         0           0           0              01085 3  8  324
0.0        -1.412   +06         0           0           1              91085 3  8  325
           9             2                                            1085 3  8  326
1.435   +06 0.0         1.50    +06 0.019       1.572   +06 0.039       1085 3  8  327
1.648   +06 0.062       1.65    +06 0.062       1.73    +06 0.085       1085 3  8  328
1.75    +06 0.091       1.75    +06 0.0         1.50    +07 0.0         1085 3  8  329
0.0         0.0                 0           0           0              01085 3  0  330
2.9063  +04 6.2389  +01         0           0           0              01085 3  9  331
0.0        -1.547   +06         0           0           1              71085 3  9  332
           7             2                                            1085 3  9  333
1.572   +06 0.0         1.648   +06 0.014       1.65    +06 0.014       1085 3  9  334
1.73    +06 0.020       1.75    +06 0.023       1.75    +06 0.0         1085 3  9  335
```

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1.50    +07 0.0                                                         1085 3  9   336
0.0         0.0                 0           0           0          01085 3  0   337
2.9063 +04 6.2389 +01           0           0           0          01085 3 16   338
0.0       -10.481 +06           0           0           1          91085 3 16   339
       9          3                                                 1085 3 16   340
1.10    +07 0.0         1.15    +07 0.040       1.20    +07 0.079       1085 3 16   341
1.25    +07 0.185       1.30    +07 0.290       1.35    +07 0.382       1085 3 16   342
1.40    +07 0.470       1.45    +07 0.549       1.50    +07 0.609       1085 3 16   343
0.0         0.0                 0           0           0          01085 3  0   344
2.9063 +04 6.2389 +01           0           0           0          01085 3102   345
0.0         0.0                 0           0           1        1951085 3102   346
       195        5             0           0           0          01085 3102   347
1.0     -03 22.626      2.53    -02 4.4977      5.1265 -01 0.9964       1085 3102   348
1.0     +00 0.7115      5.5     +00 0.2959      1.0     +01 0.2141      1085 3102   349
1.0    E+01 0.004       5.0    E+01 0.009       1.0    E+02 0.013       1085 3102   350
5.0    E+02 0.029       1.0    E+03 0.038       5.0    E+03 0.062       1085 3102   351
1.0    E+04 0.066       2.0    E+04 0.058       3.0    E+04 0.048       1085 3102   352
3.0000E 04 1.0500E-01 3.0400E 04 1.0415E-01 3.0550E 04 1.0383E-011085 3102   353
3.0600E 04 1.0373E-01 3.0800E 04 1.0332E-01 3.1000E 04 1.0291E-011085 3102   354
3.1300E 04 1.0230E-01 3.1400E 04 1.0210E-01 3.1600E 04 1.0170E-011085 3102   355
3.1900E 04 1.0111E-01 3.2100E 04 1.0073E-01 3.2300E 04 1.0034E-011085 3102   356
3.2650E 04 9.9682E-02 3.3000E 04 9.9032E-02 3.3400E 04 9.8302E-021085 3102   357
3.4000E 04 9.7233E-02 3.4300E 04 9.6711E-02 3.4700E 04 9.6025E-021085 3102   358
3.5000E 04 9.5518E-02 3.5400E 04 9.4854E-02 3.6000E 04 9.3880E-021085 3102   359
3.6200E 04 9.3562E-02 3.6700E 04 9.2777E-02 3.6900E 04 9.2468E-021085 3102   360
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4.0100E 04 8.7887E-02 4.0300E 04 8.7663E-02 4.0500E 04 8.7440E-021085 3102   363
4.0600E 04 8.7329E-02 4.0900E 04 8.6999E-02 4.1100E 04 8.6781E-021085 3102   364
4.1300E 04 8.6565E-02 4.1500E 04 8.6350E-02 4.1800E 04 8.6031E-021085 3102   365
4.2000E 04 8.5820E-02 4.2300E 04 8.5507E-02 4.2600E 04 8.5197E-021085 3102   366
4.2900E 04 8.4890E-02 4.3200E 04 8.4586E-02 4.3500E 04 8.4286E-021085 3102   367
4.3800E 04 8.3989E-02 4.4000E 04 8.3792E-02 4.4300E 04 8.3500E-021085 3102   368
4.4600E 04 8.3211E-02 4.4800E 04 8.3020E-02 4.5000E 04 8.2830E-021085 3102   369
4.7300E 04 8.0734E-02 4.7900E 04 8.0213E-02 4.9000E 04 7.9282E-021085 3102   370
4.9800E 04 7.8625E-02 5.0000E 04 7.8463E-02 5.0400E 04 7.8142E-021085 3102   371
5.1000E 04 7.7668E-02 5.2400E 04 7.6594E-02 5.2700E 04 7.6370E-021085 3102   372
5.3000E 04 7.6147E-02 5.3800E 04 7.5563E-02 5.4600E 04 7.4992E-021085 3102   373
5.5000E 04 7.4711E-02 5.6000E 04 7.4022E-02 5.6500E 04 7.3685E-021085 3102   374
5.6600E 04 7.3618E-02 5.8200E 04 7.2570E-02 5.8600E 04 7.2315E-021085 3102   375
5.9000E 04 7.2063E-02 5.9600E 04 7.1689E-02 5.9800E 04 7.1566E-021085 3102   376
6.0600E 04 7.1078E-02 6.1200E 04 7.0719E-02 6.1800E 04 7.0365E-021085 3102   377
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6.9200E 04 6.6391E-02 6.9800E 04 6.6097E-02 7.1000E 04 6.5427E-021085 3102  382
7.1500E 04 6.5145E-02 7.1700E 04 6.5033E-02 7.2200E 04 6.4756E-021085 3102  383
7.2500E 04 6.4591E-02 7.3000E 04 6.4318E-02 7.3300E 04 6.4156E-021085 3102  384
7.4000E 04 6.3782E-02 7.4400E 04 6.3571E-02 7.5000E 04 6.3258E-021085 3102  385
7.5800E 04 6.2847E-02 7.6100E 04 6.2694E-02 7.7600E 04 6.1946E-021085 3102  386
7.8000E 04 6.1750E-02 7.8500E 04 6.1508E-02 7.9200E 04 6.1173E-021085 3102  387
8.0600E 04 6.0518E-02 8.2000E 04 5.9880E-02 8.3800E 04 5.9086E-021085 3102  388
8.4200E 04 5.8913E-02 8.5600E 04 5.8318E-02 8.6300E 04 5.8027E-021085 3102  389
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8.9000E 04 5.6938E-02 9.0000E 04 5.6548E-02 9.0800E 04 5.6241E-021085 3102  391
9.1500E 04 5.5976E-02 9.2000E 04 5.5789E-02 9.2500E 04 5.5603E-021085 3102  392
9.3000E 04 5.5419E-02 9.4000E 04 5.5056E-02 9.5000E 04 5.4699E-021085 3102  393
9.5600E 04 5.4487E-02 9.6200E 04 5.4278E-02 9.7700E 04 5.3764E-021085 3102  394
9.8400E 04 5.3528E-02 9.9000E 04 5.3329E-02 9.9500E 04 5.3164E-021085 3102  395
9.99   E+04 0.053       1.0    E+05 0.053       1.0    E+05 0.053      1085 3102  396
2.0     +05 0.032       3.0     +05 0.023       4.0     +05 0.019      1085 3102  397
5.0     +05 0.018       6.0     +05 0.017       6.79    +05 0.0167     1085 3102  398
7.0     +05 0.0165      7.82    +05 0.0162      8.0     +05 0.016      1085 3102  399
9.0     +05 0.0155      9.76    +05 0.0152      1.0     +06 0.015      1085 3102  400
1.131   +06 0.0136      1.348   +06 0.0116      1.435   +06 0.0108     1085 3102  401
1.50    +06 0.010       1.572   +06 0.0096      1.648   +06 0.0090     1085 3102  402
1.65    +06 0.0090      1.73    +06 0.0085      1.75    +06 0.0084     1085 3102  403
2.0     +06 0.007       2.5     +06 0.006       3.0     +06 0.0058     1085 3102  404
3.5     +06 0.0055      4.0     +06 0.0053      4.5     +06 0.0052     1085 3102  405
5.0     +06 0.005       5.5     +06 0.0048      6.0     +06 0.0045     1085 3102  406
6.5     +06 0.0044      7.0     +06 0.0043      7.5     +06 0.0041     1085 3102  407
8.0     +06 0.0040      8.5     +06 0.0039      9.0     +06 0.0038     1085 3102  408
9.5     +06 0.0036      1.0     +07 0.0035      1.05    +07 0.0033     1085 3102  409
1.10    +07 0.0032      1.15    +07 0.0031      1.20    +07 0.0030     1085 3102  410
1.25    +07 0.0029      1.30    +07 0.0029      1.35    +07 0.0028     1085 3102  411
1.40    +07 0.0027      1.45    +07 0.0027      1.50    +07 0.0026     1085 3102  412
0.0         0.0             0           0           0          01085 3  0  413
2.9063 +04 6.2389 +01       0           0           0          01085 3103  414
0.0         0.0             0           0           2         351085 3103  415
          3           2          35          5                  1085 3103  416
1.0     -03 0.0         1.435   +06 0.0         1.50    +06 0.0058     1085 3103  417
1.572   +06 0.0070      1.648   +06 0.0090      1.650   +06 0.0091     1085 3103  418
1.73    +06 0.0115      1.75    +06 0.0120      2.0     +06 0.0203     1085 3103  419
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4.0    +06 0.0803      4.5    +06 0.093       5.0    +06 0.1012      1085 3103  421
5.5    +06 0.109       6.0    +06 0.116       6.5    +06 0.118       1085 3103  422
7.0    +06 0.1182      7.5    +06 0.120       8.0    +06 0.1206      1085 3103  423
8.5    +06 0.1195      9.0    +06 0.1191      9.5    +06 0.118       1085 3103  424
1.0    +07 0.1171      1.05   +07 0.1145      1.10   +07 0.1138      1085 3103  425
1.15   +07 0.1100      1.20   +07 0.1114      1.25   +07 0.1097      1085 3103  426
1.30   +07 0.108       1.35   +07 0.1057      1.40   +07 0.105       1085 3103  427
1.45   +07 0.1043      1.50   +07 0.1037                             1085 3103  428
0.0        0.0                 0          0          0              01085 3  0  429
2.9063 +04 6.2389 +01          0          0          0              01085 3107  430
0.0        0.0                 0          0          2             211085 3107  431
         3           2        21          5                          1085 3107  432
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6.5    +06 0.004       7.0    +06 0.0078      7.5    +06 0.0125      1085 3107  434
8.0    +06 0.0175      8.5    +06 0.0235      9.0    +06 0.0265      1085 3107  435
9.5    +06 0.0305      1.0    +07 0.0331      1.05   +07 0.0362      1085 3107  436
1.10   +07 0.0366      1.15   +07 0.0372      1.20   +07 0.0380      1085 3107  437
1.25   +07 0.0381      1.30   +07 0.0382      1.35   +07 0.0377      1085 3107  438
1.40   +07 0.0367      1.45   +07 0.0346      1.50   +07 0.0325      1085 3107  439
0.0        0.0                 0          0          0              01085 3  0  440
2.9063 +04 6.2389 +01          0          0          0              01085 3251  441
0.0        0.0                 0          0          2             481085 3251  442
         4           2        48          3                          1085 3251  443
1.00   -03 1.06905-02 1.00    +00 1.06905-02 1.00    +02 1.06905-021085 3251  444
1.00   +04 1.06905-02 5.00    +04 1.70253-02 1.00    +05 3.04146-021085 3251  445
2.07   +05 5.85377-02 3.00    +05 8.84765-02 3.40    +05 1.47597-011085 3251  446
3.90   +05 1.42243-01 4.90    +05 1.30300-01 5.50    +05 1.31714-011085 3251  447
5.90   +05 1.44045-01 6.40    +05 1.66883-01 6.90    +05 1.75260-011085 3251  448
7.40   +05 1.39669-01 7.90    +05 1.56190-01 8.40    +05 1.81237-011085 3251  449
8.80   +05 1.59551-01 9.80    +05 1.67237-01 9.90    +05 1.64428-011085 3251  450
1.04   +06 1.95775-01 1.09    +06 2.10271-01 1.14    +06 1.86825-011085 3251  451
1.19   +06 2.20289-01 1.25    +06 2.00881-01 1.30    +06 2.25728-011085 3251  452
1.35   +06 2.07540-01 1.40    +06 2.42599-01 1.46    +06 2.70667-011085 3251  453
1.65   +06 3.07081-01 1.85    +06 3.31293-01 2.00    +06 3.58356-011085 3251  454
2.25   +06 4.40397-01 2.47    +06 4.13995-01 2.80    +06 5.37858-011085 3251  455
2.90   +06 5.19253-01 3.00    +06 4.94172-01 3.30    +06 4.83701-011085 3251  456
3.49   +06 5.71854-01 3.70    +06 4.99383-01 4.00    +06 6.38750-011085 3251  457
4.56   +06 6.73550-01 5.00    +06 7.64323-01 6.09    +06 7.29948-011085 3251  458
7.05   +06 7.48037-01 8.05    +06 8.22638-01 1.50    +07 8.49821-011085 3251  459
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2.9063 +04 6.2389 +01          0          0          0              01085 3252  461
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1.00    +04 3.17169-02 5.00    +04 3.15134-02 1.00    +05 3.10843-021085 3252   465
2.07    +05 3.01831-02 3.00    +05 2.92246-02 3.40    +05 2.73294-021085 3252   466
3.90    +05 2.75011-02 4.90    +05 2.78835-02 5.50    +05 2.78394-021085 3252   467
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1.35    +06 2.54150-02 1.40    +06 2.42897-02 1.46    +06 2.33875-021085 3252   473
1.65    +06 2.22213-02 1.85    +06 2.14484-02 2.00    +06 2.05813-021085 3252   474
2.25    +06 1.79535-02 2.47    +06 1.88036-02 2.80    +06 1.48237-021085 3252   475
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3.49    +06 1.37345-02 3.70    +06 1.60771-02 4.00    +06 1.16059-021085 3252   477
4.56    +06 1.04588-02 5.00    +06 7.60318-03 6.09    +06 8.66503-031085 3252   478
7.05    +06 8.08976-03 8.05    +06 5.67149-03 1.50    +07 5.23216-031085 3252   479
0.0         0.0                 0          0          0          01085 3   0   480
2.9063  +04 6.2389 +01          0          0          0          01085 3253   481
0.0         0.0                 0          0          2         481085 3253   482
        4           2          48          3                      1085 3253   483
1.00    -03 2.12583-02 1.00    +00 2.12583-02 1.00    +02 2.12583-021085 3253   484
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2.25    +06 1.87605-02 2.47    +06 1.93962-02 2.80    +06 1.70769-021085 3253   495
2.90    +06 1.75088-02 3.00    +06 1.85150-02 3.30    +06 1.83778-021085 3253   496
3.49    +06 1.77824-02 3.70    +06 1.89241-02 4.00    +06 1.69373-021085 3253   497
4.56    +06 1.61978-02 5.00    +06 1.26362-02 6.09    +06 1.42833-021085 3253   498
7.05    +06 1.36381-02 8.05    +06 1.28673-02 1.50    +07 1.44991-021085 3253   499
0.0         0.0                 0          0          0          01085 3   0   500
0.0         0.0                 0          0          0          01085 0   0   501
2.90630+04  6.23890+01          1          1          0          01085 4   2   502
0.0         6.23890+01          0          2        441         201085 4   2   503
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 0.0        0.0        C.C        0.0        0.0         0.0         1085 4  2  509
 0.C        0.C        C.C        C.C        0.0         0.0         1085 4  2  510
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 0.0        0.0        C.C        0.0        1.54110-04-1.92265-021085 4  2  514
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 4.86511-C8 1.43277-08 C.C        0.0        0.0         0.0         1085 4  2  516
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 0.0        0.C        C.0        0.C        0.0         0.0         1085 4  2  520
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0.C          0.0                                                             1085 4  2  624
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0.0          0.0                                                             1085 4  2  629
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0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	633
0.0	0.0						1085	4	2	634
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0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	642
0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	643
0.0	0.0						1085	4	2	644
0.0	7.90000+05	0	0		20		01085	4	2	645
1.46333-01	8.10000-02	1.37143-02	5.77778-03	0.0		0.0	1085	4	2	646
0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	647
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0.0	8.80000+05	0	0		20		01085	4	2	655
1.49667-01	8.02000-02	2.75714-02	6.11111-03	0.0		0.0	1085	4	2	656
0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	657
0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	658
0.0	0.0						1085	4	2	659
0.0	9.80000+05	0	0		20		01085	4	2	660
1.57667-01	1.08800-01	2.04286-02	3.14444-02	0.0		0.0	1085	4	2	661
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1.55000-01	1.25000-01	4.44286-02	7.88888-03	0.0		0.0	1085	4	2	666
0.0	0.0	0.0	0.0	0.0		0.0	1085	4	2	667
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0.0	0.0						1085	4	2	669
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1.86333-01	1.22800-01	3.45714-02	4.22222-03	0.0		0.0	1085	4	2	671

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 0.0          0.0                                                             1085 4  2  674
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 1.24147-03 7.44733-04                                                1085 4  2  799
 0.0        1.50000+07          0           0          20            01085 4  2  800
 8.34532-01 7.29313-01 6.22396-01 5.12066-01 3.87979-01 2.73013-011085 4  2  801
 1.84548-01 1.24207-01 7.22951-02 3.27272-02 1.34152-02 7.06104-031085 4  2  802
 6.90277-03 8.63178-03 9.98238-03 1.03242-02 9.09703-03 6.94340-031085 4  2  803
 4.25867-03 1.46851-03                                                1085 4  2  804
 0.0        0.0                 0           0          0             01085 4  0  805
 0.0        0.0                 0           0          0             01085 0  0  806
 2.9063 +04 6.2389 +01          0           0          6             01085 5  4  807
 0.0        0.668  +06          0           3          1            181085 5  4  808
         18            2                                             1085 5  4  809
 6.79   +05 1.0         7.0    +05 1.0       7.82   +05 1.0        1085 5  4  810
 8.0    +05 1.0         9.0    +05 1.0       9.76   +05 1.0        1085 5  4  811
 1.0    +06 0.6159      1.131  +06 0.398     1.348  +06 0.365      1085 5  4  812
 1.435  +06 0.351       1.50   +06 0.326     1.572  +06 0.309      1085 5  4  813
 1.648  +06 0.274       1.65   +06 0.274     1.73   +06 0.252      1085 5  4  814
 1.75   +06 0.247       1.75   +06 0.0       1.50   +07 0.0        1085 5  4  815
 0.0        0.961  +06          0           3          1            131085 5  4  816
         13            2                                             1085 5  4  817
 9.76   +05 0.0         1.0    +06 0.3841    1.131  +06 0.602      1085 5  4  818
 1.348  +06 0.635       1.435  +06 0.625     1.50   +06 0.588      1085 5  4  819
 1.572  +06 0.558       1.648  +06 0.500     1.65   +06 0.500      1085 5  4  820
 1.73   +06 0.464       1.75   +06 0.457     1.75   +06 0.0        1085 5  4  821
 1.50   +07 0.0                                                     1085 5  4  822
 0.0        1.327  +06          0           3          1            101085 5  4  823
         10            2                                             1085 5  4  824
 1.348  +06 0.0         1.435  +06 0.024     1.50   +06 0.056      1085 5  4  825
 1.572  +06 0.075       1.648  +06 0.132     1.65   +06 0.132      1085 5  4  826
 1.73   +06 0.159       1.75   +06 0.163     1.75   +06 0.0        1085 5  4  827
 1.50   +07 0.0                                                     1085 5  4  828
 0.0        1.412  +06          0           3          1             91085 5  4  829
          9            2                                             1085 5  4  830
 1.435  +06 0.0         1.50   +06 0.030     1.572  +06 0.058      1085 5  4  831
 1.648  +06 0.081       1.65   +06 0.081     1.73   +06 0.095      1085 5  4  832
 1.75   +06 0.106       1.75   +06 0.0       1.50   +07 0.0        1085 5  4  833
 0.0        1.547  +06          0           3          1             71085 5  4  834
          7            2                                             1085 5  4  835
 1.572  +06 0.0         1.648  +06 0.013     1.65   +06 0.013      1085 5  4  836
 1.73   +06 0.030       1.75   +06 0.027     1.75   +06 0.0        1085 5  4  837
 1.50   +07 0.0                                                     1085 5  4  838
 0.0        0.0                 0           9          1            301085 5  4  839
```

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          30            2                                                          1085 5   4   840
6.79     +05 0.0             1.75     +06 0.0             1.75     +06 1.0         1085 5   4   841
2.0      +06 1.0             2.5      +06 1.0             3.0      +06 1.0         1085 5   4   842
3.5      +06 1.0             4.0      +06 1.0             4.5      +06 1.0         1085 5   4   843
5.0      +06 1.0             5.5      +06 1.0             6.0      +06 1.0         1085 5   4   844
6.5      +06 1.0             7.0      +06 1.0             7.5      +06 1.0         1085 5   4   845
8.0      +06 1.0             8.5      +06 1.0             9.0      +06 1.0         1085 5   4   846
9.5      +06 1.0             1.0      +07 1.0             1.05     +07 1.0         1085 5   4   847
1.10     +07 1.0             1.15     +07 1.0             1.20     +07 1.0         1085 5   4   848
1.25     +07 1.0             1.30     +07 1.0             1.35     +07 1.0         1085 5   4   849
1.40     +07 1.0             1.45     +07 1.0             1.50     +07 1.0         1085 5   4   850
0.0          0.0                      0            0               1             301085 5   4   851
          30            3                                                          1085 5   4   852
6.79     +05 0.10     +05 1.75     +06 0.10     +05 1.75     +06 0.6038 +061085 5   4   853
2.0      +06 0.6455   +06 2.5      +06 0.7212   +06 3.0      +06 0.7906 +061085 5   4   854
3.5      +06 0.8539   +06 4.0      +06 0.9129   +06 4.5      +06 0.9682 +061085 5   4   855
5.0      +06 1.0206   +06 5.5      +06 1.0704   +06 6.0      +06 1.1180 +061085 5   4   856
6.5      +06 1.1637   +06 7.0      +06 1.2076   +06 7.5      +06 1.2500 +061085 5   4   857
8.0      +06 1.2910   +06 8.5      +06 1.3307   +06 9.0      +06 1.3693 +061085 5   4   858
9.5      +06 1.4068   +06 10.0     +06 1.4434   +06 10.5     +06 1.4790 +061085 5   4   859
11.0     +06 1.5138   +06 11.5     +06 1.5478   +06 12.0     +06 1.5811 +061085 5   4   860
12.5     +06 1.6138   +06 13.0     +06 1.6459   +06 13.5     +06 1.6771 +061085 5   4   861
14.0     +06 1.7078   +06 14.5     +06 1.7380   +06 15.0     +06 1.7678 +061085 5   4   862
0.0          0.0                      0            0               0              01085 5   0   863
2.9063   +04 6.2389   +01             0            0               2              01085 5  16   864
0.0          0.0                      0            9               1              91085 5  16   865
           9            2                                                          1085 5  16   866
1.10     +07 0.5             1.15     +07 0.5             1.20     +07 0.5         1085 5  16   867
1.25     +07 0.5             1.30     +07 0.5             1.35     +07 0.5         1085 5  16   868
1.40     +07 0.5             1.45     +07 0.5             1.50     +07 0.5         1085 5  16   869
0.0          0.0                      0            0               1              91085 5  16   870
           9            3                                                          1085 5  16   871
1.10     +07 1.515    +06 1.15     +07 1.547    +06 1.20     +07 1.581  +061085 5  16   872
1.25     +07 1.614    +06 1.30     +07 1.646    +06 1.35     +07 1.677  +061085 5  16   873
1.40     +07 1.708    +06 1.45     +07 1.738    +06 1.50     +07 1.768  +061085 5  16   874
0.0          0.0                      0            9               1              91085 5  16   875
           9            2                                                          1085 5  16   876
1.10     +07 0.5             1.15     +07 0.5             1.20     +07 0.5         1085 5  16   877
1.25     +07 0.5             1.30     +07 0.5             1.35     +07 0.5         1085 5  16   878
1.40     +07 0.5             1.45     +07 0.5             1.50     +07 0.5         1085 5  16   879
0.0          0.0                      0            0               1              91085 5  16   880
           9            3                                                          1085 5  16   881
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1.10    +07 0.10    +C5 1.15    +07 0.323   +06 1.20    +07 0.456   +061085 5 16   882
1.25    +07 0.557   +06 1.30    +07 0.644   +06 1.35    +07 0.720   +061085 5 16   883
1.40    +07 0.789   +06 1.45    +07 0.853   +06 1.50    +07 0.911   +061085 5 16   884
0.0         0.0                   0           0           0           01085 5  0   885
0.0         0.0                   0           0           0           01085 0  0   886
0.0         0.0                   0           0           0           0   0 0  0   887
2.9065 +C4 6.4373 +C1             1           0           0          201086 1451    1
0.0         0.0                   1           0          72          01086 1451    2
COPPER-65 ENDF/B MAT 1086 REF. AI-AEC-12741      SEPT. 1968          1086 1451    3
MF=1                   GENERAL  INFORMATION                          1086 1451    4
     ATOMIC MASS GIVEN AS 64.9278 FOR A NEUTRON MASS OF 1.008665     1086 1451    5
  MT=453  RADIOACTIVE DECAY DATA FROM REF. 1                         1086 1451    6
MF=2                    RESONANCE PARAMETERS                        1086 1451    7
  MT=1511.ALL RESOLVED RESONANCES TREATED AS L=0 RESONANCES         1086 1451    8
        2.RESOLVED RESONANCE PARAMETERS FROM REF.2.                 1086 1451    9
        3.G VALUES FOR 0.229KEV AND ABOVE 14KEV ASSIGNED            1086 1451   10
        4.NEGATIVE ENERGY RESONANCE GAMMA-N AND E0 OBTAINED FROM    1086 1451   11
          FIT TO SIGS=15.48, SIGA=2.28 AT 2200M/S. ASSUMED GAMMA-   1086 1451   12
          GAMMA=0.24EV.                                             1086 1451   13
        5.L=C  UNRESOLVED RESONANCE PARAMETERS FROM AVERAGED        1086 1451   14
          RESOLVED RESONANCE PARAMETERS. OBSERVED LEVEL SPACING     1086 1451   15
          =DC=1.4KEV, STRENGTH FUNCTION/J STATE=S0J=1.7E-04, FOR    1086 1451   16
          EACH J STATE D=D0/G                                       1086 1451   17
        6.L=1,2  S1J=S2J=1.CE-C4, DJ=D0/DJ, GAMMA-GAMMA=0.24EV      1086 1451   18
          ASSUMED.                                                  1086 1451   19
        7.OPTIONS LRU=1, LRF=2 (MLBW REF. 10) ARE USED.             1086 1451   20
MF=3                    SMOOTH CROSS SECTIONS                       1086 1451   21
  MT=1    NO EXP. VALUES AVAILABLE FOR SEPERATE CU ISOTOPES. THE    1086 1451   22
          TOTAL WAS SET EQUAL TO SUM OF ITS PARTS,EXCEPT FOR 30     1086 1451   23
          TO 100 KEV WHERE IT WAS ASSUMED TO BE EQUAL TO A          1086 1451   24
          SMOOTHING OF NATURAL COPPER GIVEN IN REF.2                1086 1451   25
  MT=2    BELOW RESONANCE REGION VALUES WERE CALCULATED FROM        1086 1451   26
          RESOLVED RESONANCE PARAMETERS USING UNICORN-REF. 3. IN    1086 1451   27
          THE RESOLVED RESONANCE RANGE THE SMOOTH DATA IS THE       1086 1451   28
          CONTRIBUTION FROM L .GT. 0 CALCULATED FROM UNRESOLVED     1086 1451   29
          RESONANCE PARAMETERS USING TRIX-REF.4.                    1086 1451   30
                          FROM 30 TO 100 KEV VALUES ARE THE         1086 1451   31
          DIFFERENCE BETWEEN THE TOTAL AND NON-ELASTIC CROSS        1086 1451   32
          SECTIONS. ABOVE 100 KEV, VALUES WERE                      1086 1451   33
          ASSUMED TO BE IDENTICAL TO NATURALLY OCCURING CU-REF.5.   1086 1451   34
  MT=4-8  LEVEL DATA FROM REF.5, ABOVE 1.75MEV CONTINUUM WAS USED   1086 1451   35
          WHICH WAS MATCHED TO LEVEL DATA AND WHEN WEIGHTED ALONG   1086 1451   36
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          WITH CU-63 GAVE CONTINUUM OF NATURAL CU FROM REF.5.    1086 1451   37
  MT=16   REF.5                                                  1086 1451   38
  MT=251  MUBAR CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING  1086 1451   39
          CHAD-REF.6.                                            1086 1451   40
  MT=252  XI CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING CHAD1086 1451   41
          -REF.6.                                                1086 1451   42
  MT=253  GAMMA CALCULATED FROM LEGENDRE COEFF. IN FILE 4 USING  1086 1451   43
          CHAD-REF.6.                                            1086 1451   44
  MT=102  BELOW RESONANCE REGION CALCULATED AS PER MT=2.   FOR   1086 1451   45
          RESOLVED RESONANCE RANGE,L.GT.0 CONTRIBUTION CALCULATED1086 1451   46
          FROM UNRESOLVED RESONANCE PARAMETERS USING TRIX-REF.4. 1086 1451   47
          THE 30 TO 100 KEV RANGE FROM EVALUATION OF REFERENCE   1086 1451   48
          DOCUMENT. ABOVE 100 KEV-REF.5.                         1086 1451   49
  MT=103  REF.5                                                  1086 1451   50
  MT=107  REF.5                                                  1086 1451   51
MF=4              SECONDARY ANGULAR DISTRIBUTIONS                1086 1451   52
  MT=2    LEGENDRE COEFF. FOR ELASTIC SCATT. ARE GIVEN. DATA ARE 1086 1451   53
          AVAILABLE FOR NATURALLY OCCURING CU AND ARE ASSUMED TO 1086 1451   54
          BE THE SAME FOR THE SEPERATE ISOTOPES. DATA OBTAINED   1086 1451   55
          FROM REFERANCES 7,8,9. WHERE LEGENDRE COEFF. WERE NOT  1086 1451   56
          GIVEN THEY WERE OBTAINED FROM THE DATA POINTS BY USING 1086 1451   57
          CHAD-REF.6.                                            1086 1451   58
MF=5              SECONDARY ENERGY DISTRIBUTIONS                 1086 1451   59
  MT=4    REF. 5                                                 1086 1451   60
  MT=16    REF. 5                                                1086 1451   61
                            REFERENCES                           1086 1451   62
     1. GOLDMAN,DAVID T.,CHART OF THE NUCLIDES,KAPL(1966)        1086 1451   63
     2. GOLDBERG,M.D.,ET. AL., BNL 325 2ND. ED. SUPPL. NO.2 VOL. 1086 1451   64
        IIA (1966)                                               1086 1451   65
     3.   OTTER,J., NAA-SR-11980 VOL.6(1966)                     1086 1451   66
     4. OTTER,J.,NAA-SR-MEMO-11538 (1965)                        1086 1451   67
     5. OFFORD,SUSAN M.,PARKER,K.,AWRE 0-63/67 (1967)            1086 1451   68
     6. BERLAND,R.F.,NAA-SR-11231 (1965)                         1086 1451   69
     7. GOLDBERG,M.D.,ET. AL., BNL 400 2ND ED. VOL. II (1962)    1086 1451   70
     8. HOLMQVIST,B.,WIEDLING,T., NUCLEAR DATA FOR REACTORS, VOL.1086 1451   71
        I,IAEA,VIENNA (1967)                                     1086 1451   72
     9. SMITH,A.B.,ET. AL., PHY. REV. 135, B76 (1964)            1086 1451   73
    10. OTTER,J.M., NSE 28, 149 (1967)                           1086 1451   74
0.0        0.0                 1        451        92           01086 1451   75
0.0        0.0                 1        453         6           01086 1451   76
0.0        0.0                 2        151        25           01086 1451   77
0.0        0.0                 3          1        68           01086 1451   78
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0.0		0.0			3		2		68	01086	1451	79
0.0		0.0			3		4		17	01086	1451	80
0.0		0.0			3		5		9	01086	1451	81
0.0		0.0			3		6		7	01086	1451	82
0.0		0.0			3		7		6	01086	1451	83
0.0		0.0			3		8		5	01086	1451	84
0.0		0.0			3		16		7	01086	1451	85
0.0		0.0			3		102		68	01086	1451	86
0.0		0.0			3		103		12	01086	1451	87
0.0		0.0			3		107		10	01086	1451	88
0.0		0.0			3		251		19	01086	1451	89
0.0		0.0			3		252		19	01086	1451	90
0.0		0.0			3		253		19	01086	1451	91
0.0		0.0			4		2		303	01086	1451	92
0.0		0.0			5		4		48	01086	1451	93
0.0		0.0			5		16		25	01086	1451	94
0.0		0.0			0		0		0	01086	1 0	95
2.9065	+04	6.4373	+01		0		0		0	01086	1453	96
0.0		0.0			0		0		24	41086	1453	97
16.0		2.9064	+04	1.488	-05	2.8064	+04			1086	1453	98
102.0		2.9066	+04	2.255	-03	3.0066	+04			1086	1453	99
103.0		2.8065	+04	7.500	-05	2.9065	+04			1086	1453	100
107.0		2.7062	+04	6.053	-03	2.8062	+04			1086	1453	101
0.0		0.0			0		0		0	01086	1 0	102
0.0		0.0			0		0		0	01086	0 0	103
2.9065	+04	6.4373	+01		0		0		1	01086	2151	104
2.9065	+04	1.0			0		0		1	01086	2151	105
1.0	+01	3.0	+04		1		2		0	01086	2151	106
1.5		7.302	-01		0		0		1	01086	2151	107
1.090	-03	0.0			0		0		120	201086	2151	108
-9.476	+02	2.0		9.231	+01	9.207	+01	0.24	+00	1086	2151	109
2.290	+02	2.0		2.6	-01	1.60	-02	0.24	+00	1086	2151	110
2.55	+03	2.0		1.704	+01	1.68	+01	0.24	+00	1086	2151	111
3.92	+03	1.0		2.424	+01	2.40	+01	0.24	+00	1086	2151	112
4.4	+03	2.0		7.24	+00	7.0	+00	0.24	+00	1086	2151	113
4.5	+03	1.0		1.624	+01	1.6	+01	0.24	+00	1086	2151	114
6.48	+03	2.0		2.624	+01	2.6	+01	0.24	+00	1086	2151	115
7.6	+03	2.0		2.324	+01	2.3	+01	0.24	+00	1086	2151	116
7.65	+03	1.0		3.324	+01	3.3	+01	0.24	+00	1086	2151	117
7.94	+03	2.0		5.024	+01	5.0	+01	0.24	+00	1086	2151	118
8.549	+03	1.0		7.80	+00	7.56	+00	0.24	+00	1086	2151	119
1.366	+04	2.0		7.524	+01	7.5	+01	0.24	+00	1086	2151	120

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1.423  +04 2.0          4.184  +01 4.16   +01 0.24   +00            1086 2151  121
1.509  +04 2.0          0.786  +01 0.762  +01 0.24   +00            1086 2151  122
1.582  +04 2.0          3.224  +01 3.2    +01 0.24   +00            1086 2151  123
1.780  +04 2.0          2.4468 +02 2.4444 +02 0.24   +00            1086 2151  124
2.0    +04 1.0          2.5356 +02 2.5332 +02 0.24   +00            1086 2151  125
2.18   +04 1.0          3.677  +01 3.653  +01 0.24   +00            1086 2151  126
2.41   +04 1.0          1.1224 +02 1.12   +02 0.24   +00            1086 2151  127
2.5    +04 2.0          2.0504 +02 2.048  +02 0.24   +00            1086 2151  128
0.0        0.0                  0          0          0           01086 2   0  129
0.0        0.0                  0          0          0           01086 0   0  130
2.9065 +04 6.4373 +01           0          0          0           01086 3   1  131
0.0        0.0                  0          0          1         1951086 3   1  132
       195            5         0          0          0           01086 3   1  133
1.0    -03 26.486       2.53   -02 17.6182      5.1265 -01 15.8983   1086 3   1  134
1.0    +00 15.7513      5.5    +00 15.4756      1.0    +01 15.3636   1086 3   1  135
1.0000E 01 4.0000E-03 5.0000E 01 9.0000E-03 1.0000E 02 1.3000E-02 1086 3   1  136
5.0000E 02 2.9000E-02 1.0000E 03 4.7000E-02 5.0000E 03 8.6000E-02 1086 3   1  137
1.0000E 04 1.3700E-01 2.0000E 04 1.9600E-01 3.0000E 04 2.3200E-01 1086 3   1  138
3.0000E 04 1.0700E 01 3.0400E 04 7.2000E 00 3.0550E 04 1.0400E 01 1086 3   1  139
3.0600E 04 8.2000E 00 3.0800E 04 6.8000E 00 3.1000E 04 7.0000E 00 1086 3   1  140
3.1300E 04 4.6000E 00 3.1400E 04 1.5800E 01 3.1600E 04 6.6999E 00 1086 3   1  141
3.1900E 04 5.9000E 00 3.2100E 04 4.8000E 00 3.2300E 04 7.0000E 00 1086 3   1  142
3.2650E 04 4.4000E 00 3.3000E 04 4.5000E 00 3.3400E 04 2.5200E 01 1086 3   1  143
3.4000E 04 7.2000E 00 3.4300E 04 1.0500E 01 3.4700E 04 7.0000E 00 1086 3   1  144
3.5000E 04 2.0000E 01 3.5400E 04 8.0000E 00 3.6000E 04 5.1000E 00 1086 3   1  145
3.6200E 04 2.4000E 01 3.6700E 04 4.6000E 00 3.6900E 04 2.0500E 01 1086 3   1  146
3.7100E 04 9.2000E 00 3.7800E 04 6.1000E 00 3.8100E 04 8.2000E 00 1086 3   1  147
3.8200E 04 6.1000E 00 3.9300E 04 4.6000E 00 3.9700E 04 1.3000E 01 1086 3   1  148
4.0100E 04 6.0000E 00 4.0300E 04 7.0000E 00 4.0500E 04 5.4000E 00 1086 3   1  149
4.0600E 04 6.2000E 00 4.0900E 04 4.7000E 00 4.1100E 04 6.8000E 00 1086 3   1  150
4.1300E 04 4.5000E 00 4.1500E 04 4.0000E 00 4.1800E 04 2.7000E 00 1086 3   1  151
4.2000E 04 2.2000E 01 4.2300E 04 1.2000E 01 4.2600E 04 2.0500E 01 1086 3   1  152
4.2900E 04 1.1700E 01 4.3200E 04 1.3400E 01 4.3500E 04 8.4000E 00 1086 3   1  153
4.3800E 04 1.0000E 01 4.4000E 04 6.7999E 00 4.4300E 04 8.0000E 00 1086 3   1  154
4.4600E 04 5.6000E 00 4.4800E 04 1.2000E 01 4.5000E 04 6.3000E 00 1086 3   1  155
4.7300E 04 4.5000E 00 4.7900E 04 7.0000E 00 4.9000E 04 4.2000E 00 1086 3   1  156
4.9800E 04 3.8000E 00 5.0000E 04 2.3000E 00 5.0400E 04 9.0000E 00 1086 3   1  157
5.1000E 04 4.2000E 00 5.2400E 04 3.0000E 00 5.2700E 04 2.6000E 00 1086 3   1  158
5.3000E 04 2.8000E 00 5.3800E 04 1.6500E 01 5.4600E 04 3.8000E 00 1086 3   1  159
5.5000E 04 2.0000E 01 5.6000E 04 9.8000E 00 5.6500E 04 1.8600E 01 1086 3   1  160
5.6600E 04 1.2000E 01 5.8200E 04 7.0000E 00 5.8600E 04 1.2000E 01 1086 3   1  161
5.9000E 04 6.8000E 00 5.9600E 04 7.7000E 00 5.9800E 04 6.6000E 00 1086 3   1  162
```

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6.0600E 04 6.5000E 00 6.1200E 04 5.0000E 00 6.1800E 04 4.3000E 001086 3  1  163
6.2200E 04 7.8000E 00 6.3000E 04 3.5000E 00 6.3300E 04 6.5000E 001086 3  1  164
6.4200E 04 3.0000E 00 6.4700E 04 5.0000E 00 6.5400E 04 1.3100E 011086 3  1  165
6.6000E 04 5.0000E 00 6.6500E 04 1.1500E 01 6.6800E 04 8.2000E 001086 3  1  166
6.7200E 04 1.2000E 01 6.7900E 04 6.2000E 00 6.8200E 04 7.2000E 001086 3  1  167
6.9200E 04 3.8000E 00 6.9800E 04 8.1000E 00 7.1000E 04 3.8000E 001086 3  1  168
7.1500E 04 4.3000E 00 7.1700E 04 2.9000E 00 7.2200E 04 3.6000E 001086 3  1  169
7.2500E 04 2.7000E 00 7.3000E 04 1.4500E 01 7.3300E 04 1.1000E 011086 3  1  170
7.4000E 04 1.5000E 01 7.4400E 04 1.0500E 01 7.5000E 04 1.5000E 011086 3  1  171
7.5800E 04 7.8000E 00 7.6100E 04 9.7000E 00 7.7600E 04 5.7000E 001086 3  1  172
7.8000E 04 6.0000E 00 7.8500E 04 5.0000E 00 7.9200E 04 7.2999E 001086 3  1  173
8.0600E 04 3.7000E 00 8.2000E 04 1.3300E 01 8.3800E 04 7.7000E 001086 3  1  174
8.4200E 04 8.8000E 00 8.5600E 04 5.3000E 00 8.6300E 04 8.2000E 001086 3  1  175
8.7300E 04 5.6000E 00 8.7600E 04 6.0000E 00 8.8400E 04 5.3000E 001086 3  1  176
8.9000E 04 3.6000E 00 9.0000E 04 1.0500E 01 9.0800E 04 4.6000E 001086 3  1  177
9.1500E 04 8.1000E 00 9.2000E 04 6.7000E 00 9.2500E 04 8.0000E 001086 3  1  178
9.3000E 04 5.9000E 00 9.4000E 04 5.2000E 00 9.5000E 04 6.0000E 001086 3  1  179
9.5600E 04 5.1000E 00 9.6200E 04 7.6000E 00 9.7700E 04 4.7000E 001086 3  1  180
9.8400E 04 6.0000E 00 9.9000E 04 4.7999E 00 9.9500E 04 6.0000E 001086 3  1  181
9.9900E 04 4.7000E 00 1.0000E 05 4.7000E 00 1.0000E 05 4.4857E 001086 3  1  182
2.0000E 05 4.7870E 00 3.0000E 05 4.8910E 00 4.0000E 05 4.6427E 001086 3  1  183
5.0000E 05 4.3429E 00 6.0000E 05 4.0934E 00 6.7900E 05 3.9072E 001086 3  1  184
7.0000E 05 3.8633E 00 7.8200E 05 3.6876E 00 8.0000E 05 3.6833E 001086 3  1  185
9.0000E 05 3.5579E 00 9.7600E 05 3.4367E 00 1.0000E 06 3.3940E 001086 3  1  186
1.1310E 06 3.1867E 00 1.3480E 06 3.1516E 00 1.4350E 06 3.1140E 001086 3  1  187
1.5000E 06 3.1054E 00 1.5720E 06 3.0520E 00 1.6480E 06 3.0070E 001086 3  1  188
1.6500E 06 3.0100E 00 1.7300E 06 3.0300E 00 1.7500E 06 3.0220E 001086 3  1  189
2.0000E 06 2.9030E 00 2.5000E 06 2.9134E 00 3.0000E 06 3.0704E 001086 3  1  190
3.5000E 06 3.1986E 00 4.0000E 06 3.3336E 00 4.5000E 06 3.4436E 001086 3  1  191
5.0000E 06 3.5137E 00 5.5000E 06 3.5488E 00 6.0000E 06 3.5501E 001086 3  1  192
6.5000E 06 3.5523E 00 7.0000E 06 3.5297E 00 7.5000E 06 3.4694E 001086 3  1  193
8.0000E 06 3.4223E 00 8.5000E 06 3.3534E 00 9.0000E 06 3.2822E 001086 3  1  194
9.5000E 06 3.2123E 00 1.0000E 07 3.1510E 00 1.0500E 07 3.1065E 001086 3  1  195
1.1000E 07 3.1633E 00 1.1500E 07 3.2372E 00 1.2000E 07 3.2078E 001086 3  1  196
1.2500E 07 3.2145E 00 1.3000E 07 3.1956E 00 1.3500E 07 3.1379E 001086 3  1  197
1.4000E 07 3.0889E 00 1.4500E 07 3.0339E 00 1.5000E 07 3.0539E 001086 3  1  198
0.0        0.0                  0           0           0           01086 3  0  199
2.9065 +04 6.4373 +01           0           0           0           01086 3  2  200
0.0        0.0                  0           0           3         1951086 3  2  201
         6            5         11          2         195           51086 3  2  202
1.0    -03 15.418      2.53    -02 15.418      5.1265 -01 15.410     1086 3  2  203
1.0    +00 15.402      5.5     +00 15.328      1.0    +01 15.255     1086 3  2  204
```

1.0	E+01	0.0		5.0	E+01	0.0		1.0	E+02	0.0		1086	3	2	205				
5.0	E+02	0.0		1.0	E+03	0.01		5.0	E+03	0.04		1086	3	2	206				
1.0	E+04	0.10		2.0	E+04	0.17		3.0	E+04	0.21		1086	3	2	207				
3.0000E	04	1.0656E	01	3.0400E	04	7.1563E	00	3.0550E	04	1.0356E	01	1086	3	2	208				
3.0600E	04	8.1564E	00	3.0800E	04	6.7566E	00	3.1000E	04	6.9567E	00	1086	3	2	209				
3.1300E	04	4.5569E	00	3.1400E	04	1.5757E	01	3.1600E	04	6.5571E	00	1086	3	2	210				
3.1900E	04	5.8574E	00	3.2100E	04	4.7575E	00	3.2300E	04	6.9576E	00	1086	3	2	211				
3.2650E	04	4.3579E	00	3.3000E	04	4.4581E	00	3.3400E	04	2.5158E	01	1086	3	2	212				
3.4000E	04	7.1587E	00	3.4300E	04	1.0459E	01	3.4700E	04	6.9591E	00	1086	3	2	213				
3.5000E	04	1.9959E	01	3.5400E	04	7.9596E	00	3.6000E	04	5.0599E	00	1086	3	2	214				
3.6200E	04	2.3960E	01	3.6700E	04	4.5603E	00	3.6900E	04	2.0460E	01	1086	3	2	215				
3.7100E	04	9.1605E	00	3.7800E	04	6.0609E	00	3.8100E	04	8.1610E	00	1086	3	2	216				
3.8200E	04	6.0611E	00	3.9300E	04	4.5617E	00	3.9700E	04	1.2962E	01	1086	3	2	217				
4.0100E	04	5.9621E	00	4.0300E	04	6.9622E	00	4.0500E	04	5.3623E	00	1086	3	2	218				
4.0600E	04	6.1623E	00	4.0900E	04	4.6625E	00	4.1100E	04	6.7626E	00	1086	3	2	219				
4.1300E	04	4.4627E	00	4.1500E	04	3.9628E	00	4.1800E	04	2.6630E	00	1086	3	2	220				
4.2000E	04	2.1963E	01	4.2300E	04	1.1963E	01	4.2600E	04	2.0463E	01	1086	3	2	221				
4.2900E	04	1.1664E	01	4.3200E	04	1.3364E	01	4.3500E	04	8.3639E	00	1086	3	2	222				
4.3800E	04	9.9640E	00	4.4000E	04	6.7641E	00	4.4300E	04	7.9643E	00	1086	3	2	223				
4.4600E	04	5.5644E	00	4.4800E	04	1.1965E	01	4.5000E	04	6.7646E	00	1086	3	2	224				
4.7300E	04	4.4657E	00	4.7900E	04	6.9660E	00	4.9000E	04	4.1664E	00	1086	3	2	225				
4.9800E	04	3.7668E	00	5.0000E	04	2.2668E	00	5.0400E	04	8.9670E	00	1086	3	2	226				
5.1000E	04	4.1672E	00	5.2400E	04	2.9678E	00	5.2700E	04	2.5679E	00	1086	3	2	227				
5.3000E	04	2.7680E	00	5.3800E	04	1.6468E	01	5.4600E	04	3.7686E	00	1086	3	2	228				
5.5000E	04	1.9969E	01	5.6000E	04	9.7691E	00	5.6500E	04	1.8569E	01	1086	3	2	229				
5.6600E	04	1.1969E	01	5.8200E	04	6.9698E	00	5.8600E	04	1.1970E	01	1086	3	2	230				
5.9000E	04	6.7700E	00	5.9600E	04	7.6702E	00	5.9800E	04	6.5703E	00	1086	3	2	231				
6.0600E	04	6.4705E	00	6.1200E	04	4.9707E	00	6.1800E	04	4.2709E	00	1086	3	2	232				
6.2200E	04	7.7710E	00	6.3000E	04	3.4712E	00	6.3300E	04	6.5713E	00	1086	3	2	233				
6.4200E	04	2.9715E	00	6.4700E	04	4.9717E	00	6.5400E	04	1.3072E	01	1086	3	2	234				
6.6000E	04	4.9720E	00	6.6500E	04	1.1472E	01	6.6800E	04	8.1722E	00	1086	3	2	235				
6.7200E	04	1.1972E	01	6.7900E	04	6.1725E	00	6.8200E	04	7.1726E	00	1086	3	2	236				
6.9200E	04	3.7728E	00	6.9800E	04	8.0730E	00	7.1000E	04	3.7733E	00	1086	3	2	237				
7.1500E	04	4.2734E	00	7.1700E	04	2.8735E	00	7.2200E	04	3.5736E	00	1086	3	2	238				
7.2500E	04	2.6737E	00	7.3000E	04	1.4474E	01	7.3300E	04	1.0974E	01	1086	3	2	239				
7.4000E	04	1.4974E	01	7.4400E	04	1.0474E	01	7.5000E	04	1.4974E	01	1086	3	2	240				
7.5800E	04	7.7745E	00	7.6100E	04	9.6745E	00	7.7600E	04	5.6749E	00	1086	3	2	241				
7.8000E	04	5.9750E	00	7.8500E	04	4.9751E	00	7.9200E	04	7.2752E	00	1086	3	2	242				
8.0600E	04	3.6756E	00	8.2000E	04	1.3276E	01	8.3800E	04	7.6762E	00	1086	3	2	243				
8.4200E	04	8.7763E	00	8.5600E	04	5.2766E	00	8.6300E	04	8.1767E	00	1086	3	2	244				
8.7300E	04	5.5769E	00	8.7600E	04	5.9769E	00	8.8400E	04	5.2771E	00	1086	3	2	245				
8.9000E	04	3.5772E	00	9.0000E	04	1.0477E	01	9.0800E	04	4.5775E	00	1086	3	2	246				

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9.1500E 04 8.0776E 00 9.2000E 04 6.6777E 00 9.2500E 04 7.9778E 001086 3  2  247
9.3000E 04 5.8779E 00 9.4000E 04 5.1781E 00 9.5000E 04 5.9782E 001086 3  2  248
9.5600E 04 5.0783E 00 9.6200E 04 7.5784E 00 9.7700E 04 4.6787E 001086 3  2  249
9.8400E 04 5.9788E 00 9.9000E 04 4.7788E 00 9.9500E 04 5.9789E 001086 3  2  250
9.99   E+04 4.679       1.0    E+05 4.679       1.0    E+05 4.4647     1086 3  2  251
2.0     +05 4.774       3.0     +05 4.881       4.0     +05 4.6342     1086 3  2  252
5.0     +05 4.3352      6.0     +05 4.086       6.79    +05 3.90       1086 3  2  253
7.0     +05 3.8558      7.82    +05 3.68        8.0     +05 3.6656     1086 3  2  254
9.0     +05 3.476       9.76    +05 3.33        1.0     +06 3.282      1086 3  2  255
1.131   +06 3.05        1.348   +06 2.80        1.435   +06 2.70       1086 3  2  256
1.50    +06 2.6615      1.572   +06 2.56        1.648   +06 2.45       1086 3  2  257
1.65    +06 2.45        1.73    +06 2.38        1.75    +06 2.35       1086 3  2  258
2.0     +06 2.077       2.5     +06 1.847       3.0     +06 1.845      1086 3  2  259
3.5     +06 1.92        4.0     +06 2.011       4.5     +06 2.108      1086 3  2  260
5.0     +06 2.157       5.5     +06 2.201       6.0     +06 2.214      1086 3  2  261
6.5     +06 2.221       7.0     +06 2.215       7.5     +06 2.176      1086 3  2  262
8.0     +06 2.133       8.5     +06 2.072       9.0     +06 2.011      1086 3  2  263
9.5     +06 1.973       1.0     +07 1.945       1.05    +07 1.905      1086 3  2  264
1.10    +07 1.83        1.15    +07 1.77        1.20    +07 1.70       1086 3  2  265
1.25    +07 1.65        1.30    +07 1.60        1.35    +07 1.523      1086 3  2  266
1.40    +07 1.465       1.45    +07 1.415       1.50    +07 1.355      1086 3  2  267
0.0       0.0             0           0           0          01086 3  0  268
2.9065 +04 6.4373 +01     0           0           0          01086 3  4  269
0.0       -0.770  +06     0           0           1          411086 3  4  270
        41            2                                      1086 3  4  271
7.82    +05 0.0         8.0     +05 0.010       9.0     +05 0.074      1086 3  4  272
9.76    +05 0.0987      1.0     +06 0.104       1.131   +06 0.129      1086 3  4  273
1.348   +06 0.3445      1.435   +06 0.407       1.50    +06 0.4370     1086 3  4  274
1.572   +06 0.4857      1.648   +06 0.5508      1.65    +06 0.5538     1086 3  4  275
1.73    +06 0.6439      1.75    +06 0.6660      2.0     +06 0.8204     1086 3  4  276
2.5     +06 1.0618      3.0     +06 1.2216      3.5     +06 1.2753     1086 3  4  277
4.0     +06 1.3183      4.5     +06 1.3309      5.0     +06 1.3512     1086 3  4  278
5.5     +06 1.3413      6.0     +06 1.3365      6.5     +06 1.3190     1086 3  4  279
7.0     +06 1.2977      7.5     +06 1.2711      8.0     +06 1.2611     1086 3  4  280
8.5     +06 1.2457      9.0     +06 1.2302      9.5     +06 1.1927     1086 3  4  281
1.0     +07 1.1550      1.05    +07 1.1457      1.10    +07 1.1058     1086 3  4  282
1.15    +07 1.0683      1.20    +07 0.9844      1.25    +07 0.8848     1086 3  4  283
1.30    +07 0.7920      1.35    +07 0.7109      1.40    +07 0.6402     1086 3  4  284
1.45    +07 0.5839      1.50    +07 0.5459                             1086 3  4  285
0.0       0.0             0           0           0          01086 3  0  286
2.9065 +04 6.4373 +01     0           0           0          01086 3  5  287
0.0       -0.770  +06     0           0           1          161086 3  5  288
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         16            2                                                 1086 3  5   289
7.82    +05 0.0          8.0     +05 0.010      9.0     +05 0.074       1086 3  5   290
9.76    +05 0.0987       1.0     +06 0.104      1.131   +06 0.129       1086 3  5   291
1.348   +06 0.1375       1.435   +06 0.155      1.50    +06 0.165       1086 3  5   292
1.572   +06 0.1663       1.648   +06 0.1676     1.65    +06 0.1676      1086 3  5   293
1.73    +06 0.1679       1.75    +06 0.168      1.75    +06 0.0         1086 3  5   294
1.50    +07 0.0                                                          1086 3  5   295
0.0         0.0                   0          0          0              01086 3  0   296
2.9065  +04 6.4373 +C1            0          0          0              01086 3  6   297
0.0        -1.114  +06            0          0          1             111086 3  6   298
         11            2                                                 1086 3  6   299
1.131   +06 0.0          1.348   +06 0.207      1.435   +06 0.252       1086 3  6   300
1.50    +06 0.272        1.572   +06 0.288      1.648   +06 0.314       1086 3  6   301
1.65    +06 0.314        1.73    +06 0.327      1.75    +06 0.330       1086 3  6   302
1.75    +06 0.0          1.50    +07 0.0                                 1086 3  6   303
0.0         0.0                   0          0          0              01086 3  0   304
2.9065  +04 6.4373 +C1            0          0          0              01086 3  7   305
0.0        -1.482  +06            0          0          1              81086 3  7   306
          8            2                                                 1086 3  7   307
1.50    +06 0.0          1.572   +06 0.0314     1.648   +06 0.0692      1086 3  7   308
1.65    +06 0.0692       1.73    +06 0.107      1.75    +06 0.116       1086 3  7   309
1.75    +06 0.0          1.50    +07 0.0                                 1086 3  7   310
0.0         0.0                   0          0          0              01086 3  0   311
2.9065  +04 6.4373 +C1            0          0          0              01086 3  8   312
0.0        -1.623  +06            0          0          1              61086 3  8   313
          6            2                                                 1086 3  8   314
1.648   +06 0.0          1.65    +06 0.003      1.73    +06 0.042       1086 3  8   315
1.75    +06 0.052        1.75    +06 0.0        1.50    +07 0.0         1086 3  8   316
0.0         0.0                   0          0          0              01086 3  0   317
2.9065  +04 6.4373 +C1            0          0          0              01086 3 16   318
0.0        -9.91   +06            0          0          1             101086 3 16   319
         10            3                                                 1086 3 16   320
1.05    +07 0.0          1.10    +07 0.170      1.15    +07 0.34        1086 3 16   321
1.20    +07 0.462        1.25    +07 0.617      1.30    +07 0.740       1086 3 16   322
1.35    +07 0.840        1.40    +07 0.920      1.45    +07 0.973       1086 3 16   323
1.50    +07 1.090                                                        1086 3 16   324
0.0         0.0                   0          0          0              01086 3  0   325
2.9065  +04 6.4373 +C1            0          0          0              01086 3102   326
0.0         0.0                   0          0          1            1951086 3102   327
        195            5          0          0          0              01086 3102   328
1.0     -03 11.068       2.53    -02 2.2002     5.1265  -01 0.48832     1086 3102   329
1.0     +00 0.3493       5.5     +00 0.14764    10.0    +00 0.10855     1086 3102   330
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1.0	E+01	0.004	5.0	E+01	0.009	1.0	E+02	0.013	1086	3102	331
5.0	E+02	0.029	1.0	E+03	0.037	5.0	E+03	0.046	1086	3102	332
1.0	E+04	0.037	2.0	E+04	0.026	3.0	E+04	0.022	1086	3102	333
3.0000E	04	4.4000E-02	3.0400E	04	4.3704E-02	3.0550E	04	4.3594E-02	1086	3102	334
3.0600E	04	4.3558E-02	3.0800E	04	4.3414E-02	3.1000E	04	4.3271E-02	1086	3102	335
3.1300E	04	4.3059E-02	3.1400E	04	4.2989E-02	3.1600E	04	4.2850E-02	1086	3102	336
3.1900E	04	4.2644E-02	3.2100E	04	4.2509E-02	3.2300E	04	4.2374E-02	1086	3102	337
3.2650E	04	4.2142E-02	3.3000E	04	4.1914E-02	3.3400E	04	4.1657E-02	1086	3102	338
3.4000E	04	4.1281E-02	3.4300E	04	4.1097E-02	3.4700E	04	4.0855E-02	1086	3102	339
3.5000E	04	4.0676E-02	3.5400E	04	4.0441E-02	3.6000E	04	4.0096E-02	1086	3102	340
3.6200E	04	3.9983E-02	3.6700E	04	3.9704E-02	3.6900E	04	3.9595E-02	1086	3102	341
3.7100E	04	3.9486E-02	3.7800E	04	3.9111E-02	3.8100E	04	3.8954E-02	1086	3102	342
3.8200E	04	3.8902E-02	3.9300E	04	3.8343E-02	3.9700E	04	3.8146E-02	1086	3102	343
4.0100E	04	3.7942E-02	4.0300E	04	3.7827E-02	4.0500E	04	3.7713E-02	1086	3102	344
4.0600E	04	3.7656E-02	4.0900E	04	3.7487E-02	4.1100E	04	3.7376E-02	1086	3102	345
4.1300E	04	3.7265E-02	4.1500E	04	3.7155E-02	4.1800E	04	3.6992E-02	1086	3102	346
4.2000E	04	3.6884E-02	4.2300E	04	3.6724E-02	4.2600E	04	3.6566E-02	1086	3102	347
4.2900E	04	3.6410E-02	4.3200E	04	3.6255E-02	4.3500E	04	3.6102E-02	1086	3102	348
4.3800E	04	3.5951E-02	4.4000E	04	3.5851E-02	4.4300E	04	3.5703E-02	1086	3102	349
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4.7300E	04	3.4302E-02	4.7900E	04	3.4039E-02	4.9000E	04	3.3571E-02	1086	3102	351
4.9800E	04	3.3240E-02	5.0000E	04	3.3159E-02	5.0400E	04	3.2998E-02	1086	3102	352
5.1000E	04	3.2760E-02	5.2400E	04	3.2223E-02	5.2700E	04	3.2111E-02	1086	3102	353
5.3000E	04	3.2000E-02	5.3800E	04	3.1708E-02	5.4600E	04	3.1424E-02	1086	3102	354
5.5000E	04	3.1284E-02	5.6000E	04	3.0942E-02	5.6500E	04	3.0774E-02	1086	3102	355
5.6600E	04	3.0741E-02	5.8200E	04	3.0222E-02	5.8600E	04	3.0096E-02	1086	3102	356
5.9000E	04	2.9971E-02	5.9600E	04	2.9787E-02	5.9800E	04	2.9726E-02	1086	3102	357
6.0600E	04	2.9485E-02	6.1200E	04	2.9309E-02	6.1800E	04	2.9134E-02	1086	3102	358
6.2200E	04	2.9020E-02	6.3000E	04	2.8794E-02	6.3300E	04	2.8711E-02	1086	3102	359
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6.6000E	04	2.7988E-02	6.6500E	04	2.7859E-02	6.6800E	04	2.7783E-02	1086	3102	361
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6.9200E	04	2.7190E-02	6.9800E	04	2.7047E-02	7.1000E	04	2.6731E-02	1086	3102	363
7.1500E	04	2.6600E-02	7.1700E	04	2.6547E-02	7.2200E	04	2.6418E-02	1086	3102	364
7.2500E	04	2.6341E-02	7.3000E	04	2.6213E-02	7.3300E	04	2.6138E-02	1086	3102	365
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7.8000E	04	2.5018E-02	7.8500E	04	2.4905E-02	7.9200E	04	2.4750E-02	1086	3102	368
8.0600E	04	2.4446E-02	8.2000E	04	2.4152E-02	8.3800E	04	2.3785E-02	1086	3102	369
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8.7300E	04	2.3109E-02	8.7600E	04	2.3053E-02	8.8400E	04	2.2906E-02	1086	3102	371
8.9000E	04	2.2797E-02	9.0000E	04	2.2618E-02	9.0800E	04	2.2478E-02	1086	3102	372

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9.3000E 04 2.2102E-02 9.4000E 04 2.1936E-02 9.5000E 04 2.1773E-021086 3102  374
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9.99   E+04 0.021       1.0    E+05 0.021       1.0    E+05 0.0210     1086 3102  377
2.0     +05 0.013       3.0     +05 0.01        4.0     +05 0.0085     1086 3102  378
5.0     +05 0.0077      6.0     +05 0.0074      6.79    +05 0.0072     1086 3102  379
7.0     +05 0.0075      7.82    +05 0.0076      8.0     +05 0.0077     1086 3102  380
9.0     +05 0.0079      9.76    +05 0.0080      1.0     +06 0.0080     1086 3102  381
1.131   +06 0.0077      1.348   +06 0.0071      1.435   +06 0.0070     1086 3102  382
1.50    +06 0.0069      1.572   +06 0.0063      1.648   +06 0.0062     1086 3102  383
1.65    +06 0.0062      1.73    +06 0.0061      1.75    +06 0.0060     1086 3102  384
2.0     +06 0.0056      2.5     +06 0.0046      3.0     +06 0.0038     1086 3102  385
3.5     +06 0.0033      4.0     +06 0.0027      4.5     +06 0.0022     1086 3102  386
5.0     +06 0.0019      5.5     +06 0.0017      6.0     +06 0.0015     1086 3102  387
6.5     +06 0.0016      7.0     +06 0.0017      7.5     +06 0.0018     1086 3102  388
8.0     +06 0.0020      8.5     +06 0.0022      9.0     +06 0.0025     1086 3102  389
9.5     +06 0.0027      1.0     +07 0.0030      1.05    +07 0.0033     1086 3102  390
1.10    +07 0.0035      1.15    +07 0.0037      1.20    +07 0.0040     1086 3102  391
1.25    +07 0.0044      1.30    +07 0.0048      1.35    +07 0.0053     1086 3102  392
1.40    +07 0.0060      1.45    +07 0.0066      1.50    +07 0.0076     1086 3102  393
0.0         0.0             0           0           0           01086 3  0  394
2.9065 +04 6.4373 +01       0           0           0           01086 3103  395
0.0       -1.347  +06       0           0           2           251086 3103  396
        3           3       25          5                       1086 3103  397
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4.5     +06 0.0025      5.0     +06 0.0036      5.5     +06 0.0048     1086 3103  399
6.0     +06 0.0061      6.5     +06 0.0067      7.0     +06 0.0075     1086 3103  400
7.5     +06 0.0080      8.0     +06 0.0087      8.5     +06 0.0100     1086 3103  401
9.0     +06 0.0120      9.5     +06 0.0134      1.0     +07 0.0149     1086 3103  402
1.05    +07 0.0163      1.10    +07 0.0174      1.15    +07 0.0180     1086 3103  403
1.20    +07 0.0194      1.25    +07 0.0202      1.30    +07 0.0206     1086 3103  404
1.35    +07 0.0210      1.40    +07 0.0210      1.45    +07 0.0208     1086 3103  405
1.50    +07 0.0202                                                     1086 3103  406
0.0         0.0             0           0           0           01086 3  0  407
2.9065 +04 6.4373 +01       0           0           0           01086 3107  408
0.0       -0.091  +06       0           0           2           211086 3107  409
        3           3       21          5                       1086 3107  410
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8.0     +06 0.0175      8.5     +06 0.0235      9.0     +06 0.0265     1086 3107  413
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1.40    +07 0.0367      1.45    +07 0.0346      1.50    +07 0.0352     1086 3107  417
0.0         0.0             0           0           0            01086 3  0  418
2.9065  +04 6.4373 +01      0           0           0            01086 3251  419
0.0         0.0             0           0           2           481086 3251  420
          4           2       48          3                        1086 3251  421
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1.00    +04 1.03608-02  5.00    +04 1.66959-02  1.00    +05 3.00850-021086 3251  423
2.07    +05 5.82107-02  3.00    +05 8.81535-02  3.40    +05 1.47281-011086 3251  424
3.90    +05 1.41927-01  4.90    +05 1.29982-01  5.50    +05 1.31405-011086 3251  425
5.90    +05 1.43736-01  6.40    +05 1.66578-01  6.90    +05 1.74954-011086 3251  426
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2.25    +06 4.40161-01  2.47    +06 4.13760-01  2.80    +06 5.37637-011086 3251  433
2.90    +06 5.19029-01  3.00    +06 4.93953-01  3.30    +06 4.83476-011086 3251  434
3.49    +06 5.71657-01  3.70    +06 4.99173-01  4.00    +06 6.38572-011086 3251  435
4.56    +06 6.73380-01  5.00    +06 7.64170-01  6.09    +06 7.29789-011086 3251  436
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0.0         0.0             0           0           0            01086 3  0  438
2.9065  +04 6.4373 +01      0           0           0            01086 3252  439
0.0         0.0             0           0           2           481086 3252  440
          4           2       48          3                        1086 3252  441
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0.0           0.C                0           0            2         481086 3253     460
          4          2          48           3                        1086 3253     461
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3.49      +06 1.72370-C2 3.70      +06 1.83432-02 4.00      +06 1.64177-021086 3253     475
4.56      +C6 1.57C05-02 5.00      +06 1.22486-02 6.09      +06 1.38442-021086 3253     476
7.05      +06 1.32188-02 8.05      +C6 1.24707-02 1.50      +07 1.40511-021086 3253     477
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0.0           C.0                0           0            0          01086 0  0     479
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0.0        6.43730+C1            0           2          441         201086 4  2     481
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0.0          0.0                                                             1086 4  2  627
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0.0          0.C                                                             1086 4  2  647
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-4.5112C-02-4.05946-02-2.75864-02-1.49865-02-3.99256-03 5.17450-031086 4  2  770
 8.66825-03 7.48574-03 3.35418-03 7.47443-04-7.54268-04-1.41192-031086 4  2  771
-1.33278-03-1.C7966-03                                                1086 4  2  772
 0.0        8.05CCC+06          0           0          20            01086 4  2  773
 8.2008E-01 6.76901-01 5.02842-01 3.62960-01 2.07462-01 1.00736-011086 4  2  774
 3.06516-02-1.58811-03-1.65056-02-2.21290-02-2.34706-02-2.09284-021086 4  2  775
-1.5792C-02-1.01331-02-5.19032-03-1.61684-03 5.57783-04 1.41572-031086 4  2  776
 1.24147-03 7.44733-04                                                1086 4  2  777
 0.0        1.5CCCC+07          0           0          20            01086 4  2  778
 8.34532-01 7.29313-01 6.22396-01 5.12066-01 3.87979-01 2.73013-011086 4  2  779
 1.84548-01 1.242C7-01 7.22951-02 3.27272-02 1.34152-02 7.06104-031086 4  2  780
 6.90277-03 8.63178-03 9.98238-03 1.03242-02 9.09703-03 6.94340-031086 4  2  781
 4.25867-03 1.46851-03                                                1086 4  2  782
 0.0        0.0                 0           0           0            01086 4  0  783
 0.0        0.0                 0           0           0            01086 0  0  784
 2.9065 +04 6.4373 +01          0           0           5            01086 5  4  785
 0.0        0.77C  +06          0           3           1           161086 5  4  786
         16              2                                            1086 5  4  787
 7.82   +05 1.0       8.0    +05 1.0       9.0    +05 1.0          1086 5  4  788
 9.76   +05 1.0       1.0    +06 1.0       1.131  +06 1.0          1086 5  4  789
 1.348  +06 0.399     1.435  +06 0.381     1.50   +06 0.378        1086 5  4  790
 1.572  +06 0.342     1.648  +06 0.304     1.65   +06 0.303        1086 5  4  791
 1.73   +06 0.261     1.75   +06 0.252     1.75   +06 0.0          1086 5  4  792
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1.50    +07 0.0                                                          1086 5  4   793
0.0         1.114   +06          0          3          1           111086 5  4   794
       11           2                                                    1086 5  4   795
1.131   +06 0.0         1.348   +06 0.601       1.435   +06 0.619        1086 5  4   796
1.50    +06 0.622       1.572   +06 0.593       1.648   +06 0.570        1086 5  4   797
1.65    +06 0.567       1.73    +06 0.508       1.75    +06 0.495        1086 5  4   798
1.75    +06 0.0         1.50    +07 0.0                                  1086 5  4   799
0.0         1.482   +06          0          3          1            81086 5  4   800
        8           2                                                    1086 5  4   801
1.50    +06 0.0         1.572   +06 0.065       1.648   +06 0.126        1086 5  4   802
1.65    +06 0.125       1.73    +06 0.166       1.75    +06 0.174        1086 5  4   803
1.75    +06 0.0         1.50    +07 0.0                                  1086 5  4   804
0.0         1.623   +06          0          3          1            61086 5  4   805
        6           2                                                    1086 5  4   806
1.648   +06 0.0         1.65    +06 0.005       1.73    +06 0.055        1086 5  4   807
1.75    +06 0.079       1.75    +06 0.0         1.50    +07 0.0          1086 5  4   808
0.0         0.0                  0          9          1           301086 5  4   809
       30           2                                                    1086 5  4   810
7.82    +05 0.0         1.75    +06 0.0         1.75    +06 1.0          1086 5  4   811
2.0     +06 1.0         2.5     +06 1.0         3.0     +06 1.0          1086 5  4   812
3.5     +06 1.0         4.0     +06 1.0         4.5     +06 1.0          1086 5  4   813
5.0     +06 1.0         5.5     +06 1.0         6.0     +06 1.0          1086 5  4   814
6.5     +06 1.0         7.0     +06 1.0         7.5     +06 1.0          1086 5  4   815
8.0     +06 1.0         8.5     +06 1.0         9.0     +06 1.0          1086 5  4   816
9.5     +06 1.0         1.0     +07 1.0         1.05    +07 1.0          1086 5  4   817
1.10    +07 1.0         1.15    +07 1.0         1.20    +07 1.0          1086 5  4   818
1.25    +07 1.0         1.30    +07 1.0         1.35    +07 1.0          1086 5  4   819
1.40    +07 1.0         1.45    +07 1.0         1.50    +07 1.0          1086 5  4   820
0.0         0.0                  0          0          2           301086 5  4   821
        3           2           30          5                            1086 5  4   822
7.82    +05 0.10    +05 1.75    +06 0.10    +05 1.75    +06 0.6038 +061086 5  4   823
2.0     +06 0.6455  +06 2.5     +06 0.7212  +06 3.0     +06 0.7906 +061086 5  4   824
3.5     +06 0.8539  +06 4.0     +06 0.9129  +06 4.5     +06 0.9682 +061086 5  4   825
5.0     +06 1.0206  +06 5.5     +06 1.0704  +06 6.0     +06 1.1180 +061086 5  4   826
6.5     +06 1.1637  +06 7.0     +06 1.2076  +06 7.5     +06 1.2500 +061086 5  4   827
8.0     +06 1.2910  +06 8.5     +06 1.3307  +06 9.0     +06 1.3693 +061086 5  4   828
9.5     +06 1.4068  +06 10.0    +06 1.4434  +06 10.5    +06 1.4790 +061086 5  4   829
11.0    +06 1.5138  +06 11.5    +06 1.5478  +06 12.0    +06 1.5811 +061086 5  4   830
12.5    +06 1.6138  +06 13.0    +06 1.6459  +06 13.5    +06 1.6771 +061086 5  4   831
14.0    +06 1.7078  +06 14.5    +06 1.7380  +06 15.0    +06 1.7678 +061086 5  4   832
0.0         0.0                  0          0          0             01086 5  0   833
2.9065  +04 6.4373  +01          0          0          2             01086 5 16   834
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0.0         0.0                   0          9           1          111086 5 16   835
       11           2                                                  1086 5 16   836
1.0     +07 0.5          1.05     +07 0.5          1.10     +07 0.5    1086 5 16   837
1.15    +07 0.5          1.20     +07 0.5          1.25     +07 0.5    1086 5 16   838
1.30    +07 0.5          1.35     +07 0.5          1.40     +07 0.5    1086 5 16   839
1.45    +07 0.5          1.50     +07 0.5                              1086 5 16   840
0.0         0.0                   0          0           1          111086 5 16   841
       11           3                                                  1086 5 16   842
1.0     +07 1.448   +06 1.05     +07 1.479   +06 1.10     +07 1.514  +061086 5 16   843
1.15    +07 1.547   +06 1.20     +07 1.581   +06 1.25     +07 1.614  +061086 5 16   844
1.30    +07 1.646   +06 1.35     +07 1.677   +06 1.40     +07 1.708  +061086 5 16   845
1.45    +07 1.738   +06 1.50     +07 1.768   +06                       1086 5 16   846
0.0         0.0                   0          9           1          111086 5 16   847
       11           2                                                  1086 5 16   848
1.0     +07 0.5          1.05     +07 0.5          1.10     +07 0.5    1086 5 16   849
1.15    +07 0.5          1.20     +07 0.5          1.25     +07 0.5    1086 5 16   850
1.30    +07 0.5          1.35     +07 0.5          1.40     +07 0.5    1086 5 16   851
1.45    +07 0.5          1.50     +07 0.5                              1086 5 16   852
0.0         0.0                   0          0           1          111086 5 16   853
       11           3                                                  1086 5 16   854
1.0     +07 0.10    +05 1.05     +07 0.299   +06 1.10     +07 0.440  +061086 5 16   855
1.15    +07 0.546   +06 1.20     +07 0.634   +06 1.25     +07 0.711  +061086 5 16   856
1.30    +07 0.781   +06 1.35     +07 0.846   +06 1.40     +07 0.905  +061086 5 16   857
1.45    +07 0.961   +06 1.50     +07 1.013   +06                       1086 5 16   858
0.0         0.0                   0          0           0           01086 5  0   859
0.0         0.0                   0          0           0           01086 0  0   860
0.0         0.0                   0          0           0           0    0 0  0   861
2.9000 +04 6.2994 +01             1          0           0          241087 1451     1
0.0         0.0                   1          0          83           01087 1451     2
COPPER     ENDF/B MAT 1087 REF. AI-AEC-12741      SEPT. 1968           1087 1451     3
MF=1                       GENERAL  INFORMATION                        1087 1451     4
     ATOMIC MASS GIVEN AS 63.54   FOR A NEUTRON MASS OF 1.008665 1087 1451     5
     FOR RADIOACTIVE DECAY SEE SEPERATE ISOTOPES OF COPPER             1087 1451     6
MF=2                        RESONANCE PARAMETERS                       1087 1451     7
  MT=151  CU-63                                                        1087 1451     8
        1.ALL RESOLVED RESONANCES TREATED AS L=0 RESONANCES            1087 1451     9
        2.RESOLVED RESONANCE PARAMETERS FROM REF.2.                    1087 1451    10
        3.G VALUES FOR 7.64KEV AND ABOVE 13.5KEV ASSIGNED.             1087 1451    11
        4.NEGATIVE ENERGY RESONANCE GAMMA-N AND E0 OBTAINED FROM 1087 1451    12
          FIT TO SIGS=5.6B, SIGA=4.5B AT 2200M/S. ASSUMED GAMMA- 1087 1451    13
          GAMMA=0.55EV.                                                1087 1451    14
        5.L=0  UNRESOLVED RESONANCE PARAMETERS FROM AVERAGED           1087 1451    15
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                RESOLVED RESONANCE PARAMETERS. CBSERVED LEVEL SPACING  1087 1451   16
                =DC=1.1KEV, STRENGTH FUNCTICN/J STATE=(SOJ)=2.55E-04,  1087 1451   17
                FOR EACH J STATE D=DO/G                                1087 1451   18
              6.L=1,2  S1J=S2J=1.CE-04, DJ=DO/GJ, GAMMA-GAMMA=0.55EV   1087 1451   19
                ASSUMED.                                               1087 1451   20
              7.OPTIONS LRU=1, LRF=2 (MLBW REF. 10) ARE USED.          1087 1451   21
                CU-65                                                  1087 1451   22
              1.ALL RESOLVED RESONANCES TREATED AS L=0 RESONANCES      1087 1451   23
              2.RESOLVED RESONANCE PARAMETERS FROM REF.2.              1087 1451   24
              3.G VALUES FOR C.229KEV AND ABOVE 14KEV ASSIGNED         1087 1451   25
              4.NEGATIVE ENERGY RESONANCE GAMMA-N AND E0 OBTAINED FROM 1087 1451   26
                FIT TO SIGS=15.4B, SIGA=2.2B AT 2200M/S. ASSUMED GAMMA-1087 1451   27
                GAMMA=0.24EV.                                          1087 1451   28
              5.L=0  UNRESOLVED RESONANCE PARAMETERS FROM AVERAGED     1087 1451   29
                RESOLVED RESONANCE PARAMETERS. CBSERVED LEVEL SPACING  1087 1451   30
                =DO=1.4KEV, STRENGTH FUNCTION/J STATE=S0J=1.7E-04, FOR 1087 1451   31
                EACH J STATE D=DO/G                                    1087 1451   32
              6.L=1,2  S1J=S2J=1.CE-04, DJ=DO/GJ, GAMMA-GAMMA=0.24EV   1087 1451   33
                ASSUMED.                                               1087 1451   34
              7.OPTIONS LRU=1, LRF=2 (MLBW REF. 10) ARE USED.          1087 1451   35
MF=3                      SMOOTH CROSS SECTIONS                        1087 1451   36
  MT=1    TOTAL IS EQUAL TO THE SUM OF PARTIAL CROSS SECTIONS. 30      1087 1451   37
          TO 100 KEV EXPERIMENTAL DATA OF REF.2 USED AT 130            1087 1451   38
          POINTS. ABOVE RESONANCE REGION RESULT AGREE WITH REF.5.      1087 1451   39
  MT=2    BELOW RESONANCE REGION =7.7BARNS, REF. DOC. NOTE- THE        1087 1451   40
          ABUNDANCE WEIGHTED VALUE IS 8.648ARNS.  IN                   1087 1451   41
          THE RESOLVED RESONANCE RANGE THE SMOOTH DATA IS THE          1087 1451   42
          CONTRIBUTION FROM L .GT. 0 CALCULATED FROM UNRESOLVED        1087 1451   43
          RESONANCE PARAMETERS USING TRIX-REF. 4. FROM 30 TO 100       1087 1451   44
          KEV VALUES ARE THE DIFFERENCE BETWEEN THE TOTAL AND          1087 1451   45
          NON-ELASTIC CROSS SECTIONS. ABOVE 100 KEV, REF. 5.           1087 1451   46
  MT=4-13 LEVEL DATA TO 1.75 MEV. CONTINUUM ABOVE 1.75 MEV. BOTH       1087 1451   47
          FROM REF. 5.                                                 1087 1451   48
  MT=16   REF. 5                                                       1087 1451   49
  MT=251  MUBAR CALCULATED FROM LEGENDRE COEFFICIENTS IN FILE 4        1087 1451   50
          USING CHAD-REF. 6.                                           1087 1451   51
  MT=252  XI CALCULATED FROM LEGENDRE COEFFICIENTS IN FILE 4           1087 1451   52
          USING CHAD-REF. 6.                                           1087 1451   53
  MT=253  GAMMA CALCULATED FROM LEGENDRE COEFFICIENTS IN FILE 4        1087 1451   54
          USING CHAD-REF. 6.                                           1087 1451   55
  MT=102  BELOW RES. REGION CALCULATED USING UNICORN-REF. 3. FOR       1087 1451   56
          RESOLVED RES. RANGE, L .GT. 0 CONTRIBUTION CALCULATED        1087 1451   57
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            FROM UNRESOLVED RES. PARAMETERS USING TRIX-REF. 4.      1087 1451   58
            THE 3C TO 100 KEV RANGE FROM EVALUATION OF REFERENCE    1087 1451   59
            DOCUMENT. ABOVE 1CO KEV, ABUNDANCE WEIGHTED ISOTOPIC    1087 1451   60
            VALUES-REF. 5.                       NOTE- ABUNDANCE    1087 1451   61
            WEIGHTED ISOTOPIC DATA ARE 45-80 PERCENT HIGHER THAN    1087 1451   62
            EVALUATED NATURAL CU MEASUREMENTS IN UNRESOLVED REGION.1087 1451   63
  MT=1C3    REF.5                                                   1087 1451   64
  MT=1C7    REF.5                                                   1087 1451   65
MF=4                SECONDARY ANGULAR DISTRIBUTIONS                 1087 1451   66
  MT=2      LEGENDRE COEFF. FOR ELASTIC SCATT. ARE GIVEN. DATA ARE 1087 1451   67
            FROM REFERANCES 7,8,9. WHERE LEGENDRE COEFF. WERE NOT  1087 1451   68
            GIVEN THEY WERE OBTAINED FRCM THE DATA POINTS BY USING 1087 1451   69
            CHAD-REF.6.                                             1087 1451   70
MF=5                SECONDARY ENERGY DISTRIBUTIONS                  1087 1451   71
  MT=4      REF. 5                                                  1087 1451   72
  MT=16      REF. 5                                                 1087 1451   73
                              REFERENCES                            1087 1451   74
      1. GOLDMAN,DAVID T.,CHART OF THE NUCLIDES,KAPL(1966)          1087 1451   75
      2. GOLDBERG,M.D.,ET. AL., BNL 325 2ND. ED. SUPPL. NO.2 VOL.   1087 1451   76
      3.   OTTER,J., NAA-SR-1198C VOL.6(1966)                       1087 1451   77
      4. OTTER,J.,NAA-SR-MEMC-11538 (1965)                          1087 1451   78
      5. OFFORD,SUSAN M.,PARKER,K.,AWRE 0-63/67 (1967)              1087 1451   79
      6. BERLAND,R.F.,NAA-SR-11231 (1965)                           1087 1451   80
      7. GOLDBERG,M.D.,ET. AL., BNL 400 2ND ED. VOL. II (1962)      1087 1451   81
      8. HOLMQVIST,B.,WIEDLING,T., NUCLEAR DATA FOR REACTORS, VOL.1087 1451   82
         I, IAEA, VIENNA (1967)                                     1087 1451   83
      9. SMITH,A.B.,ET. AL., PHY. REV. 135, B76 (1964)              1087 1451   84
     10. OTTER,J.M., NSE 28, 149 (1967)                             1087 1451   85
0.0        0.0                 1      451       107             01087 1451   86
0.0        0.0                 2      151        57             01087 1451   87
0.0        0.0                 3        1        68             01087 1451   88
0.0        0.0                 3        2        68             01087 1451   89
0.0        0.0                 3        4        18             01087 1451   90
0.0        0.0                 3        5         9             01087 1451   91
0.0        0.0                 3        6         9             01087 1451   92
0.0        0.0                 3        7         8             01087 1451   93
0.0        0.0                 3        8         7             01087 1451   94
0.0        0.0                 3        9         7             01087 1451   95
0.0        0.0                 3       10         6             01087 1451   96
0.0        0.0                 3       11         6             01087 1451   97
0.0        0.0                 3       12         6             01087 1451   98
0.0        0.0                 3       13         5             01087 1451   99
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0.0		0.0			3		16		7	01087	1451	100
0.0		0.0			3		102		68	01087	1451	101
0.0		0.0			3		103		15	01087	1451	102
0.0		0.C			3		107		10	01087	1451	103
0.0		0.0			3		251		19	01087	1451	104
0.0		0.0			3		252		19	01087	1451	105
0.0		0.0			3		253		19	01087	1451	106
0.0		0.0			4		2		303	01087	1451	107
0.0		0.0			5		4		79	01087	1451	108
0.0		0.0			5		16		35	01087	1451	109
0.0		0.0			0		0		0	01087	1 0	110
0.0		0.C			0		0		0	01087	0 0	111
2.9000	+04	6.2994	+01		0		0		2	01087	2151	112
2.9063	+04	0.6842			0		0		1	01087	2151	113
1.0	+C1	3.0	+C4		1		2		0	01087	2151	114
1.5		0.73C2			0		0		1	01087	2151	115
1.078	-C3	0.C			0		0		168	281087	2151	116
-3.069	+02	2.0		5.103	+00	4.553	+00	0.55	+00	1087	2151	117
5.777	+C2	2.0		1.410	+00	0.860	+0	0.55	+00	1087	2151	118
2.06C	+03	1.0		4.405	+01	4.35	+01	0.55	+00	1087	2151	119
2.66C	+C3	2.0		5.C5	+00	4.5	+00	0.55	+00	1087	2151	120
4.86C	+03	1.C		1.455	+01	1.4	+01	0.55	+00	1087	2151	121
5.39C	+C3	2.0		4.055	+01	4.0	+01	0.55	+00	1087	2151	122
5.82C	+03	2.C		1.095	+01	1.C4	+01	0.55	+00	1087	2151	123
7.640	+03	2.0		C.735	+01	0.68	+01	0.55	+00	1087	2151	124
7.94	+03	2.0		8.C55	+01	8.C	+01	0.55	+00	1087	2151	125
9.20	+03	2.0		3.715	+01	3.66	+01	0.55	+00	1087	2151	126
9.93	+C3	1.C		8.755	+C1	8.7	+01	0.55	+00	1087	2151	127
1.085	+C4	2.0		5.855	+C1	5.8	+01	0.55	+00	1087	2151	128
1.254	+04	1.0		2.355	+01	2.3	+01	0.55	+00	1087	2151	129
1.317	+04	2.C		6.655	+01	6.6	+01	0.55	+00	1087	2151	130
1.370	+04	2.0		3.999	+01	3.944	+01	0.55	+00	1087	2151	131
1.49C	+04	2.0		2.831	+01	2.776	+01	0.55	+00	1087	2151	132
1.56C	+04	2.0		1.823	+01	1.768	+01	0.55	+00	1087	2151	133
1.61C	+04	2.0		1.159	+01	1.104	+01	0.55	+00	1087	2151	134
1.788	+C4	1.C		1.3355	+02	1.33	+02	0.55	+00	1087	2151	135
1.812	+04	1.C		13.355	+01	13.30	+01	0.55	+00	1087	2151	136
2.104	+C4	1.0		2.C055	+02	2.00	+02	0.55	+00	1087	2151	137
2.125	+C4	2.C		1.2055	+02	1.20	+02	0.55	+00	1087	2151	138
2.282	+C4	2.0		1.1255	+02	1.12	+02	0.55	+00	1087	2151	139
2.48C	+C4	2.C		C.6095	+02	0.604	+02	0.55	+00	1087	2151	140
2.56C	+C4	2.C		1.6615	+02	1.656	+02	0.55	+00	1087	2151	141

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2.650  +C4 2.0          9.735  +01 9.68   +01 0.55   +00            1087 2151   142
2.82   +04 1.0          6.921  +01 6.866  +01 0.55   +00            1087 2151   143
2.93   +C4 1.0          32.285 +01 32.23  +01 0.55   +00            1087 2151   144
2.9065 +C4 0.3158                0          0          1           01087 2151   145
1.0    +C1 3.0     +C4          1          2          0           01087 2151   146
1.5        0.73C2               0          0          1           01087 2151   147
1.090  -03 0.C                  0          0        120           201087 2151   148
-9.476 +02 2.0          9.231  +01 9.207  +01 0.24   +00            1087 2151   149
2.290  +C2 2.0          2.6    -01 1.60   -02 0.24   +00            1087 2151   150
2.55   +C3 2.0          1.704  +01 1.68   +01 0.24   +00            1087 2151   151
3.92   +C3 1.0          2.424  +01 2.40   +01 0.24   +00            1087 2151   152
4.4    +03 2.0          7.24   +00 7.0    +00 0.24   +00            1087 2151   153
4.5    +03 1.0          1.624  +01 1.6    +01 0.24   +00            1087 2151   154
6.48   +03 2.0          2.624  +01 2.6    +01 0.24   +00            1087 2151   155
7.6    +03 2.0          2.324  +01 2.3    +01 0.24   +00            1087 2151   156
7.65   +C3 1.0          3.324  +01 3.3    +01 0.24   +00            1087 2151   157
7.94   +03 2.0          5.024  +01 5.0    +01 0.24   +00            1087 2151   158
8.549  +C3 1.0          7.80   +00 7.56   +00 0.24   +00            1087 2151   159
1.366  +04 2.0          7.524  +01 7.5    +01 0.24   +00            1087 2151   160
1.423  +04 2.0          4.184  +01 4.16   +01 0.24   +00            1087 2151   161
1.509  +C4 2.0          C.786  +01 0.762  +01 0.24   +00            1087 2151   162
1.582  +04 2.0          3.224  +01 3.2    +01 0.24   +00            1087 2151   163
1.780  +C4 2.0          2.4468 +02 2.4444 +02 0.24   +00            1087 2151   164
2.0    +C4 1.0          2.5356 +C2 2.5332 +02 0.24   +00            1087 2151   165
2.18   +C4 1.0          3.677  +01 3.653  +01 0.24   +00            1087 2151   166
2.41   +C4 1.0          1.1224 +02 1.12   +02 0.24   +00            1087 2151   167
2.5    +04 2.0          2.0504 +02 2.048  +02 0.24   +00            1087 2151   168
0.0        0.0                  0          0          0         01087 2   0     169
0.0        0.0                  0          0          0         01087 0   0     170
2.90C0 +C4 6.2994 +01           0          0          0         01087 3   1     171
0.0        0.0                  0          0          1       1951087 3   1     172
       195              5       0          0          0         01087 3   1     173
1.0   E-03 26.7534     2.53  E-02 11.4876     5.1265E-01 8.5393     1087 3   1   174
1.0000E 00 8.2996E 00 5.500CE 00 7.9500E 00 1.0000E 01 7.8815E 001087 3   1   175
1.0000E 01 4.C0C0E-03 5.000CE 01 9.0000E-03 1.0000E 02 1.3000E-021087 3   1   176
5.0000E 02 2.90CCE-C2 1.000CE 03 3.8000E-02 5.0000E 03 8.7000E-021087 3   1   177
1.0000E C4 1.37CCE-C1 2.00CCE 04 1.9800E-01 3.0000E 04 2.3000E-011087 3   1   178
3.0000E 04 1.C7CCE 01 3.04CCE 04 7.2000E 00 3.0550E 04 1.0400E 011087 3   1   179
3.0600E C4 8.2CCCE C0 3.C8CCE 04 6.8000E 00 3.1000E 04 7.0000E 001087 3   1   180
3.1300E C4 4.60CCE 00 3.140CE 04 1.5800E 01 3.1600E 04 6.7000E 001087 3   1   181
3.1900E C4 5.90CCE 00 3.210CE 04 4.8000E 00 3.2300E 04 7.0000E 001087 3   1   182
3.2650E C4 4.40CCE 00 3.30CCE 04 4.5000E 00 3.3400E 04 2.5200E 011087 3   1   183
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3.4000E	04	7.2000E	00	3.4300E	04	1.0500E	01	3.4700E	04	7.0000E	001087	3	1	184
3.5000E	04	2.0000E	01	3.5400E	04	7.9999E	00	3.6000E	04	5.1000E	001087	3	1	185
3.6200E	04	2.4000E	01	3.6700E	04	4.6000E	00	3.6900E	04	2.0500E	011087	3	1	186
3.7100E	04	9.2000E	00	3.7800E	04	6.1000E	00	3.8100E	04	8.2000E	001087	3	1	187
3.8200E	04	6.1000E	00	3.9300E	04	4.6000E	00	3.9700E	04	1.3000E	011087	3	1	188
4.0100E	04	6.0000E	00	4.0300E	04	7.0000E	00	4.0500E	04	5.4000E	001087	3	1	189
4.0600E	04	6.2000E	00	4.0900E	04	4.7000E	00	4.1100E	04	6.3000E	001087	3	1	190
4.1300E	04	4.5000E	00	4.1500E	04	4.0000E	00	4.1800E	04	2.7000E	001087	3	1	191
4.2000E	04	2.2000E	01	4.2300E	04	1.2000E	01	4.2600E	04	2.0500E	011087	3	1	192
4.2900E	04	1.1700E	01	4.3200E	04	1.3400E	01	4.3500E	04	8.4000E	001087	3	1	193
4.3800E	04	1.0000E	01	4.4000E	04	6.8000E	00	4.4300E	04	8.0000E	001087	3	1	194
4.4600E	04	5.6000E	00	4.4800E	04	1.2000E	01	4.5000E	04	6.3000E	001087	3	1	195
4.7300E	04	4.5000E	00	4.7900E	04	7.0000E	00	4.9000E	04	4.2000E	001087	3	1	196
4.9800E	04	3.8000E	00	5.0000E	04	2.2999E	00	5.0400E	04	9.0000E	001087	3	1	197
5.1000E	04	4.2000E	00	5.2400E	04	3.0000E	00	5.2700E	04	2.6000E	001087	3	1	198
5.3000E	04	2.8000E	00	5.3800E	04	1.6500E	01	5.4600E	04	3.8000E	001087	3	1	199
5.5000E	04	2.0000E	01	5.6000E	04	9.8000E	00	5.6500E	04	1.8600E	011087	3	1	200
5.6600E	04	1.2000E	01	5.8200E	04	7.0000E	00	5.8600E	04	1.2000E	011087	3	1	201
5.9000E	04	6.8000E	00	5.9600E	04	7.7000E	00	5.9800E	04	6.6000E	001087	3	1	202
6.0600E	04	6.5000E	00	6.1200E	04	5.0000E	00	6.1800E	04	4.3000E	001087	3	1	203
6.2200E	04	7.8000E	00	6.3000E	04	3.5000E	00	6.3300E	04	6.6000E	001087	3	1	204
6.4200E	04	3.0000E	00	6.4700E	04	5.0000E	00	6.5400E	04	1.3100E	011087	3	1	205
6.6000E	04	5.0000E	00	6.6500E	04	1.1500E	01	6.6800E	04	8.2000E	001087	3	1	206
6.7200E	04	1.2000E	01	6.7900E	04	6.2000E	00	6.8200E	04	7.2000E	001087	3	1	207
6.9200E	04	3.8000E	00	6.9800E	04	8.1000E	00	7.1000E	04	3.8000E	001087	3	1	208
7.1500E	04	4.3000E	00	7.1700E	04	2.9000E	00	7.2200E	04	3.6000E	001087	3	1	209
7.2500E	04	2.7000E	00	7.3000E	04	1.4500E	01	7.3300E	04	1.1000E	011087	3	1	210
7.4000E	04	1.5000E	01	7.4400E	04	1.0500E	01	7.5000E	04	1.5000E	011087	3	1	211
7.5800E	04	7.8000E	00	7.6100E	04	9.7000E	00	7.7600E	04	5.7000E	001087	3	1	212
7.8000E	04	6.0000E	00	7.8500E	04	5.0000E	00	7.9200E	04	7.3000E	001087	3	1	213
8.0600E	04	3.7000E	00	8.2000E	04	1.3300E	01	8.3800E	04	7.7000E	001087	3	1	214
8.4200E	04	8.8000E	00	8.5600E	04	5.3000E	00	8.6300E	04	8.2000E	001087	3	1	215
8.7300E	04	5.6000E	00	8.7600E	04	6.0000E	00	8.8400E	04	5.3000E	001087	3	1	216
8.9000E	04	3.6000E	00	9.0000E	04	1.0500E	01	9.0800E	04	4.6000E	001087	3	1	217
9.1500E	04	8.1000E	00	9.2000E	04	6.7000E	00	9.2500E	04	8.0000E	001087	3	1	218
9.3000E	04	5.9000E	00	9.4000E	04	5.2000E	00	9.5000E	04	6.0000E	001087	3	1	219
9.5600E	04	5.1000E	00	9.6200E	04	7.6000E	00	9.7700E	04	4.7000E	001087	3	1	220
9.8400E	04	6.0000E	00	9.9000E	04	4.8000E	00	9.9500E	04	6.0000E	001087	3	1	221
9.9900E	04	4.7000E	00	1.0000E	05	4.7000E	00	1.0000E	05	4.4927E	001087	3	1	222
2.0000E	05	4.8001E	00	3.0000E	05	4.9000E	00	4.0000E	05	4.6499E	001087	3	1	223
5.0000E	05	4.3500E	00	6.0000E	05	4.1000E	00	6.7900E	05	3.9138E	001087	3	1	224
7.0000E	05	3.9000E	00	7.8200E	05	3.7633E	00	8.0000E	05	3.7601E	001087	3	1	225

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9.0000E 05 3.62CCE CC 9.760CE 05 3.4915E 00 1.0000E 06 3.5201E 001087 3  1  226
1.1310E 06 3.417SE C0 1.348OE 06 3.3027E 00 1.4350E 06 3.2587E 001087 3  1  227
1.5000E 06 3.26CCE C0 1.572OE 06 3.2051E 00 1.6480E 06 3.1647E 001087 3  1  228
1.6500E 06 3.1658E CC 1.73C0E 06 3.1744E 00 1.7500E 06 3.1629E 001087 3  1  229
2.0000E C6 3.08CCE C0 2.50CCE 06 3.1500E 00 3.0000E 06 3.3500E 001087 3  1  230
3.5000E 06 3.4994E C0 4.000CE 06 3.6495E 00 4.5000E 06 3.7703E 001087 3  1  231
5.0000E C6 3.8499E C0 5.5000E 06 3.8895E 00 6.0000E 06 3.9020E 001087 3  1  232
6.5000E 06 3.8914E 00 7.000CE 06 3.8641E 00 7.5000E 06 3.7994E 001087 3  1  233
8.00C0E 06 3.75C0E 00 8.5000E 06 3.6762E 00 9.0000E 06 3.6000E 001087 3  1  234
9.5000E 06 3.52C5E CC 1.00C0E 07 3.4500E 00 1.0500E 07 3.4009E 001087 3  1  235
1.10C0E 07 3.3310E C0 1.1500E 07 3.3071E 00 1.2000E 07 3.2010E 001087 3  1  236
1.25C0E C7 3.152CE C0 1.30C0E 07 3.0999E 00 1.3500E 07 3.0189E 001087 3  1  237
1.4000E C7 2.96C0E 00 1.450CE 07 2.9102E 00 1.5000E 07 2.8810E 001087 3  1  238
0.0        0.0                  0           0           0           01087 3  0  239
2.9000 +C4 6.2994 +01           0           0           0           01087 3  2  240
0.0        0.0                  0           0           3         1951087 3  2  241
         6            5         12           2         195         51087 3  2  242
1.0   E-03 7.7        2.53  E-02 7.7        5.1265E-01 7.7         1087 3  2  243
1.0   E+C0 7.7        5.50  E+00 7.7        1.0   E+01 7.7         1087 3  2  244
1.0   E+01 0.0        5.0   E+01 0.0        1.0   E+02 0.0         1087 3  2  245
5.0   E+C2 0.0        1.0   E+03 0.0        5.0   E+03 0.03        1087 3  2  246
1.0   E+04 0.C8       2.0   E+04 0.15       3.0   E+04 0.19        1087 3  2  247
3.0000E 04 1.C652E C1 3.C40CE 04 7.1523E 00 3.0550E 04 1.0352E 011087 3  2  248
3.0600E 04 8.1524E CC 3.08CCE 04 6.7526E 00 3.1000E 04 6.9527E 001087 3  2  249
3.13C0E C4 4.5529E 00 3.14CCE 04 1.5753E 01 3.1600E 04 6.6531E 001087 3  2  250
3.1900E 04 5.8533E 00 3.21CCE 04 4.7535E 00 3.2300E 04 6.9536E 001087 3  2  251
3.2650E C4 4.3538E 00 3.3000E 04 4.4541E 00 3.3400E 04 2.5154E 011087 3  2  252
3.4000E 04 7.1547E CC 3.43CCE 04 1.0455E 01 3.4700E 04 6.9551E 001087 3  2  253
3.5000E C4 1.9955E C1 3.54CCE 04 7.9555E 00 3.6000E 04 5.0559E 001087 3  2  254
3.6200E C4 2.3956E C1 3.67CCE 04 4.5563E 00 3.6900E 04 2.0456E 011087 3  2  255
3.7100E C4 9.1565E 0C 3.78CCE 04 6.0569E 00 3.8100E 04 8.1570E 001087 3  2  256
3.8200E C4 6.0571E 00 3.93CCE 04 4.5577E 00 3.9700E 04 1.2958E 011087 3  2  257
4.01C0E C4 5.9580E 00 4.03CCE 04 6.9581E 00 4.0500E 04 5.3582E 001087 3  2  258
4.0600E 04 6.1583E CC 4.090CE 04 4.6584E 00 4.1100E 04 6.7585E 001087 3  2  259
4.1300E 04 4.4586E CC 4.150CE 04 3.9587E 00 4.1800E 04 2.6588E 001087 3  2  260
4.2000E 04 2.1959E 01 4.230CE 04 1.1959E 01 4.2600E 04 2.0459E 011087 3  2  261
4.2900E C4 1.1659E C1 4.320CE 04 1.3359E 01 4.3500E 04 8.3595E 001087 3  2  262
4.3800E 04 9.9596E 00 4.400CE 04 6.7597E 00 4.4300E 04 7.9598E 001087 3  2  263
4.4600E 04 5.5599E 00 4.480CE 04 1.1960E 01 4.5000E 04 6.7601E 001087 3  2  264
4.7300E C4 4.4609E 00 4.790CE 04 6.9611E 00 4.9000E 04 4.1615E 001087 3  2  265
4.9800E 04 3.7618E CC 5.000CE 04 2.2618E 00 5.0400E 04 8.9620E 001087 3  2  266
5.1000E 04 4.1622E CC 5.240CE 04 2.9626E 00 5.2700E 04 2.5627E 001087 3  2  267
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5.3000E 04 2.7628E 00 5.3800E 04 1.6463E 01 5.4600E 04 3.7633E 001087 3  2  268
5.5000E 04 1.9963E 01 5.6000E 04 9.7637E 00 5.6500E 04 1.8564E 011087 3  2  269
5.6600E 04 1.1964E 01 5.8200E 04 6.9643E 00 5.8600E 04 1.1964E 011087 3  2  270
5.9000E 04 6.7645E 00 5.9600E 04 7.6646E 00 5.9800E 04 6.5647E 001087 3  2  271
6.0600E 04 6.4649E 00 6.1200E 04 4.9650E 00 6.1800E 04 4.2652E 001087 3  2  272
6.2200E 04 7.7653E 00 6.3000E 04 3.4655E 00 6.3300E 04 6.5655E 001087 3  2  273
6.4200E 04 2.9657E 00 6.4700E 04 4.9659E 00 6.5400E 04 1.3066E 011087 3  2  274
6.6000E 04 4.9662E 00 6.6500E 04 1.1466E 01 6.6800E 04 8.1663E 001087 3  2  275
6.7200E 04 1.1966E 01 6.7900E 04 6.1666E 00 6.8200E 04 7.1666E 001087 3  2  276
6.9200E 04 3.7668E 00 6.9800E 04 8.0670E 00 7.1000E 04 3.7672E 001087 3  2  277
7.1500E 04 4.2673E 00 7.1700E 04 2.8674E 00 7.2200E 04 3.5675E 001087 3  2  278
7.2500E 04 2.6675E 00 7.3000E 04 1.4468E 01 7.3300E 04 1.0968E 011087 3  2  279
7.4000E 04 1.4968E 01 7.4400E 04 1.0468E 01 7.5000E 04 1.4968E 011087 3  2  280
7.5800E 04 7.7682E 00 7.6100E 04 9.6682E 00 7.7600E 04 5.6685E 001087 3  2  281
7.8000E 04 5.9686E 00 7.8500E 04 4.9687E 00 7.9200E 04 7.2688E 001087 3  2  282
8.0600E 04 3.6691E 00 8.2000E 04 1.3269E 01 8.3800E 04 7.6696E 001087 3  2  283
8.4200E 04 8.7697E 00 8.5600E 04 5.2699E 00 8.6300E 04 8.1700E 001087 3  2  284
8.7300E 04 5.5702E 00 8.7600E 04 5.9702E 00 8.8400E 04 5.2704E 001087 3  2  285
8.9000E 04 3.5705E 00 9.0000E 04 1.0471E 01 9.0800E 04 4.5707E 001087 3  2  286
9.1500E 04 8.0708E 00 9.2000E 04 6.6709E 00 9.2500E 04 7.9710E 001087 3  2  287
9.3000E 04 5.8710E 00 9.4000E 04 5.1712E 00 9.5000E 04 5.9713E 001087 3  2  288
9.5600E 04 5.0714E 00 9.6200E 04 7.5715E 00 9.7700E 04 4.6717E 001087 3  2  289
9.8400E 04 5.9718E 00 9.9000E 04 4.7719E 00 9.9500E 04 5.9719E 001087 3  2  290
9.99   E+04 4.672       1.0    E+05 4.672       1.0    E+05 4.4647     1087 3  2  291
2.0      +05 4.774       3.0      +05 4.881       4.0      +05 4.6342     1087 3  2  292
5.0      +05 4.3352      6.0      +05 4.086       6.79     +05 3.90       1087 3  2  293
7.0      +05 3.8558      7.82     +05 3.68        8.0      +05 3.6656     1087 3  2  294
9.0      +05 3.476       9.76     +05 3.33        1.0      +06 3.282      1087 3  2  295
1.131    +06 3.05        1.348    +06 2.80        1.435    +06 2.70       1087 3  2  296
1.50     +06 2.6615      1.572    +06 2.56        1.648    +06 2.45       1087 3  2  297
1.65     +06 2.45        1.73     +06 2.38        1.75     +06 2.35       1087 3  2  298
2.0      +06 2.077       2.5      +06 1.847       3.0      +06 1.845      1087 3  2  299
3.5      +06 1.92        4.0      +06 2.011       4.5      +06 2.108      1087 3  2  300
5.0      +06 2.157       5.5      +06 2.201       6.0      +06 2.214      1087 3  2  301
6.5      +06 2.221       7.0      +06 2.215       7.5      +06 2.176      1087 3  2  302
8.0      +06 2.133       8.5      +06 2.072       9.0      +06 2.011      1087 3  2  303
9.5      +06 1.973       1.0      +07 1.945       1.05     +07 1.905      1087 3  2  304
1.10     +07 1.83        1.15     +07 1.77        1.20     +07 1.70       1087 3  2  305
1.25     +07 1.65        1.30     +07 1.60        1.35     +07 1.523      1087 3  2  306
1.40     +07 1.465       1.45     +07 1.415       1.50     +07 1.355      1087 3  2  307
0.0          0.0             0          0            0          01087 3  0  308
2.9000 +04 6.2994 +01        0          0            0          01087 3  4  309
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0.0        -0.668  +06          0          0          1        431087 3  4  310
       43              2                                           1087 3  4  311
6.79    +05 0.0          7.0    +05 0.0305     7.82   +05 0.0698   1087 3  4  312
8.0     +05 0.081        9.0    +05 0.1309     9.76   +05 0.1485   1087 3  4  313
1.0     +06 0.2252       1.131  +06 0.3561     1.348  +06 0.4925   1087 3  4  314
1.435   +06 0.5490       1.50   +06 0.5855     1.572  +06 0.6318   1087 3  4  315
1.648   +06 0.7004       1.65   +06 0.7014     1.73   +06 0.7787   1087 3  4  316
1.75    +06 0.7970       2.0    +06 0.9824     2.5    +06 1.2714   1087 3  4  317
3.0     +06 1.4628       3.5    +06 1.5271     4.0    +06 1.5785   1087 3  4  318
4.5     +06 1.5937       5.0    +06 1.6179     5.5    +06 1.6082   1087 3  4  319
6.0     +06 1.6004       6.5    +06 1.5793     7.0    +06 1.5538   1087 3  4  320
7.5     +06 1.5221       8.0    +06 1.5101     8.5    +06 1.4916   1087 3  4  321
9.0     +06 1.4731       9.5    +06 1.4281     1.0    +07 1.3831   1087 3  4  322
1.05    +07 1.3717       1.10   +07 1.3241     1.15   +07 1.2791   1087 3  4  323
1.20    +07 1.1787       1.25   +07 1.0595     1.30   +07 0.9483   1087 3  4  324
1.35    +07 0.8512       1.40   +07 0.7666     1.45   +07 0.6992   1087 3  4  325
1.50    +07 0.6536                                                 1087 3  4  326
0.0         0.0                 0          0          0         01087 3  0  327
2.9000  +04 6.2994 +01          0          0          0         01087 3  5  328
0.0        -0.668  +06          0          0          1        181087 3  5  329
       18              2                                           1087 3  5  330
6.79    +05 0.0          7.0    +05 0.0305     7.82   +05 0.0698   1087 3  5  331
8.0     +05 0.078        9.0    +05 0.1079     9.76   +05 0.1180   1087 3  5  332
1.0     +06 0.1190       1.131  +06 0.126      1.348  +06 0.141    1087 3  5  333
1.435   +06 0.1430       1.50   +06 0.1435     1.572  +06 0.1442   1087 3  5  334
1.648   +06 0.1450       1.65   +06 0.1450     1.73   +06 0.1458   1087 3  5  335
1.75    +06 0.1460       1.75   +06 0.0        1.50   +07 0.0      1087 3  5  336
0.0         0.0                 0          0          0         01087 3  0  337
2.9000  +04 6.2994 +01          0          0          0         01087 3  6  338
0.0        -0.770  +06          0          0          1        161087 3  6  339
       16              2                                           1087 3  6  340
7.82    +05 0.0          8.0    +05 0.003      9.0    +05 0.023    1087 3  6  341
9.76    +05 0.0305       1.0    +06 0.032      1.131  +06 0.040    1087 3  6  342
1.348   +06 0.0425       1.435  +06 0.048      1.50   +06 0.051    1087 3  6  343
1.572   +06 0.0514       1.648  +06 0.0518     1.65   +06 0.0518   1087 3  6  344
1.73    +06 0.0519       1.75   +06 0.052      1.75   +06 0.0      1087 3  6  345
1.50    +07 0.0                                                    1087 3  6  346
0.0         0.0                 0          0          0         01087 3  0  347
2.9000  +04 6.2994 +01          0          0          0         01087 3  7  348
0.0        -0.961  +06          0          0          1        131087 3  7  349
       13              2                                           1087 3  7  350
9.76    +05 0.0          1.0    +06 0.0742     1.131  +06 0.1901   1087 3  7  351
```

```
1.348  +06 0.245      1.435  +06 0.255      1.50   +06 0.259     1087 3  7  352
1.572  +06 0.2605     1.648  +06 0.265      1.65   +06 0.265     1087 3  7  353
1.73   +06 0.269      1.75   +06 0.270      1.75   +06 0.0       1087 3  7  354
1.50   +07 0.0                                                   1087 3  7  355
0.0        0.0             0          0          0              01087 3  0  356
2.9000 +04 6.2994 +01      0          0          0              01087 3  8  357
0.0       -1.114  +06      0          0          1              111087 3  8  358
        11           2                                         1087 3  8  359
1.131  +06 0.0      1.348  +06 0.064      1.435  +06 0.078     1087 3  8  360
1.50   +06 0.084    1.572  +06 0.089      1.648  +06 0.097     1087 3  8  361
1.65   +06 0.097    1.73   +06 0.101      1.75   +06 0.102     1087 3  8  362
1.75   +06 0.0      1.50   +07 0.0                             1087 3  8  363
0.0        0.0             0          0          0              01087 3  0  364
2.9000 +04 6.2994 +01      0          0          0              01087 3  9  365
0.0       -1.327  +06      0          0          1              101087 3  9  366
        10           2                                         1087 3  9  367
1.348  +06 0.0      1.435  +06 0.025      1.50   +06 0.035     1087 3  9  368
1.572  +06 0.050    1.648  +06 0.070      1.65   +06 0.070     1087 3  9  369
1.73   +06 0.092    1.75   +06 0.096      1.75   +06 0.0       1087 3  9  370
1.50   +07 0.0                                                 1087 3  9  371
0.0        0.0             0          0          0              01087 3  0  372
2.9000 +04 6.2994 +01      0          0          0              01087 3 10  373
0.0       -1.412  +06      0          0          1              91087 3 10  374
         9           2                                         1087 3 10  375
1.435  +06 0.0      1.50   +06 0.013      1.572  +06 0.027     1087 3 10  376
1.648  +06 0.043    1.65   +06 0.043      1.73   +06 0.059     1087 3 10  377
1.75   +06 0.063    1.75   +06 0.0        1.50   +07 0.0       1087 3 10  378
0.0        0.0             0          0          0              01087 3  0  379
2.9000 +04 6.2994 +01      0          0          0              01087 3 11  380
0.0       -1.482  +06      0          0          1              81087 3 11  381
         8           2                                         1087 3 11  382
1.50   +06 0.0      1.572  +06 0.0097     1.648  +06 0.0214    1087 3 11  383
1.65   +06 0.0214   1.73   +06 0.033      1.75   +06 0.036     1087 3 11  384
1.75   +06 0.0      1.50   +07 0.0                             1087 3 11  385
0.0        0.0             0          0          0              01087 3  0  386
2.9000 +04 6.2994 +01      0          0          0              01087 3 12  387
0.0       -1.547  +06      0          0          1              71087 3 12  388
         7           2                                         1087 3 12  389
1.572  +06 0.0      1.648  +06 0.0072     1.65   +06 0.0072    1087 3 12  390
1.73   +06 0.014    1.75   +06 0.016      1.75   +06 0.0       1087 3 12  391
1.50   +07 0.0                                                 1087 3 12  392
0.0        0.0             0          0          0              01087 3  0  393
```

```
2.9000 +04 6.2994 +01          0          0          0          01087 3 13  394
0.0       -1.623  +06          0          0          1          61087 3 13  395
        6             2                                          1087 3 13  396
1.648  +06 0.0        1.65   +06 0.001     1.73   +06 0.013     1087 3 13  397
1.75   +06 0.016      1.75   +06 0.0     1.50     +07 0.0       1087 3 13  398
0.0        0.0             0          0          0          01087 3  0  399
2.9000 +04 6.2994 +01          0          0          0          01087 3 16  400
0.0       -9.910  +06          0          0          1         111087 3 16  401
       11             3                                          1087 3 16  402
1.0    +07 0.0        1.05   +07 0.0       1.10   +07 0.053     1087 3 16  403
1.15   +07 0.134      1.20   +07 0.198     1.25   +07 0.319     1087 3 16  404
1.30   +07 0.429      1.35   +07 0.524     1.40   +07 0.609     1087 3 16  405
1.45   +07 0.679      1.50   +07 0.758                          1087 3 16  406
0.0        0.0             0          0          0          01087 3  0  407
2.9000 +04 6.2994 +01          0          0          0          01087 3102  408
0.0        0.0             0          0          1         1951087 3102  409
       195             5          0          0          0          01087 3102  410
1.0    -03 19.0534     2.53   -02 3.7876    5.1265 -01 0.8393     1087 3102  411
1.0    +00 0.5996      5.5    +00 0.2500    1.0    +01 0.1815     1087 3102  412
1.0   E+01 0.004       5.0   E+01 0.009     1.0   E+02 0.013      1087 3102  413
5.0   E+02 0.029       1.0   E+03 0.038     5.0   E+03 0.057      1087 3102  414
1.0   E+04 0.057       2.0   E+04 0.048     3.0   E+04 0.040      1087 3102  415
3.0000E 04 4.8000E-02 3.0400E 04 4.7706E-02 3.0550E 04 4.7597E-021087 3102  416
3.0600E 04 4.7561E-02 3.0800E 04 4.7417E-02 3.1000E 04 4.7275E-021087 3102  417
3.1300E 04 4.7064E-02 3.1400E 04 4.6994E-02 3.1600E 04 4.6856E-021087 3102  418
3.1900E 04 4.6651E-02 3.2100E 04 4.6516E-02 3.2300E 04 4.6382E-021087 3102  419
3.2650E 04 4.6151E-02 3.3000E 04 4.5923E-02 3.3400E 04 4.5567E-021087 3102  420
3.4000E 04 4.5291E-02 3.4300E 04 4.5107E-02 3.4700E 04 4.4864E-021087 3102  421
3.5000E 04 4.4685E-02 3.5400E 04 4.4450E-02 3.6000E 04 4.4105E-021087 3102  422
3.6200E 04 4.3992E-02 3.6700E 04 4.3713E-02 3.6900E 04 4.3602E-021087 3102  423
3.7100E 04 4.3493E-02 3.7800E 04 4.3117E-02 3.8100E 04 4.2959E-021087 3102  424
3.8200E 04 4.2907E-02 3.9300E 04 4.2346E-02 3.9700E 04 4.2147E-021087 3102  425
4.0100E 04 4.1955E-02 4.0300E 04 4.1865E-02 4.0500E 04 4.1776E-021087 3102  426
4.0600E 04 4.1731E-02 4.0900E 04 4.1599E-02 4.1100E 04 4.1512E-021087 3102  427
4.1300E 04 4.1425E-02 4.1500E 04 4.1339E-02 4.1800E 04 4.1211E-021087 3102  428
4.2000E 04 4.1126E-02 4.2300E 04 4.1000E-02 4.2600E 04 4.0875E-021087 3102  429
4.2900E 04 4.0752E-02 4.3200E 04 4.0630E-02 4.3500E 04 4.0509E-021087 3102  430
4.3800E 04 4.0389E-02 4.4000E 04 4.0310E-02 4.4300E 04 4.0192E-021087 3102  431
4.4600E 04 4.0075E-02 4.4800E 04 3.9998E-02 4.5000E 04 3.9921E-021087 3102  432
4.7300E 04 3.9073E-02 4.7900E 04 3.8861E-02 4.9000E 04 3.8483E-021087 3102  433
4.9800E 04 3.8215E-02 5.0000E 04 3.8149E-02 5.0400E 04 3.8018E-021087 3102  434
5.1000E 04 3.7825E-02 5.2400E 04 3.7386E-02 5.2700E 04 3.7294E-021087 3102  435
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5.3000E 04 3.7203E-02 5.3800E 04 3.6964E-02 5.4600E 04 3.6729E-021087 3102  436
5.5000E 04 3.6614E-02 5.6000E 04 3.6331E-02 5.6500E 04 3.6192E-021087 3102  437
5.6600E 04 3.6164E-02 5.8200E 04 3.5733E-02 5.8600E 04 3.5627E-021087 3102  438
5.9000E 04 3.5523E-02 5.9600E 04 3.5368E-02 5.9800E 04 3.5317E-021087 3102  439
6.0600E 04 3.5116E-02 6.1200E 04 3.4967E-02 6.1800E 04 3.4820E-021087 3102  440
6.2200E 04 3.4724E-02 6.3000E 04 3.4533E-02 6.3300E 04 3.4462E-021087 3102  441
6.4200E 04 3.4253E-02 6.4700E 04 3.4139E-02 6.5400E 04 3.3981E-021087 3102  442
6.6000E 04 3.3847E-02 6.6500E 04 3.3738E-02 6.6800E 04 3.3672E-021087 3102  443
6.7200E 04 3.3586E-02 6.7900E 04 3.3436E-02 6.8200E 04 3.3373E-021087 3102  444
6.9200E 04 3.3164E-02 6.9800E 04 3.3041E-02 7.1000E 04 3.2785E-021087 3102  445
7.1500E 04 3.2679E-02 7.1700E 04 3.2637E-02 7.2200E 04 3.2533E-021087 3102  446
7.2500E 04 3.2471E-02 7.3000E 04 3.2368E-02 7.3300E 04 3.2307E-021087 3102  447
7.4000E 04 3.2166E-02 7.4400E 04 3.2086E-02 7.5000E 04 3.1968E-021087 3102  448
7.5800E 04 3.1812E-02 7.6100E 04 3.1754E-02 7.7600E 04 3.1470E-021087 3102  449
7.8000E 04 3.1395E-02 7.8500E 04 3.1303E-02 7.9200E 04 3.1175E-021087 3102  450
8.0600E 04 3.0925E-02 8.2000E 04 3.0680E-02 8.3800E 04 3.0375E-021087 3102  451
8.4200E 04 3.0308E-02 8.5600E 04 3.0079E-02 8.6300E 04 2.9966E-021087 3102  452
8.7300E 04 2.9808E-02 8.7600E 04 2.9761E-02 8.8400E 04 2.9636E-021087 3102  453
8.9000E 04 2.9544E-02 9.0000E 04 2.9392E-02 9.0800E 04 2.9273E-021087 3102  454
9.1500E 04 2.9169E-02 9.2000E 04 2.9096E-02 9.2500E 04 2.9024E-021087 3102  455
9.3000E 04 2.8952E-02 9.4000E 04 2.8810E-02 9.5000E 04 2.8669E-021087 3102  456
9.5600E 04 2.8586E-02 9.6200E 04 2.8504E-02 9.7700E 04 2.8302E-021087 3102  457
9.8400E 04 2.8209E-02 9.9000E 04 2.8130E-02 9.9500E 04 2.8065E-021087 3102  458
9.99   E+04 0.028       1.0    E+05 0.0228      1.0    E+05 0.0280     1087 3102  459
2.0     +05 0.02612     3.0     +05 0.01899     4.0     +05 0.01573    1087 3102  460
5.0     +05 0.01478     6.0     +05 0.01399     6.79    +05 0.0138     1087 3102  461
7.0     +05 0.01372     7.82    +05 0.0135      8.0     +05 0.01348    1087 3102  462
9.0     +05 0.01315     9.76    +05 0.0130      1.0     +06 0.01287    1087 3102  463
1.131   +06 0.0118      1.348   +06 0.0102      1.435   +06 0.0097     1087 3102  464
1.50    +06 0.00904     1.572   +06 0.0085      1.648   +06 0.0081     1087 3102  465
1.65    +06 0.0081      1.73    +06 0.0078      1.75    +06 0.0076     1087 3102  466
2.0     +06 0.00656     2.5     +06 0.00557     3.0     +06 0.00518    1087 3102  467
3.5     +06 0.00482     4.0     +06 0.00449     4.5     +06 0.0043     1087 3102  468
5.0     +06 0.00404     5.5     +06 0.0038      6.0     +06 0.00357    1087 3102  469
6.5     +06 0.0035      7.0     +06 0.00346     7.5     +06 0.0034     1087 3102  470
8.0     +06 0.00338     8.5     +06 0.00337     9.0     +06 0.00336    1087 3102  471
9.5     +06 0.00335     1.0     +07 0.00335     1.05    +07 0.00334    1087 3102  472
1.10    +07 0.00333     1.15    +07 0.00332     1.20    +07 0.00331    1087 3102  473
1.25    +07 0.00338     1.30    +07 0.00345     1.35    +07 0.00355    1087 3102  474
1.40    +07 0.00372     1.45    +07 0.00387     1.50    +07 0.00415    1087 3102  475
0.0         0.0                  0           0           0            01087 3  0  476
2.9000 +04 6.2994 +01            0           0           0            01087 3103  477
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0.0          0.0                      0             0             2          351087 3103   478
        3             2              35             5                          1087 3103   479
1.0     -03  0.0          1.435    +06  0.0            1.50     +06  0.0040      1087 3103   480
1.572   +06  0.0048       1.648    +06  0.0062         1.65     +06  0.0063      1087 3103   481
1.73    +06  0.0079       1.75     +06  0.00829        2.0      +06  0.0140      1087 3103   482
2.5     +06  0.0260       3.0      +06  0.0370         3.5      +06  0.0475      1087 3103   483
4.0     +06  0.0555       4.5      +06  0.0643         5.0      +06  0.0710      1087 3103   484
5.5     +06  0.0765       6.0      +06  0.0820         6.5      +06  0.0836      1087 3103   485
7.0     +06  0.0840       7.5      +06  0.0854         8.0      +06  0.0860      1087 3103   486
8.5     +06  0.0857       9.0      +06  0.0860         9.5      +06  0.0856      1087 3103   487
1.0     +07  0.0855       1.05     +07  0.0847         1.10     +07  0.0840      1087 3103   488
1.15    +07  0.0835       1.20     +07  0.0830         1.25     +07  0.0820      1087 3103   489
1.30    +07  0.0810       1.35     +07  0.0795         1.40     +07  0.0790      1087 3103   490
1.45    +07  0.0785       1.50     +07  0.0778                                   1087 3103   491
0.0          0.0                      0             0             0           01087 3  0   492
2.9000  +04  6.2994 +01               0             0             0           01087 3107   493
0.0          0.0                      0             0             2          211087 3107   494
        3             2              21             5                          1087 3107   495
1.0     -03  0.0          5.5      +06  0.0            6.0      +06  0.002       1087 3107   496
6.5     +06  0.004        7.0      +06  0.0078         7.5      +06  0.0125      1087 3107   497
8.0     +06  0.0175       8.5      +06  0.0235         9.0      +06  0.0265      1087 3107   498
9.5     +06  0.0305       1.0      +07  0.0331         1.05     +07  0.0362      1087 3107   499
1.10    +07  0.0366       1.15     +07  0.0372         1.20     +07  0.0380      1087 3107   500
1.25    +07  0.0381       1.30     +07  0.0382         1.35     +07  0.0377      1087 3107   501
1.40    +07  0.0367       1.45     +07  0.0346         1.50     +07  0.0325      1087 3107   502
0.0          0.0                      0             0             0           01087 3  0   503
2.9000  +04  6.2994 +01               0             0             0           01087 3251   504
0.0          0.0                      0             0             2          481087 3251   505
        4             2              48             3                          1087 3251   506
1.00    -03  1.059   -02  1.00     +00  1.059   -02    1.00     +02  1.059   -021087 3251   507
1.00    +04  1.059   -02  5.0      +04  1.692   -02    1.00     +05  3.031   -021087 3251   508
2.07    +05  5.844   -02  3.0      +05  8.838   -02    3.40     +05  1.475   -011087 3251   509
3.90    +05  1.42144-01   4.90     +05  1.30201-01     5.50     +05  1.31618-011087 3251   510
5.90    +05  1.43949-01   6.40     +05  1.66788-01     6.90     +05  1.75164-011087 3251   511
7.40    +05  1.39574-01   7.90     +05  1.56095-01     8.40     +05  1.81145-011087 3251   512
8.80    +05  1.59456-01   9.80     +05  1.67145-01     9.90     +05  1.64338-011087 3251   513
1.04    +06  1.95684-01   1.09     +06  2.10182-01     1.14     +06  1.86738-011087 3251   514
1.19    +06  2.20200-01   1.25     +06  2.00793-01     1.30     +06  2.25644-011087 3251   515
1.35    +06  2.07458-01   1.40     +06  2.42516-01     1.46     +06  2.706   -011087 3251   516
1.65    +06  3.070   -01  1.85     +06  3.312   -01    2.00     +06  3.58277-011087 3251   517
2.25    +06  4.40323-01   2.47     +06  4.13922-01     2.80     +06  5.37790-011087 3251   518
2.90    +06  5.19183-01   3.00     +06  4.94104-01     3.30     +06  4.83631-011087 3251   519
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3.49    +06 5.71793-01 3.70    +06 4.99318-01 4.00    +06 6.38695-011087 3251  520
4.56    +06 6.73497-01 5.00    +06 7.64276-01 6.09    +06 7.29898-011087 3251  521
7.05    +06 7.47990-01 8.05    +06 8.22601-01 1.50    +07 8.49791-011087 3251  522
0.0         0.0                  0           0          0          01087 3  0  523
2.9000 +04 6.2994 +01            0           0          0          01087 3252  524
0.0         0.0                  0           0          2         481087 3252  525
          4           2         48           3                      1087 3252  526
1.00   -03 3.142  -02 1.00    +00 3.142  -02 1.00    +02 3.142  -021087 3252  527
1.00   +04 3.142  -02 5.0     +04 3.121  -02 1.00    +05 3.079  -021087 3252  528
2.07   +05 2.990  -02 3.0     +05 2.895  -02 3.40    +05 2.707  -021087 3252  529
3.90   +05 2.72400-02 4.90    +05 2.76188-02 5.50    +05 2.75750-021087 3252  530
5.90   +05 2.71831-02 6.40    +05 2.64583-02 6.90    +05 2.61923-021087 3252  531
7.40   +05 2.73219-02 7.90    +05 2.67979-02 8.40    +05 2.60030-021087 3252  532
8.80   +05 2.66912-02 9.80    +05 2.64500-02 9.90    +05 2.65372-021087 3252  533
1.04   +06 2.55417-02 1.09    +06 2.50826-02 1.14    +06 2.58270-021087 3252  534
1.19   +06 2.47656-02 1.25    +06 2.53821-02 1.30    +06 2.45958-021087 3252  535
1.35   +06 2.51735-02 1.40    +06 2.40589-02 1.46    +06 2.317  -021087 3252  536
1.65   +06 2.201  -02 1.85    +06 2.124  -02 2.00    +06 2.03860-021087 3252  537
2.25   +06 1.77834-02 2.47    +06 1.86252-02 2.80    +06 1.46834-021087 3252  538
2.90   +06 1.52948-02 3.00    +06 1.60740-02 3.30    +06 1.64422-021087 3252  539
3.49   +06 1.36045-02 3.70    +06 1.59247-02 4.00    +06 1.14961-021087 3252  540
4.56   +06 1.03600-02 5.00    +06 7.53160-03 6.09    +06 8.58331-031087 3252  541
7.05   +06 8.01349-03 8.05    +06 5.61810-03 1.50    +07 5.18268-031087 3252  542
0.0         0.0                  0           0          0          01087 3  0  543
2.9000 +04 6.2994 +01            0           0          0          01087 3253  544
0.0         0.0                  0           0          2         481087 3253  545
          4           2         48           3                      1087 3253  546
1.00   -03 2.106  -02 1.00    +00 2.106  -02 1.00    +02 2.106  -021087 3253  547
1.00   +04 2.106  -02 5.0     +04 2.100  -02 1.0     +05 2.085  -021087 3253  548
2.07   +05 2.063  -02 3.0     +05 2.041  -02 3.40    +05 1.990  -021087 3253  549
3.90   +05 1.99893-02 4.90    +05 2.00779-02 5.50    +05 2.03451-021087 3253  550
5.90   +05 2.01968-02 6.40    +05 2.00878-02 6.90    +05 1.99200-021087 3253  551
7.40   +05 2.02932-02 7.90    +05 2.02586-02 8.40    +05 2.02646-021087 3253  552
8.80   +05 2.02002-02 9.80    +05 2.04613-02 9.90    +05 2.06971-021087 3253  553
1.04   +06 2.02477-02 1.09    +06 2.02778-02 1.14    +06 2.07356-021087 3253  554
1.19   +06 2.01210-02 1.25    +06 2.04885-02 1.30    +06 2.07902-021087 3253  555
1.35   +06 2.12512-02 1.40    +06 2.07158-02 1.46    +06 2.015  -021087 3253  556
1.65   +06 1.989  -02 1.85    +06 1.997  -02 2.00    +06 1.94268-021087 3253  557
2.25   +06 1.85812-02 2.47    +06 1.92108-02 2.80    +06 1.69138-021087 3253  558
2.90   +06 1.73416-02 3.00    +06 1.83381-02 3.30    +06 1.82022-021087 3253  559
3.49   +06 1.76124-02 3.70    +06 1.87431-02 4.00    +06 1.67754-021087 3253  560
4.56   +06 1.60428-02 5.00    +06 1.25154-02 6.09    +06 1.41465-021087 3253  561
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 7.05    +06 1.35075-02 8.05    +06 1.27438-02 1.50    +07 1.43588-021087 3253   562
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0.0         0.0                 0           0           0           01087 0  0   564
2.90000+04 6.29940+01           1           1           0           01087 4  2   565
0.0         6.29940+01          0           2         441           201087 4  2   566
1.00000+00 1.05830-02 5.04019-05 1.78687-09 0.0         0.0          1087 4  2   567
0.0         0.0         0.0         0.0         0.0         0.0          1087 4  2   568
0.0         0.0         0.0         0.0         0.0         0.0          1087 4  2   569
0.0         0.0         0.0         0.0         9.99849-01 1.90481-021087 4  2   570
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0.0         0.0         0.0         0.0         0.0         0.0          1087 4  2   572
0.0         0.0         0.0         0.0         0.0         0.0          1087 4  2   573
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0.0         0.0         0.0         0.0         1.51165-04-1.90420-021087 4  2   577
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         45           3                                                1087 4  2  642
 0.0          1.00000+04             0           0          20          01087 4  2  643
 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  644
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 0.0          0.0                                                             1087 4  2  657
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 0.0          0.0                                                             1087 4  2  662
 0.0          3.00000+05             0            0           20             01087 4  2  663
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 0.0          0.0                                                             1087 4  2  667
 0.0          3.40000+05             0            0           20             01087 4  2  668
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 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  671
 0.0          0.0                                                             1087 4  2  672
 0.0          3.90000+05             0            0           20             01087 4  2  673
 1.32000-01 4.42000-02 9.14285-03 3.77778-03 0.0          0.0          1087 4  2  674
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 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  676
 0.0          0.0                                                             1087 4  2  677
 0.0          4.90000+05             0            0           20             01087 4  2  678
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 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  680
 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  681
 0.0          0.0                                                             1087 4  2  682
 0.0          5.50000+05             0            0           20             01087 4  2  683
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 0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  685
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 0.0          0.0                                                             1087 4  2  687
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0.0        5.90CCC+C5          0          0          20              01087 4  2  688
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0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  690
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0.0        0.0                                                        1087 4  2  692
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0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  696
0.0        0.0                                                        1087 4  2  697
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1.65333-01 7.5CCCC-C2 1.65714-02 4.55555-03 0.0         0.0           1087 4  2  699
0.0        0.0        0.0        0.C        0.0         0.0           1087 4  2  700
0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  701
0.0        0.0                                                        1087 4  2  702
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0.0        0.0        C.0        0.C        0.0         0.0           1087 4  2  705
0.0        0.0        C.0        0.C        0.0         0.0           1087 4  2  706
0.0        0.C                                                        1087 4  2  707
0.0        7.9CCCC+C5          0          0          20              01087 4  2  708
1.46333-C1 8.10C0C-C2 1.37143-02 5.77778-03 0.0         0.0           1087 4  2  709
0.0        0.0        C.C        0.0        0.0         0.0           1087 4  2  710
0.0        0.C        0.0        0.0        0.0         0.0           1087 4  2  711
0.0        0.0                                                        1087 4  2  712
0.0        8.4CCCC+C5          0          0          20              01087 4  2  713
1.71667-01 1.C82CC-01 1.47143-02 4.66666-03 0.0         0.0           1087 4  2  714
0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  715
0.0        0.0        C.C        0.0        0.0         0.0           1087 4  2  716
0.0        0.0                                                        1087 4  2  717
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1.49667-01 8.02CCC-02 2.75714-02 6.11111-03 0.0         0.0           1087 4  2  719
0.0        0.C        C.C        0.0        0.0         0.0           1087 4  2  720
0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  721
0.0        0.0                                                        1087 4  2  722
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1.57667-01 1.C88C0-01 2.04286-02 3.14444-02 0.0         0.0           1087 4  2  724
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0.0        0.0        C.0        0.0        0.0         0.0           1087 4  2  726
0.0        0.0                                                        1087 4  2  727
0.0        9.90CCC+C5          0          0          20              01087 4  2  728
1.5500C-01 1.25C0C-01 4.44286-02 7.88888-03 0.0         0.0           1087 4  2  729
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  730
0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  731
0.0          0.0                                                             1087 4  2  732
0.0          1.04000+06             0            0              20           01087 4  2  733
1.86333-01   1.22800-01   3.45714-02   4.22222-03   0.0          0.0          1087 4  2  734
0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  735
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0.0          0.0                                                             1087 4  2  737
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0.0          0.0                                                             1087 4  2  742
0.0          1.14000+06             0            0              20           01087 4  2  743
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  746
0.0          0.0                                                             1087 4  2  747
0.0          1.19000+06             0            0              20           01087 4  2  748
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  751
0.0          0.0                                                             1087 4  2  752
0.0          1.25000+06             0            0              20           01087 4  2  753
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  756
0.0          0.0                                                             1087 4  2  757
0.0          1.30000+06             0            0              20           01087 4  2  758
2.17000-01   1.95200-01   7.71428-02   4.64444-02   0.0          0.0          1087 4  2  759
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  761
0.0          0.0                                                             1087 4  2  762
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0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  765
0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  766
0.0          0.0                                                             1087 4  2  767
0.0          1.40000+06             0            0              20           01087 4  2  768
2.34000-01   2.07000-01   7.38571-02   3.12222-02   0.0          0.0          1087 4  2  769
0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  770
0.0          0.0          0.0          0.0          0.0          0.0          1087 4  2  771
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 0.0         0.0                                                        1087 4  2  772
 0.0         1.46000+06          0           0          20             01087 4  2  773
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-4.65397-04  9.43701-04  0.0         0.0         0.0         0.0        1087 4  2  776
 0.0         0.0                                                        1087 4  2  777
 0.0         1.65000+06          0           0          20             01087 4  2  778
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 0.0         0.0         0.0         0.0         0.0         0.0        1087 4  2  781
 0.0         0.0                                                        1087 4  2  782
 0.0         1.85000+06          0           0          20             01087 4  2  783
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 0.0         0.0         0.0         0.0         0.0         0.0        1087 4  2  786
 0.0         0.0                                                        1087 4  2  787
 0.0         2.00000+06          0           0          20             01087 4  2  788
 3.50038-01  2.49274-01  1.81182-01  5.09262-02  1.13832-02-3.25884-031087 4  2  789
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 1.88698-03-2.30594-04  0.0         0.0         0.0         0.0        1087 4  2  791
 0.0         0.0                                                        1087 4  2  792
 0.0         2.25000+06          0           0          20             01087 4  2  793
 4.32580-01  2.99262-01  2.22731-01  8.22880-02  1.34998-02  2.38395-031087 4  2  794
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 4.91962-04  4.78328-06  0.0         0.0         0.0         0.0        1087 4  2  796
 0.0         0.0                                                        1087 4  2  797
 0.0         2.47000+06          0           0          20             01087 4  2  798
 4.06120-01  3.01723-01  2.25136-01  8.89791-02  3.82765-03-1.62345-031087 4  2  799
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-1.26153-03-1.10041-03  0.0         0.0         0.0         0.0        1087 4  2  801
 0.0         0.0                                                        1087 4  2  802
 0.0         2.80000+06          0           0          20             01087 4  2  803
 5.30497-01  3.46309-01  2.36050-01  1.19235-01-1.06137-02-2.92197-021087 4  2  804
-1.49922-02-1.53658-02-4.28272-03  9.75414-03  8.04353-03  2.99532-031087 4  2  805
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 0.0         0.0                                                        1087 4  2  807
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 4.64574-03  3.52580-04  1.93086-04-1.23502-03-1.01671-03-1.34801-031087 4  2  810
 8.03801-05  2.00116-03  0.0         0.0         0.0         0.0        1087 4  2  811
 0.0         0.0                                                        1087 4  2  812
 0.0         3.00000+06          0           0          20             01087 4  2  813
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 1.31457-03 1.16254-03 0.0         0.0         0.0         0.0         1087 4  2  816
 0.0        0.0                                                        1087 4  2  817
 0.0        3.30000+06          0           0           20             01087 4  2  818
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 2.29054-02 1.17773-02 1.04135-02 8.60462-03 3.08495-03-1.32363-041087 4  2  820
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 0.0        0.0                                                        1087 4  2  822
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 1.07264-02-8.22747-05-5.97869-03-6.09187-03-5.98790-03-6.56600-031087 4  2  825
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 0.0        0.0                                                        1087 4  2  827
 0.0        3.70000+06          0           0           20             01087 4  2  828
 4.92041-01 3.79718-01 2.72320-01 1.49517-01 3.76696-02 9.36968-031087 4  2  829
 5.17692-03 1.70624-03 2.30925-03 2.49464-04-1.73065-03 1.62953-041087 4  2  830
 7.62181-04-3.01141-04 0.0         0.0         0.0         0.0         1087 4  2  831
 0.0        0.0                                                        1087 4  2  832
 0.0        4.00000+06          0           0           20             01087 4  2  833
 6.32724-01 4.83244-01 3.75385-01 2.30434-01 9.14419-02 4.28058-021087 4  2  834
 1.26656-02-2.64175-03-1.21992-02-1.73409-02-1.49019-02-1.08962-021087 4  2  835
-5.51400-03 1.01769-03 4.26007-03 3.65589-03 2.41520-03 9.34838-041087 4  2  836
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 2.34562-03-6.58755-03-6.96342-03-8.19915-03-8.44301-03-5.01041-031087 4  2  840
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-1.00446-03-1.02979-03                                                  1087 4  2  842
 0.0        5.00000+06          0           0           20             01087 4  2  843
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-1.41571-03-1.01356-02-9.44048-03-3.43210-03 1.69871-03 3.37224-031087 4  2  845
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 1.82389-03 1.01121-03                                                  1087 4  2  847
 0.0        6.09000+06          0           0           20             01087 4  2  848
 7.24957-01 5.43923-01 3.63914-01 2.37485-01 8.26270-02 1.80235-031087 4  2  849
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-2.27576-03-2.23580-03                                                  1087 4  2  852
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-1.33278-03-1.07966-03                                                1087 4  2  857
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 8.20088-01 6.76901-01 5.02842-01 3.62960-01 2.07462-01 1.00736-011087 4  2  859
 3.06516-02-1.58811-03-1.65056-02-2.21290-02-2.34706-02-2.09284-021087 4  2  860
-1.57920-02-1.01331-02-5.19032-03-1.61684-03 5.57783-04 1.41572-031087 4  2  861
 1.24147-03 7.44733-04                                                1087 4  2  862
 0.0        1.50000+07          0          0          20             01087 4  2  863
 8.34532-01 7.29213-01 6.22396-01 5.12066-01 3.87979-01 2.73013-011087 4  2  864
 1.84548-01 1.24207-01 7.22951-02 3.27272-02 1.34152-02 7.06104-031087 4  2  865
 6.90277-03 8.63178-03 9.98238-03 1.03242-02 9.09703-03 6.94340-031087 4  2  866
 4.25867-03 1.46851-03                                                1087 4  2  867
 0.0        0.0                 0          0          0              01087 4  0  868
 0.0        0.0                 0          0          0              01087 0  0  869
 2.9000 +04 6.2994 +01          0          0          10             01087 5  4  870
 0.0        0.668  +06          0          3          1             181087 5  4  871
         18            2                                             1087 5  4  872
 6.79   +05 1.0        7.0    +05 1.0       7.82   +05 1.0          1087 5  4  873
 8.0    +05 0.96       9.0    +05 0.824     9.76   +05 0.795        1087 5  4  874
 1.0    +06 0.528      1.131  +06 0.354     1.348  +06 0.286        1087 5  4  875
 1.435  +06 0.260      1.50   +06 0.245     1.572  +06 0.228        1087 5  4  876
 1.648  +06 0.207      1.65   +06 0.207     1.73   +06 0.187        1087 5  4  877
 1.75   +06 0.183      1.75   +06 0.0       1.50   +07 0.0          1087 5  4  878
 0.0        0.770  +06          0          3          1             161087 5  4  879
         16            2                                             1087 5  4  880
 7.82   +05 0.0        8.0    +05 0.04      9.0    +05 0.176        1087 5  4  881
 9.76   +05 0.205      1.0    +06 0.142     1.131  +06 0.112        1087 5  4  882
 1.348  +06 0.086      1.435  +06 0.087     1.50   +06 0.087        1087 5  4  883
 1.572  +06 0.081      1.648  +06 0.074     1.65   +06 0.074        1087 5  4  884
 1.73   +06 0.067      1.75   +06 0.065     1.75   +06 0.0          1087 5  4  885
 1.50   +07 0.0                                                     1087 5  4  886
 0.0        0.961  +06          0          3          1             131087 5  4  887
         13            2                                             1087 5  4  888
 9.76   +05 0.0        1.0    +06 0.330     1.131  +06 0.534        1087 5  4  889
 1.348  +06 0.498      1.435  +06 0.465     1.50   +06 0.442        1087 5  4  890
 1.572  +06 0.412      1.648  +06 0.378     1.65   +06 0.378        1087 5  4  891
 1.73   +06 0.345      1.75   +06 0.339     1.75   +06 0.0          1087 5  4  892
 1.50   +07 0.0                                                     1087 5  4  893
 0.0        1.114  +06          0          3          1             111087 5  4  894
         11            2                                             1087 5  4  895
 1.131  +06 0.0        1.348  +06 0.130     1.435  +06 0.142        1087 5  4  896
 1.50   +06 0.144      1.572  +06 0.141     1.648  +06 0.139        1087 5  4  897
```

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1.65    +06 0.138       1.73    +06 0.130       1.75    +06 0.128      1087 5  4  898
1.75    +06 0.0         1.50    +07 0.0                                1087 5  4  899
0.0         1.327   +06             0           3           1         101087 5  4  900
          10            2                                              1087 5  4  901
1.348   +06 0.0         1.435   +06 0.046       1.50    +06 0.060      1087 5  4  902
1.572   +06 0.079       1.648   +06 0.100       1.65    +06 0.100      1087 5  4  903
1.73    +06 0.118       1.75    +06 0.120       1.75    +06 0.0        1087 5  4  904
1.50    +07 0.0                                                        1087 5  4  905
0.0         1.412   +06             0           3           1          91087 5  4  906
            9           2                                              91087 5  4  907
1.435   +06 0.0         1.50    +06 0.022       1.572   +06 0.043      1087 5  4  908
1.648   +06 0.061       1.65    +06 0.061       1.73    +06 0.076      1087 5  4  909
1.75    +06 0.079       1.75    +06 0.0         1.50    +07 0.0        1087 5  4  910
0.0         1.482   +06             0           3           1          81087 5  4  911
            8           2                                              1087 5  4  912
1.50    +06 0.0         1.572   +06 0.016       1.648   +06 0.031      1087 5  4  913
1.65    +06 0.031       1.73    +06 0.042       1.75    +06 0.045      1087 5  4  914
1.75    +06 0.0         1.50    +07 0.0                                1087 5  4  915
0.0         1.547   +06             0           3           1          71087 5  4  916
            7           2                                              1087 5  4  917
1.572   +06 0.0         1.648   +06 0.010       1.65    +06 0.010      1087 5  4  918
1.73    +06 0.018       1.75    +06 0.021       1.75    +06 0.0        1087 5  4  919
1.50    +07 0.0                                                        1087 5  4  920
0.0         1.623   +06             0           3           1          61087 5  4  921
            6           2                                              1087 5  4  922
1.648   +06 0.0         1.65    +06 0.001       1.73    +06 0.017      1087 5  4  923
1.75    +06 0.020       1.75    +06 0.0         1.50    +07 0.0        1087 5  4  924
0.0         0.0                 0           9           1         301087 5  4  925
          30            2                                              1087 5  4  926
6.79    +05 0.0         1.75    +06 0.0         1.75    +06 1.0        1087 5  4  927
2.0     +06 1.0         2.5     +06 1.0         3.0     +06 1.0        1087 5  4  928
3.5     +06 1.0         4.0     +06 1.0         4.5     +06 1.0        1087 5  4  929
5.0     +06 1.0         5.5     +06 1.0         6.0     +06 1.0        1087 5  4  930
6.0     +06 1.0         7.0     +06 1.0         7.5     +06 1.0        1087 5  4  931
8.0     +06 1.0         8.5     +06 1.0         9.0     +06 1.0        1087 5  4  932
9.5     +06 1.0         10.0    +06 1.0         10.5    +06 1.0        1087 5  4  933
11.0    +06 1.0         11.5    +06 1.0         12.0    +06 1.0        1087 5  4  934
12.5    +06 1.0         13.0    +06 1.0         13.5    +06 1.0        1087 5  4  935
14.0    +06 1.0         14.5    +06 1.0         15.0    +06 1.0        1087 5  4  936
0.0         0.0             0           0           2         301087 5  4  937
            3           2           30          5                      1087 5  4  938
6.79    +05 0.10    +05 1.75    +06 0.10    +05 1.75    +06 0.6038 +061087 5  4  939
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2.0     +06 0.6455 +06 2.5     +06 0.7212 +06 3.0     +06 0.7906 +061087 5  4  940
3.5     +06 0.8539 +06 4.0     +06 0.9129 +06 4.5     +06 0.9682 +061087 5  4  941
5.0     +06 1.0206 +06 5.5     +06 1.0704 +06 6.0     +06 1.1180 +061087 5  4  942
6.5     +06 1.1637 +06 7.0     +06 1.2076 +06 7.5     +06 1.2500 +061087 5  4  943
8.0     +06 1.2910 +06 8.5     +06 1.3307 +06 9.0     +06 1.3693 +061087 5  4  944
9.5     +06 1.4068 +06 10.0    +06 1.4434 +06 10.5    +06 1.4790 +061087 5  4  945
11.0    +06 1.5138 +06 11.5    +06 1.5478 +06 12.0    +06 1.5811 +061087 5  4  946
12.5    +06 1.6138 +06 13.0    +06 1.6459 +06 13.5    +06 1.6771 +061087 5  4  947
14.0    +06 1.7078 +06 14.5    +06 1.7380 +06 15.0    +06 1.7678 +061087 5  4  948
0.0         0.0                    0          0          0          01087 5  0  949
2.9000  +04 6.2994 +01             0          0          3          01087 5 16  950
0.0         0.0                    0          9          1         111087 5 16  951
          11          2                                              1087 5 16  952
1.0     +07 0.5        1.05    +07 0.5        1.10    +07 0.5        1087 5 16  953
1.15    +07 0.5        1.20    +07 0.5        1.25    +07 0.5        1087 5 16  954
1.30    +07 0.5        1.35    +07 0.5        1.40    +07 0.5        1087 5 16  955
1.45    +07 0.5        1.50    +07 0.5                                1087 5 16  956
0.0         0.0                    0          0          1         111087 5 16  957
          11          3                                              1087 5 16  958
1.0     +07 1.448  +06 1.05    +07 1.479  +06 1.10    +07 1.514  +061087 5 16  959
1.15    +07 1.547  +06 1.20    +07 1.581  +06 1.25    +07 1.614  +061087 5 16  960
1.30    +07 1.646  +06 1.35    +07 1.677  +06 1.40    +07 1.708  +061087 5 16  961
1.45    +07 1.738  +06 1.50    +07 1.768  +06                       1087 5 16  962
0.0         0.0                    0          9          1          91087 5 16  963
            9          2                                              1087 5 16  964
1.10    +07 0.345      1.15    +07 0.345      1.20    +07 0.345      1087 5 16  965
1.25    +07 0.345      1.30    +07 0.345      1.35    +07 0.345      1087 5 16  966
1.40    +07 0.345      1.45    +07 0.345      1.50    +07 0.345      1087 5 16  967
0.0         0.0                    0          0          1          91087 5 16  968
            9          3                                              1087 5 16  969
1.10    +07 0.10   +05 1.15    +07 0.323  +06 1.20    +07 0.456  +061087 5 16  970
1.25    +07 0.557  +06 1.30    +07 0.644  +06 1.35    +07 0.720  +061087 5 16  971
1.40    +07 0.789  +06 1.45    +07 0.853  +06 1.50    +07 0.911  +061087 5 16  972
0.0         0.0                    0          9          1         111087 5 16  973
          11          2                                              1087 5 16  974
1.0     +07 0.155      1.05    +07 0.155      1.10    +07 0.155      1087 5 16  975
1.15    +07 0.155      1.20    +07 0.155      1.25    +07 0.155      1087 5 16  976
1.30    +07 0.155      1.35    +07 0.155      1.40    +07 0.155      1087 5 16  977
1.45    +07 0.155      1.50    +07 0.155                              1087 5 16  978
0.0         0.0                    0          0          1         111087 5 16  979
          11          3                                              1087 5 16  980
1.0     +07 0.10   +05 1.05    +07 0.299  +06 1.10    +07 0.440  +061087 5 16  981
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1.15    +07 0.546  +06 1.20   +07 0.634  +06 1.25   +07 0.711  +061087 5 16  982
1.30    +07 0.781  +06 1.35   +07 0.846  +06 1.40   +07 0.905  +061087 5 16  983
1.45    +07 0.961  +06 1.50   +07 1.013  +06                      1087 5 16  984
0.0         0.0                 0          0          0          01087 5  0  985
0.0         0.0                 0          0          0          01087 0  0  986
0.0         0.0                 0          0          0          0   0 0  0  987
0.0         0.0                 0          0          0          0  -1 0  0    0
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