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Graphical Representation of Transmutation and Decay Chain Data, Transmutation Cross Section and Delayed Gamma Ray Emission Data

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Abstract

In a D-T burning fusion reactor, the neutron induced activity severely limits personnel access to the reactor. Accurate evaluation of the induced activity and dose rate is necessary to conduct effective biological shield design. In order to evaluate the dose rate accurately, considerable amount of activation data is required. This report gives graphical representation of transmutation and decay chain data, transmutation cross section data and delayed gamma ray emission data for 116 nuclides of interest in terms of fusion reactor design. This graphical representation was made with hope of producing a reference for examining activation problems. It has already been shown to be effective in correcting inappropriate data. A computer code AMOEBA developed for the checking and plotting of the activation data is also described in this report.

Keywords: D-T Neutron, Fusion Reactor, Induced Activity, Transmutation, Cross Section, Decay Chain, Delayed Gamma Ray, Biological Dose, Graph Plotting, Data.

* Century Research Center, Ltd., Co.

核種変換と崩壊連鎖データ，核種変換断面積と遅発ガンマ線放出データの図形表示

日本原子力研究所核融合研究部

関　泰・飯田浩正・川崎弘光*

1982年4月8日受理

要　旨

D−T 燃焼の核融合炉において誘導放射能の存在は炉停止時の従業員の近接を著しく制限する．効率良く生体遮蔽を行うためには誘導放射能と線量率を精度良く評価する必要がある．そのためにはかなりの量の放射化データが要求される．本報告書は核融合炉の設計の観点から必要とされた116核種の核種変換と崩壊連鎖データ，核種変換断面積と遅発ガンマ線放出データを図形表示して与える．この図形表示作業は放射化の問題を調べるための参考資料を与えることを目的としてなされた．本作業自体が不適当なデータを修正する上で有用であった．

放射化データの検証と図形表示を行うために開発した計算コード AMOEBA についても紹介する．

* センチュリ・リサーチ・センター（株）

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1. Introduction

In a D-T burning fusion reactor, the radioactivity induced by the 14 MeV neutrons limits personnel access to the reactor even after shutdown. The biological dose rates from the neutron induced activity of various components of fusion reactor have been evaluated by several researchers.[1)-5)] A code system THIDA [6)] has been developed in the Japan Atomic Energy Research Institute (JAERI) for the calculation of exposure dose rate around a fusion device. It consists of radiation transport codes, induced activity calculation code and data libraries for transmutation and decay chain, transmutation cross section and delayed gamma ray emission (see **Fig. 1**). This THIDA code system has been applied to calculate dose rates around several fusion devices [1),5)] and it has been also tested for a stainless steel sample activation measurement using 14 MeV neutron source. [7)] Through these applications several data errors in the data files have been identified and corrected. In order to further check and review the content of the huge amount of data in the libraries, an activation data checking and plotting code called AMOEBA has been developed. By utilizing the checking and plotting capabilities of the AMOEBA code, the consistencies of the libraries have been checked and the activation data* of the 116 stable nuclides have been plotted. Graphical representation of the data proved to be effective in correcting inappropriate data. In addition, the compilation of the graphs is found to be a convenient tool in the investigation of activation problems, for instance in identifying the source of induced activity from an irradiated material.

This report describes in Section 2, the data library structures of transmutation and decay chain, transmutation cross sections and delayed gamma ray emission data incorporated in the THIDA code system. Graphical representations of the activation data for 116 stable isotopes drawn by the AMOEBA code are shown in Section 3. The function and program structure of the AMOEBA code are described in the Appendix.

* transmutation and decay chain data for 116 stable nuclides, about 800 transmutation cross sections and gamma ray emission data of about 300 unstable nuclides.

2. Data Libraries

Induced activation calculations for fusion devices have been carried out on the basis of a calculational flow shown in **Fig. 1**. The whole network of data libraries and computer codes, the THIDA system calculates Transmutation, Hazard Potential, Induced Activity, Dose Rate and Afterheat. In this section, the structures of the following data libraries for 116 stable nuclides of interest in terms of fusion reactor design are described:

(1) CHAINLIB for transmutation and decay chain data,
(2) CROSSLIB for transmutation cross section data,
(3) GAMMALIB for delayed gamma ray emission data,

In the CHAINLIB and GAMMALIB data libraries, the nuclides are denoted using 5 digits in the following manner.

$$\begin{array}{ccccc} X & X & X & X & X \\ Z & & M & & A \end{array} ,$$

where Z and A are the atomic and mass numbers of the nuclide, respectively. M is a metastable indicator which takes 1 for metastable state and 0 otherwise. When three digits are required to denote A, only the last two digits are given (e.g. 82003 for $^{103}_{82}$Pb).

2.1 CHAINLIB, Transmutation and Decay Chain Data Library

In principle, this data library was produced based on the following guidelines:

(1) Only the primary transmutation reactions by neutron are considered. That is, neutron reactions with stable (long-lived naturally occuring) nuclides are considered but the neutron reactions with reaction product nuclides are neglected. (The exceptional cases are the ^{13}C produced from the ^{12}C(n, γ) reaction and ^{51}V produced from the ^{52}V(n, 2n) reaction.) This guideline is adopted to avoid the complexity introduced by secondary reactions. However, the secondary reactions may be included if desired. When dealing with very high irradiation fluence, the secondary reaction should be properly considered but in usual applications their effects are generally insignificant.
(2) Transmutation reactions considered are the ones with experimental data or evaluation(s) in CINDA 75 [8] .
(3) Production of metastable nuclides is also considered using branching ratio.
(4) Decay chains of unstable nuclides are followed until they end up with stable nuclides listed in **Table 1**.
(5) Only transmutation reactions are included. Inelastic reactions resulting in metastable state are not included because such metastable nuclide is mostly short-lived. They will be included in future if necessary.

The data structure of the CHAINLIB library is described below.

#1 (I12, E12.0)

IPAIR ; the number of #2 cards required to describe the transmutation and decay chain of the nuclide being considered.

ABUND ; natural abundance of the nuclide in percent.

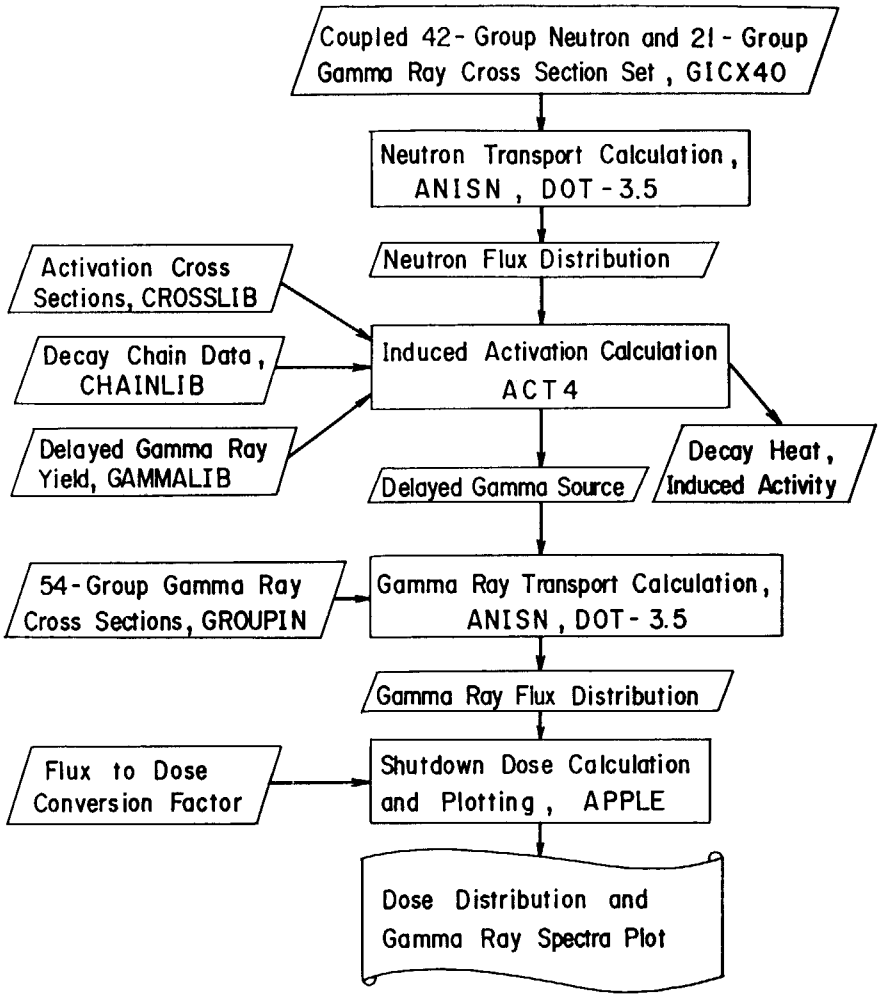


Fig. 1 Flow chart of calculation of induced activation and dose rate.

#2 (E12.0, A8, 4X, 2E12.0, E11.0, A1, E12.0)

ZAP ; the name of the parent nuclide (Z, M, A) (see the note in the previous page).

ACTYP ; the symbol of the transmutation reaction or the decay scheme (see Table 2 and the note below).

ZAD ; the name of the daughter nuclide (Z, M, A) (see the note in the previous page).

BETA ; branching ratio.

TIME ; half life of the nuclide specified by ZAP.

UNIT ; the unit for the half life (S, M, H, D, W, G and Y corresponding to second, minute, hour, day, week, month and year, respectively).

EMEAN ; mean energy of the emitted β ray.

#3 (I12)

KKM ; the number of transmutation reactions to be treated in the CROSSLIB library for the parent nuclide specified by ZAP.

Data in cards #1 ~ #3 are repeatedly given for each of the stable nuclides. The number of #2 cards is specified by IPAIR. By using #2 cards, first the transmutation reaction data of the stable nuclide are given followed by the decay data of unstable product nuclides. Decay chains are followed until they end up with stable nuclides given in **Table 1**.

Table 1 List of stable or long-lived naturally occurring isotopes from the Chart of Nuclides [9)]

Element	Name of isotopes
H	1001 1002
He	2003 2004
Li	3006 3007
Be	4009
B	5010 5011
C	6012 6013
N	7014 7015
O	8016 8017 8018
F	9019
Ne	10020 10021 10022
Na	11023
Mg	12024 12025 12026
Al	13027
Si	14028 14029 14030
P	15031
S	16032 16033 16034 16036
Cl	17035 17037
Ar	18036 18038 18040
K	19039 19040 19041
Ca	20040 20042 20043 20044 20046 20048
Sc	21045
Ti	22046 22047 22048 22049 22050
V	23050 23051
Cr	24050 24052 24053 24054
Mn	25055
Fe	26054 26056 26057 26058
Co	27059
Ni	28058 28060 28061 28062 28064
Cu	29063 29065
Zn	30064 30066 30067 30068 30070
Ga	31069 31071
Ge	32070 32072 32073 32074 32076
As	33075
Se	34074 34076 34077 34078 34080 34082
Br	35079 35081
Kr	36078 36080 36082 36083 36084 36086
Rb	37085 37087
Sr	38084 38086 38087 38088
Y	39089
Zr	40090 40091 40092 40094 40096
Nb	41093
Mo	42092 42094 42095 42096 42097 42098 42000
Tc	—
Ru	44096 44098 44099 44000 44001 44002 44004
Rh	45003
Pd	46002 46004 46005 46006 46008 46010
Ag	47007 47009
Cd	48006 48008 48010 48011 48012 48013 48014 48016
In	49013 48015
Sn	50012 50014 50015 50016 50017 50018 50019 50020 20022 50024
Sb	51021 51023
Te	52020 52022 52023 52024 52025 52026 52028 52030
I	53027
Xe	54024 54026 54028 54029 54030 54031 54032 54034 54036

Table 1 (continued)

Element	Name of isotopes
Cs	55033
Ba	56030 56032 56034 56035 56036 56037 56038
La	57038 57039
Ce	58036 58038 58040 58042
Pr	59041
Nd	60042 60043 60044 60045 60046 60048 60050
Pm	——
Sm	62044 62047 62048 62049 62050 62052 62054
Eu	63051 63053
Gd	64052 64054 64055 64056 64057 64058 64060
Tb	65059
Dy	66056 66058 66060 66061 66062 66063 66064
Ho	67065
Er	68062 68064 68066 68067 68068 68070
Tm	69069
Yb	70068 70070 70071 70072 70073 70074 70076
Lu	71075 71076
Hf	72074 72076 72077 72078 72079 72080
Ta	73080 73081
W	74080 74082 74083 74084 74086
Re	75085 75087
Os	76084 76086 76087 76088 76089 76090 76092
Ir	77091 77093
Pt	78090 78092 78094 78095 78096 78098
Au	79097
Hg	80096 80098 80099 80000 80001 80002 80004
Tl	81003 81005
Pb	82004 82006 82007 82008
Bi	83009

The symbols used to denote the nuclear reactions and decay chain are shown in **Table 2** together with the changes in atomic number Z, metastable state indicator M and mass number A.

The name of transmutation reactions and decay scheme (ACTYP) are denoted by 8 characters at most (A8). The name of a transmutation reaction should coincide with the one used in the transmutation cross section library CROSSLIB. In principle, the name of a reaction is formed as follows.

(1) Firstly the name of the parent nuclide is given. (e.g. C12 is used to denote $^{12}_{6}C$)

(2) Secondly the symbol of the reaction type is given as described in **Table 2**. When the reaction produces a metastable nuclide, M is added to the symbol of the reaction type. For example, ^{60}Ni (n, p) ^{60m}Co will be denoted as NI60NPM.

The symbol of a decay type is given as shown in **Table 2**. Decay type other than the 7 types listed in **Table 2** is denoted by ETC.

As an example, the library data for ^{6}Li, ^{7}Li, ^{9}Be is shown in **Table 3**.

Table 2 Change in atomic number, stable/metastable state indicator and mass number involved in transmutation reaction and decay

Transmutation reaction				
Reaction type	Symbol	Atomic number, ΔZ	Metastable state, M*	Mass number, ΔA
(n, γ)	NG	0	0	1
(n, p)	NP	−1	0	0
(n, α)	NA	−2	0	−3
(n, d)	ND	−1	0	−1
(n, n'd)	NND	−1	0	−2
(n, t)	NT	−1	0	−2
(n, 2n)	N2N	0	0	−1
(n, 3n)	N3N	0	0	−2
(n, n'p)	NNP	−1	0	−1
(n, n'α)	NNA	−2	0	−4
(n, ^{3}He)	NHE3	−2	0	−2
(n, n't)	NNT	−1	0	−3
(n, 2n'p)	N2NP	−1	0	−2

Decay mode				
Decay type	Symbol	Atomic number, ΔZ	Metastable state, M*	Mass number, ΔA
β + decay	B+	−1	0	0
β − decay	B−	+1	0	0
Isomeric transition	IT	0	1→0	0
Electron capture	EC	−1	0	0
β−α decay	B−A	−1	0	−4
2α decay	2A	−4	0	−8
α decay	A	−2	0	−4
Others	ETC	−	−	−

*M changes from 0 to 1 whenever a reaction produces a metastable nuclide, for example for ^{60}Ni (n, p) ^{60m}Co, the symbol for this reaction is NPM and M changes from 0 to 1.

Table 3 Example of the CHAINLIB library data for the transmutation and decay chain of ^{6}Li, ^{7}Li and ^{9}Be

```
   9 0.075                                                          00000100
3006LI06NA          1003 0.10000E+01 0.0          0.0               00000200
3006                2004 0.0         0.0          0.0               00000300
3006LI06N2NP        2004 0.10000E+01 0.0          0.0               00000400
3006                1001 0.0         0.0          0.0               00000410
3006LI06NP          2006 0.10000E+01 0.0          0.0               00000500
3006                1001 0.0         0.0          0.0               00000600
3006LI06NG          3007 0.10000E+01 0.0          0.0               00000700
1003B-              2003 0.10000E+01 0.1260E+02Y 0.62000E-0200000800
2006B-              3006 0.10000E+01 0.8600E+00S 0.11690E+0100000900
   4                                                                00001000
  12 0.925                                                          00001100
3007LI07NNA         1003 0.10000E+01 0.0          0.0               00001200
3007                2004 0.0         0.0          0.0               00001300
3007LI07ND          2006 0.10000E+01 0.0          0.0               00001400
3007                1002 0.0         0.0          0.0               00001500
3007LI07NNP         2006 0.10000E+01 0.0          0.0               00001600
3007                1001 0.0         0.0          0.0               00001700
3007LI07N2N         3006 0.10000E+01 0.0          0.0               00001800
3007LI07NG          3008 0.10000E+01 0.0          0.0               00002000
1003B-              2003 0.10000E+01 0.1260E+02Y 0.62000E-0200002100
2006B-              3006 0.10000E+01 0.8600E+00S 0.11690E+0100002200
3008B-              4008 0.10000E+01 0.8800E+00S 0.43330E+0100002300
4008A               2004 1.0         0.67  E-16S 0.0               00002400
   5                                                                00002500
  16 1.0                                                            00002600
4009BE09NA          2006 0.10000E+01 0.0          0.0               00002700
4009                2004 0.0         0.0          0.0               00002800
4009BE09ND          3008 0.10000E+01 0.0          0.0               00002900
4009                1002 0.0         0.0          0.0               00003000
4009BE09N2N         4008 0.10000E+01 0.0          0.0               00003100
4009BE09NP          3009 0.10000E+01 0.0          0.0               00003200
4009                1001 0.0         0.0          0.0               00003300
4009BE09NG          4010 0.10000E+01 0.0          0.0               00003500
4009BE09NT          3007 0.10000E+01 0.0          0.0               00003600
4009                1003 0.0         0.0          0.0               00003610
1003B-              2003 0.10000E+01 0.1260E+02Y 0.62000E-0200003620
2006B-              3006 0.10000E+01 0.8600E+00S 0.11690E+0100003700
3008B-              4008 0.10000E+01 0.8800E+00S 0.43330E+0100003800
3009B-              4009 0.10000E+01 0.1760E+00S 0.45400E+0100003900
4010B-              5010 0.10000E+01 0.2500E+07Y 0.18500E+0000004000
4008A               2004 1.0         0.67  E-16S 0.0               00004100
```

2.2 CROSSLIB, Transmutation Cross Section Library

This library consists of neutron cross section data in the 42-energy group structure of the GICX40 library,[10] which is shown in **Table 4**. In calculating transmutation reaction rates, this correspondence of the energy structure permits direct use of the CROSSLIB library with the neutron flux obtained by the use of the GICX40 library.

The transmutation cross sections are obtained from the Ref. 11-21. In principle, the data included in the evaluated nuclear data file ENDF/B-4 [15] are adopted with the first priority among others. Processing codes SPTG4Z [22] and NJOY [23] are used to derive 42-group cross sections from the ENDF/B-4. Infinite dilution is assumed for processing the resonance parameters and the 1/E weighting is used for constructing 42-group cross sections. Cross section data not available in ENDF/B-4 are read from the graphs or taken from tables in various publications. We are fully aware of the incompleteness of the CROSSLIB library and that some of the data are not very accurate. We tried to put some values rather than having none. The present version of the library should be considered as a starting point and extensive re-evaluation and updating of the library is intended.

The data structure of the CROSSLIB library is shown below:

#1 (A8, 4X, I12, 5A8)

ACTYP ; the symbol of the transmutation reaction (the symbol corresponds to the ACTYP in the CHAINLIB library)

IX ; the number of group cross section data CS(I) used to represent the reaction cross section (default value of IX is 42)

REFER(I) ; the symbol representing the data source from which the data were obtained and the year when the data source was published. (**Table 5**)

#2 (6E12.0)

CS(I), I=1, IX ; the cross section data for the IX groups of the ACTYP reaction

Two types of data #1 and #2 are repeated for KKM reactions as specified in the CHAINLIB #3 data.

An example of the CROSSLIB library content is given in **Table 6**.

2.3 GAMMALIB, Delayed Gamma Ray Emission Data Library

This library stores the energies and the intensities of the gamma rays emitted from radioactive nuclides which are produced as the result of transmutation reactions. All data incorporated in this library is obtained from the Seventh Edition of the Table of Isotopes.[24)]

The data structure of the GAMMALIB library is shown below:

#1 (A4, I8, I12)

ADA ; usually left blank except at the end of the library where 'END' is written.

IZAA ; the name of the nuclide emitting gamma ray(s). IZAA corresponds to ZAP in the CHAINLIB library. The methodology for IZAA specification is described at the beginning of Section 2.

INDX ; the number of gamma ray species emmitted from the nuclide IZAA

#2 (6E12.0)

ENEG(I) ; energy of the I-th gamma-ray in eV

INT(I) ; intensity of the I-th gamma-ray (1.0 means 100% emission)

I=1, INDX

Two types of data #1 and #2 are given for each gamma-ray emitting nuclide.

An example of the GAMMALIB library data is shown in **Table 7**.

Table 4 The 42-group neutron energy group structure adopted in the CROSSLIB and GICX40 libraries

Group	Energy Limits		Mid-Point Energy	
1	15.000 – 13.720	MeV	14.360	MeV
2	13.720 – 12.549		13.135	
3	12.549 – 11.478		12.014	
4	11.478 – 10.500		10.989	
5	10.500 – 9.314		9.907	
6	9.314 – 8.261		8.788	
7	8.261 – 7.328		7.795	
8	7.328 – 6.500		6.914	
9	6.500 – 5.757		6.129	
10	5.757 – 5.099		5.428	
11	5.099 – 4.516		4.808	
12	4.516 – 4.000		4.258	
13	4.000 – 3.162		3.581	
14	3.162 – 2.500		2.831	
15	2.500 – 1.871		2.186	
16	1.871 – 1.400		1.636	
17	1.400 – 1.058		1.229	
18	1.058 – 0.800		0.929	
19	0.800 – 0.566		0.683	
20	0.566 – 0.400		0.483	
21	0.400 – 0.283		0.342	
22	0.283 – 0.200		0.242	
23	0.200 – 0.141		0.171	
24	0.141 – 0.100		0.121	
25	100.0 – 46.5	keV	73.25	keV
26	46.5 – 21.5		34.0	
27	21.5 – 10.0		15.75	
28	10.0 – 4.65		7.325	
29	4.65 – 2.15		3.40	
30	2.15 – 1.00		1.575	
31	1.00 – 0.465		0.733	
32	0.465 – 0.215		0.340	
33	0.215 – 0.100		0.158	
34	100.0 – 46.5	eV	73.25	eV
35	46.5 – 21.5		34.0	
36	21.5 – 10.0		15.75	
37	10.0 – 4.65		7.325	
38	4.65 – 2.15		3.40	
39	2.15 – 1.00		1.58	
40	1.00 – 0.465		0.733	
41	0.465 – 0.215		0.340	
42	0.215 – 0.001		0.108	

Table 5 List of the data source of the cross sections adopted in the CROSSLIB library

Symbol of data source		Name of author/ editor/compiler	Reference number
KAPL-3327	1967	J.T. Reynolds et al.	11)
JU-RR-3	1970	H. Leppaemaeki et al.	12)
ENDF/B-3	1973	M.K. Drake	13)
N. D. T. 11	1973	W.E. Alley et al.	14)
ENDF/B-4	1974	M.K. Drake	15)
KFK-2233	1975	B. Goel et al.	16)
ANL-75-34	1975	W.G. Davey et al.	17)
NSE 58	1975	W.G. Gross et al.	18)
BNL 325	1976	D.I. Garber et al.	19)
JAERI-M6354	1976	K. Tsukada	20)
KFK-2386	1977	B. Goel et al.	21)

Table 6 Example of the CROSSLIB library data

```
LI06NA                  42ENDF/B-4 1974
 0.25464E-01 0.27885E-01 0.31204E-01 0.34441E-01 0.38724E-01 0.44635E-01
 0.50937E-01 0.58299E-01 0.66775E-01 0.76767E-01 0.87353E-01 0.10007E+00
 0.12307E+00 0.15982E+00 0.22277E+00 0.25750E+00 0.24664E+00 0.25654E+00
 0.29935E+00 0.43720E+00 0.11063E+01 0.29381E+01 0.13146E+01 0.75712E+00
 0.70433E+00 0.89669E+00 0.12648E+01 0.18295E+01 0.26745E+01 0.39216E+01
 0.57500E+01 0.84474E+01 0.12408E+02 0.18200E+02 0.26737E+02 0.39268E+02
 0.57591E+02 0.84592E+02 0.12422E+03 0.18216E+03 0.26755E+03 0.82661E+03
LI06NP                  13ENDF/B-4 1974
 0.70341E-02 0.79772E-02 0.90188E-02 0.99641E-02 0.11205E-01 0.12664E-01
 0.14741E-01 0.17602E-01 0.21115E-01 0.26155E-01 0.28643E-01 0.34248E-01
 0.14015E-01
LI06NG                  42ENDF/B-4 1974
 0.10165E-04 0.10208E-04 0.10252E-04 0.10296E-04 0.10350E-04 0.10409E-04
 0.10470E-04 0.10530E-04 0.10591E-04 0.10653E-04 0.10716E-04 0.10779E-04
 0.10873E-04 0.10996E-04 0.11136E-04 0.11291E-04 0.11447E-04 0.11602E-04
 0.11782E-04 0.11981E-04 0.12184E-04 0.12734E-04 0.14963E-04 0.17793E-04
 0.23594E-04 0.34653E-04 0.50882E-04 0.74612E-04 0.10958E-03 0.16090E-03
 0.23594E-03 0.34653E-03 0.50881E-03 0.74612E-03 0.10958E-02 0.16090E-02
 0.23594E-02 0.34653E-02 0.50881E-02 0.74612E-02 0.10958E-01 0.33855E-01
LI07NNA                 14ENDF/B-4 1974
 3.261  E-01 3.530  E-01 3.796  E-01 4.005  E-01 4.142  E-01 4.201  E-01
 4.236  E-01 4.157  E-01 3.856  E-01 3.025  E-01 1.399  E-01 4.340  E-02
 1.028  E-02 9.262  E-04
LI07ND                   6ENDF/B-4 1974
 0.10530E-01 0.80586E-02 0.49108E-02 0.27772E-02 0.88959E-03 0.34941E-04
LI07N2N                  6ENDF/B-4 1974
 0.22312E-01 0.20971E-01 0.18799E-01 0.15674E-01 0.78289E-02 0.10358E-02
LI07NP                   1
 0.0
LI07NG                  42ENDF/B-4 1974
 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04
 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04
 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04
 0.10000E-04 0.10000E-04 0.10000E-04 0.10000E-04 0.10295E-04 0.19180E-04
 0.26450E-04 0.45269E-04 0.77444E-04 0.11246E-03 0.14174E-03 0.17863E-03
 0.24142E-03 0.34839E-03 0.50264E-03 0.72426E-03 0.10452E-02 0.15079E-02
 0.22004E-02 0.32520E-02 0.48051E-02 0.70570E-02 0.10338E-01 0.31579E-01
BE09NA                  19ENDF/B-4 1974
 0.10540E-01 0.12885E-01 0.15155E-01 0.17483E-01 0.20065E-01 0.23917E-01
 0.30142E-01 0.37289E-01 0.48509E-01 0.58916E-01 0.69230E-01 0.80107E-01
 0.94055E-01 0.10054E+00 0.59435E-01 0.23587E-01 0.65321E-02 0.23618E-02
 0.90523E-04
BE09ND                   1
 0.0
```

Table 7 Example of the GAMMALIB library data

```
        3009           02
0.28     +07 0.3      -01 0.2429  +07 0.32
        4011            8  (B-,B-A)
1.7722   +06 0.0028      2.1248  +06 0.33        2.8931  +06 0.93     -03
4.6663   +06 0.0200      5.0193  +06 0.0047      5.8518  +06 0.0213
6.7905   +06 0.0451      7.9747  +06 0.0174
        5012            2
3.23     +06 0.6      -04 4.43891 +06 0.0129
        5013            1
3.68     +06 0.076
        6015            5
5.29887 +06 0.68        7.3011  +06 0.74     -04 8.3129  +06 0.32     -03
8.5714   +06 0.42     -04 9.0500  +06 0.31     -03
        7013            1
0.511    +06 2.0
        7016            7
1.72     +06 0.1032  -02 1.90     +06 0.344    -03 2.75    +06 0.8944  -02
6.05     +06 0.1194  -03 6.1292  +06 0.688       7.11515 +06 0.04783
8.87     +06 0.82584 -03
        7017            2
8.71     +05 0.030       2.1842  +06 0.3176   -02
        8015            1
0.511    +06 2.0
        8019            8
1.1      +05 0.036658    1.97     +05 0.92126     1.36    +06 0.55
1.45     +06 0.031467    1.55     +06 0.01468     1.56    +06 0.288    -03
4.19     +06 0.12853 -02 2.59     +06 0.288    -03
        9018            1
0.511    +06 1.938
        9020            2
1.634    +06 1.0         3.334    +06 0.17     -03
       10023            5
4.401    +05 0.329       1.639    +06 0.9906   -02 2.079   +06 0.10268 -02
2.545    +06 0.27184 -03 2.985    +06 0.38044  -03
       11021            2
3.51     +05 0.051       0.511    +06 2.0      +00
       11022            2
1.27455 +06 0.99934     0.511    +06 1.8      +00
       11024            4
1.3686   +06 1.0         2.7541  +06 1.0         3.8672  +06 0.61     -03
4.2389   +06 0.84     -05
       11124            1
1.4723   +05 1.0
       11025            8
3.8966   +05 0.13137     5.8506  +05 0.12843     9.752   +05 0.147
1.3797   +06 0.26921 -02 1.6117  +06 0.09768     1.9651  +06 0.16476 -02
2.2156   +06 0.10445 -02 2.8006  +06 0.58403  -03
       11026           10
1.0029   +06 0.82     -02 1.13    +06 0.057676    1.4123  +06 0.03205
1.809    +06 0.989       1.8967  +06 0.0198      2.133   +06 0.59457 -02
```

3. Graphs of Activation Data

In this section, the plotted output of the transmutation and decay chain diagram, the transmutation cross sections and delayed gamma ray data are given for each of the 116 stable nuclides listed in **Table 8**. **Table 8** also gives the natural abundance and the page where the plotted data can be found.

Transmutation and decay chain diagram for a nuclide is shown on an even numbered page and transmutation cross section and delayed gamma data for the nuclide are shown together on the next odd numbered page. Descriptions of the plotted output are given first.

Plotting output descriptions

(1) Transmutation and decay chain scheme plotting output

The symbols for transmutation reaction type and decay mode type are described in **Table 2**.

A solid line arrow shows a transmutation reaction, the name of which is written above the line. Each arrow shows a neutron reaction with the stable nuclide, the symbol of which is placed inside a rectangle.

A dotted arrow shows a decay of an unstable nuclide with the decay mode and its halflife. For the multiple decay mode branching ratio is shown in parentheses.

When two types of reactions or decay modes result in the same daughter nuclides, e.g. (n, np) and (n, d) reactions or β^+ decay and electron capture, both of the reactions or decay modes are shown in smaller letters.

Metastable nuclides are shown with symbol M beside the mass number.

(2) Transmutation cross section plotting output

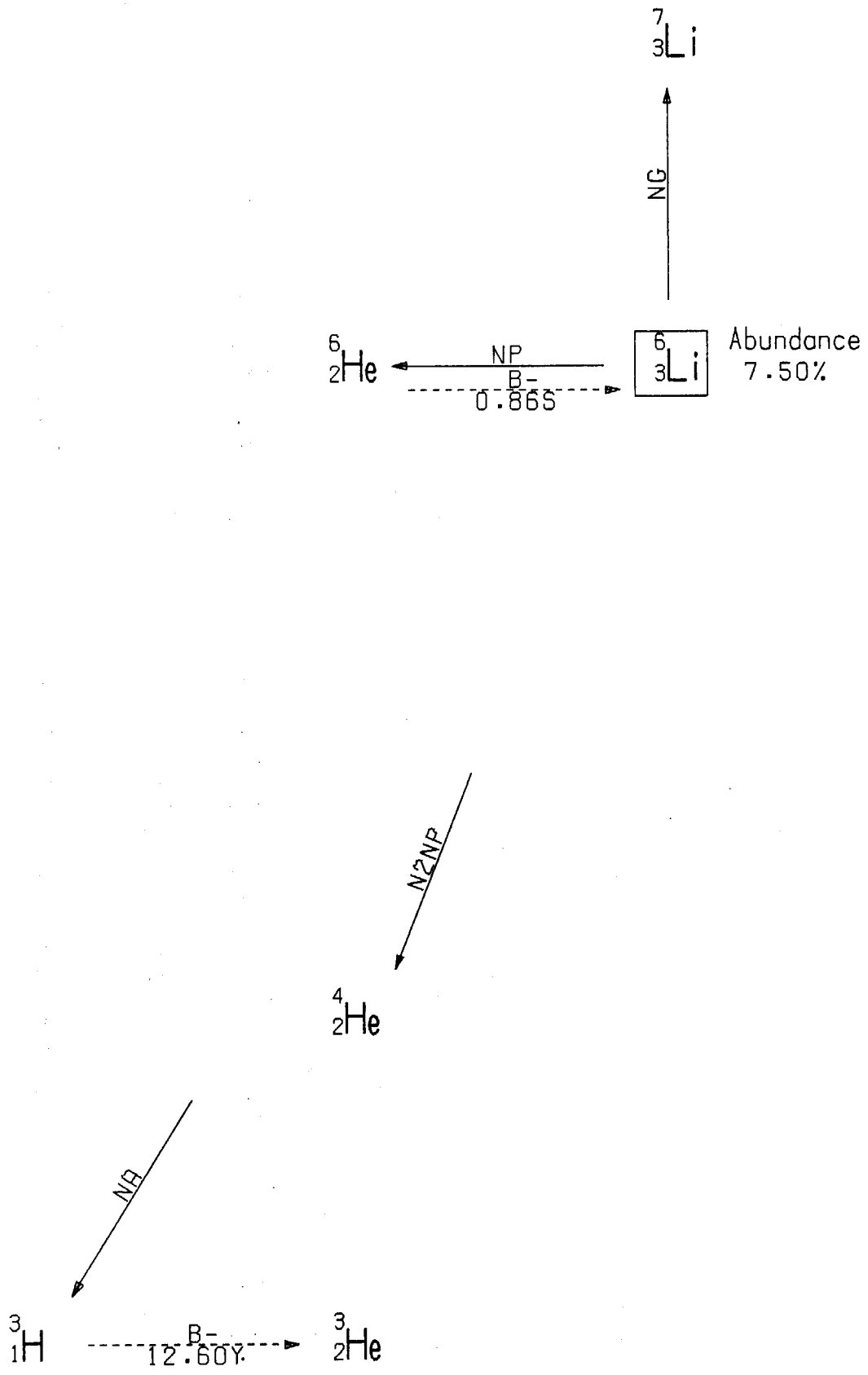
Transmutation reactions for a stable nuclide included in the CROSSLIB library are plotted in the multigroup form. All the reactions with non zero values for the nuclide in the library are plotted on a single graph. A symbol mark is assigned to each of the plotted cross sections and its identification is given below the graph. The data reference of the cross sections is also shown in parentheses by the symbol described in **Table 5**. The name of the reactions with only zero values in the CROSSLIB library are also shown below the graph without any symbol mark.

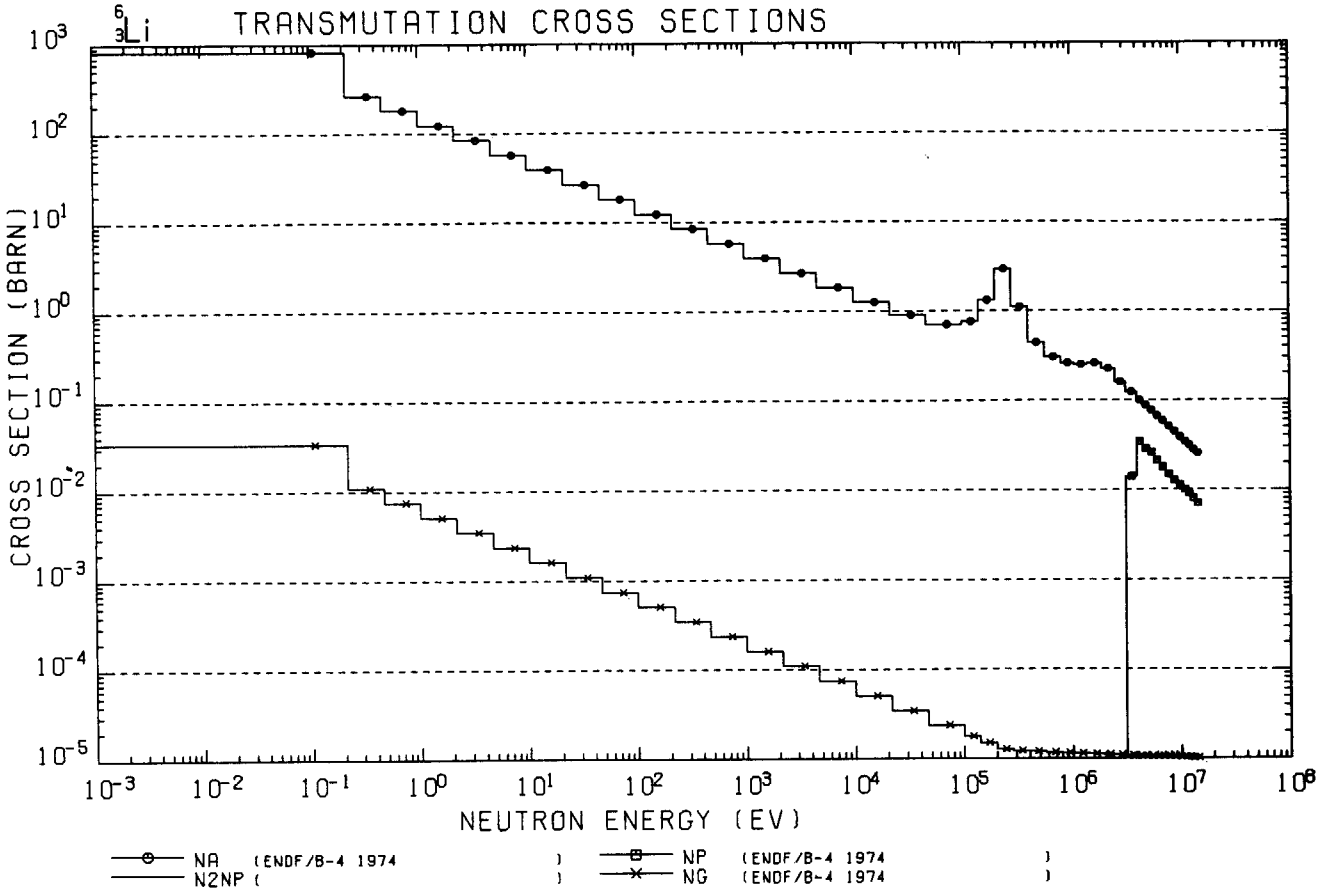
(3) Delayed gamma ray emission data table output

All the unstable nuclides in the CHAINLIB library for a parent stable nuclide are listed in the decay gamma-ray table. The energies and intensities of gamma rays with intensity greater than 0.1% per decay are tabulated. Up to 10 strongest gamma rays are tabulated for a decaying nuclide. The annihilation radiation, 0.511 MeV, from β^+ decay is always given first when it exists. Unstable nuclides without any delayed gamma ray emission are given in the table with their half lives.

Table 8 List of stable nuclides for which the activation data are plotted

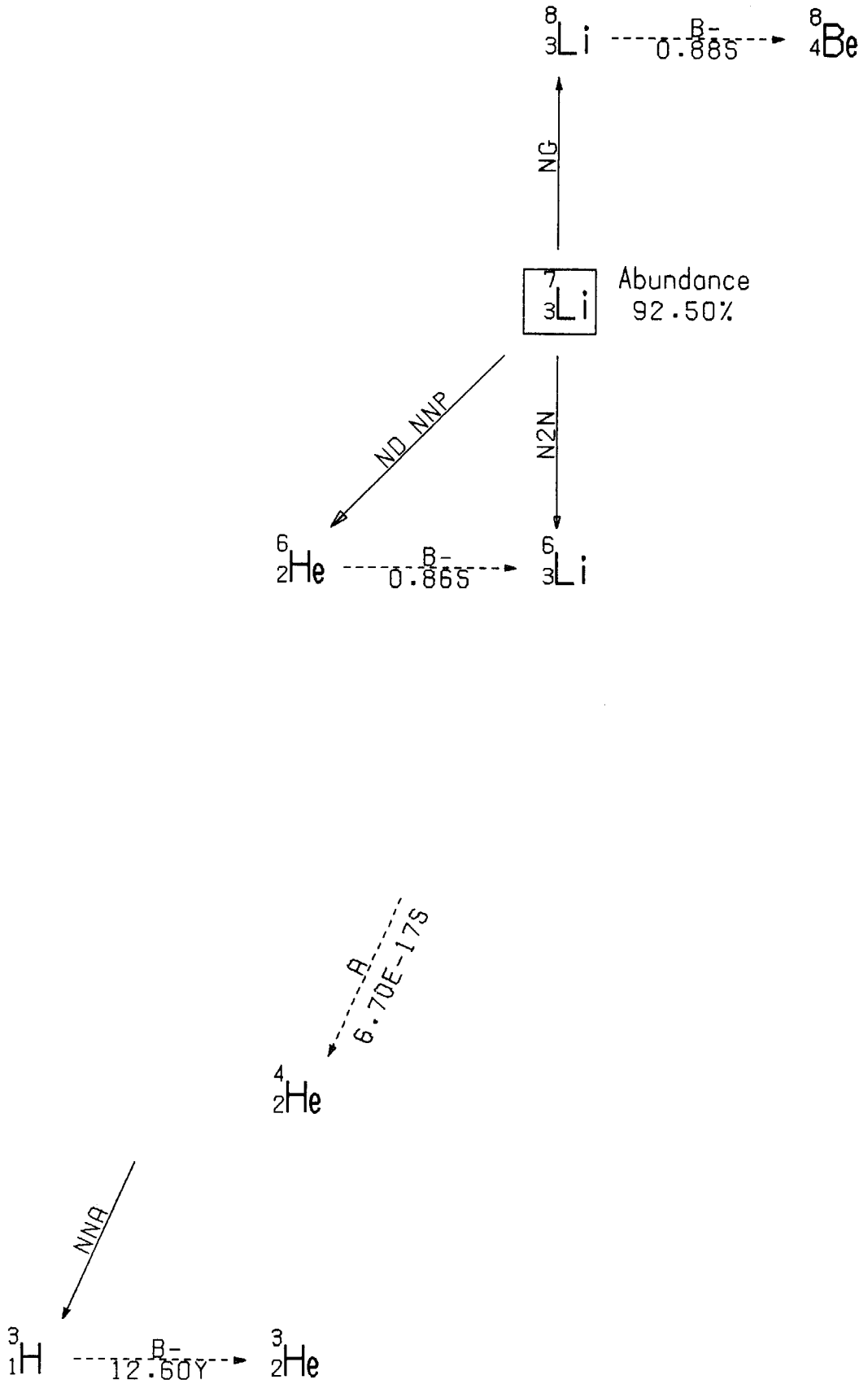
Element	File No.	Nuclide number	Natural abundance (%)	Page of plotted data
Li	1	3006	7.5	14
	2	3007	92.5	16
Be	3	4009	100.0	18
B	4	5010	19.8	20
	5	5011	80.2	22
C	6	6012	98.89	24
	7	6013	1.11	26
N	8	7014	99.63	28
	9	7015	0.366	30
O	10	8016	99.76	32
	11	8017	0.038	34
F	12	9019	100.0	36
Na	13	11023	100.0	38
Mg	14	12024	78.99	40
	15	12025	10.0	42
	16	12026	11.01	44
Al	17	13027	100.0	46
Si	18	14028	92.23	48
	19	14029	4.67	50
	20	14030	3.10	52
P	21	15031	100.0	54
C	22	16032	95.02	56
	23	16033	0.75	58
	24	16034	4.21	60
	25	16036	0.017	62
Cl	26	17035	75.77	64
	27	17037	24.23	66
K	28	19039	93.26	68
	29	19040	0.0117	70
	30	19041	6.73	72
Ca	31	20040	96.94	74
	32	20042	0.647	76
	33	20043	0.135	78
	34	20044	2.09	80
	35	20046	0.0035	82
	36	20048	0.187	84
Ti	37	22046	8.2	86
	38	22047	7.4	88
	39	22048	73.7	90
	40	22049	5.4	92
	41	22050	5.2	94
V	42	23050	0.25	96
	43	23051	99.75	98
Cr	44	24050	4.35	100
	45	24052	83.79	102
	46	24053	9.5	104
	47	24054	2.36	106
Mn	48	25055	100.0	108
Fe	49	26054	5.8	110
	50	26056	91.8	112
	51	26057	2.15	114
	52	26058	0.29	116
Co	53	27059	100.0	118
Ni	54	28058	68.3	120
	55	28060	26.1	122
	56	28061	1.13	124
	57	28062	3.59	126
	58	28064	0.91	128
Cu	59	29063	69.2	130
	60	29065	30.8	132
Zn	61	30064	48.6	134
	62	30066	27.9	136
	63	30067	4.1	138
	64	30068	18.8	140
	65	30070	0.62	142
Zr	66	40090	51.5	144
	67	40091	11.2	146
	68	40092	17.1	148
	69	40094	17.4	150
	70	40096	2.8	152
Nb	71	41093	100.0	154
Mo	72	42000	9.6	168
	73	42092	14.8	156
	74	42094	9.3	158
	75	42095	15.9	160
	76	42096	16.7	162
	77	42097	9.6	164
	78	42098	24.1	166
Cd	79	48006	1.25	170
	80	48008	0.89	172
	81	48010	12.5	174
	82	48011	12.8	176
	83	48012	24.1	178
	84	48013	12.2	180
	85	48014	28.7	182
	86	48016	7.5	184
In	87	49013	4.3	186
	88	49015	95.7	188
Sn	89	50012	1.01	190
	90	50014	0.67	192
	91	50015	0.38	194
	92	50016	14.8	196
	93	50017	7.75	198
	94	50018	24.3	200
	95	50019	8.6	202
	96	50020	32.4	204
	97	50022	4.56	206
	98	50024	5.64	208
Sb	99	51021	57.3	210
	100	51023	42.7	212
Hf	101	72074	0.16	214
	102	72076	5.2	216
	103	72077	18.6	218
	104	72078	27.1	220
	105	72079	13.7	222
	106	72080	35.2	224
Ta	107	73081	100.0	226
W	108	74080	0.13	228
	109	74082	26.3	230
	110	74083	14.3	232
	111	74084	30.7	234
	112	74086	28.6	236
Pb	113	82004	1.42	238
	114	82006	24.1	240
	115	82007	22.1	242
	116	82008	52.3	244

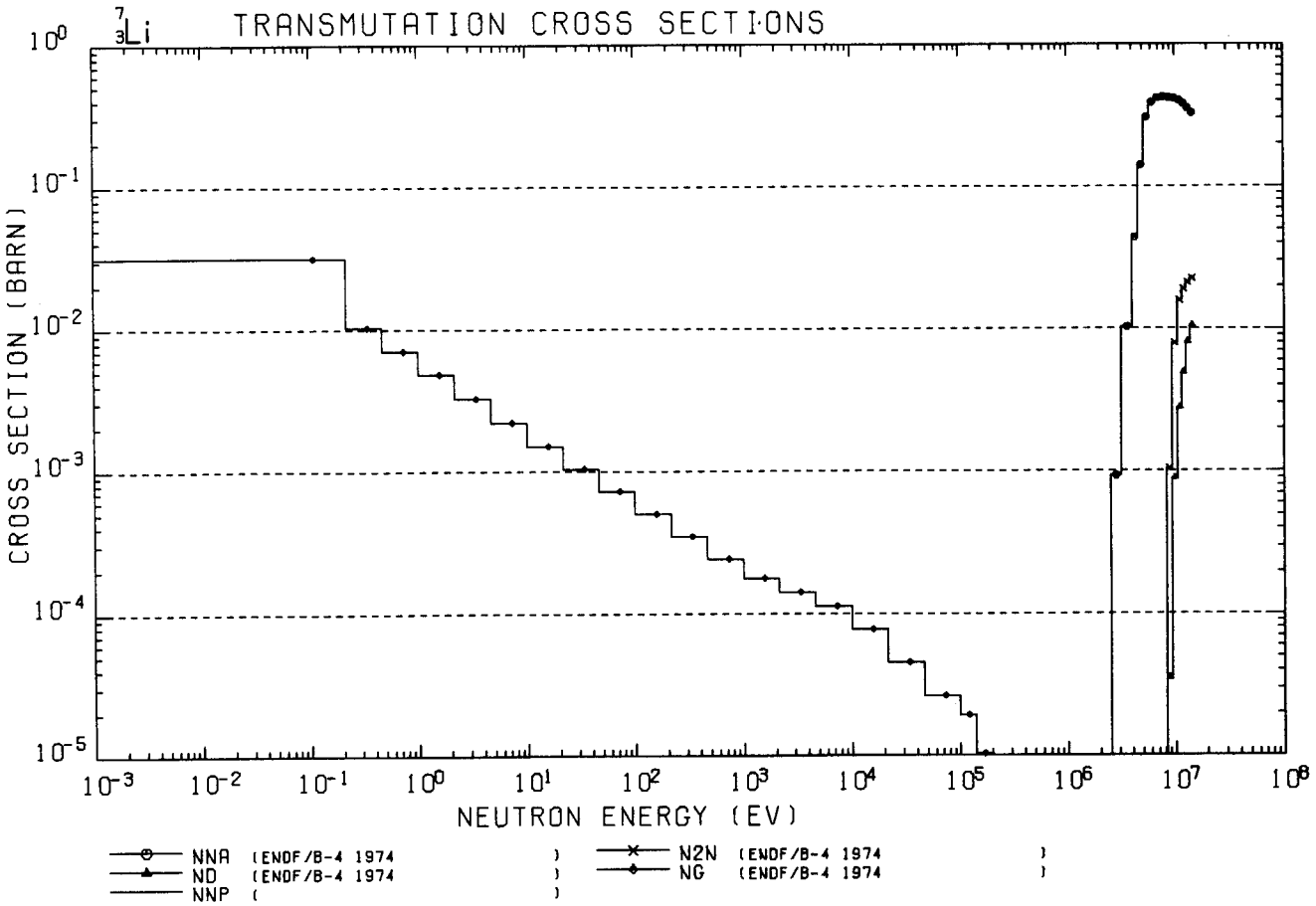

7 3Li
NG
6 2He
NP
B-
0.865
6 3Li
Abundance
7.50%
N2NP
4 2He
NA
3 1H
B-
12.60Y
3 2He



6 3Li DECAY GAMMA-RAY TABLE

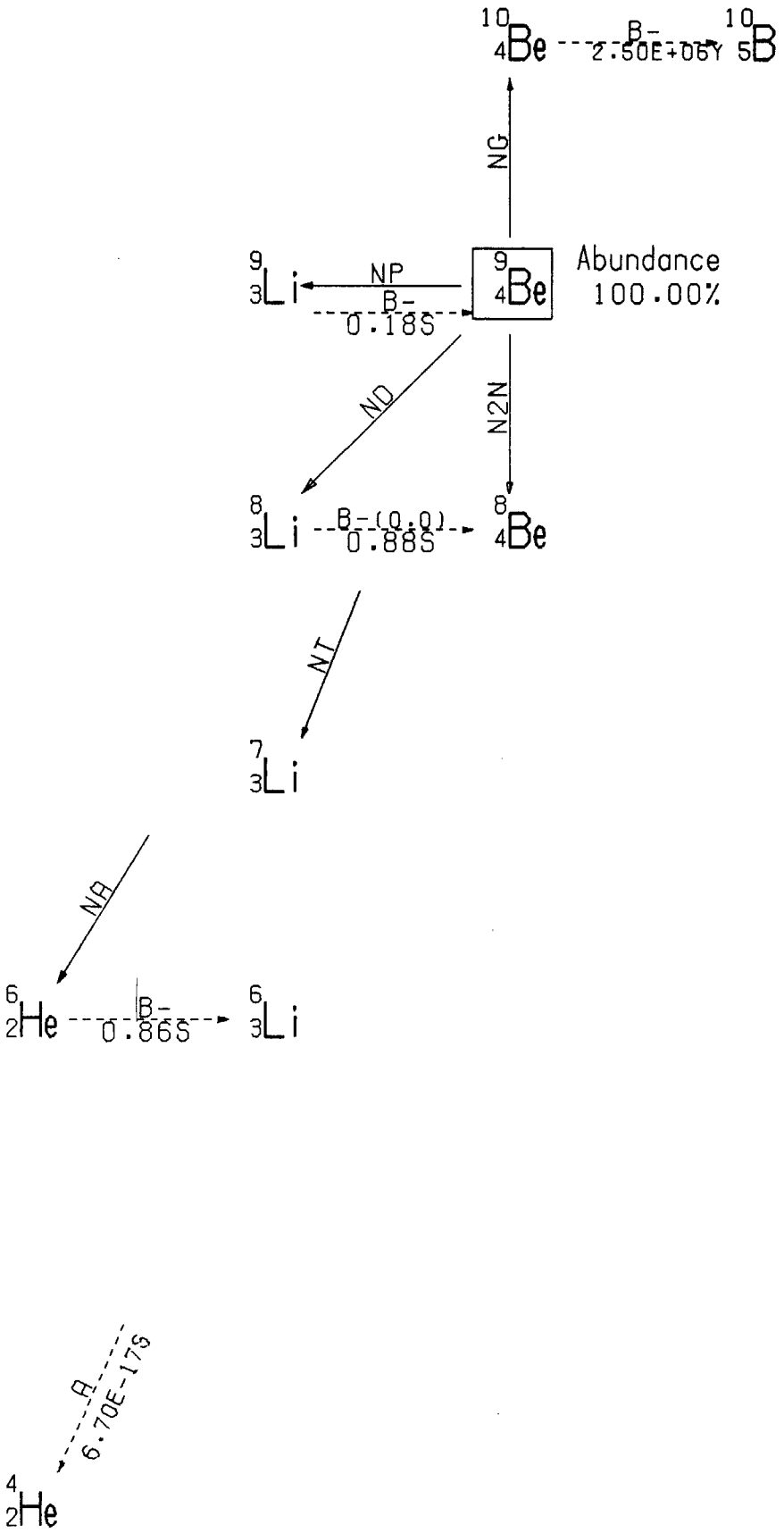
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
3 1H	12.60 Y	
6 2He	0.86 S	

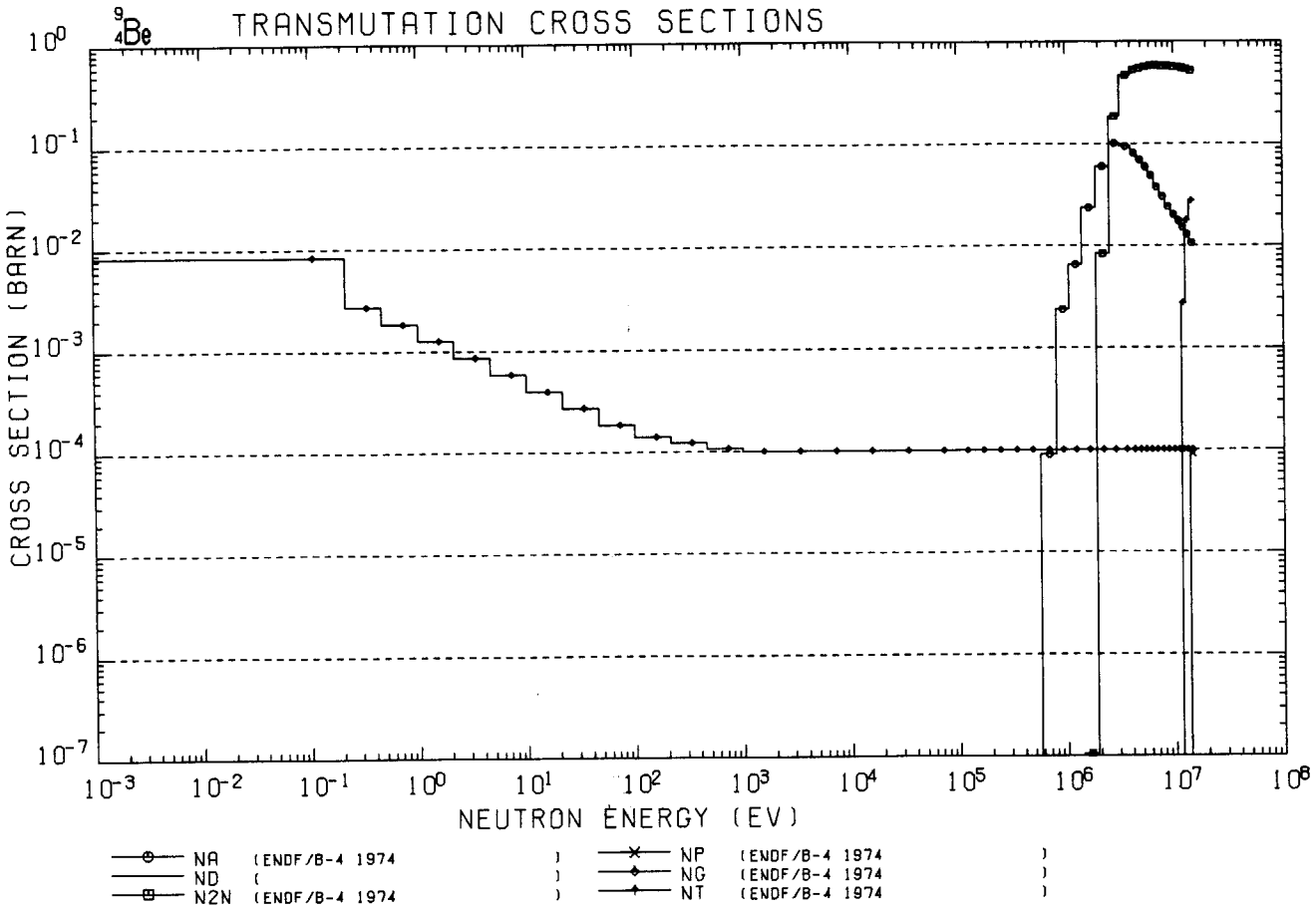

8 3 Li
B-
0.885
8 4 Be
NG
7 3 Li
Abundance
92.50%
ND NNP
N2N
6 2 He
B-
0.865
6 3 Li
A
6.70E-17S
4 2 He
NNA
3 1 H
B-
12.60Y
3 2 He



$^{7}_{3}Li$ DECAY GAMMA-RAY TABLE

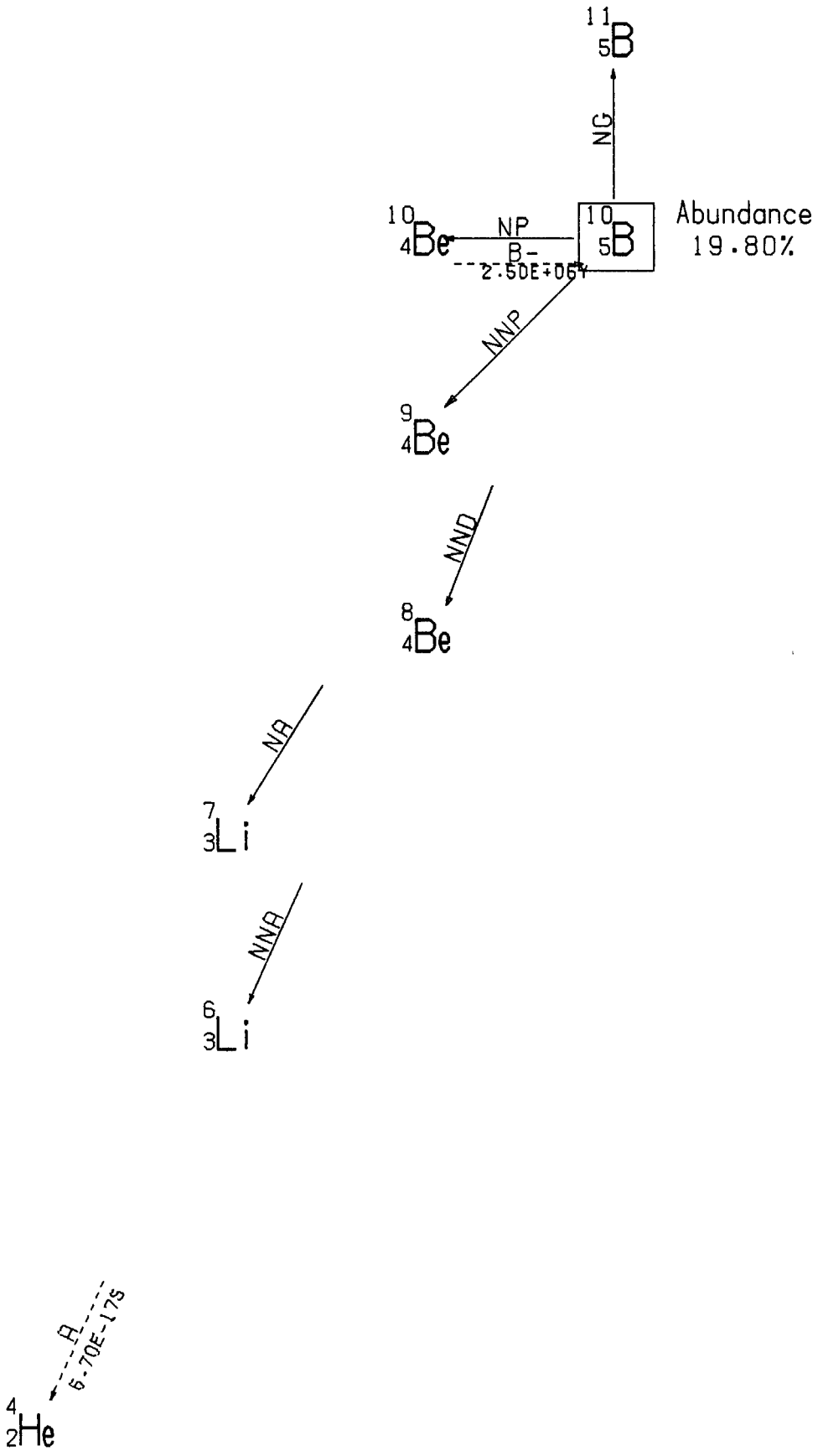
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
$^{3}_{1}H$	12.60 Y	
$^{6}_{2}He$	0.86 S	
$^{8}_{3}Li$	0.88 S	
$^{8}_{4}Be$	6.70E-17S	

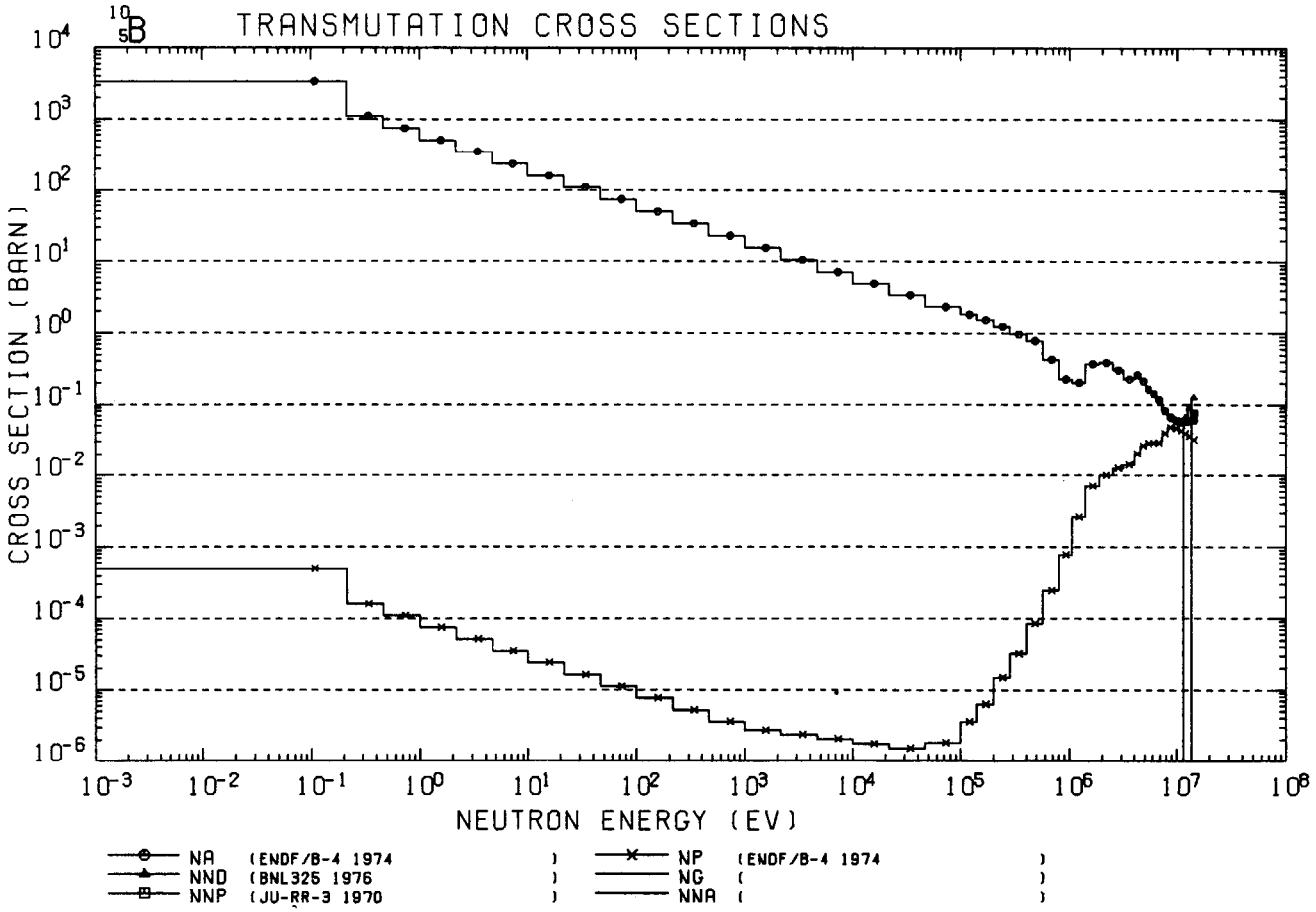

10 4Be
B-
2.50E+06Y
10 5B
NG
9 3Li
NP
B-
0.18S
9 4Be
Abundance
100.00%
ND
N2N
8 3Li
B-(0.0)
0.88S
8 4Be
NT
7 3Li
NA
6 2He
B-
0.86S
6 3Li
A
6.70E-17S
4 2He



$^{9}_{4}Be$ DECAY GAMMA-RAY TABLE

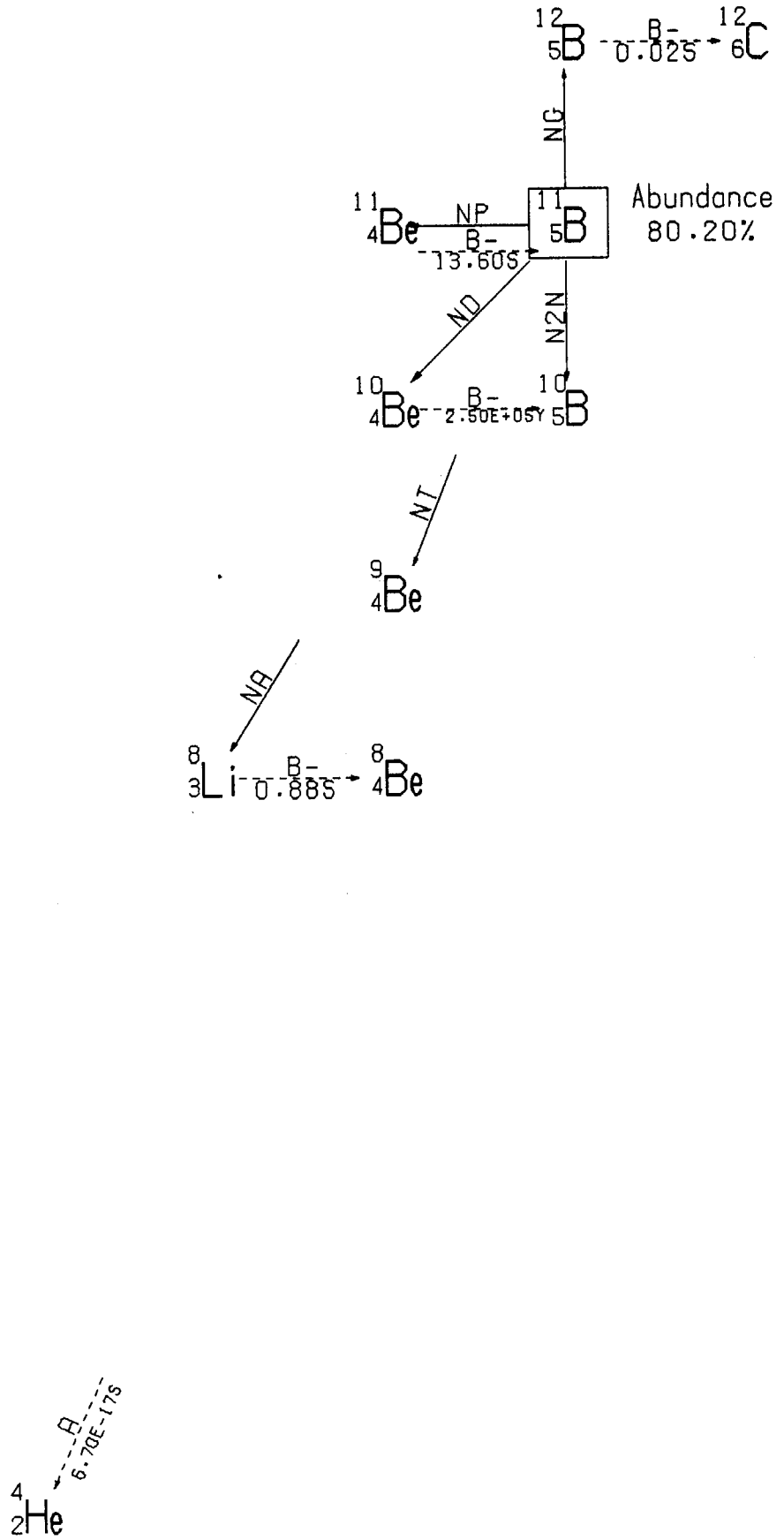
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY		
		YIELD (%) --GREATER THAN 0.1-		
$^{6}_{2}He$	0.86 S			
$^{8}_{3}Li$	0.88 S			
$^{9}_{3}Li$	0.18 S	5.11E+05	2.43E+06	2.60E+06
		0.00	32.00	3.00
$^{10}_{4}Be$	2.50E+06Y			
$^{8}_{4}Be$	6.70E-17S			

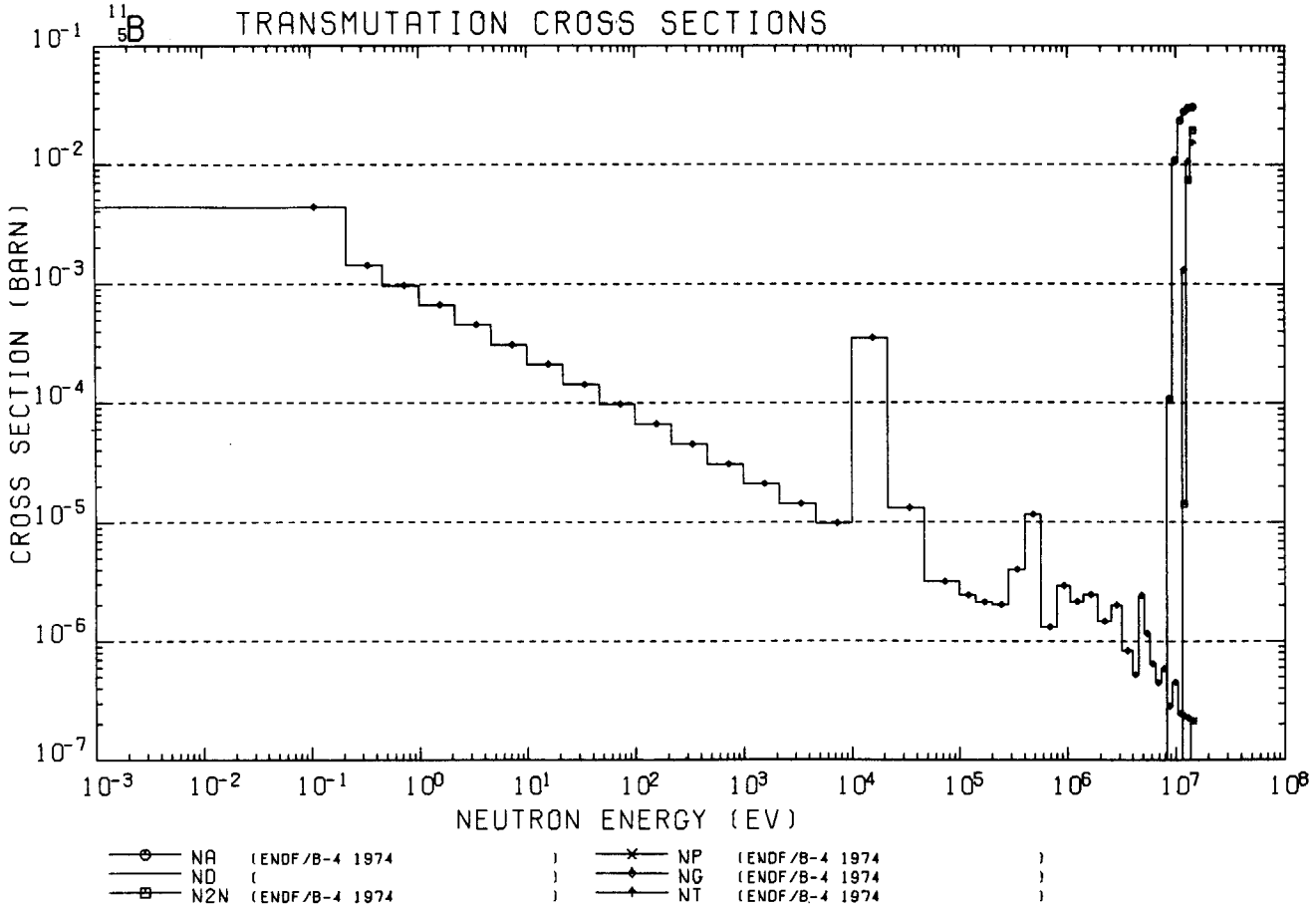

11 5B
NG
10 4Be
NP
B-
2.50E+06Y
10 5B
Abundance
19.80%
NNP
9 4Be
NND
8 4Be
NA
7 3Li
NNA
6 3Li
A
6.70E-17S
4 2He



$^{10}_{5}B$ DECAY GAMMA-RAY TABLE

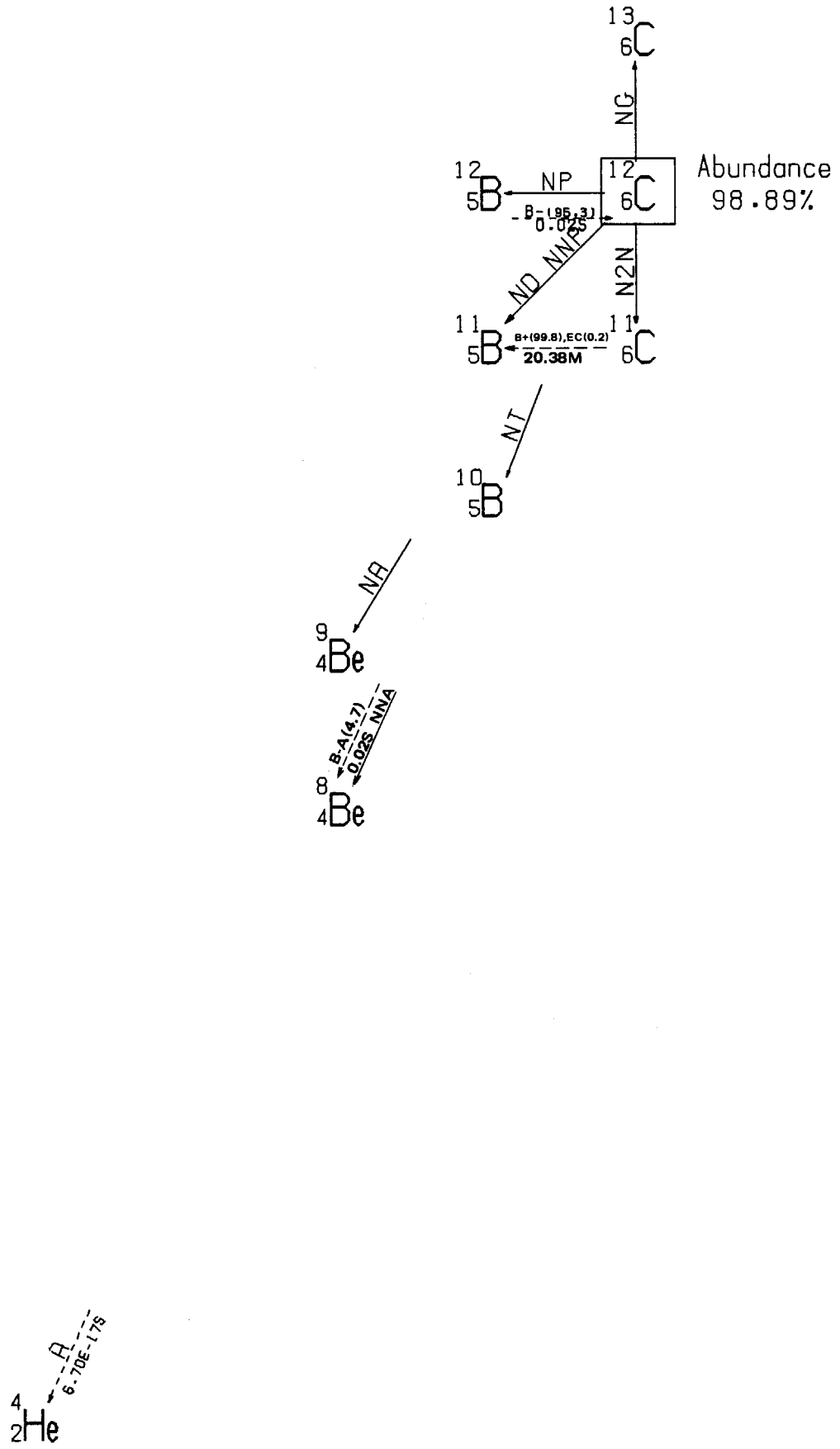
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
$^{10}_{4}Be$	2.50E+06Y	
$^{8}_{4}Be$	6.70E-17S	

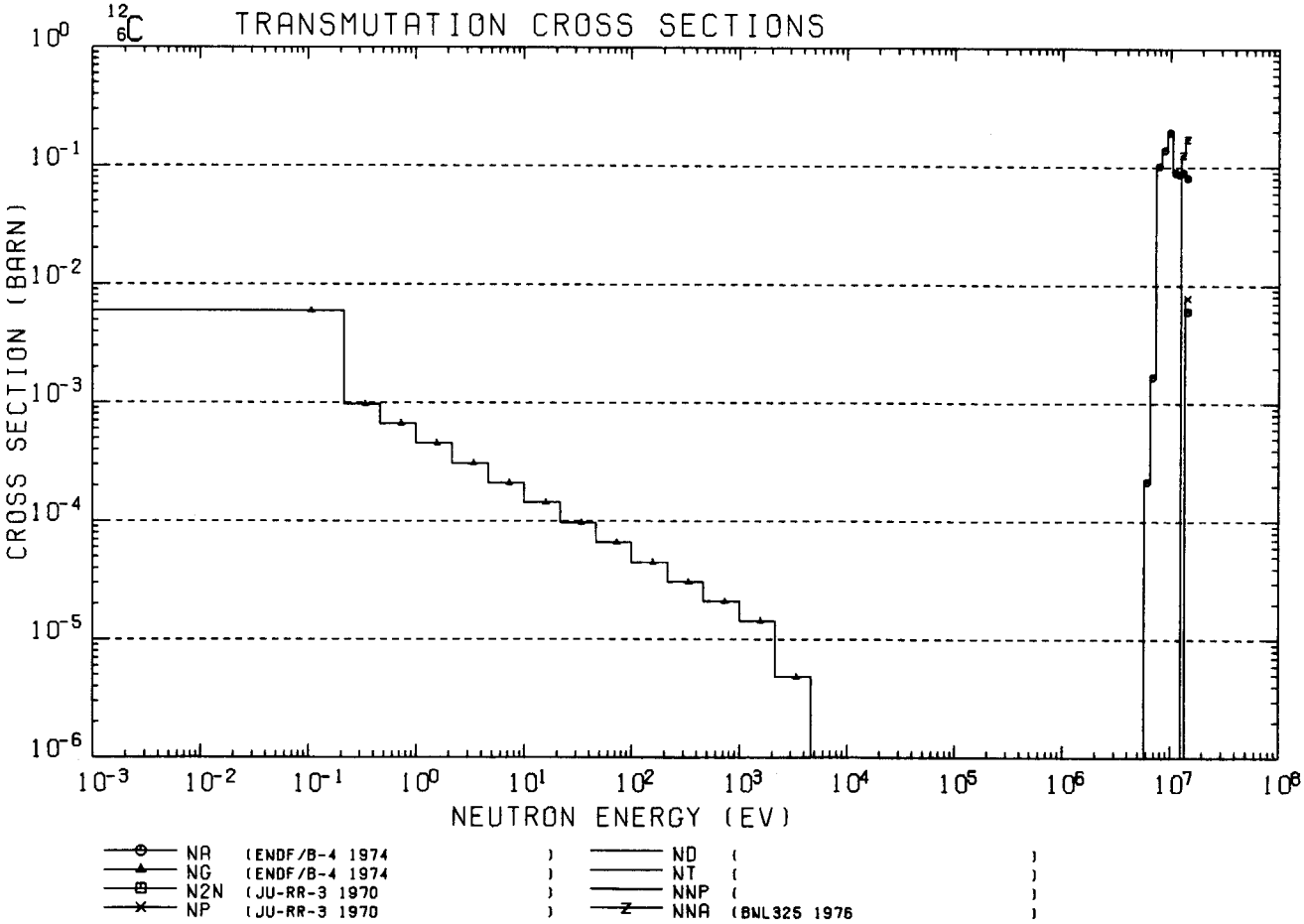

12 5B
B-
0.025
12 6C
NG
11 4Be
NP
B-
13.60S
11 5B
Abundance
80.20%
ND
N2N
10 4Be
B-
2.50E+05Y
10 5B
NT
9 4Be
NA
8 3Li
B-
0.88S
8 4Be
A
6.70E-17S
4 2He



$^{11}_{5}B$ DECAY GAMMA-RAY TABLE

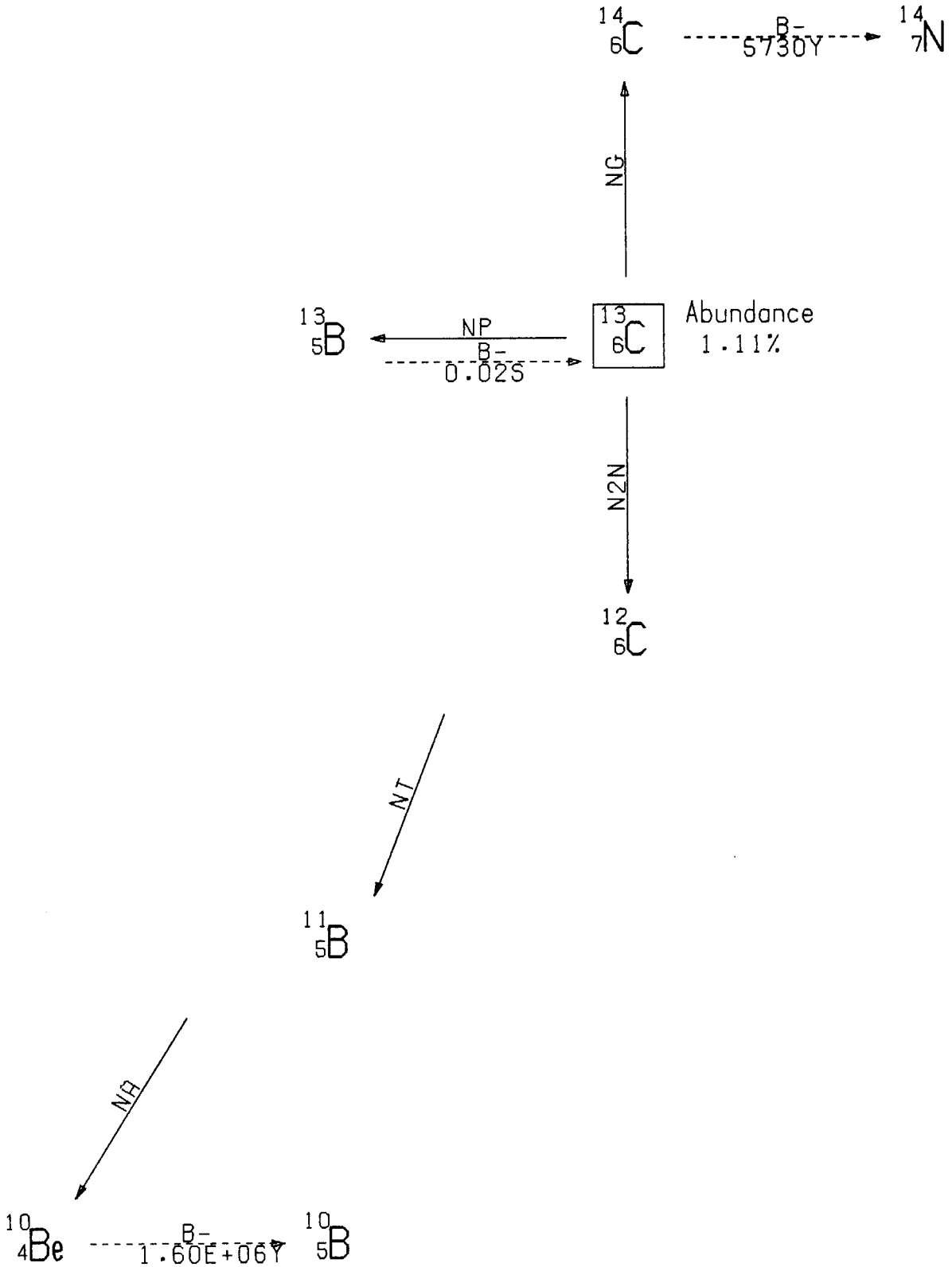
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-							
$^{8}_{3}Li$	0.88 S								
$^{10}_{4}Be$	2.50E+05Y								
$^{11}_{4}Be$	13.60 S	5.11E+05	2.12E+06	6.78E+06	5.85E+06	4.67E+06	7.97E+06	5.02E+06	1.77E+06
		0.00	33.00	4.51	2.13	2.00	1.74	0.47	0.28
$^{12}_{5}B$	0.020 S	5.11E+05	4.44E+06						
		0.00	1.29						
$^{8}_{4}Be$	6.70E-17S								

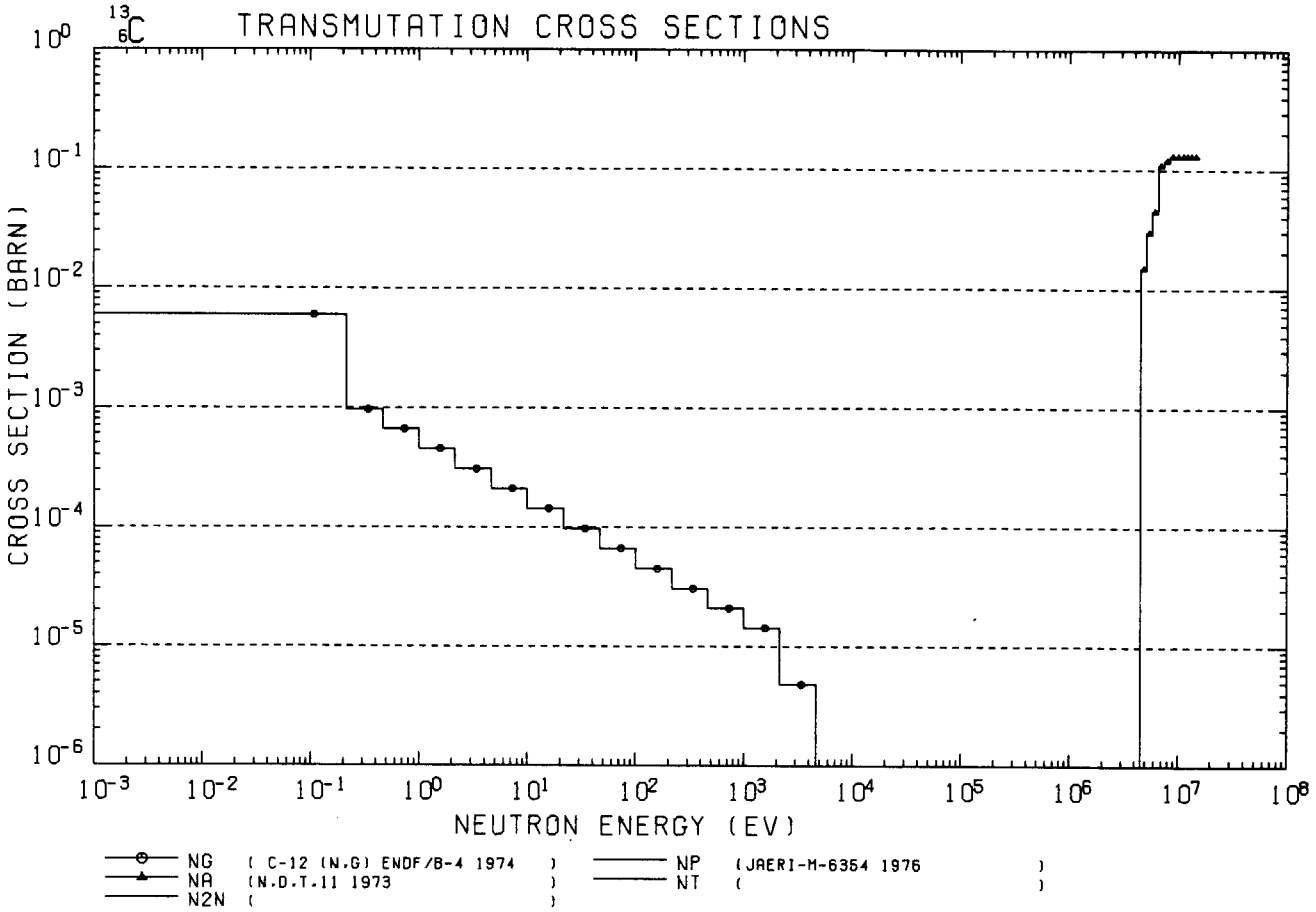

13 6C
NG
12 5B
NP
12 6C
Abundance
98.89%
B-(95.3)
0.025
ND NNP
N2N
11 5B
B+(99.8),EC(0.2)
20.38M
11 6C
NT
10 5B
NA
9 4Be
B-A(4.7)
0.025 NNA
8 4Be
A
6.70E-175
4 2He



$^{12}_{6}C$ DECAY GAMMA-RAY TABLE

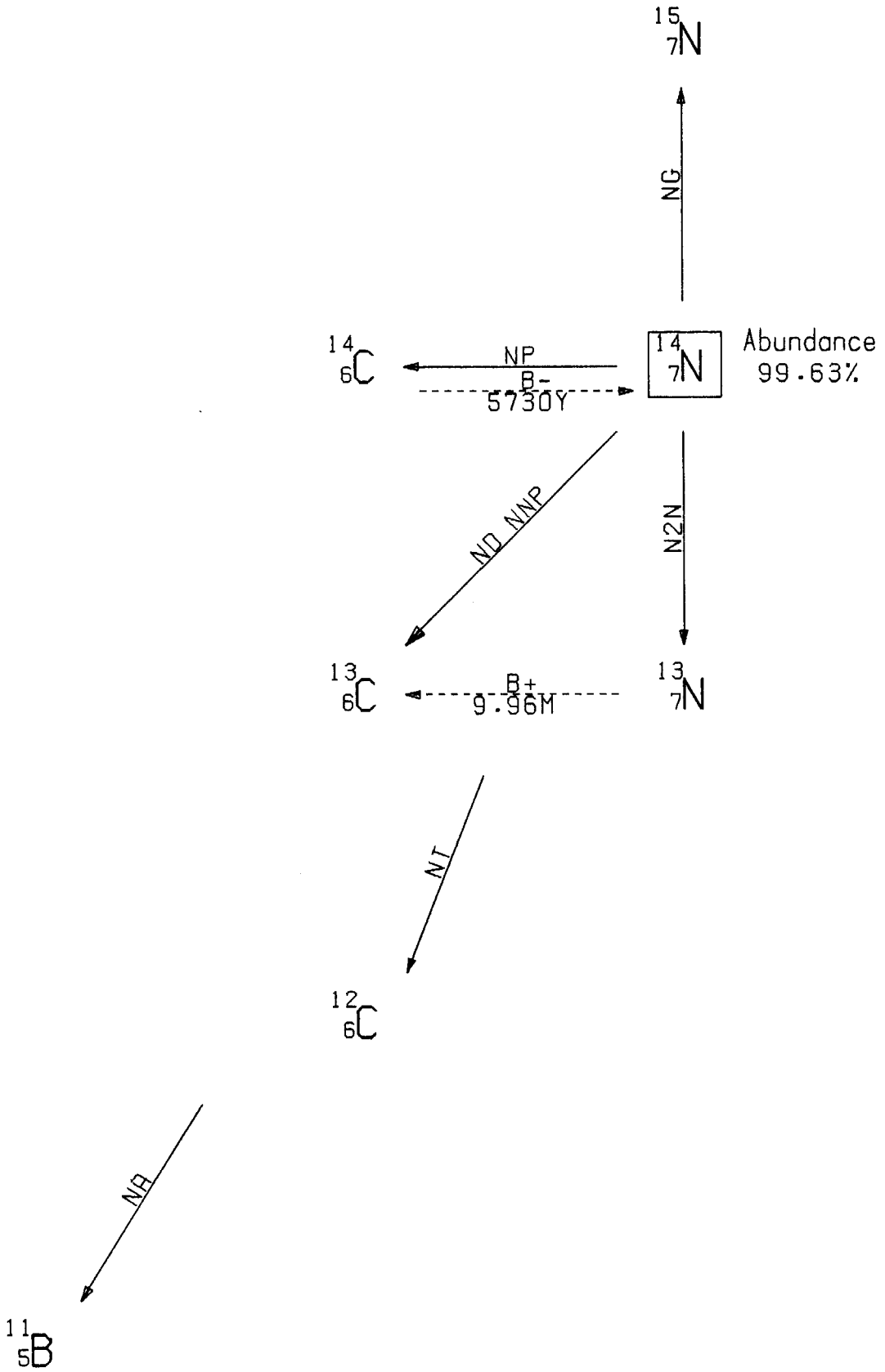
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-	
$^{11}_{6}C$	20.38 M		
$^{12}_{5}B$	0.020 S	6.11E+06	4.44E+06
		0.00	1.29
$^{8}_{4}Be$	6.70E-17S		

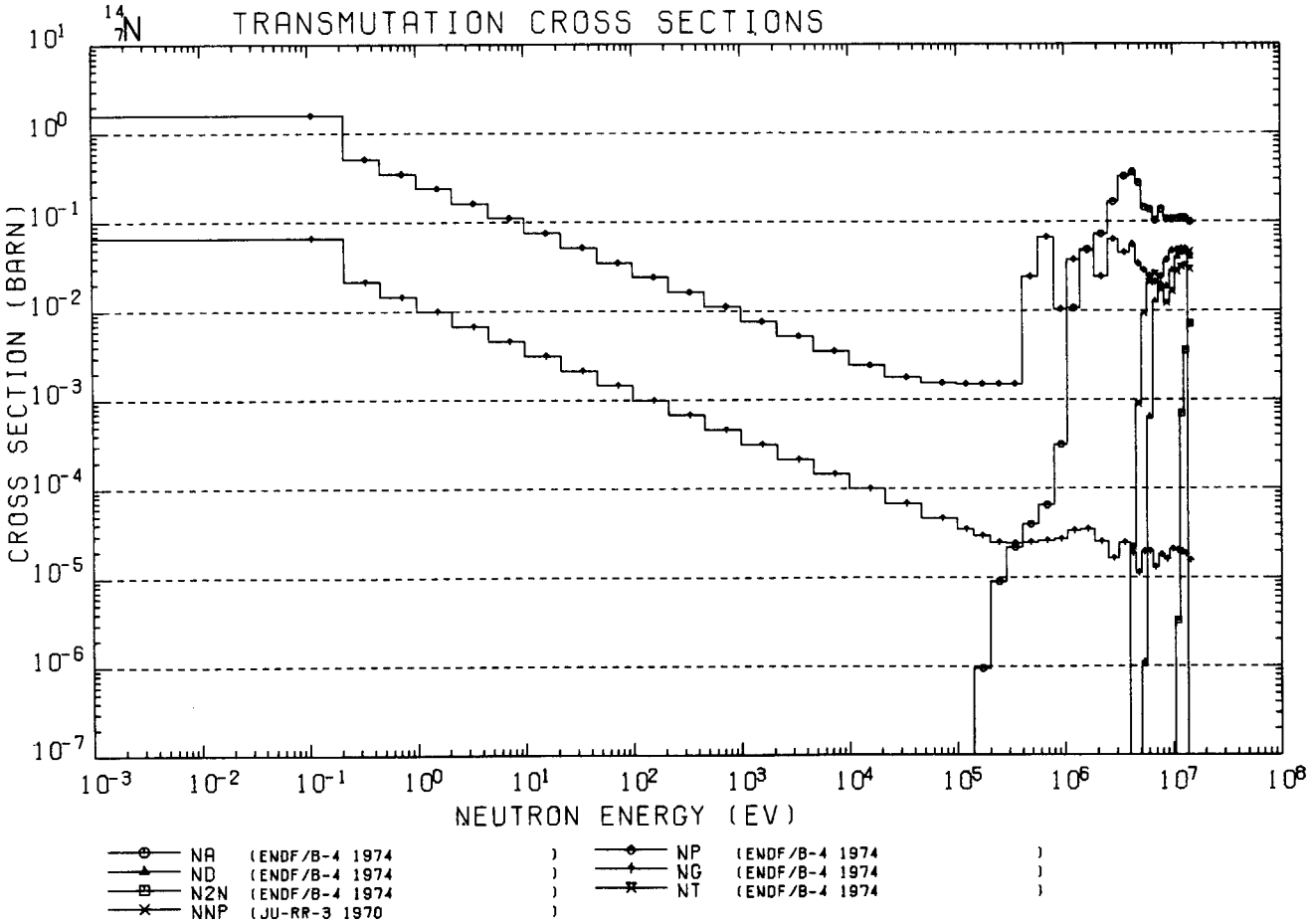

14 6C
B-
5730Y
14 7N
NG
13 5B
NP
B-
0.02S
13 6C
Abundance
1.11%
N2N
12 6C
NT
11 5B
NA
10 4Be
B-
1.60E+06Y
10 5B



$^{13}_{6}C$ DECAY GAMMA-RAY TABLE

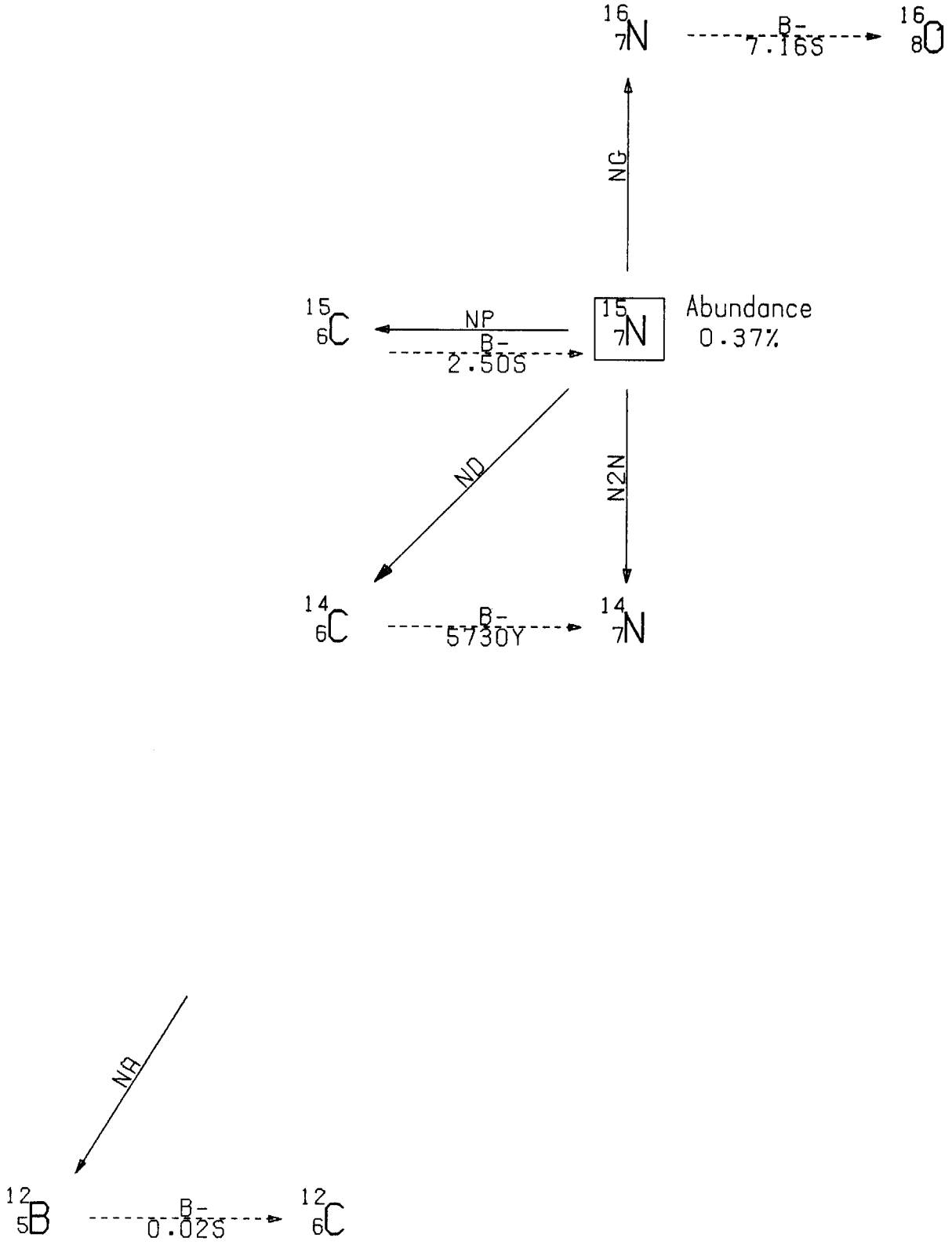
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY	
		YIELD (%) --GREATER THAN 0.1-	
$^{14}_{6}C$	5730 Y		
$^{10}_{4}Be$	1.60E+06Y		
$^{13}_{5}B$	0.017 S	5.11E+05	9.60E+06
		0.00	7.60

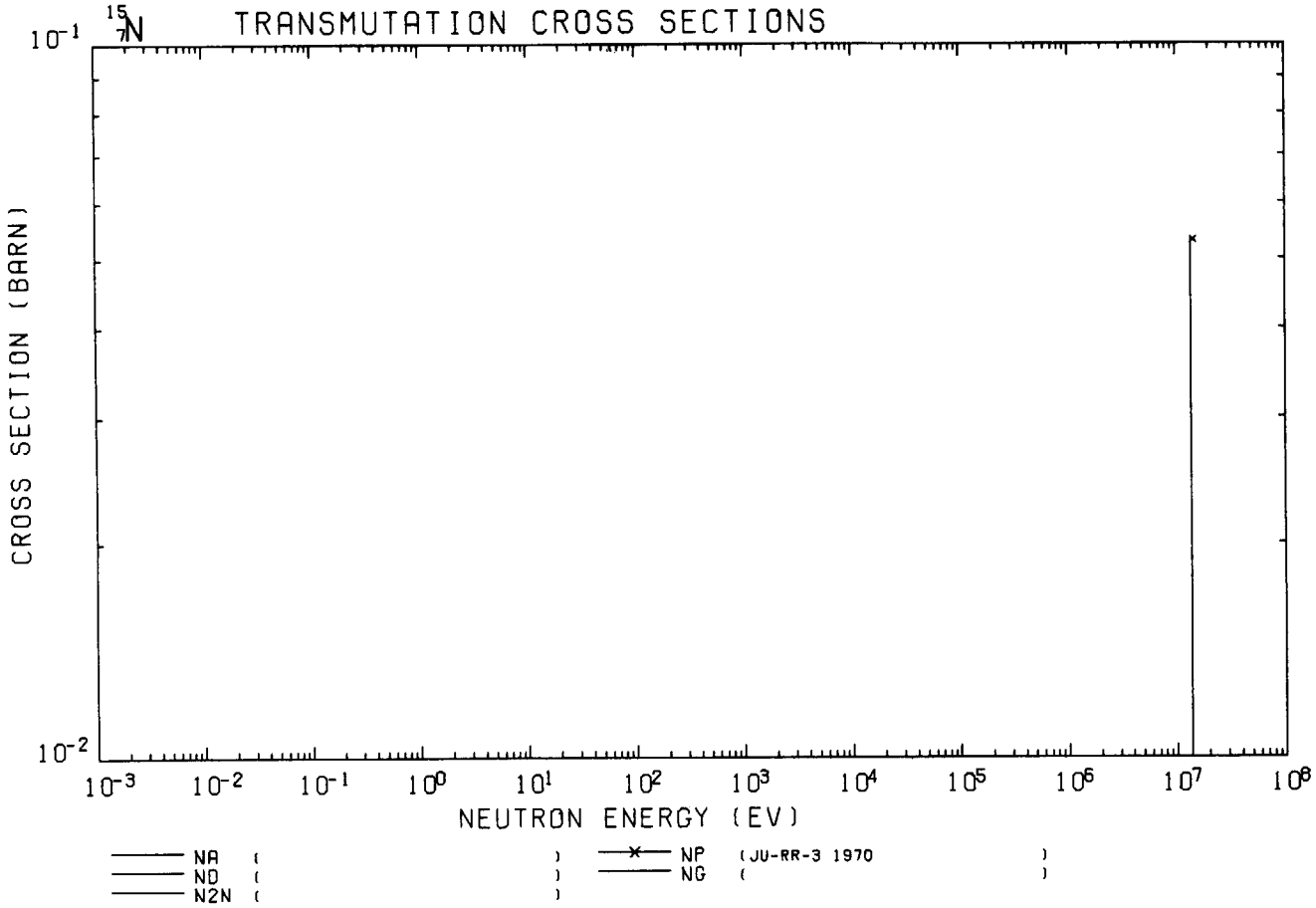

15 7N
NG
14 6C
NP
B-
5730Y
14 7N
Abundance
99.63%
ND NNP
N2N
13 6C
B+
9.96M
13 7N
NT
12 6C
NA
11 5B



$^{14}_{7}N$ DECAY GAMMA-RAY TABLE

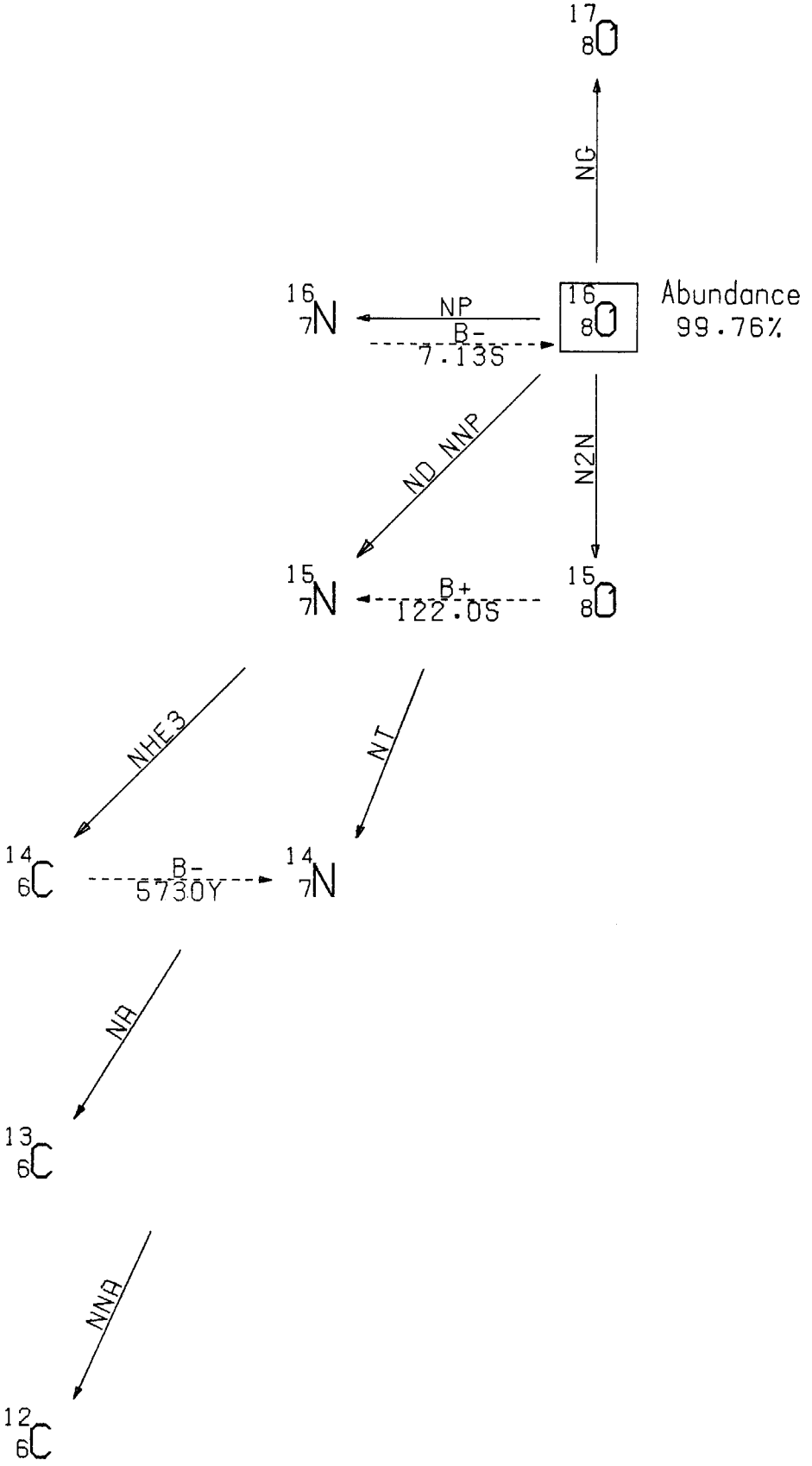
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-
$^{13}_{7}N$	9.96 M	5.11E+05 / 200.00
$^{14}_{6}C$	5730 Y	

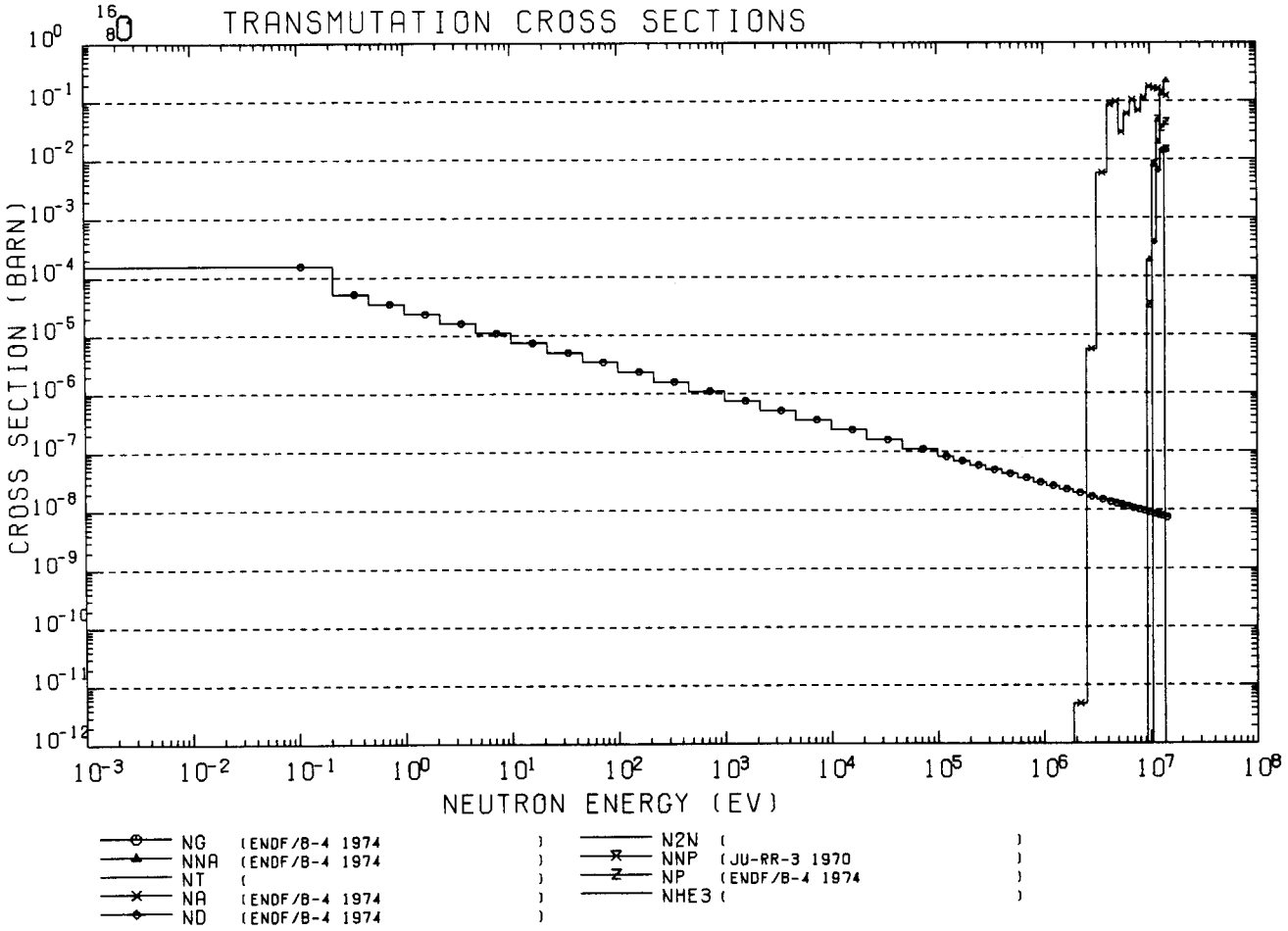

16 7N
B-
7.16S
16 8O
NG
15 6C
NP
B-
2.50S
15 7N
Abundance
0.37%
ND
N2N
14 6C
B-
5730Y
14 7N
NA
12 5B
B-
0.02S
12 6C



$^{15}_{7}N$ DECAY GAMMA-RAY TABLE

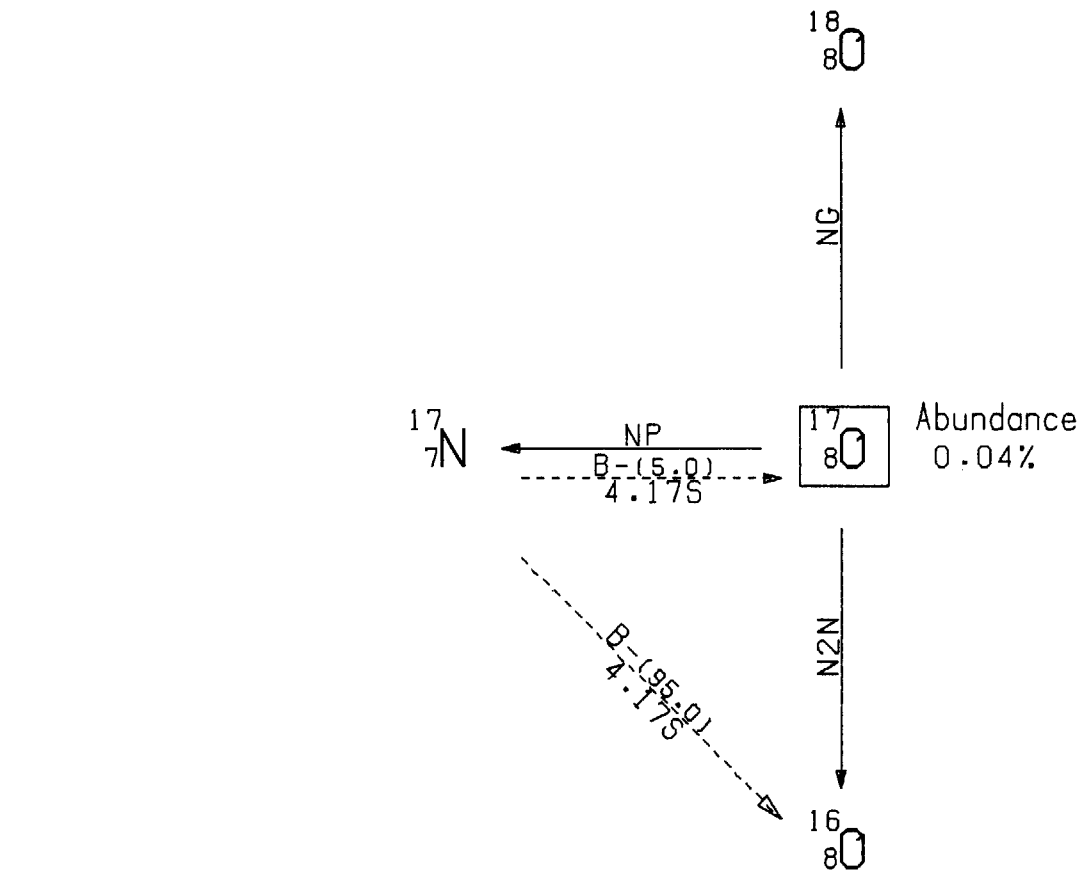
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-				
$^{12}_{5}B$	0.020	S	5.11E+05 0.00	4.44E+06 1.29			
$^{14}_{6}C$	5730	Y					
$^{15}_{6}C$	2.50	S	5.11E+05 0.00	5.30E+06 68.00			
$^{16}_{7}N$	7.16	S	5.11E+05 0.00	6.13E+06 68.80	7.12E+06 4.78	2.75E+06 0.89	1.72E+06 0.10

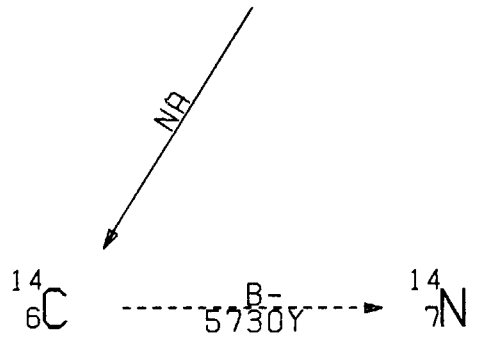

17 8 O
NG
16 7 N
NP
B-
7.13S
16 8 O
Abundance
99.76%
ND NNP
N2N
15 7 N
B+
122.0S
15 8 O
NHE3
NT
14 6 C
B-
5730Y
14 7 N
NA
13 6 C
NNA
12 6 C

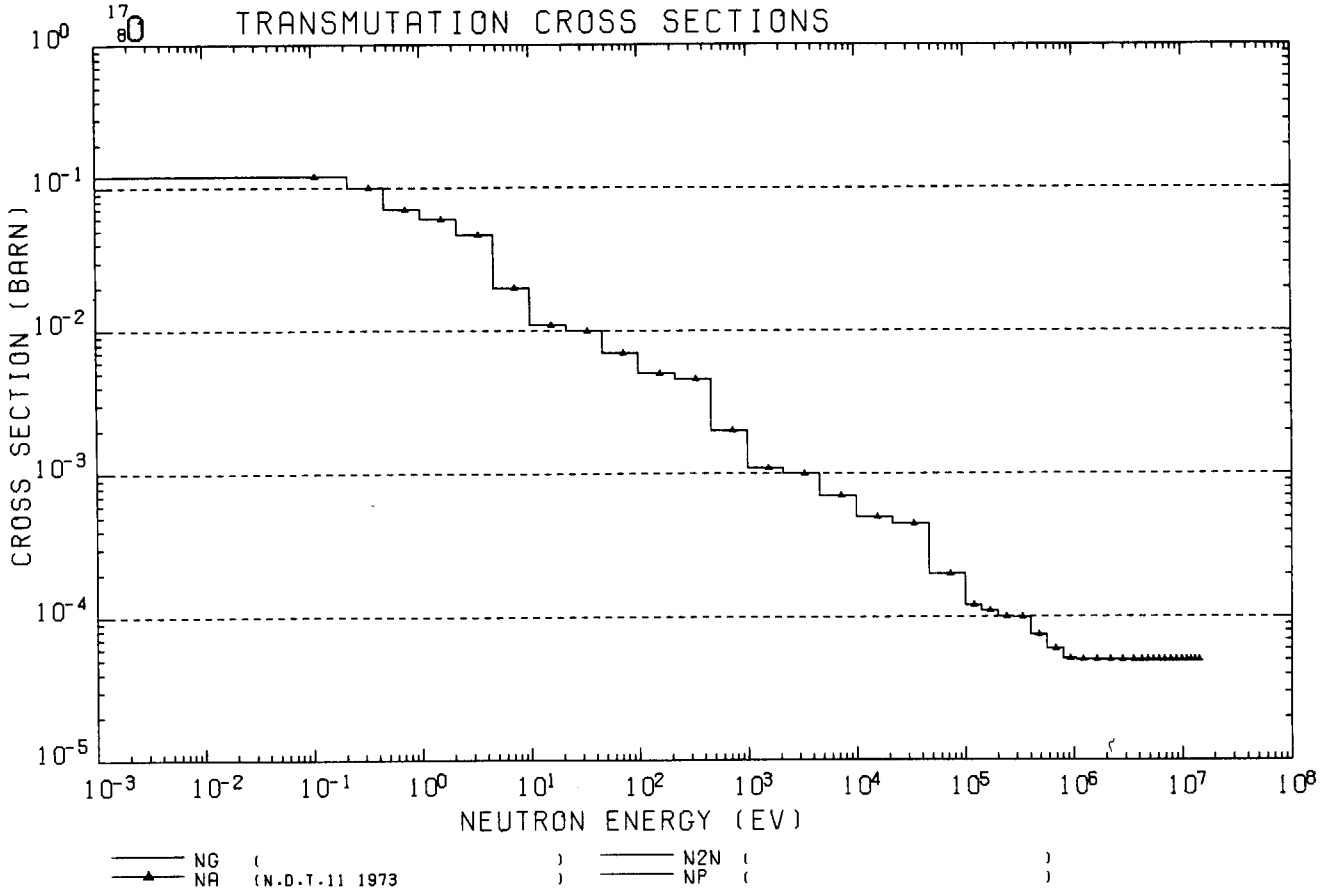


$^{16}_{8}O$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-				
$^{14}_{6}C$	5730 Y					
$^{15}_{8}O$	122.0 S	5.11E+05				
		200.00				
$^{16}_{7}N$	7.13 S	5.11E+05	6.13E+06	7.12E+06	2.75E+06	1.72E+06
		0.00	68.80	4.78	0.89	0.10

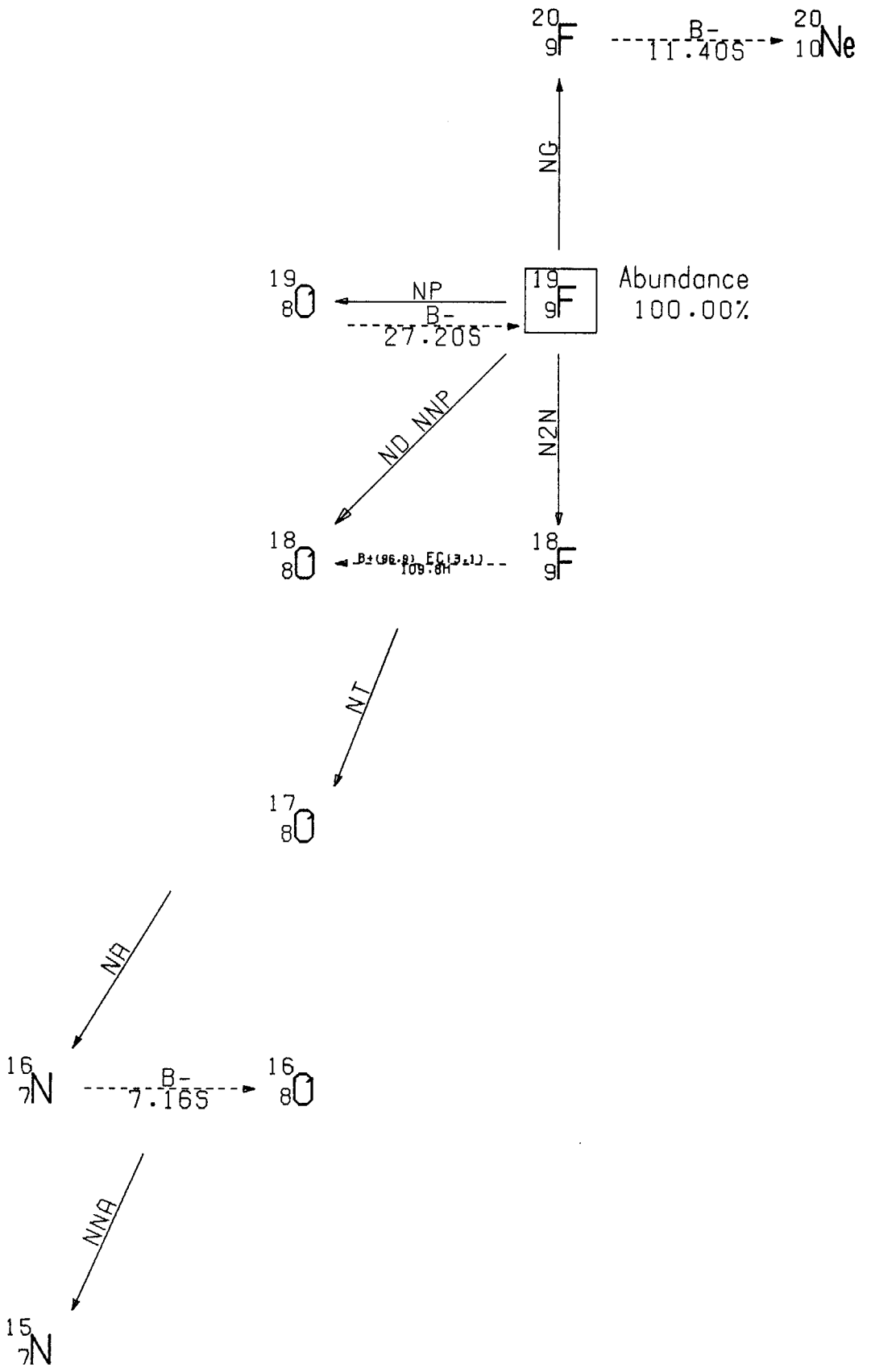

18 8 O
NG
17 7 N
NP
B-(5.0)
4.17S
17 8 O
Abundance
0.04%
B-(95.0)
4.17S
N2N
16 8 O

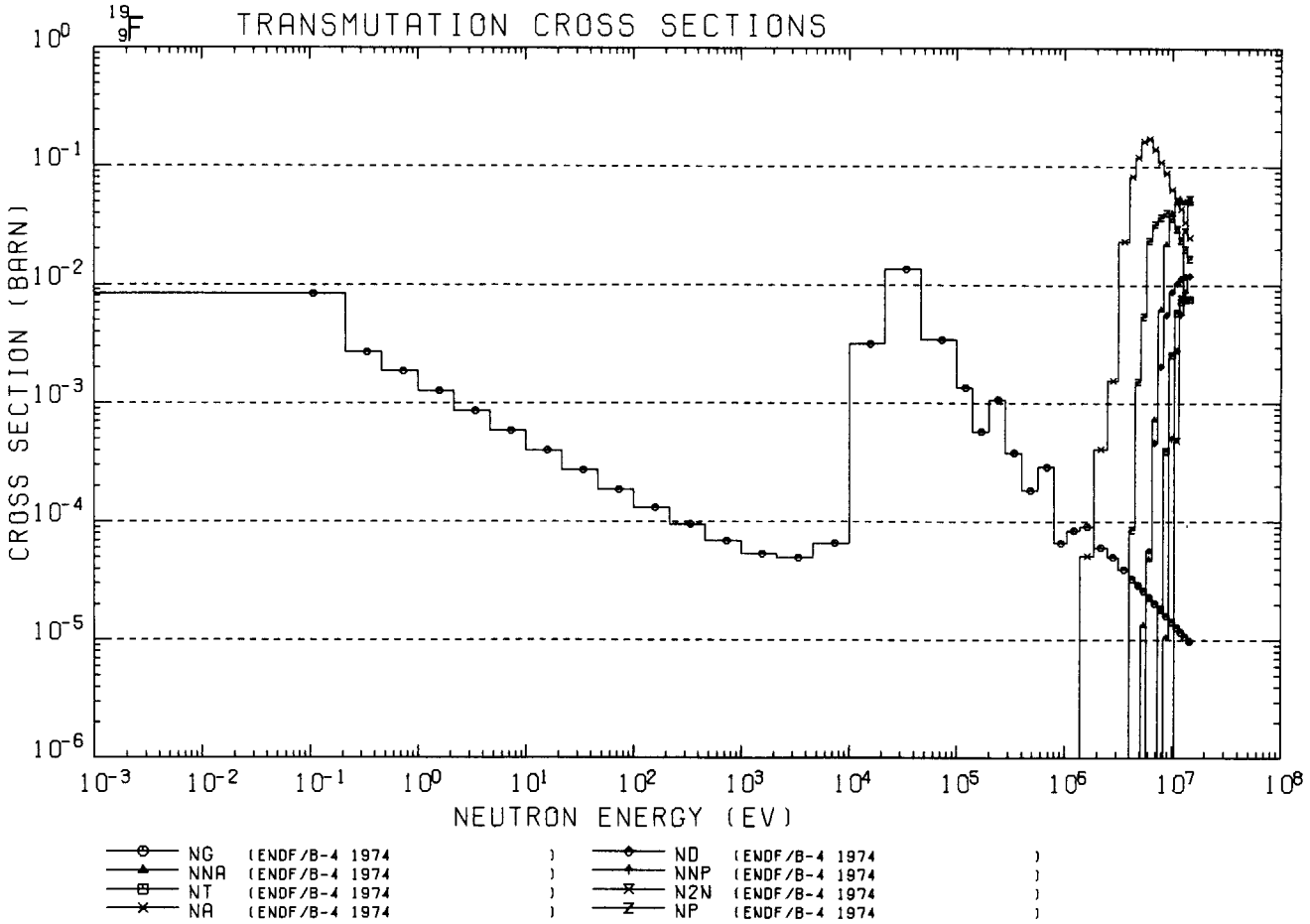

NA
14 6 C
B-
5730Y
14 7 N



$^{17}_{8}O$ DECAY GAMMA-RAY TABLE

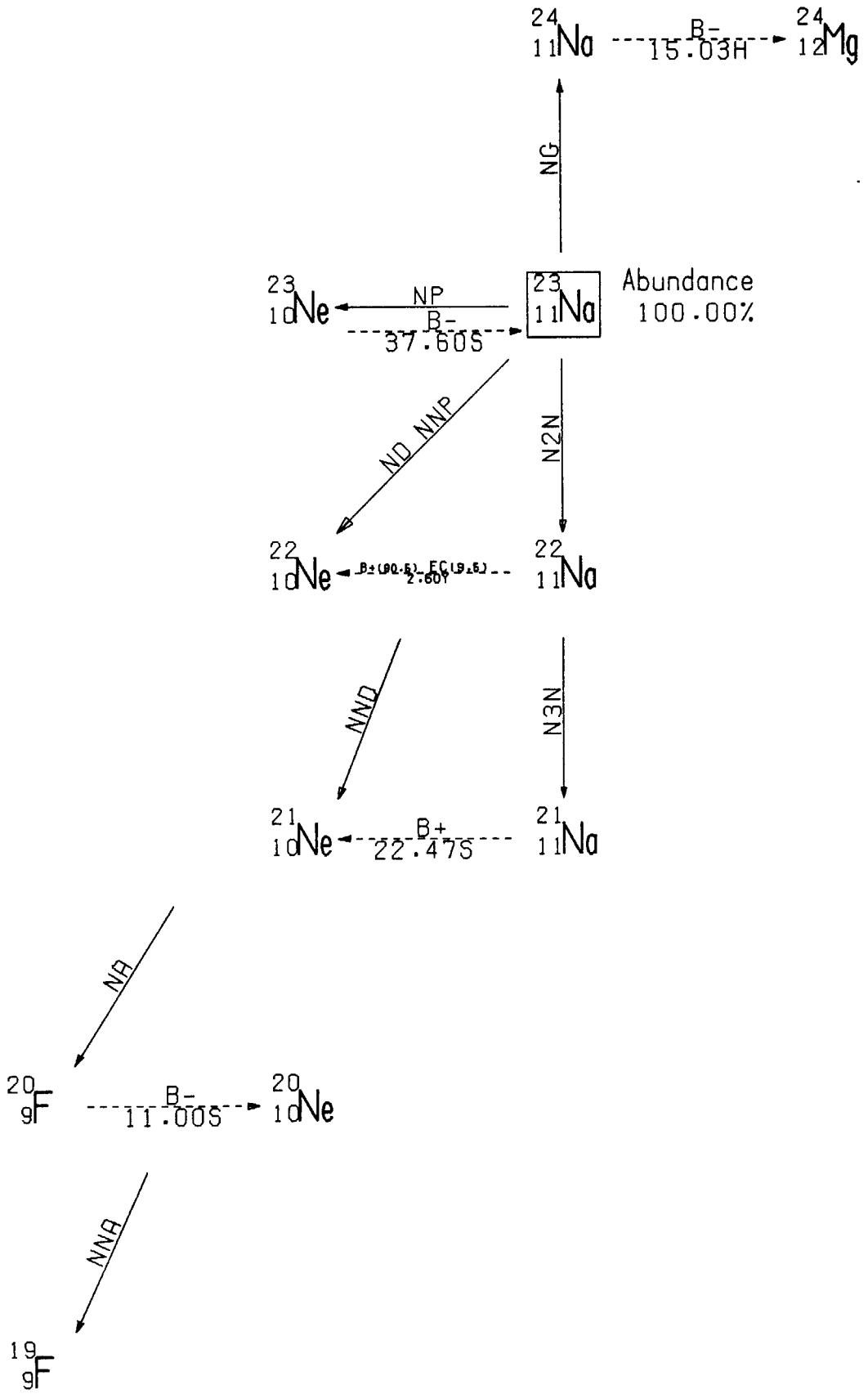
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-		
$^{14}_{6}C$	5730	Y			
$^{17}_{7}N$	4.17	S	6.11E+05 0.00	8.71E+05 3.00	2.18E+06 0.32

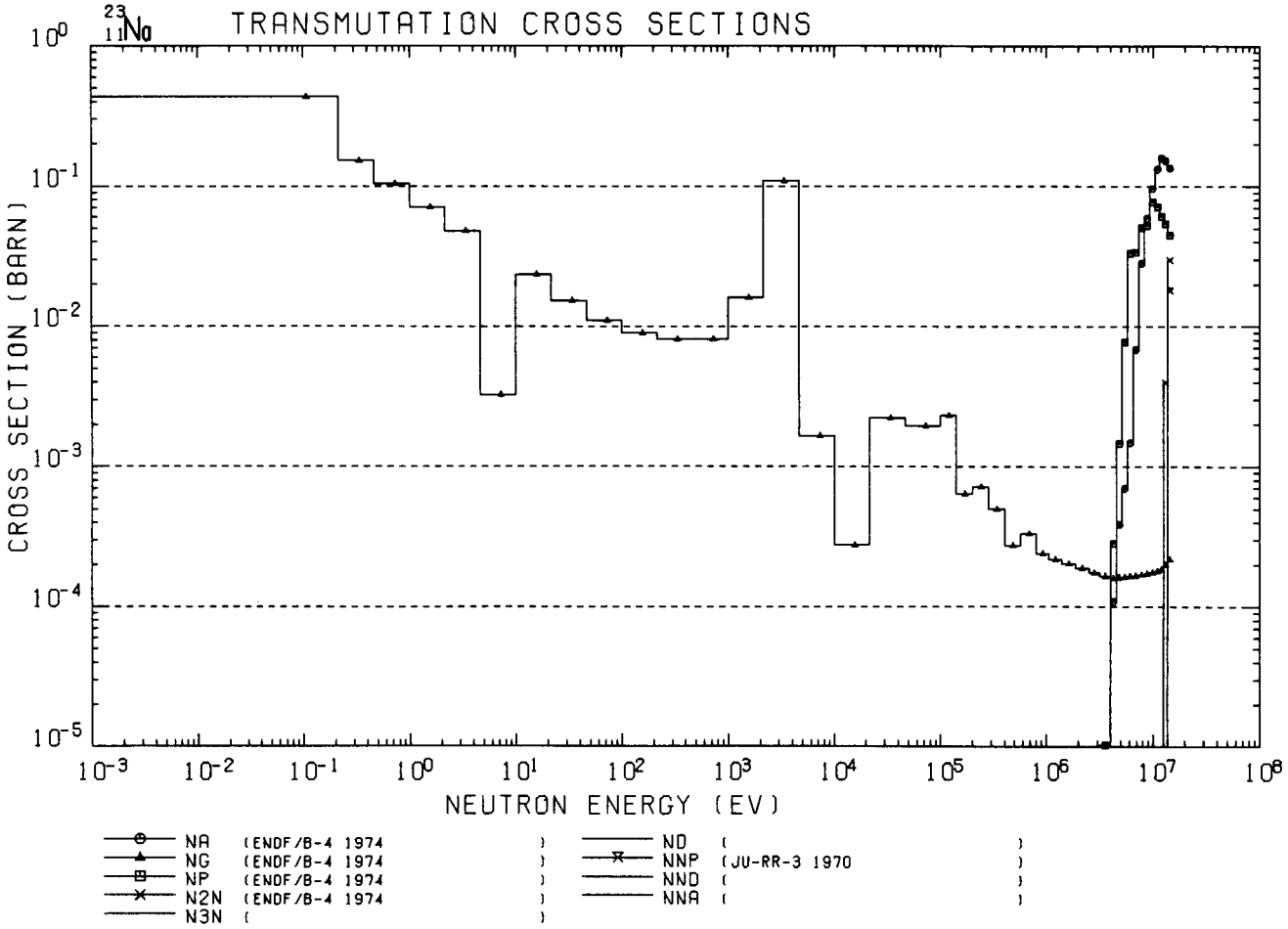

20 9F
B-
11.40S
20 10Ne
NG
19 8O
NP
B-
27.20S
19 9F
Abundance
100.00%
ND NNP
N2N
18 8O
B+(96.8) EC(3.1)
109.8M
18 9F
NT
17 8O
NA
16 7N
B-
7.16S
16 8O
NNA
15 7N



$^{19}_{9}F$ DECAY GAMMA-RAY TABLE

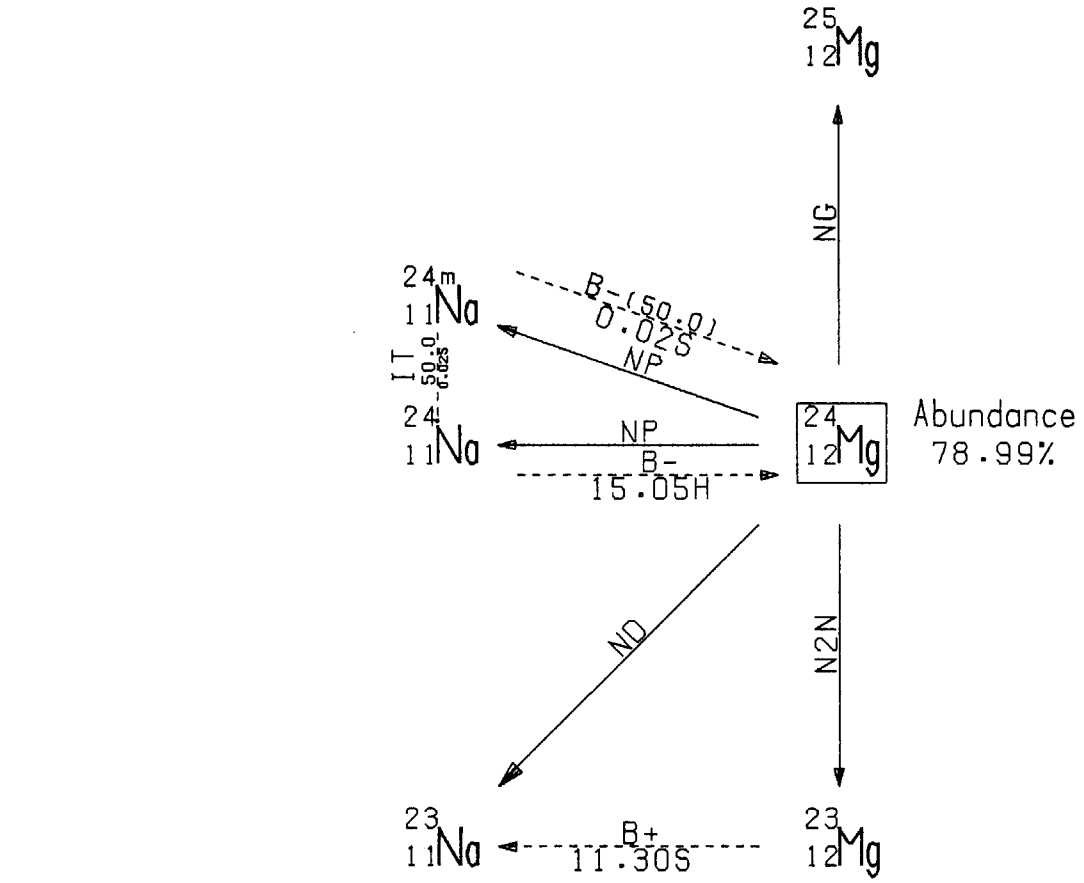
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-						
$^{20}_{9}F$	11.40 S	5.11E+05	1.63E+06					
		0.00	100.00					
$^{16}_{7}N$	7.16 S	5.11E+05	6.13E+06	7.12E+06	2.75E+06	1.72E+06		
		0.00	68.80	4.76	0.89	0.10		
$^{18}_{9}F$	109.8 M	5.11E+05						
		193.60						
$^{19}_{8}O$	27.20 S	5.11E+05	1.97E+05	1.36E+06	1.10E+05	1.45E+06	1.55E+06	4.19E+06
		0.00	92.13	55.00	3.67	3.15	1.47	0.13

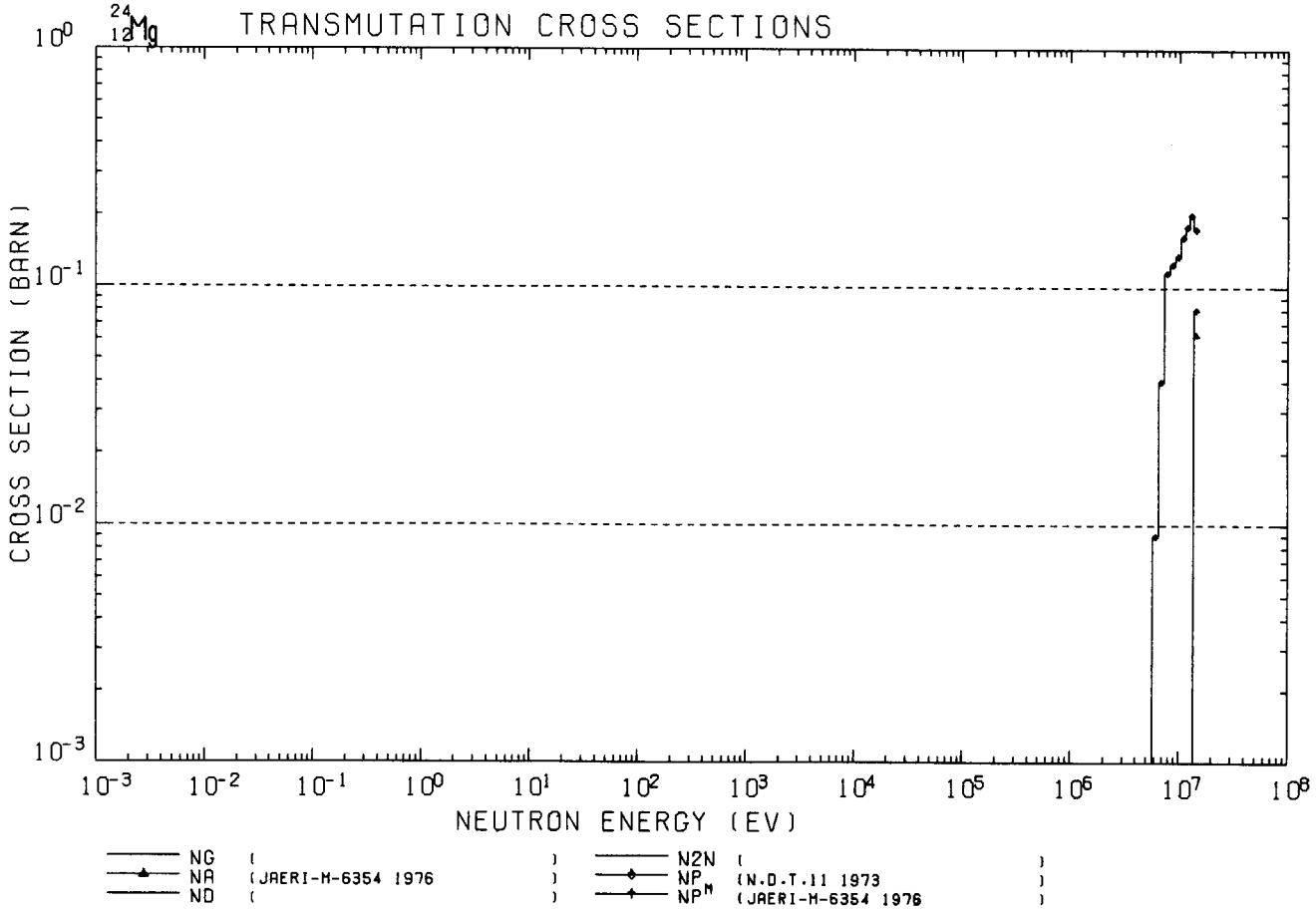

24 11Na
B-
15.03H
24 12Mg
NG
23 10Ne
NP
B-
37.60S
23 11Na
Abundance
100.00%
ND NNP
N2N
22 10Ne
B+(90.6) EC(9.4)
2.60Y
22 11Na
NND
N3N
21 10Ne
B+
22.47S
21 11Na
NA
20 9F
B-
11.00S
20 10Ne
NNA
19 9F



23 11Na DECAY GAMMA-RAY TABLE

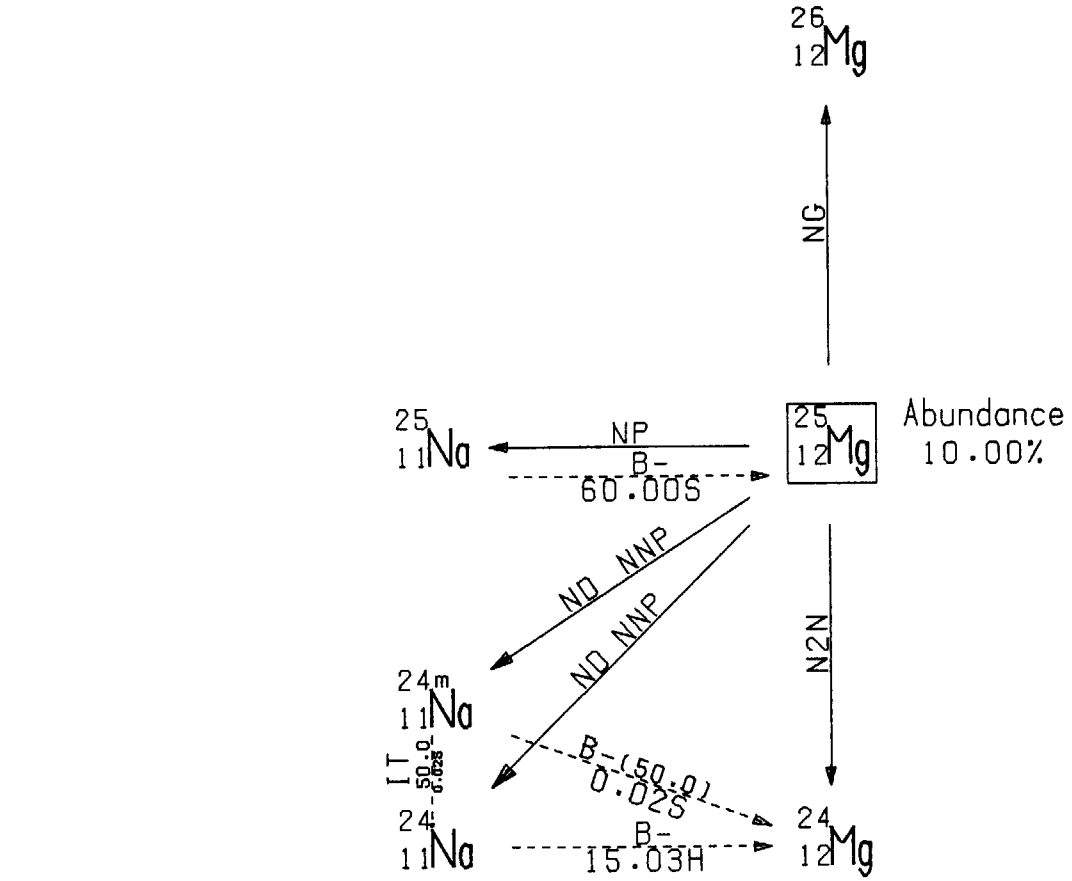
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
20 9F	11.00 S	5.11E+06	1.63E+06		
		0.00	100.00		
24 11Na	15.03 H	5.11E+05	1.37E+06	2.75E+06	
		0.00	100.00	100.00	
23 10Ne	37.60 S	5.11E+05	4.40E+05	1.64E+06	2.08E+06
		0.00	32.90	0.99	0.10
22 11Na	2.60 Y	5.11E+05	1.27E+06		
		180.00	99.93		
21 11Na	22.47 S	5.11E+05	3.51E+05		
		200.00	5.10		

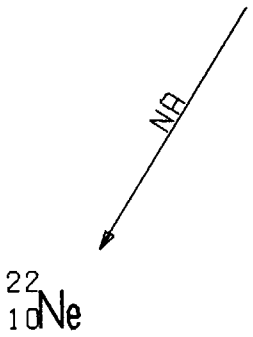

25 12 Mg
NG
24m 11 Na
B- (50.0) 0.02S
NP
IT 50.0 0.02S
24 11 Na
NP
B-
15.05H
24 12 Mg
Abundance
78.99%
ND
N2N
23 11 Na
B+
11.30S
23 12 Mg
NA
21 10 Ne

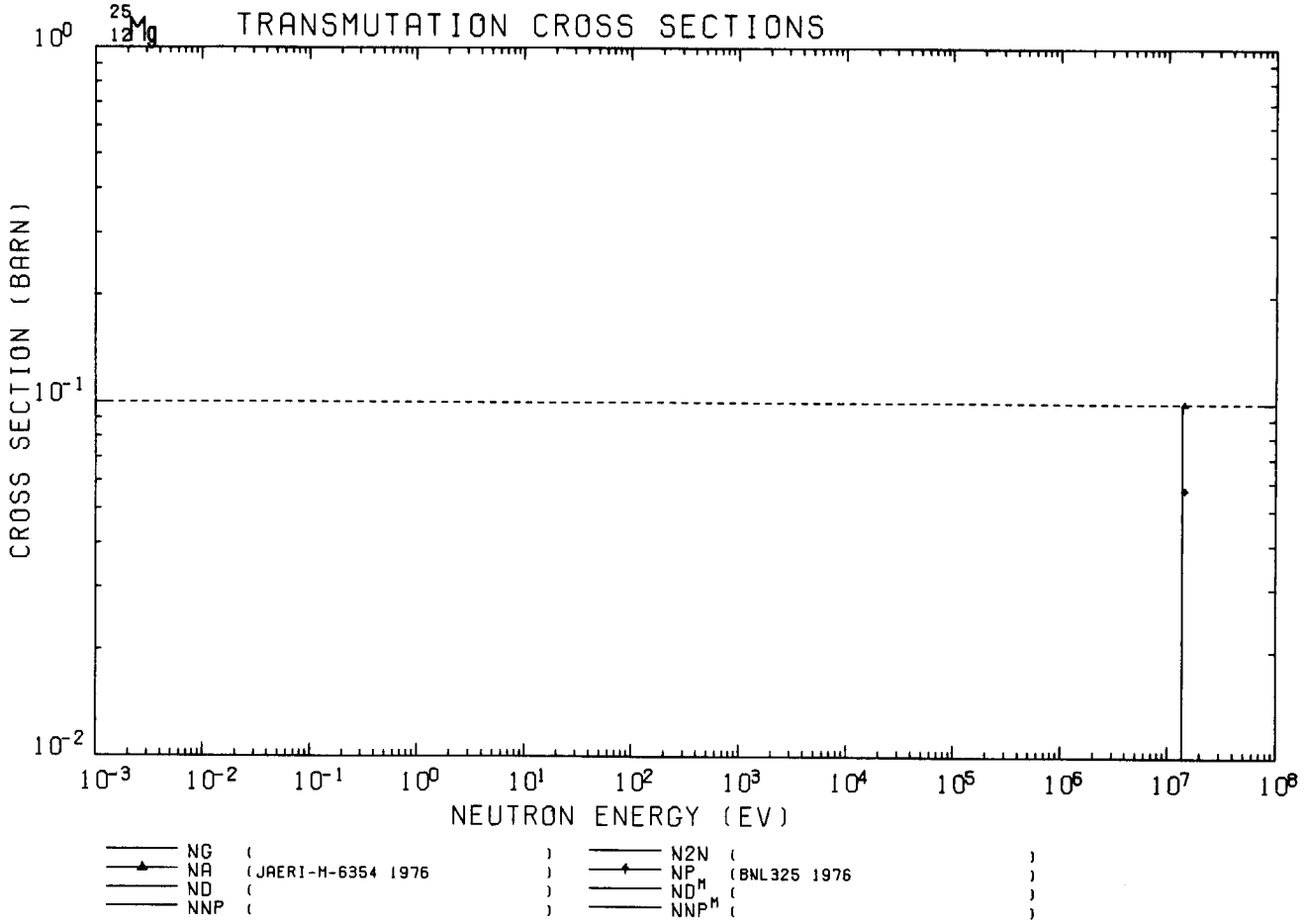


$^{24}_{12}Mg$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-		
$^{23}_{12}Mg$	11.30 S	5.11E+05	4.38E+05	
		200.00	8.63	
$^{24}_{11}Na$	15.05 H	5.11E+05	1.37E+06	2.75E+06
		0.00	100.00	100.00
$^{24m}_{11}Na$	0.020 S	5.11E+05	1.47E+05	
		0.00	100.00	

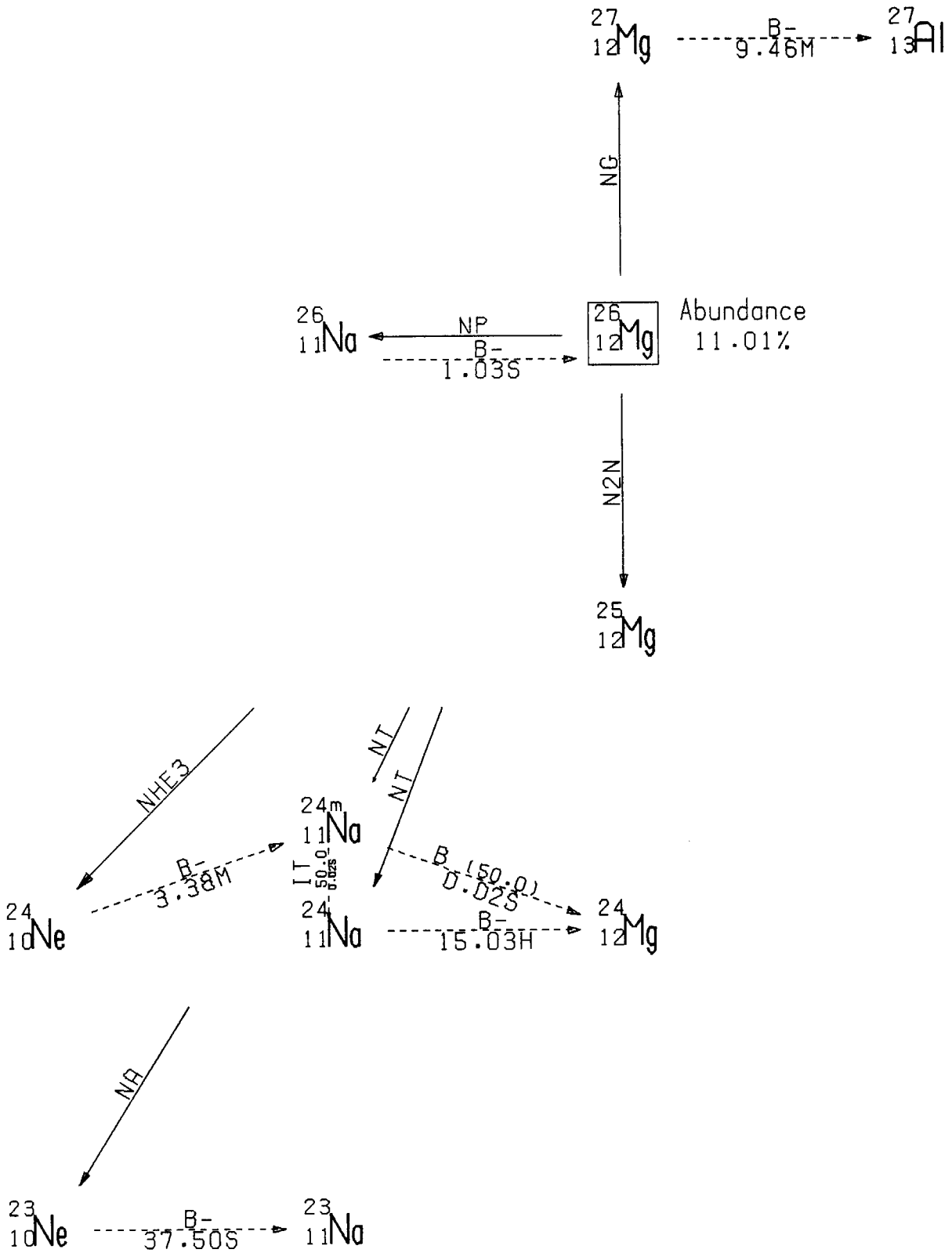

26 12 Mg
NG
25 11 Na
NP
B-
60.00S
25 12 Mg
Abundance
10.00%
ND NNP
ND NNP
N2N
24m 11 Na
IT
B-(50.0)
0.02S
24 11 Na
B-
15.03H
24 12 Mg

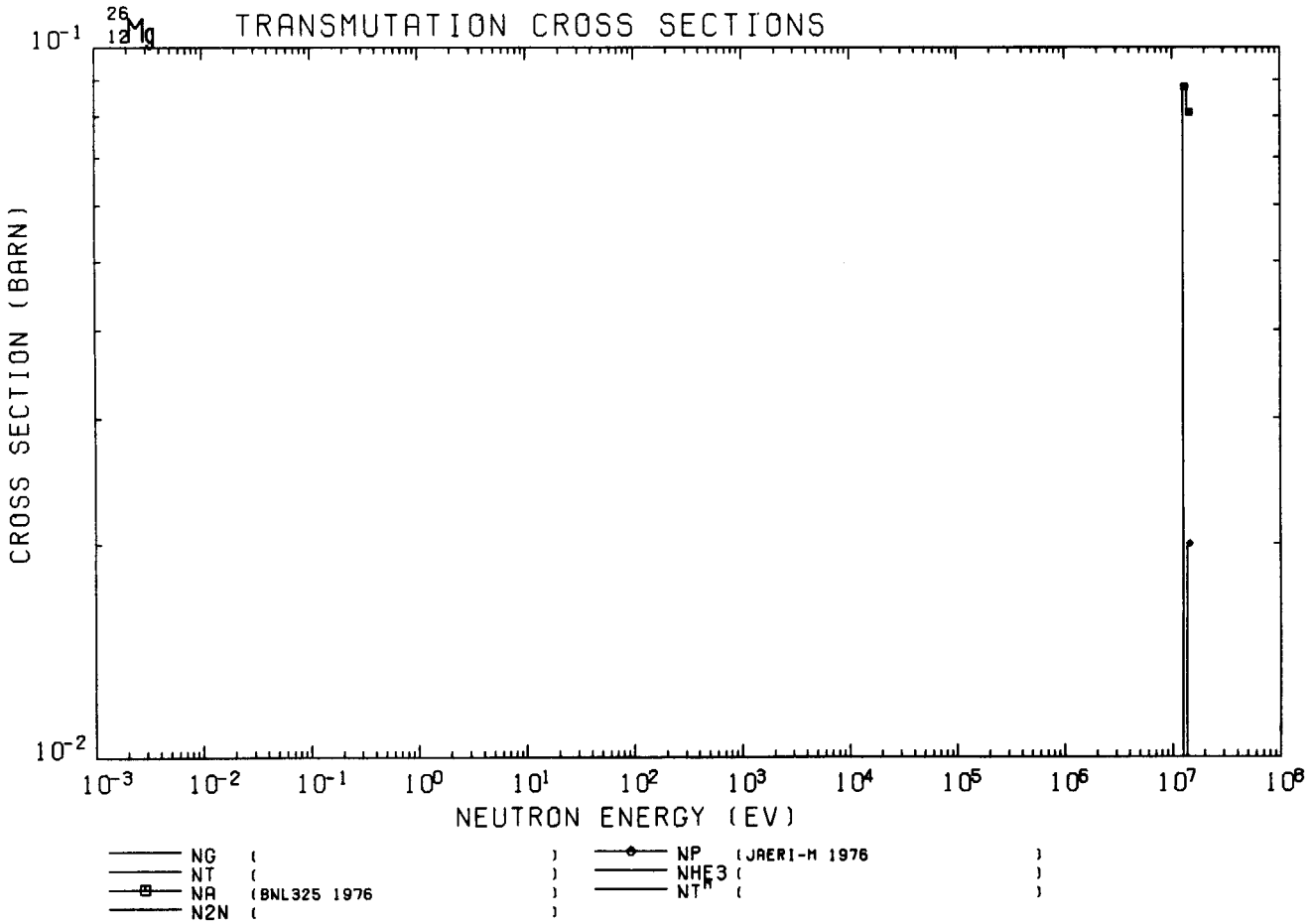

NA
22 10 Ne



25 12Mg DECAY GAMMA-RAY TABLE

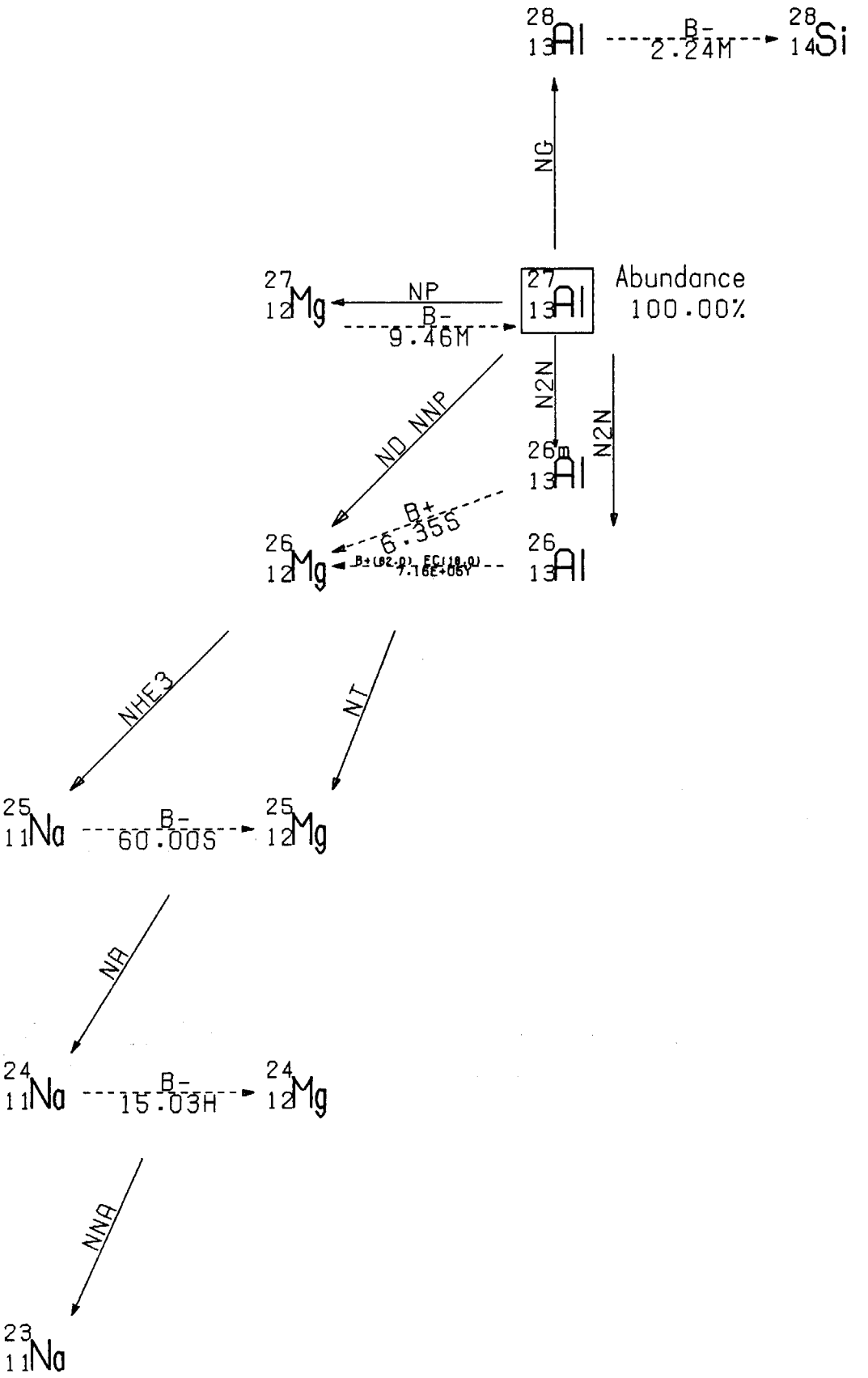
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-							
24m 11Na	0.020 S	5.11E+06	1.47E+06						
		0.00	100.00						
24 11Na	15.03 H	5.11E+06	1.37E+06	2.75E+06					
		0.00	100.00	100.00					
25 11Na	60.00 S	5.11E+06	9.75E+05	3.90E+05	5.85E+05	1.61E+06	1.38E+06	1.97E+06	2.22E+06
		0.00	14.70	13.14	12.84	9.77	0.27	0.16	0.10

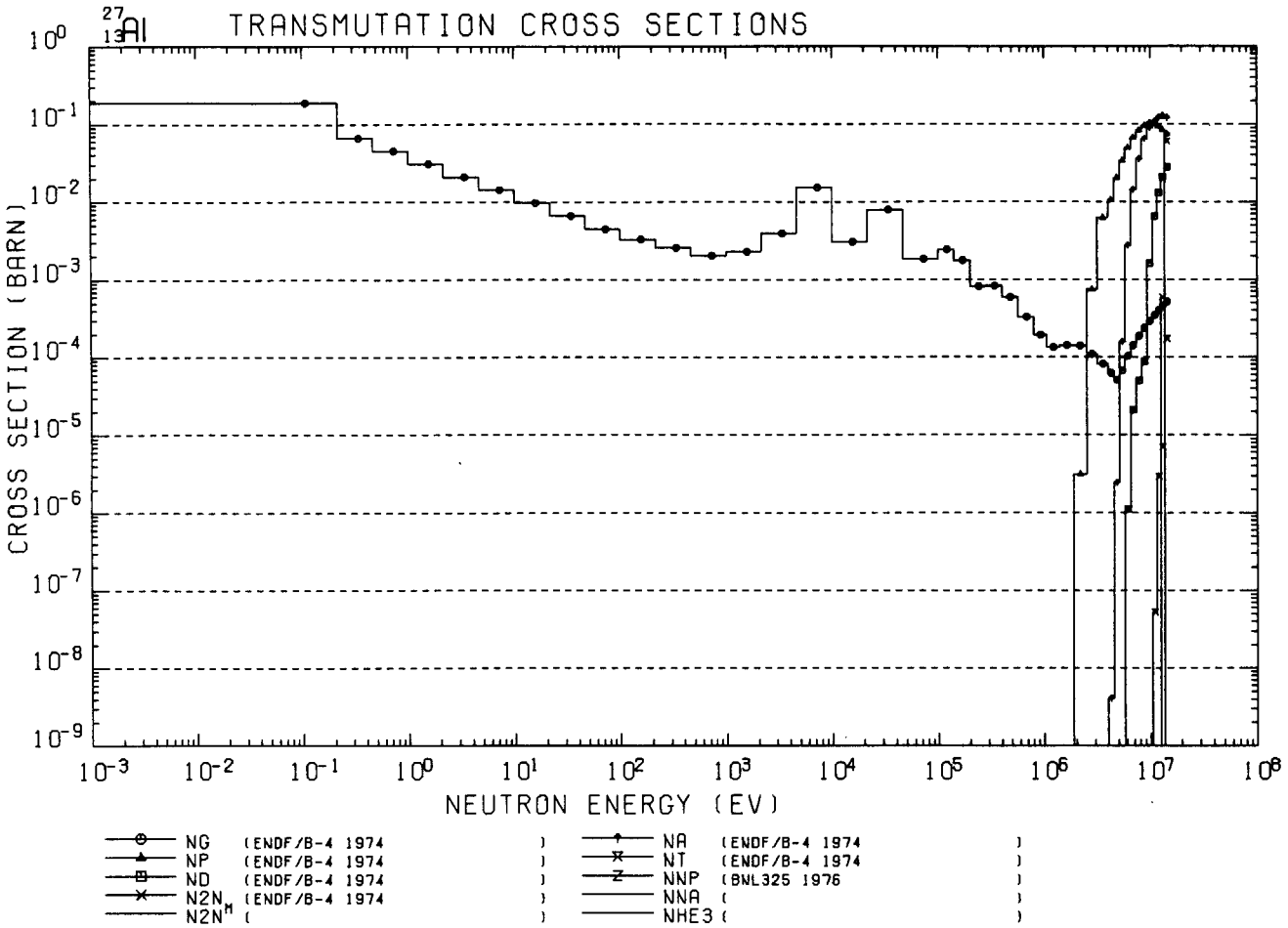

27 12 Mg
B-
9.46M
27 13 Al
NG
26 11 Na
NP
B-
1.03S
26 12 Mg
Abundance
11.01%
N2N
25 12 Mg
NHE3
NT
NT
24m 11 Na
IT
50.0
0.02S
B-
3.38M
B- (50.0)
0.02S
24 10 Ne
24 11 Na
B-
15.03H
24 12 Mg
NA
23 10 Ne
B-
37.50S
23 11 Na



26 12Mg DECAY GAMMA-RAY TABLE

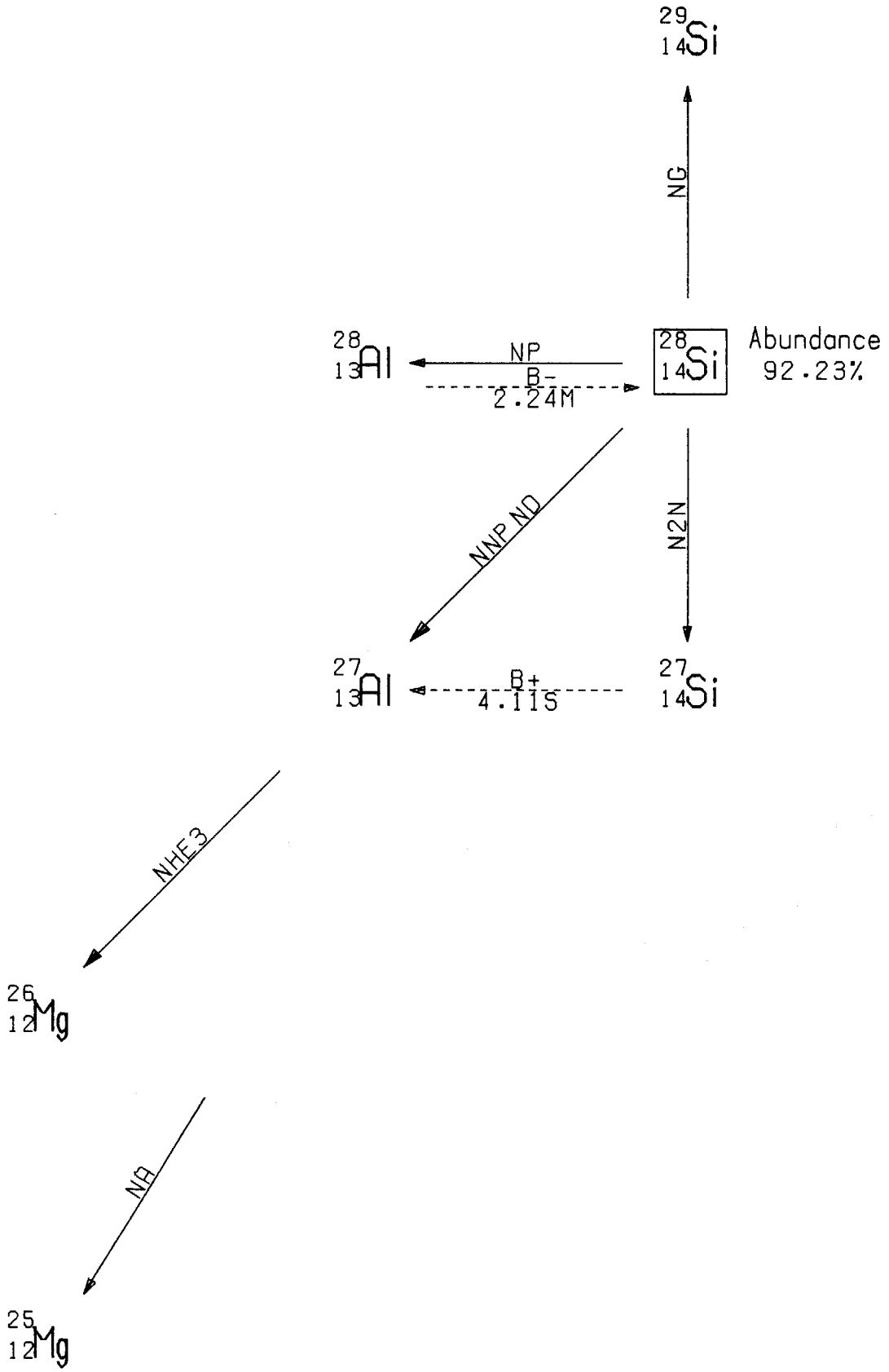
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
27 12Mg	9.46 M	5.11E+05	8.44E+05	1.01E+06	1.71E+05						
		0.00	73.10	29.17	0.79						
24m 11Na	0.020 S	5.11E+05	1.47E+06								
		0.00	100.00								
24 11Na	15.03 H	5.11E+05	1.97E+06	2.75E+06							
		0.00	100.00	100.00							
23 10Ne	37.50 S	5.11E+05	4.40E+05	1.64E+06	2.08E+06						
		0.00	32.90	0.99	0.10						
26 11Na	1.03 S	5.11E+05	1.81E+06	1.13E+06	2.64E+06	1.41E+06	1.90E+06	2.62E+06	1.00E+06	2.94E+06	2.13E+06
		0.00	98.90	5.77	4.36	3.20	1.98	1.32	0.82	0.60	0.59
24 10Ne	3.38 M	5.11E+05	4.72E+05	6.74E+05							
		0.00	100.00	7.92							

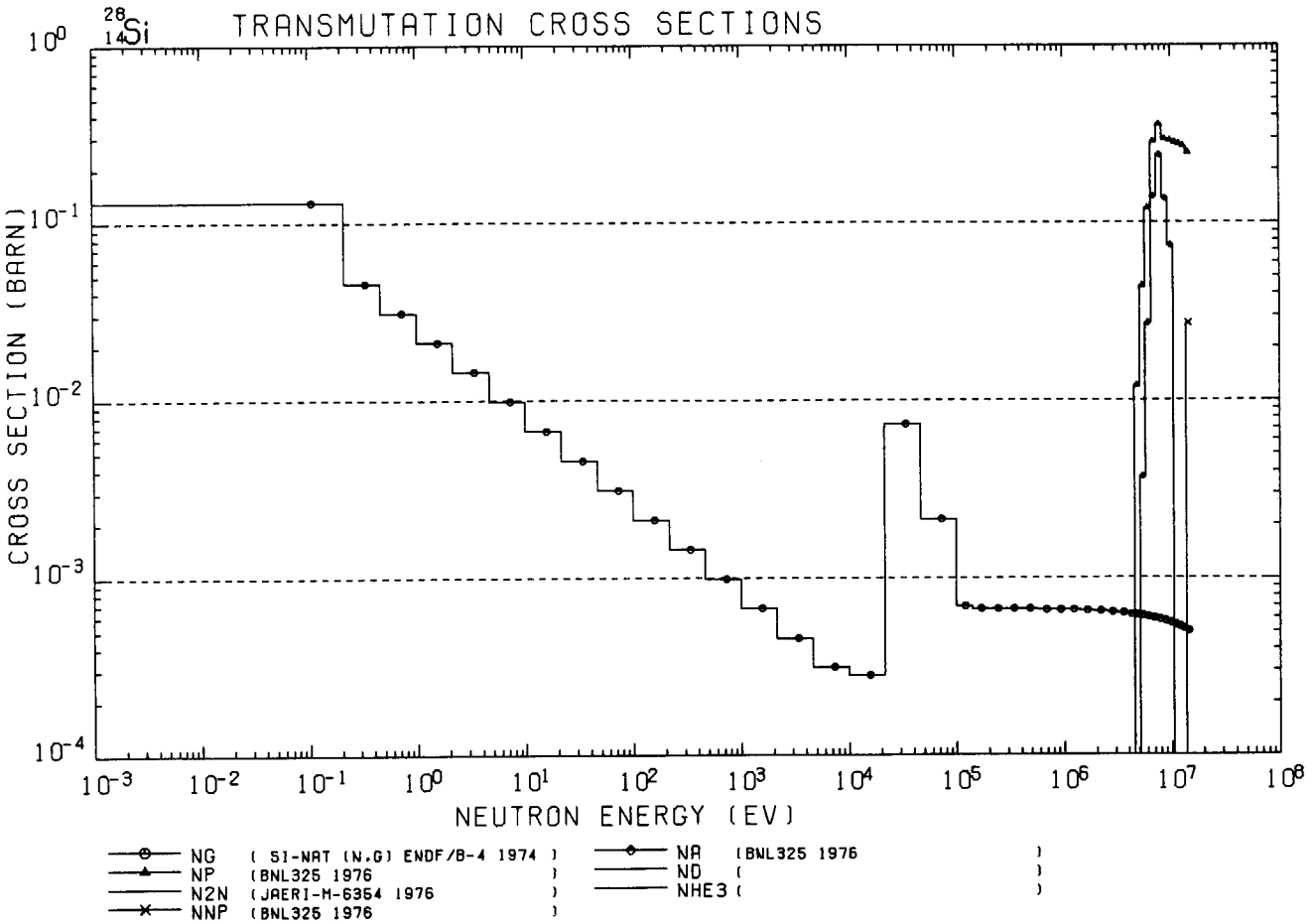

28 13 Al
B-
2.24M
28 14 Si
NG
27 12 Mg
NP
B-
9.46M
27 13 Al
Abundance
100.00%
N2N
ND NNP
26m 13 Al
N2N
B+
6.35S
26 12 Mg
B+ (82.0) EC (18.0)
7.16E+05Y
26 13 Al
NHE3
NT
25 11 Na
B-
60.00S
25 12 Mg
NA
24 11 Na
B-
15.03H
24 12 Mg
NNA
23 11 Na



$^{27}_{13}Al$ DECAY GAMMA-RAY TABLE

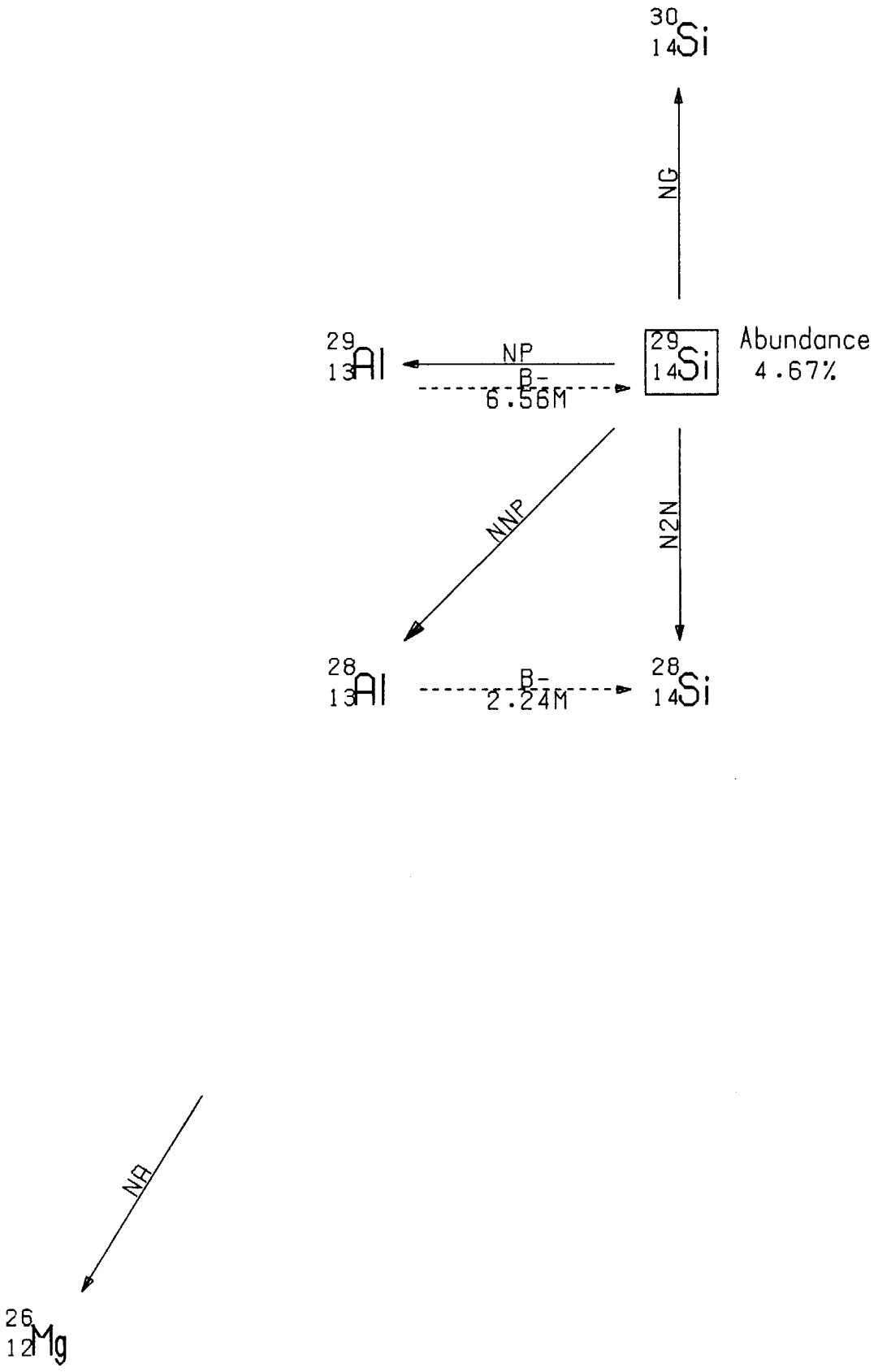
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-							
$^{28}_{13}Al$	2.24 M	5.11E+05	1.78E+06						
		0.00	100.00						
$^{27}_{12}Mg$	9.46 M	5.11E+05	8.44E+05	1.01E+06	1.71E+06				
		0.00	73.10	29.17	0.79				
$^{26m}_{13}Al$	6.35 S	5.11E+05							
		200.00							
$^{26}_{13}Al$	7.16E+05Y	5.11E+05	1.81E+06	1.13E+06	2.94E+06				
		170.00	99.76	2.51	0.24				
$^{24}_{11}Na$	15.03 H	5.11E+05	1.37E+06	2.75E+06					
		0.00	100.00	100.00					
$^{25}_{11}Na$	60.00 S	5.11E+05	9.75E+05	3.90E+06	5.85E+06	1.61E+06	1.38E+06	1.97E+06	2.22E+06
		0.00	14.70	13.14	12.84	9.77	0.27	0.16	0.10

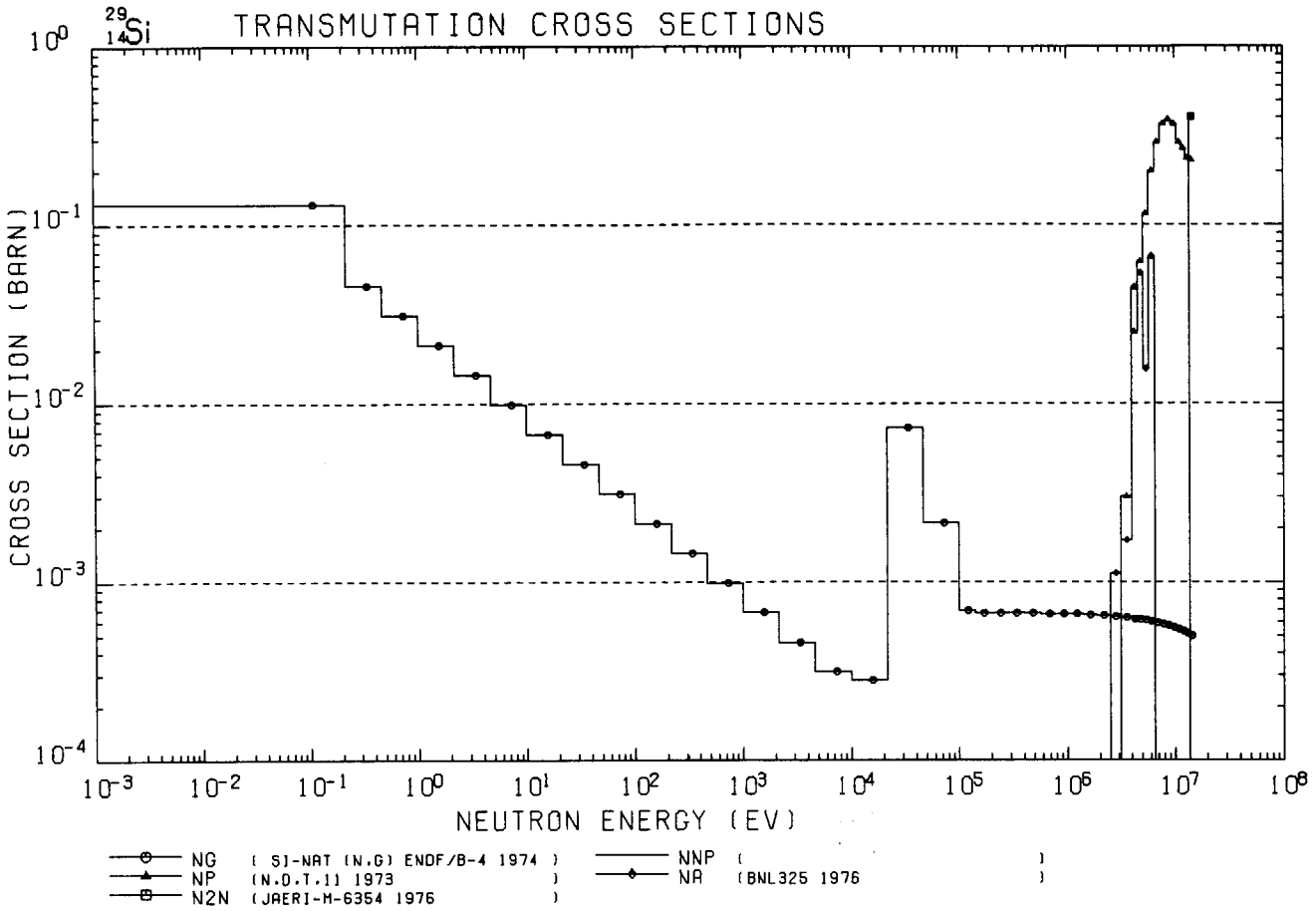

29 14 Si
NG
28 13 Al
NP
B-
2.24M
28 14 Si
Abundance
92.23%
NNP ND
N2N
27 13 Al
B+
4.11S
27 14 Si
NHE3
26 12 Mg
NA
25 12 Mg



$^{28}_{14}Si$ DECAY GAMMA-RAY TABLE

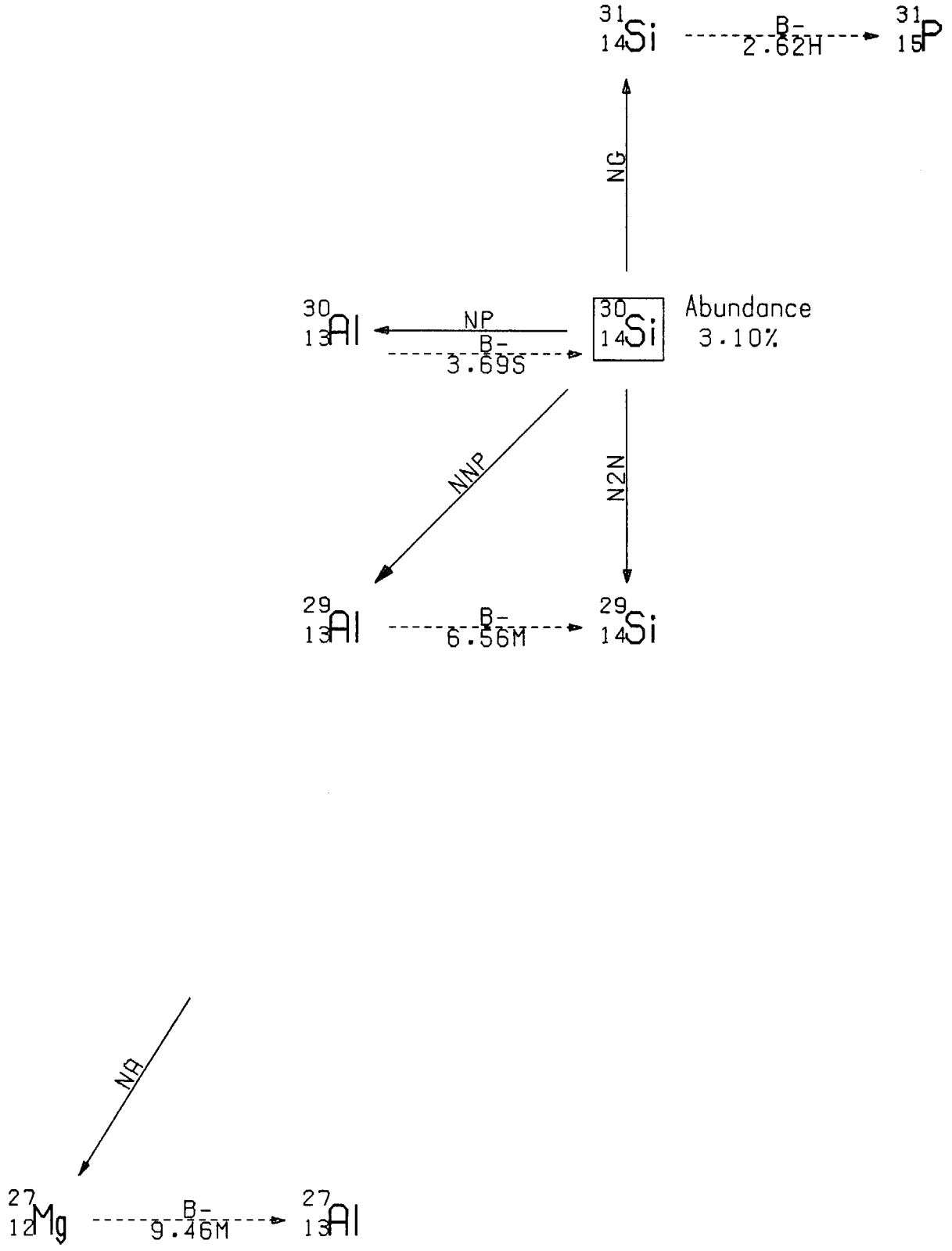
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-	
$^{28}_{13}Al$	2.24	M	6.11E+05	1.78E+06
			0.00	100.00
$^{27}_{14}Si$	4.11	S	6.11E+05	2.21E+06
			200.00	0.18

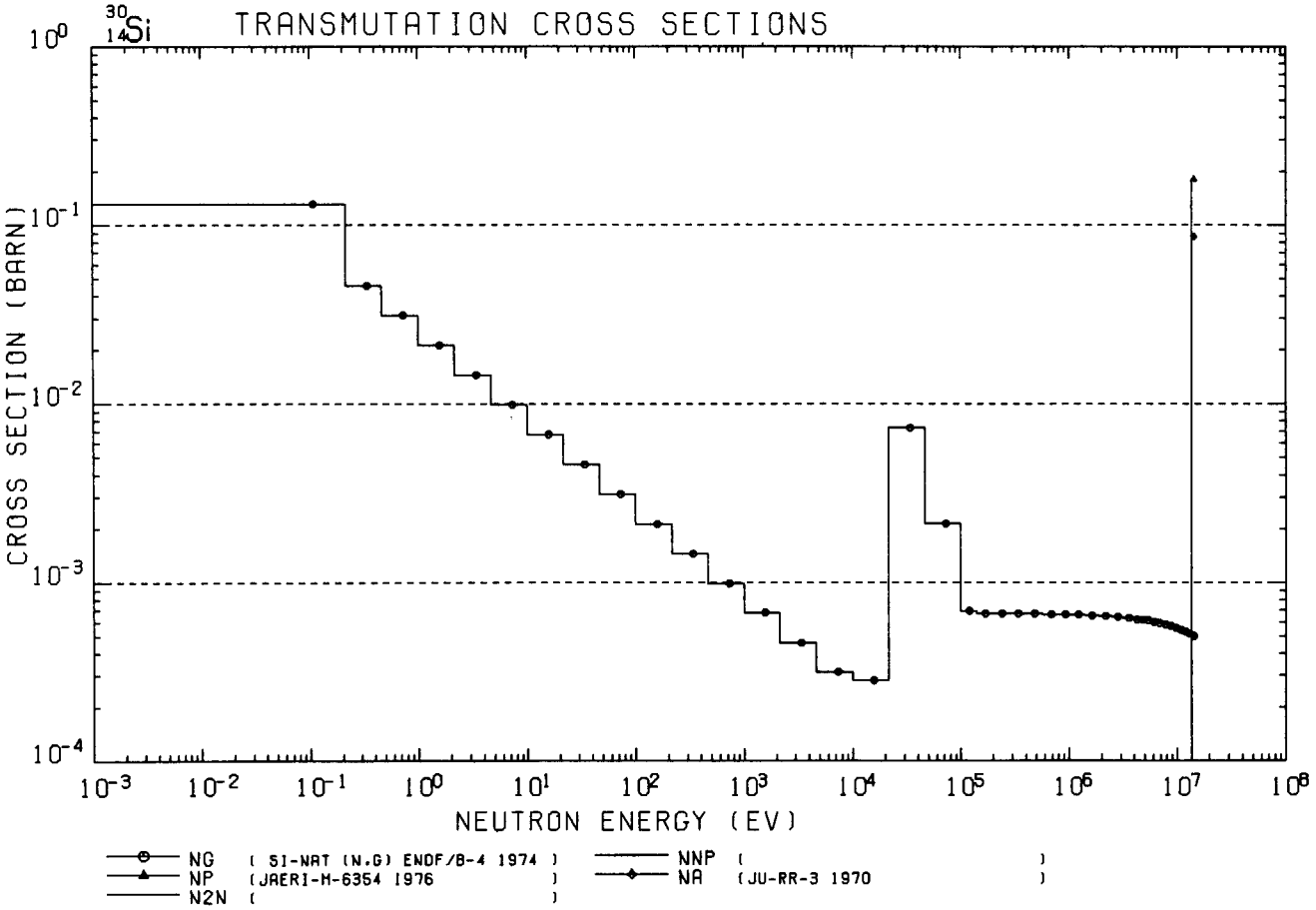

30 14 Si
NG
29 13 Al
NP
B-
6.56M
29 14 Si
Abundance
4.67%
NNP
N2N
28 13 Al
B-
2.24M
28 14 Si
NA
26 12 Mg



$^{29}_{14}Si$ DECAY GAMMA-RAY TABLE

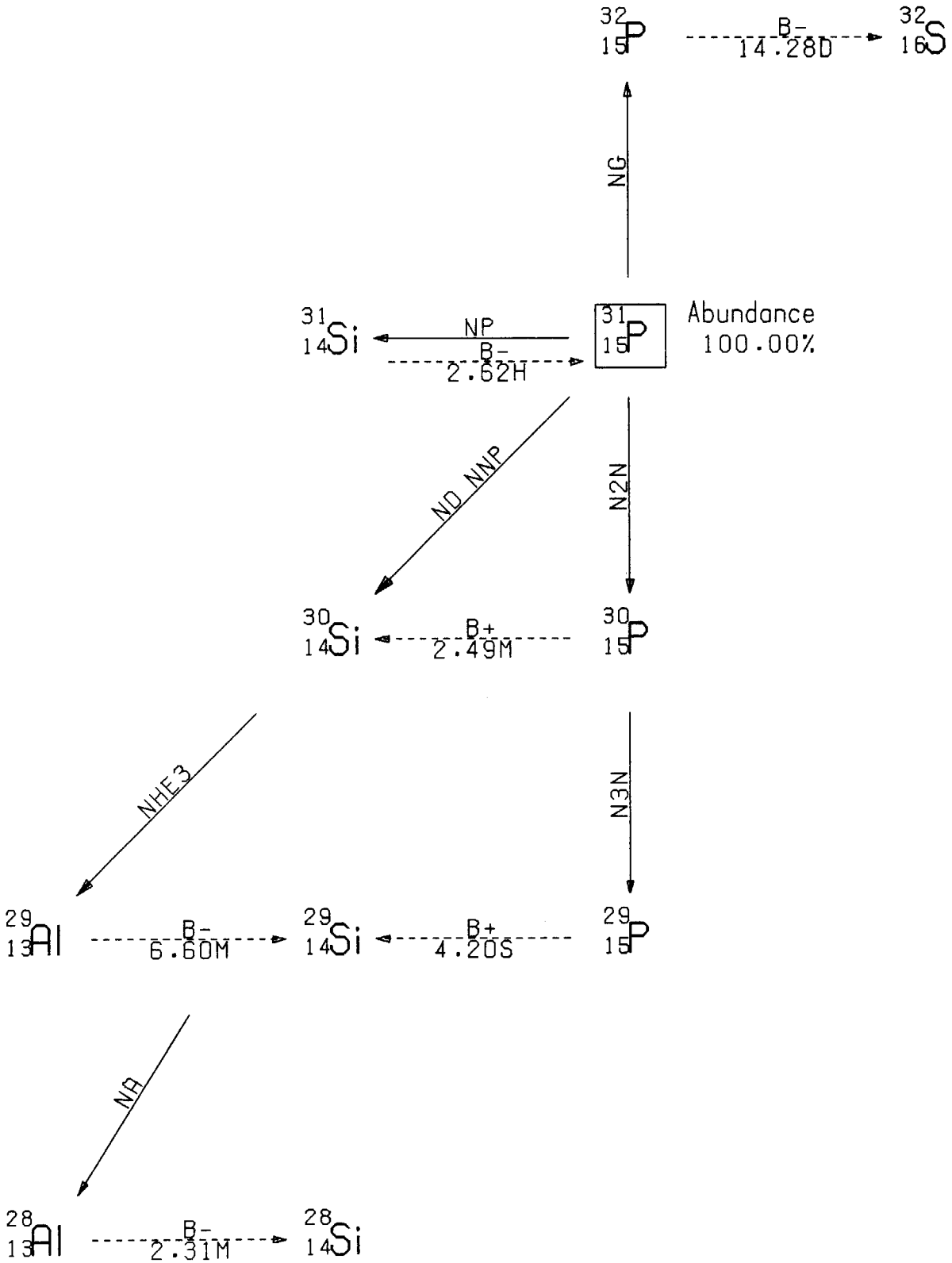
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-			
$^{29}_{13}Al$	6.56	M	6.11E+06	1.27E+06	2.43E+06	2.03E+06
			0.00	89.10	6.83	4.13
$^{28}_{13}Al$	2.24	M	6.11E+06	1.78E+06		
			0.00	100.00		

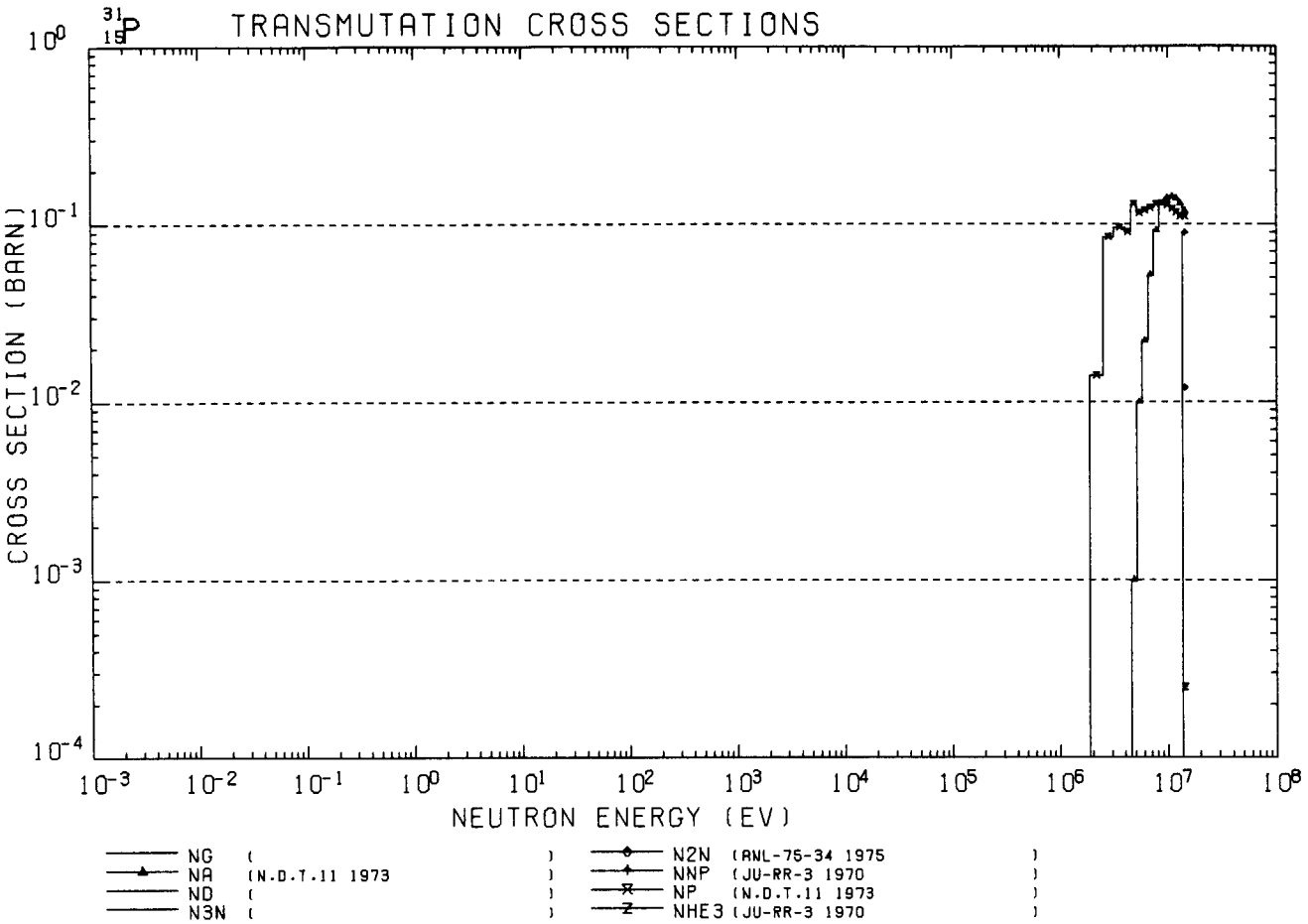

31 14 Si
B-
2.62H
31 15 P
NG
30 13 Al
NP
B-
3.69S
30 14 Si
Abundance
3.10%
NNP
N2N
29 13 Al
B-
6.56M
29 14 Si
NA
27 12 Mg
B-
9.46M
27 13 Al



30 14Si DECAY GAMMA-RAY TABLE

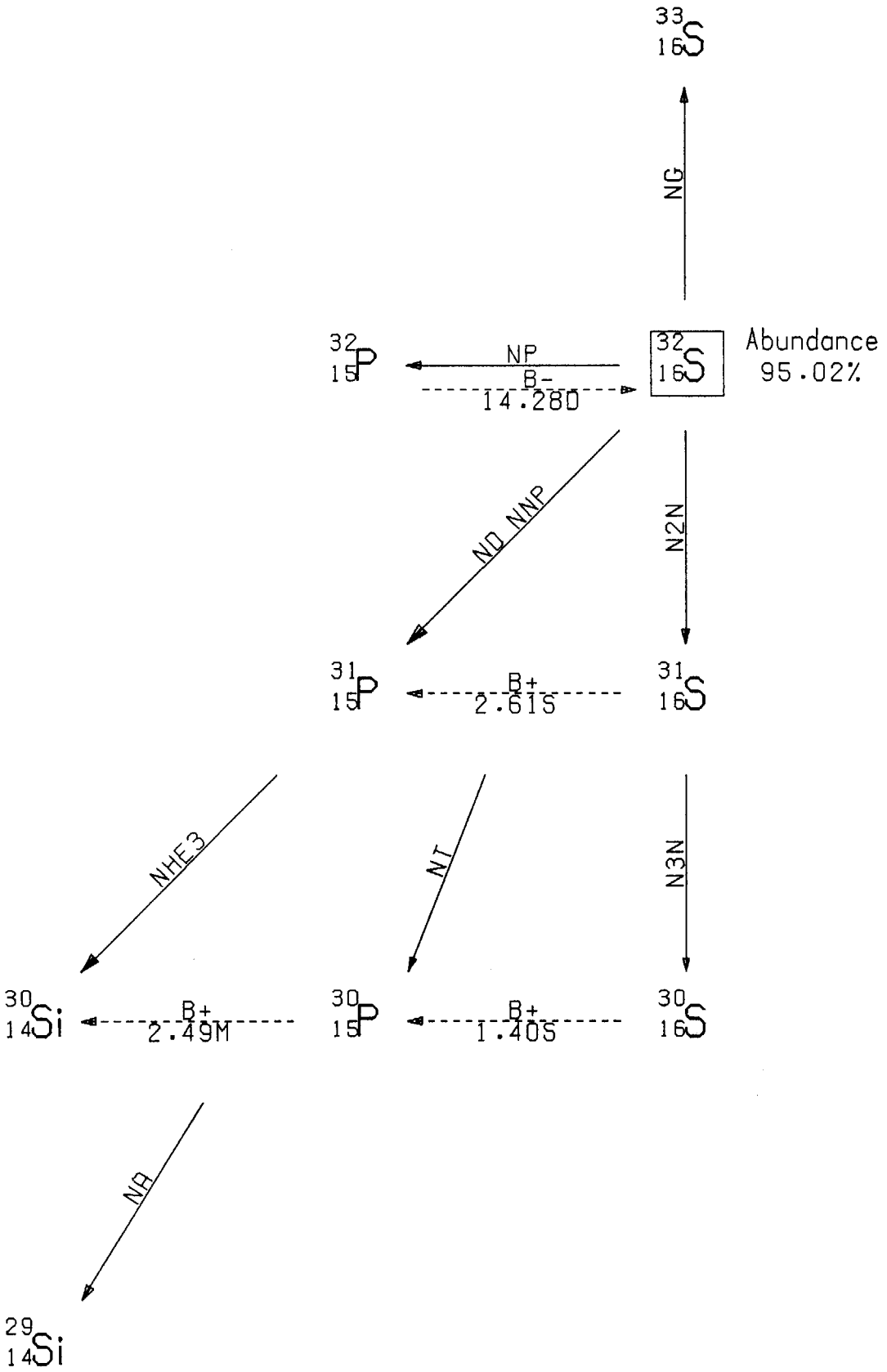
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
31 14Si	2.62	H	5.11E+05 0.00									
30 13Al	3.69	S	5.11E+05 0.00	2.24E+06 65.10	1.26E+06 40.68	3.50E+06 32.65	2.60E+06 5.08	1.31E+06 2.57	4.81E+06 2.13	1.73E+06 1.87	2.57E+06 0.97	1.33E+06 0.93
29 13Al	6.56	M	5.11E+05 0.00	1.27E+06 89.10	2.43E+06 6.83	2.03E+06 4.13						
27 12Mg	9.46	M	5.11E+05 0.00	8.44E+05 73.10	1.01E+06 28.17	1.71E+05 0.78						

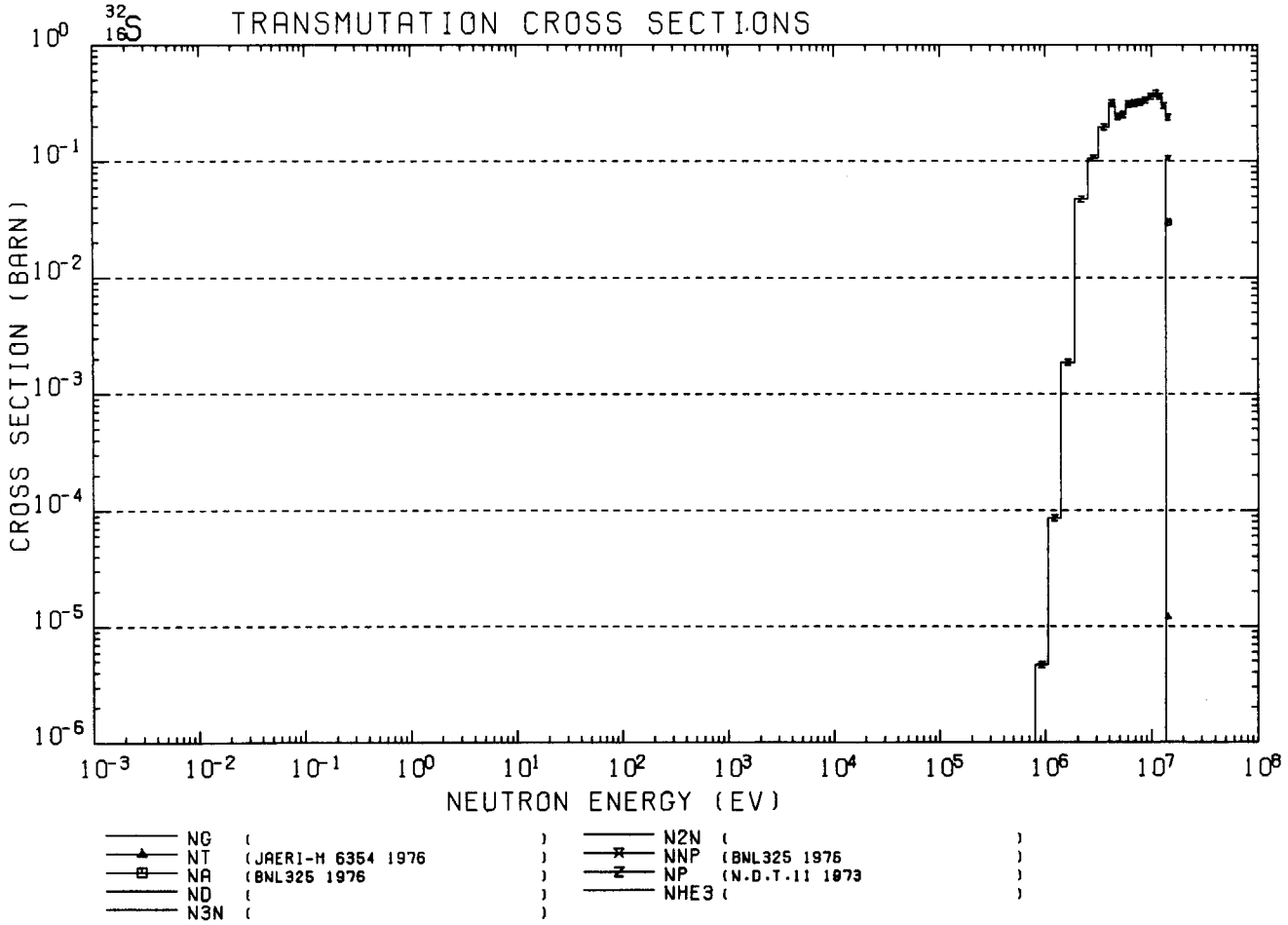

32 15 P
B-
14.28D
32 16 S
NG
31 14 Si
NP
B-
2.62H
31 15 P
Abundance
100.00%
ND NNP
N2N
30 14 Si
B+
2.49M
30 15 P
NHE3
N3N
29 13 Al
B-
6.60M
29 14 Si
B+
4.20S
29 15 P
NA
28 13 Al
B-
2.31M
28 14 Si



31 15P DECAY GAMMA-RAY TABLE

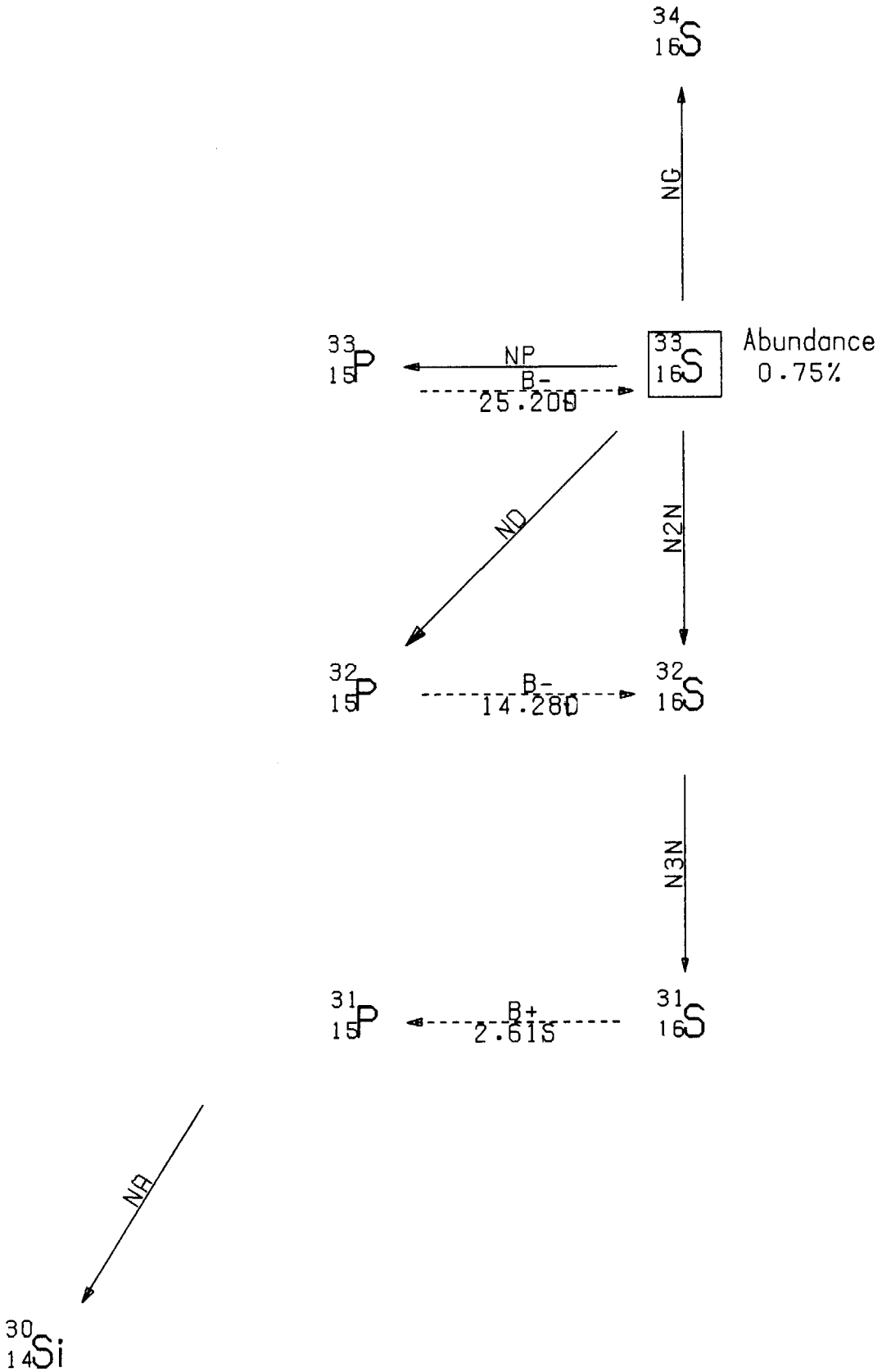
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-			
29 13Al	6.60 M	5.11E+05	1.27E+06	2.43E+06	2.03E+06
		0.00	89.10	6.83	4.13
32 15P	14.28 D				
28 13Al	2.31 M	5.11E+05	1.78E+06		
		0.00	100.00		
29 15P	4.20 S	5.11E+05	1.28E+06	2.43E+06	
		200.00	0.80	0.20	
30 15P	2.49 M	5.11E+05			
		200.00			
31 14Si	2.62 H	5.11E+05			
		0.00			

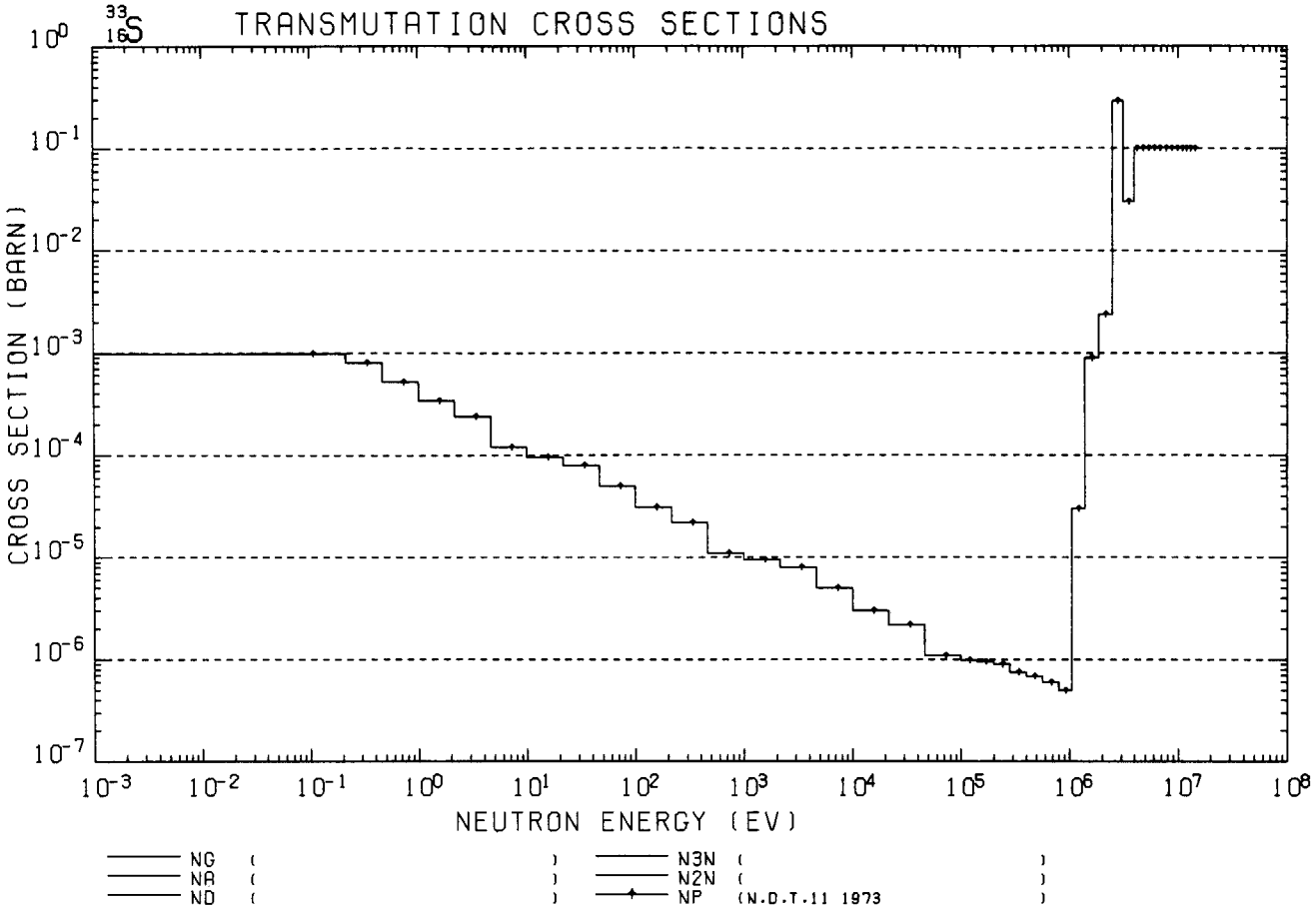

33 16 S
NG
32 15 P
NP
B-
14.280
32 16 S
Abundance
95.02%
ND NNP
N2N
31 15 P
B+
2.61S
31 16 S
NHE3
NT
N3N
30 14 Si
B+
2.49M
30 15 P
B+
1.40S
30 16 S
NA
29 14 Si



$^{32}_{16}S$ DECAY GAMMA-RAY TABLE

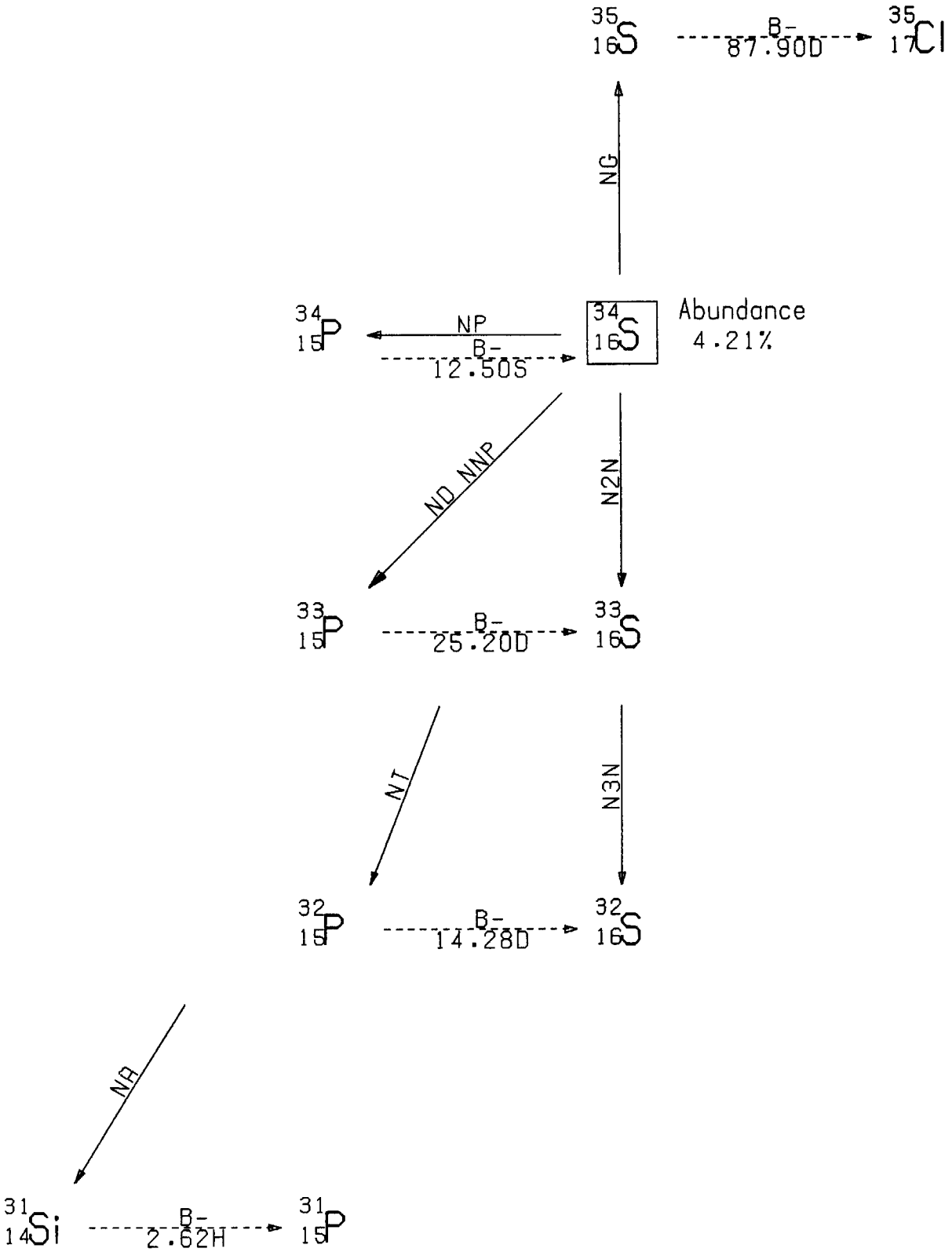
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
$^{30}_{15}P$	2.49 M	5.11E+05			
		200.00			
$^{30}_{16}S$	1.40 S	5.11E+05	8.78E+05	2.34E+06	7.09E+05
		200.00	80.10	2.58	0.50
$^{31}_{16}S$	2.61 S	5.11E+05	1.27E+06		
		200.00	1.25		
$^{32}_{15}P$	14.28 D				

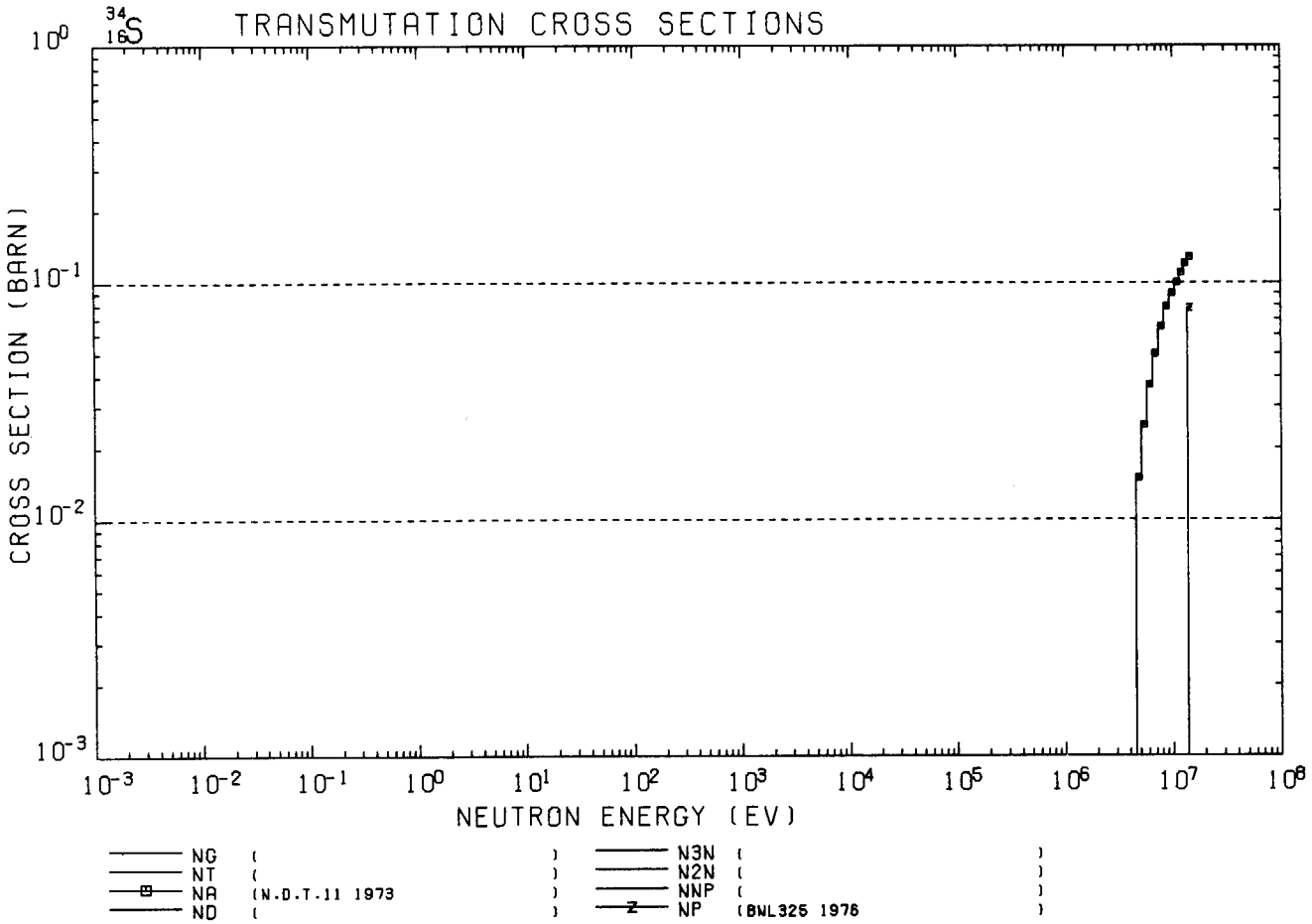

34 16 S
NG
33 15 P
NP
B-
25.20D
33 16 S
Abundance
0.75%
ND
N2N
32 15 P
B-
14.28D
32 16 S
N3N
31 15 P
B+
2.61S
31 16 S
NA
30 14 Si



$^{33}_{16}S$ DECAY GAMMA-RAY TABLE

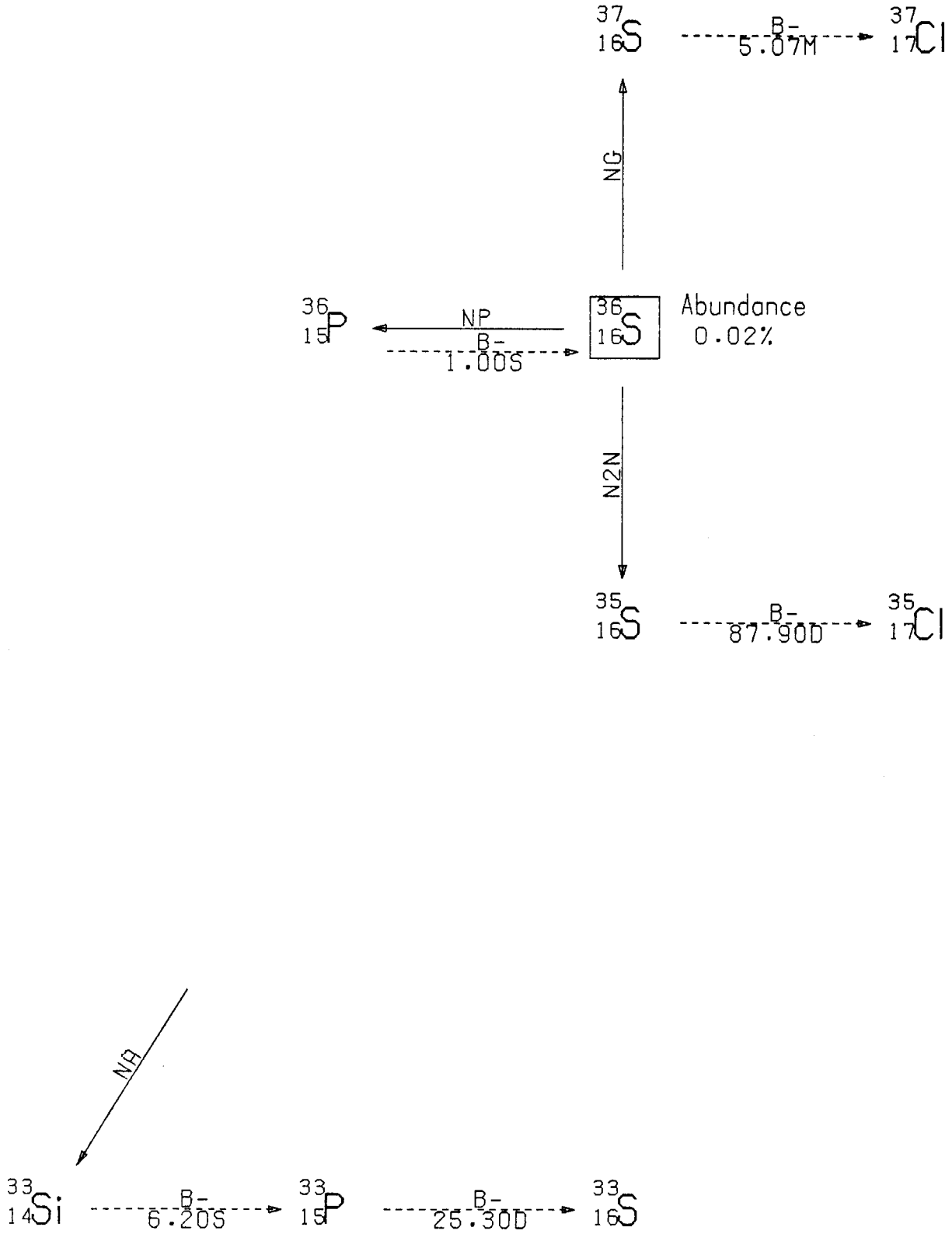
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-	
$^{32}_{15}P$	14.28	D		
$^{31}_{16}S$	2.61	S	5.11E+06 200.00	1.27E+06 1.25
$^{33}_{15}P$	25.20	D		

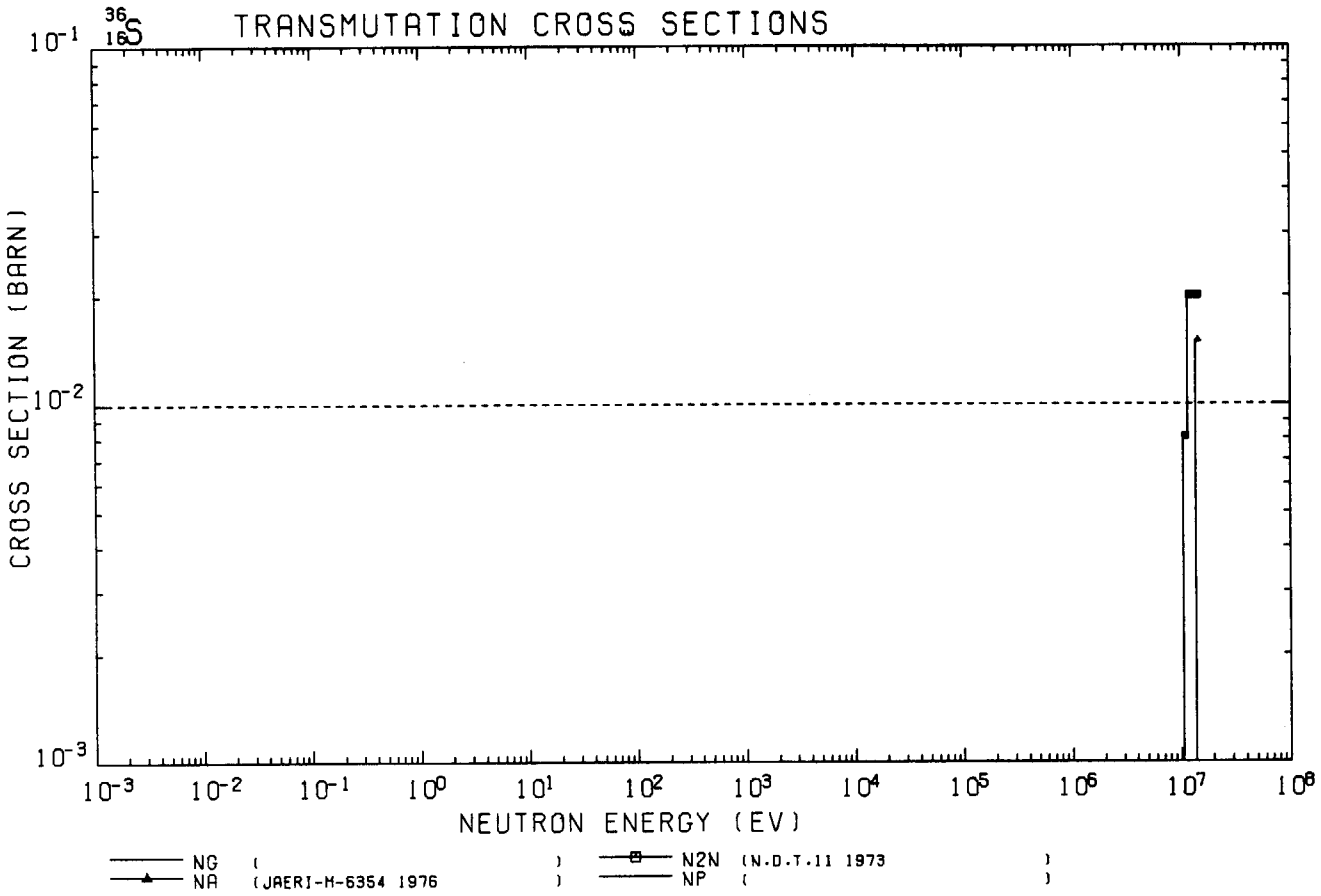

35 16 S
B-
87.90D
35 17 Cl
NG
34 15 P
NP
B-
12.50S
34 16 S
Abundance
4.21%
ND NNP
N2N
33 15 P
B-
25.20D
33 16 S
NT
N3N
32 15 P
B-
14.28D
32 16 S
NA
31 14 Si
B-
2.62H
31 15 P



$^{34}_{16}S$ DECAY GAMMA-RAY TABLE

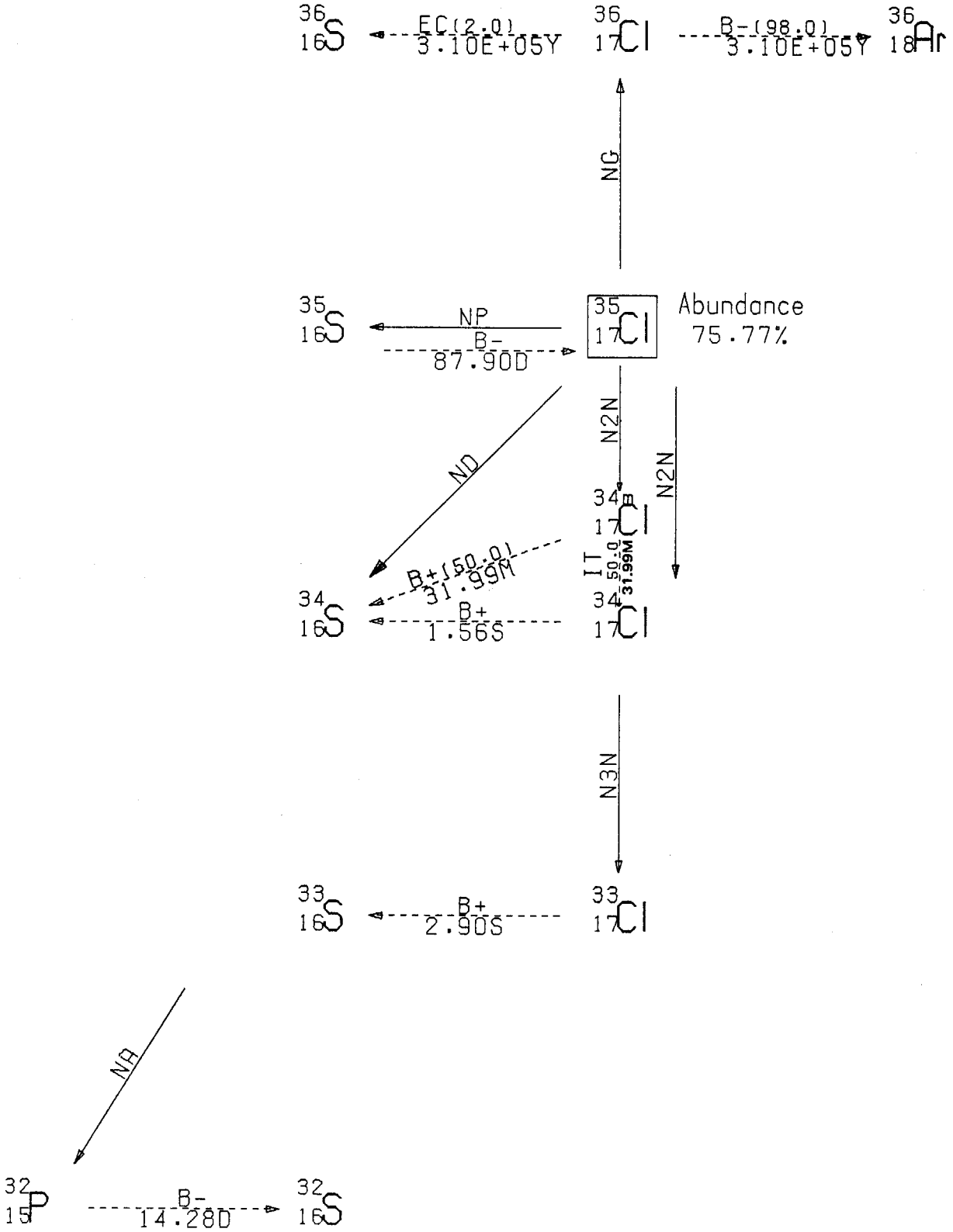
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
$^{35}_{16}S$	87.90	D				
$^{32}_{15}P$	14.28	D				
$^{31}_{14}Si$	2.62	H	5.11E+05 0.00			
$^{33}_{15}P$	25.20	D				
$^{34}_{15}P$	12.50	S	5.11E+05 0.00	2.13E+06 15.00	4.11E+06 0.19	1.99E+06 0.16

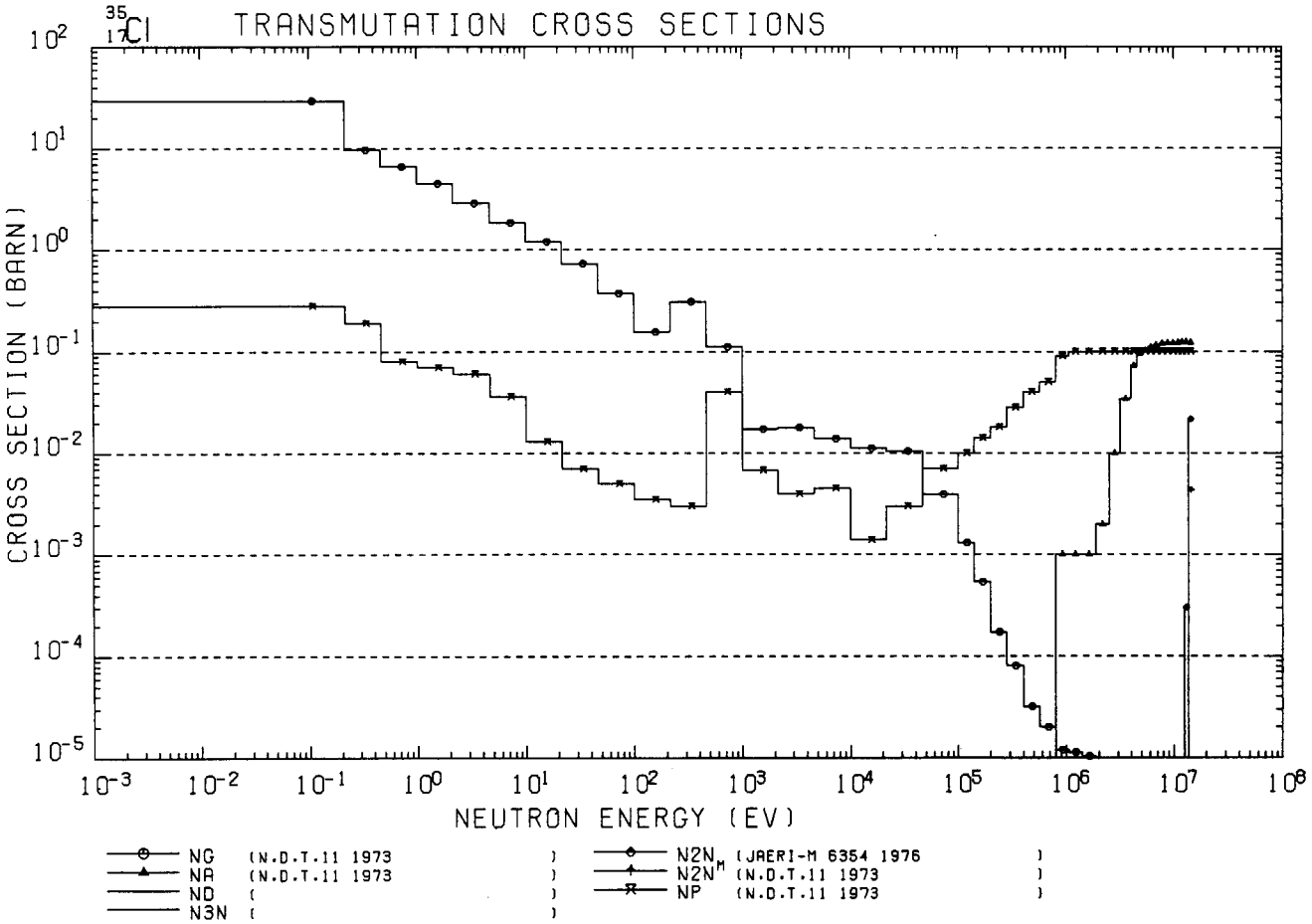

37 16 S
B-
5.07M
37 17 Cl
NG
36 15 P
NP
B-
1.00S
36 16 S
Abundance
0.02%
N2N
35 16 S
B-
87.90D
35 17 Cl
NA
33 14 Si
B-
6.20S
33 15 P
B-
25.30D
33 16 S



$^{36}_{16}S$ DECAY GAMMA-RAY TABLE

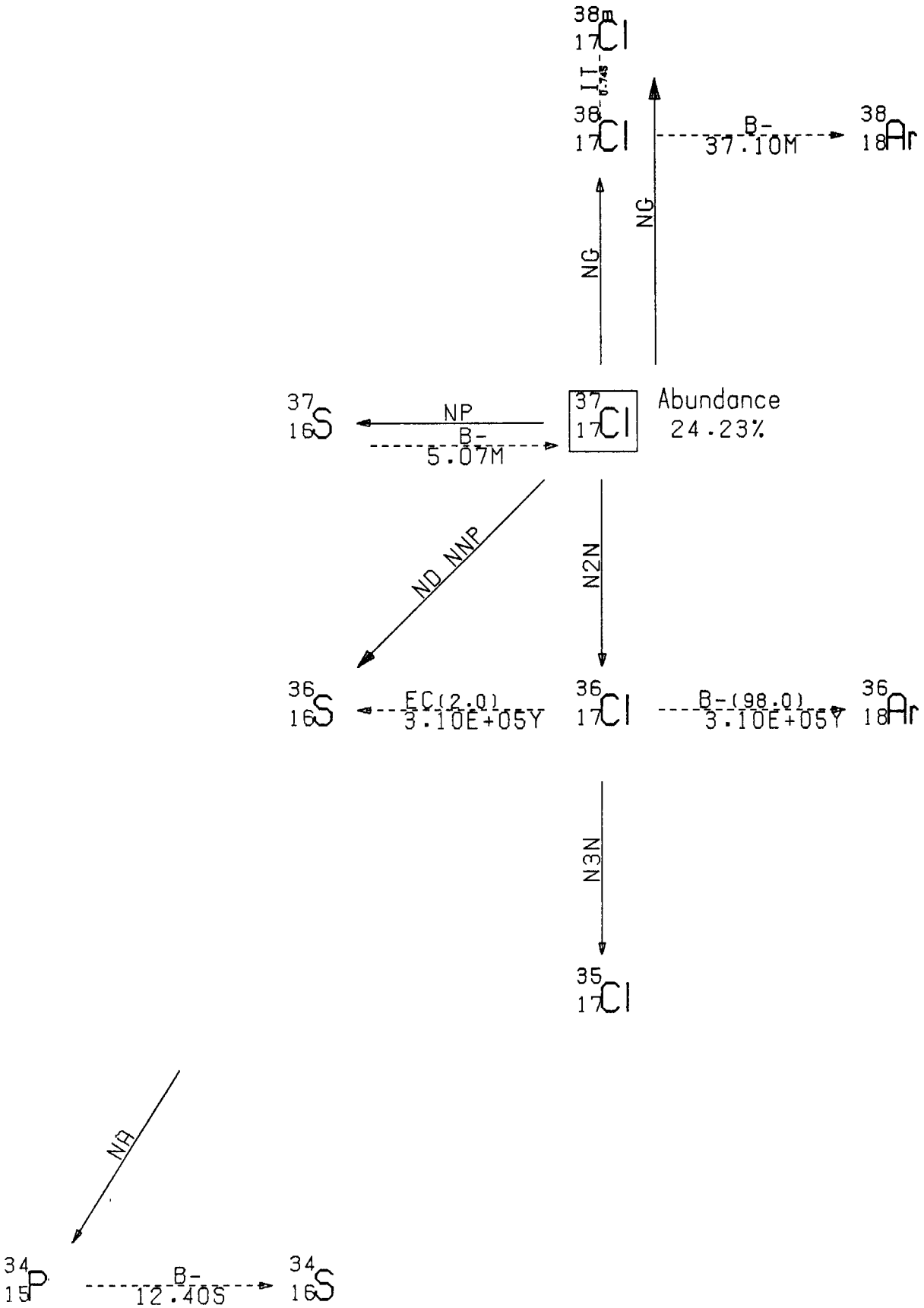
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-		
			6.11E+05	3.10E+06	3.74E+06
$^{37}_{16}S$	5.07	M	0.00	94.20	0.22
$^{35}_{16}S$	87.90	D			
$^{33}_{14}Si$	6.20	S			
$^{33}_{15}P$	25.30	D			
$^{36}_{15}P$	1.00	S			

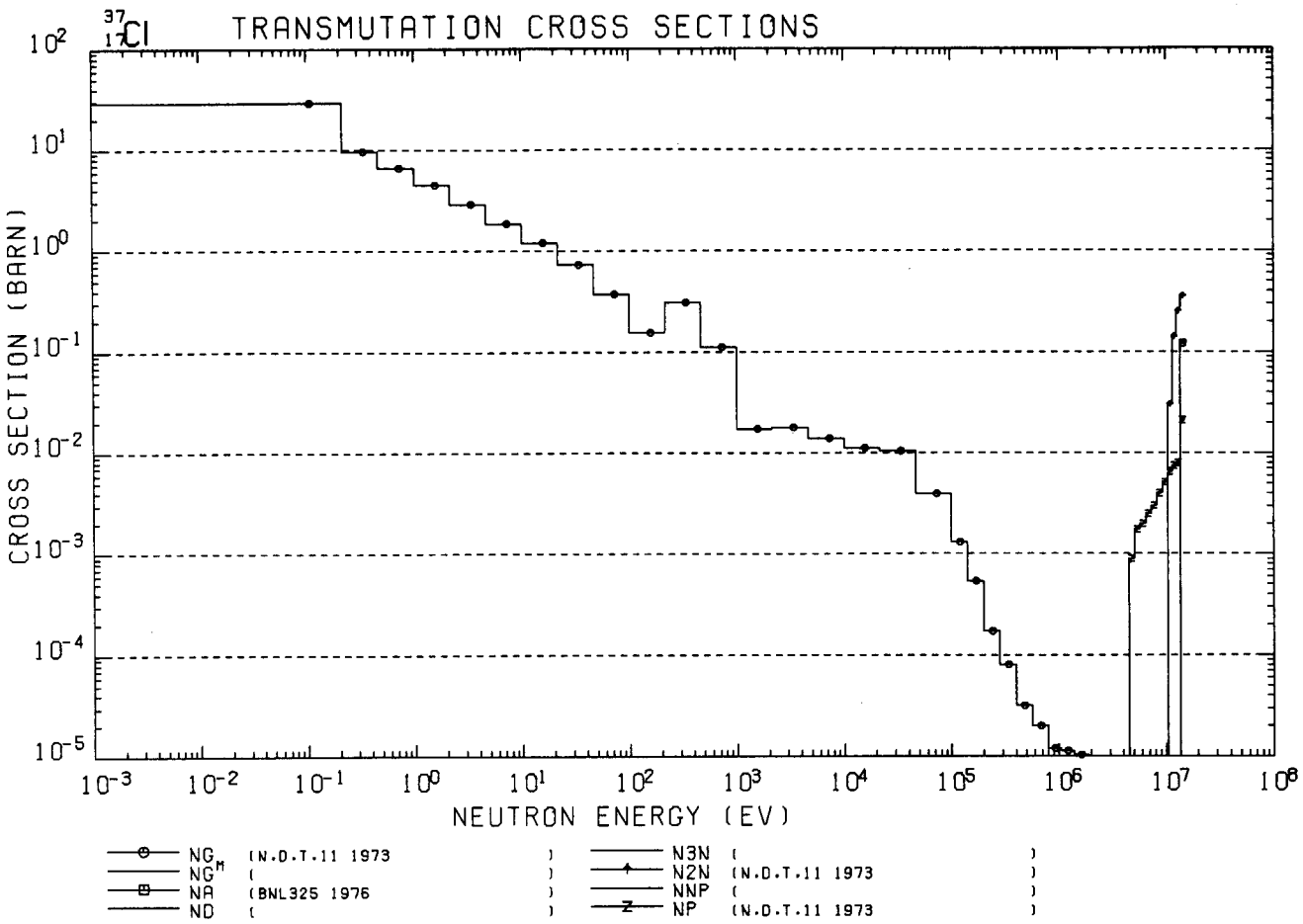

36 16 S
EC(2.0)
3.10E+05Y
36 17 Cl
B-(98.0)
3.10E+05Y
36 18 Ar
NG
35 16 S
NP
B-
87.90D
35 17 Cl
Abundance
75.77%
N2N
ND
34m 17 Cl
IT 50.0
31.99M
N2N
B+(50.0)
31.99M
34 16 S
B+
1.56S
34 17 Cl
N3N
33 16 S
B+
2.90S
33 17 Cl
NA
32 15 P
B-
14.28D
32 16 S



$^{35}_{17}Cl$ DECAY GAMMA-RAY TABLE

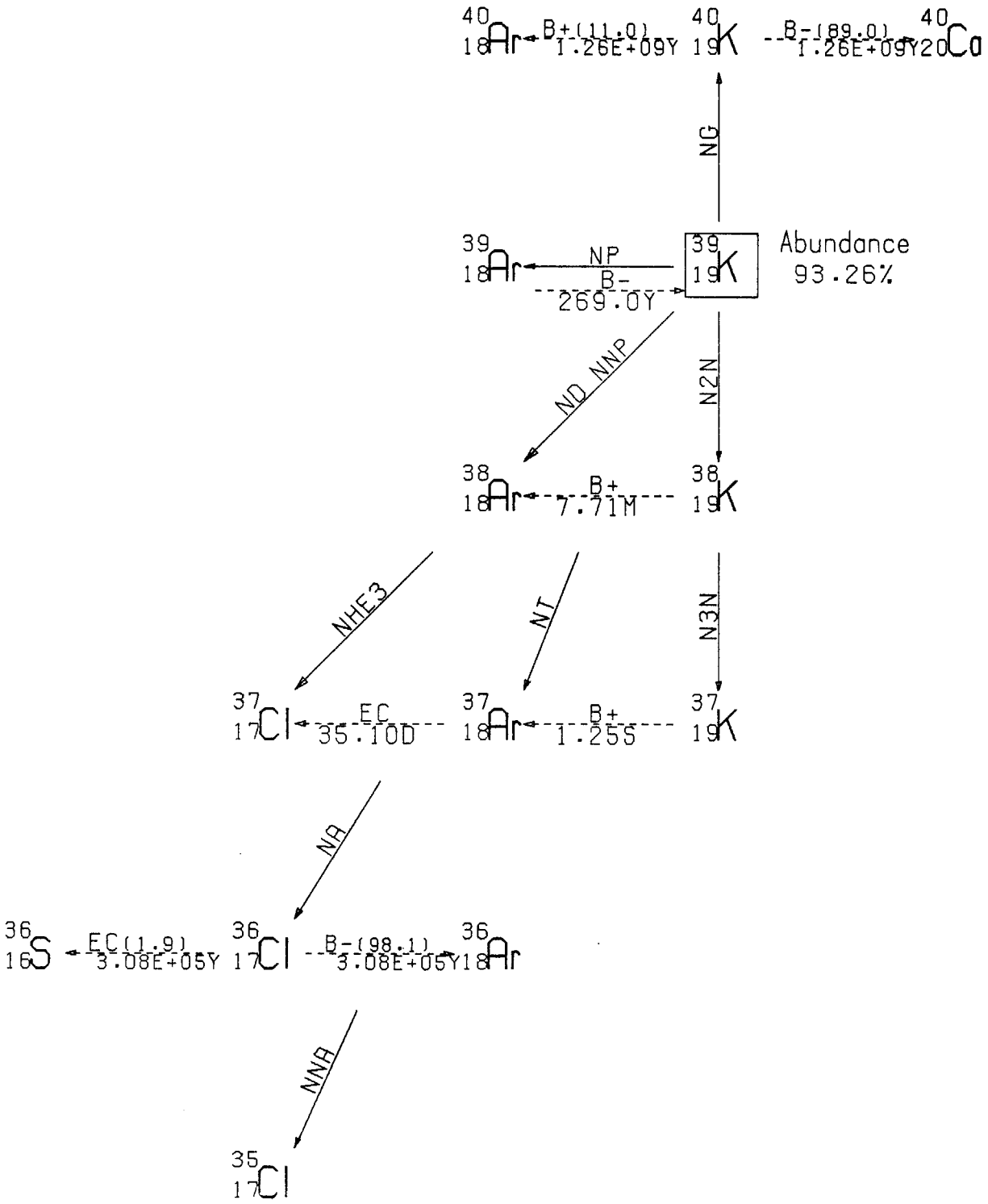
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-					
$^{36}_{17}Cl$	3.10E+05Y						
$^{32}_{15}P$	14.28 D						
$^{33}_{17}Cl$	2.90 S	5.11E+05	2.87E+06	1.97E+06	8.40E+05		
		200.00	0.57	0.56	0.55		
$^{34m}_{17}Cl$	31.99 M	5.11E+05	2.13E+06	1.18E+06	3.30E+06	4.12E+06	1.99E+06
		104.00	42.00	13.66	10.73	0.22	0.17
$^{34}_{17}Cl$	1.56 S	5.11E+05					
		200.00					
$^{35}_{16}S$	87.90 D						

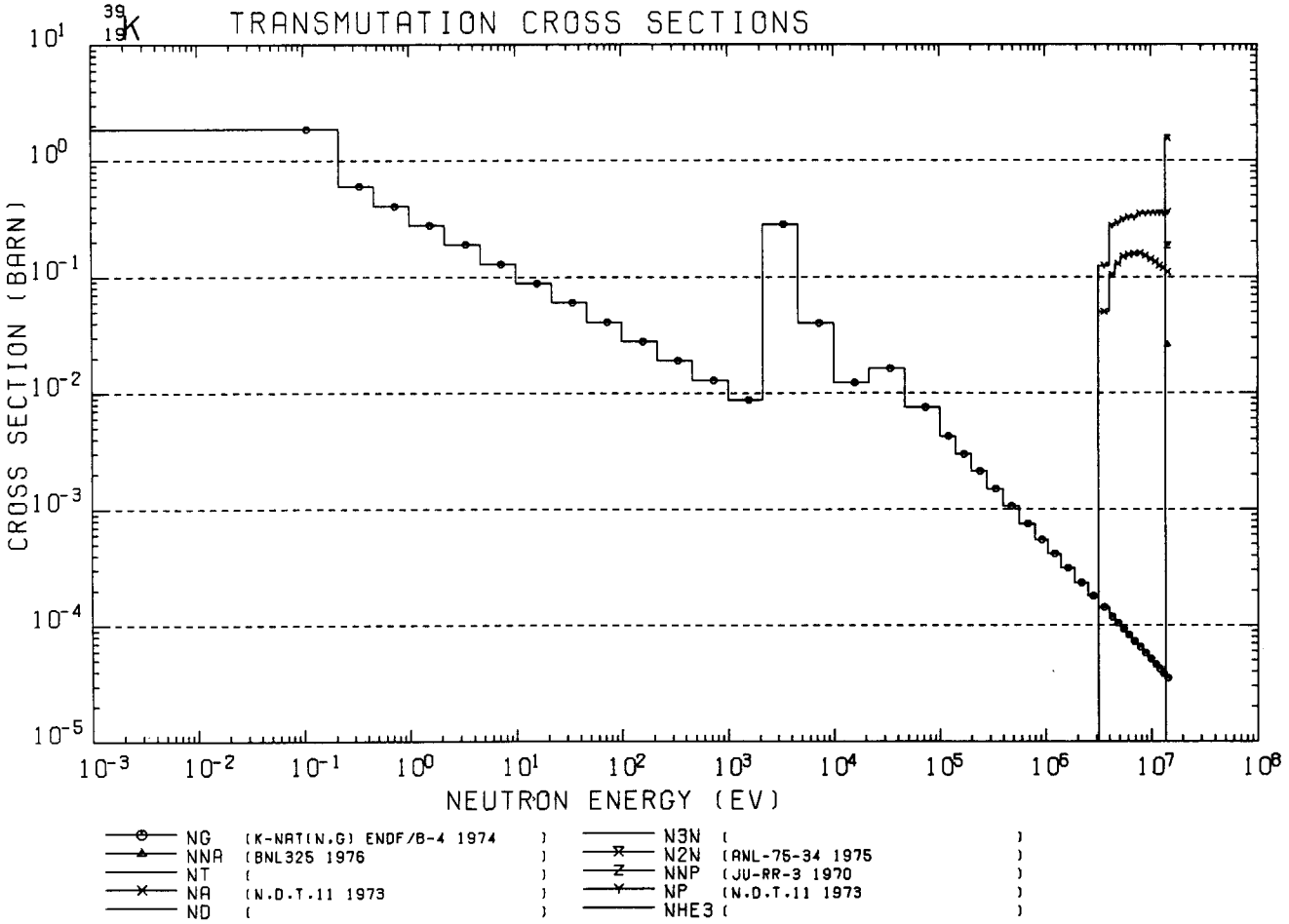

38m 17 Cl
IT 0.715
38 17 Cl
B- 37.10M
38 18 Ar
NG
NG
37 16 S
NP
B- 5.07M
37 17 Cl
Abundance 24.23%
ND NNP
N2N
36 16 S
EC(2.0) 3.10E+05Y
36 17 Cl
B-(98.0) 3.10E+05Y
36 18 Ar
N3N
35 17 Cl
NA
34 15 P
B- 12.40S
34 16 S



$^{37}_{17}Cl$ DECAY GAMMA-RAY TABLE

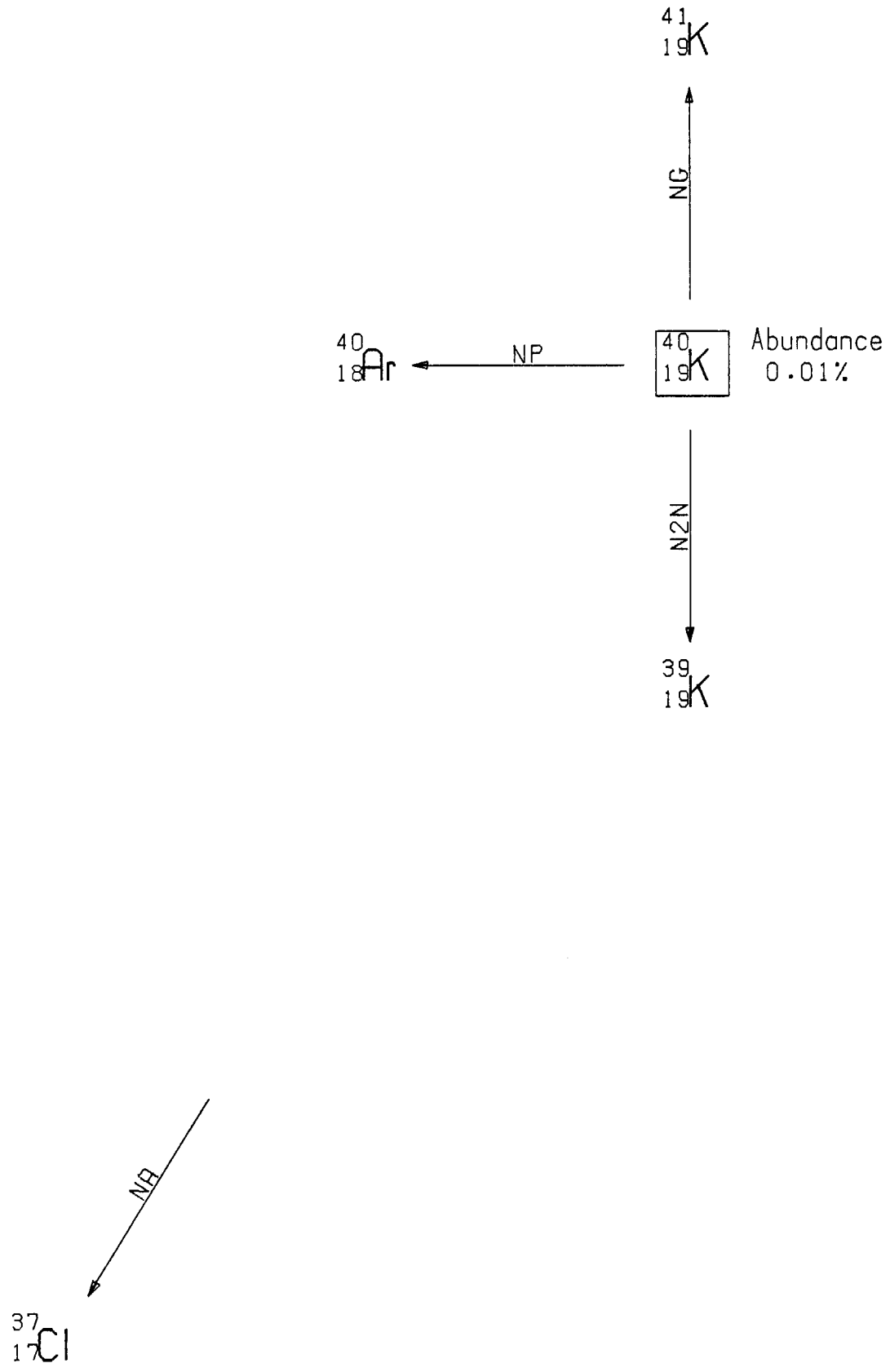
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-		
$^{38m}_{17}Cl$	0.74 S	5.11E+05	6.71E+05	
		0.00	99.95	
$^{38}_{17}Cl$	37.10 M	5.11E+05	2.17E+06	1.64E+06
		0.00	42.00	32.40
$^{34}_{15}P$	12.40 S			
$^{36}_{17}Cl$	3.10E+05Y			
$^{37}_{16}S$	5.07 M	6.11E+05	3.10E+06	3.74E+06
		0.00	94.20	0.22

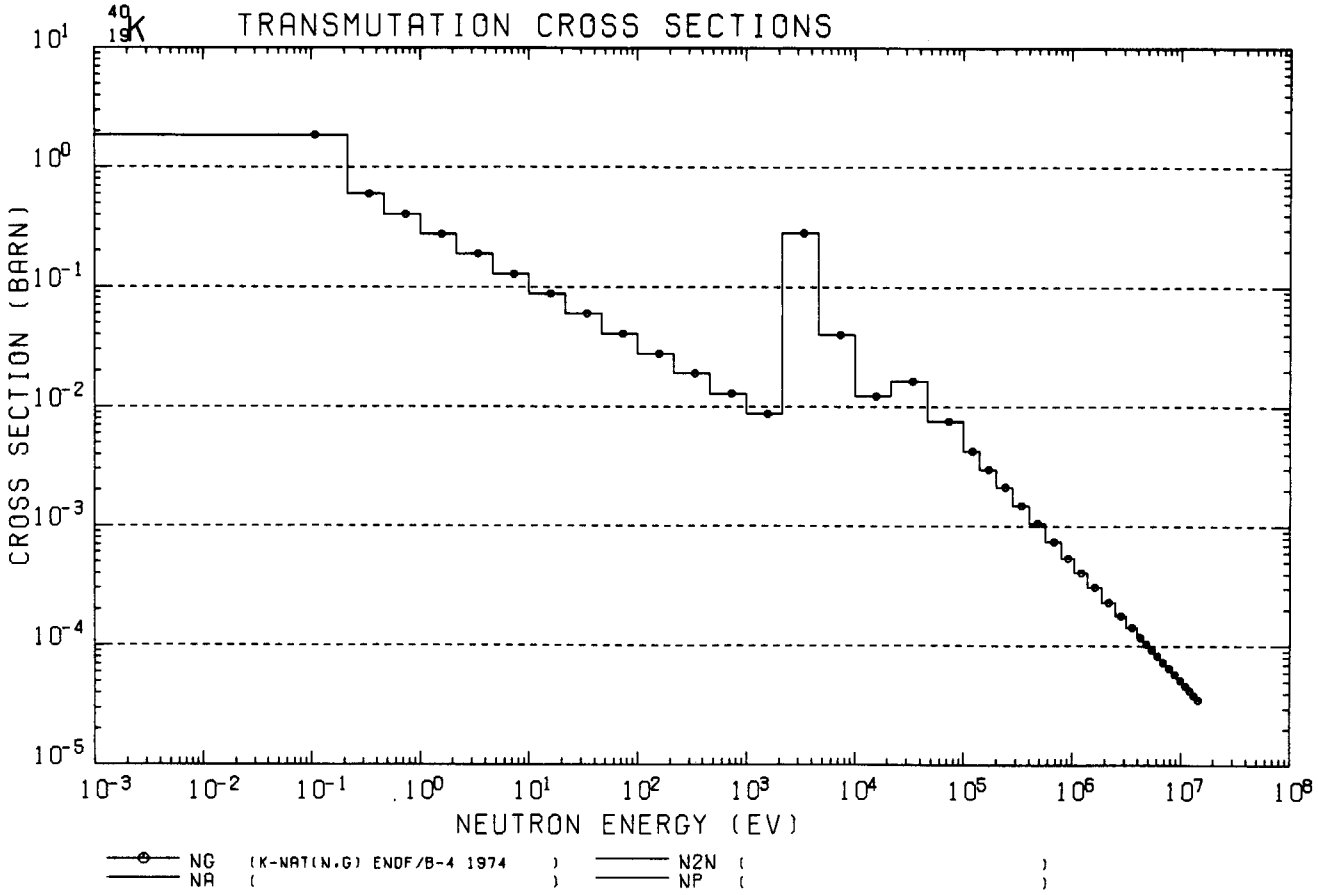

40 18 Ar
B+(11.0)
1.26E+09Y
40 19 K
B-(89.0)
1.26E+09Y
40 20 Ca
NG
39 18 Ar
NP
B-
269.0Y
39 19 K
Abundance
93.26%
ND NNP
N2N
38 18 Ar
B+
7.71M
38 19 K
NHE3
NT
N3N
37 17 Cl
EC
35.10D
37 18 Ar
B+
1.25S
37 19 K
NA
36 16 S
EC(1.9)
3.08E+05Y
36 17 Cl
B-(98.1)
3.08E+05Y
36 18 Ar
NNA
35 17 Cl



$^{39}_{19}K$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-		
$^{40}_{19}K$	1.26E+09Y	5.11E+05	1.46E+06	
		0.00	10.67	
$^{37}_{18}Ar$	35.10 D			
$^{36}_{17}Cl$	3.08E+05Y			
$^{37}_{19}K$	1.25 S	5.11E+05	2.79E+06	
		200.00	2.00	
$^{38}_{19}K$	7.71 M	5.11E+05	2.17E+06	3.94E+06
		200.00	99.80	0.20
$^{39}_{18}Ar$	269.0 Y			

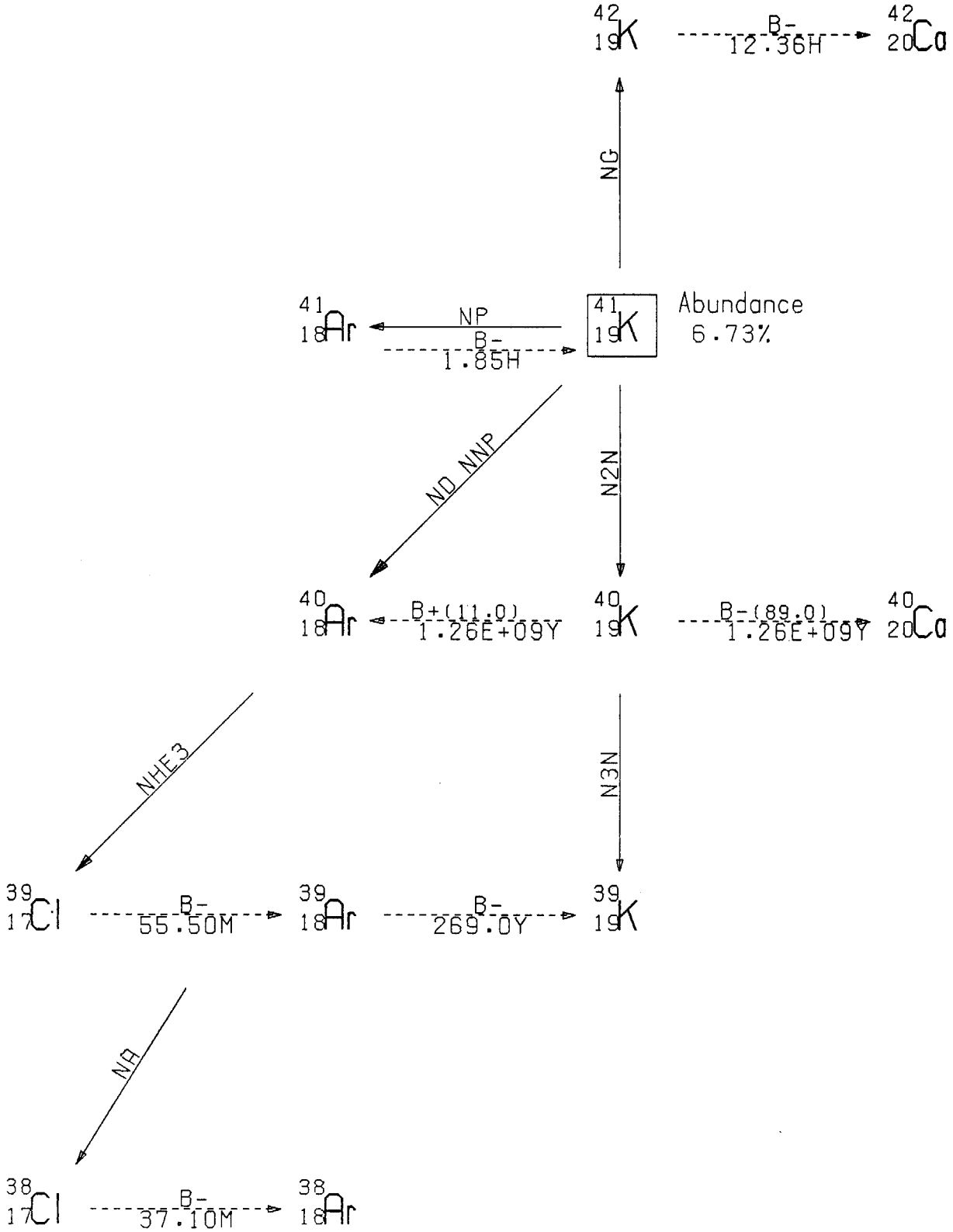

41 19 K
NG
40 18 Ar
NP
40 19 K
Abundance
0.01%
N2N
39 19 K
NA
37 17 Cl

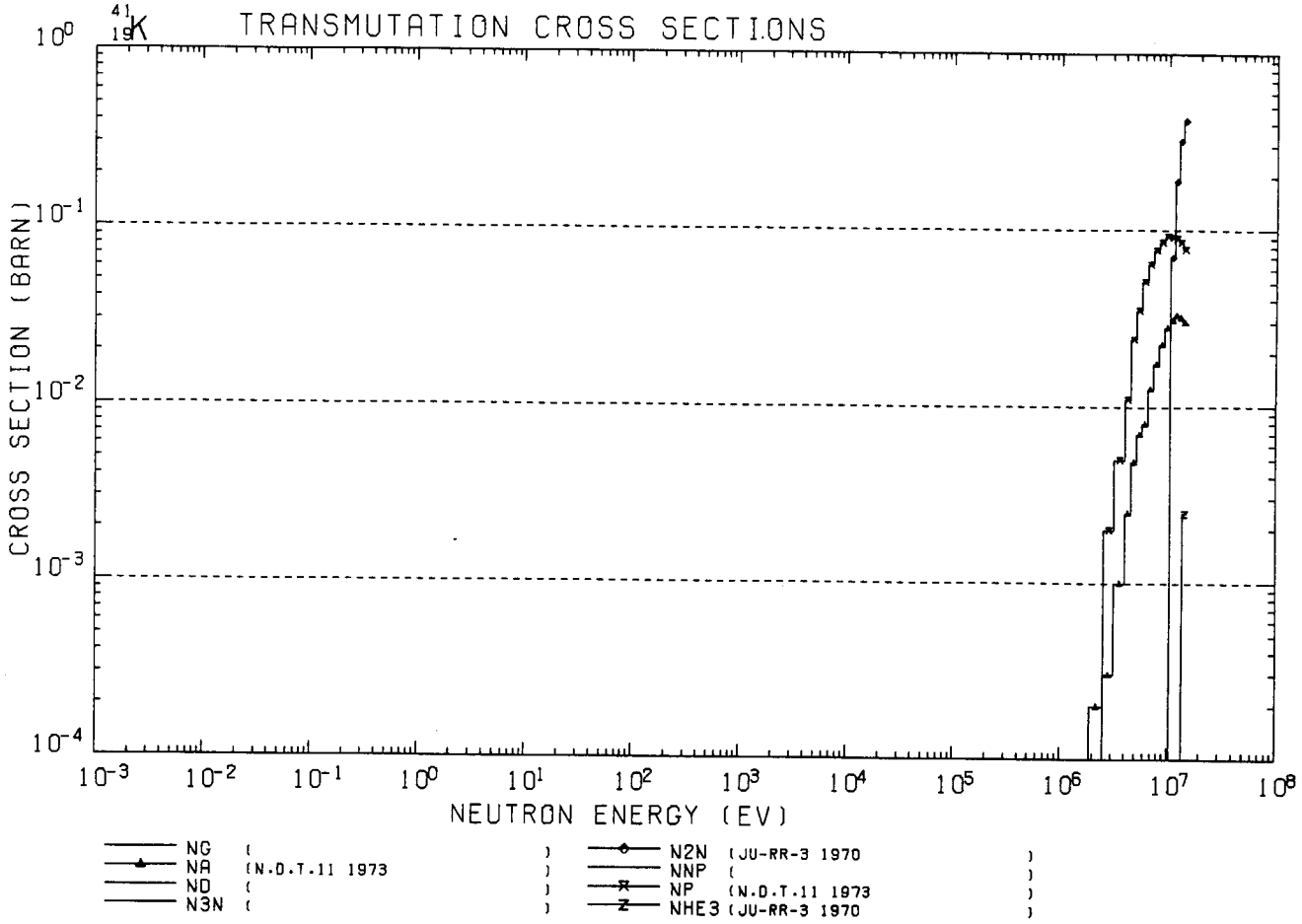


40 19K DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-

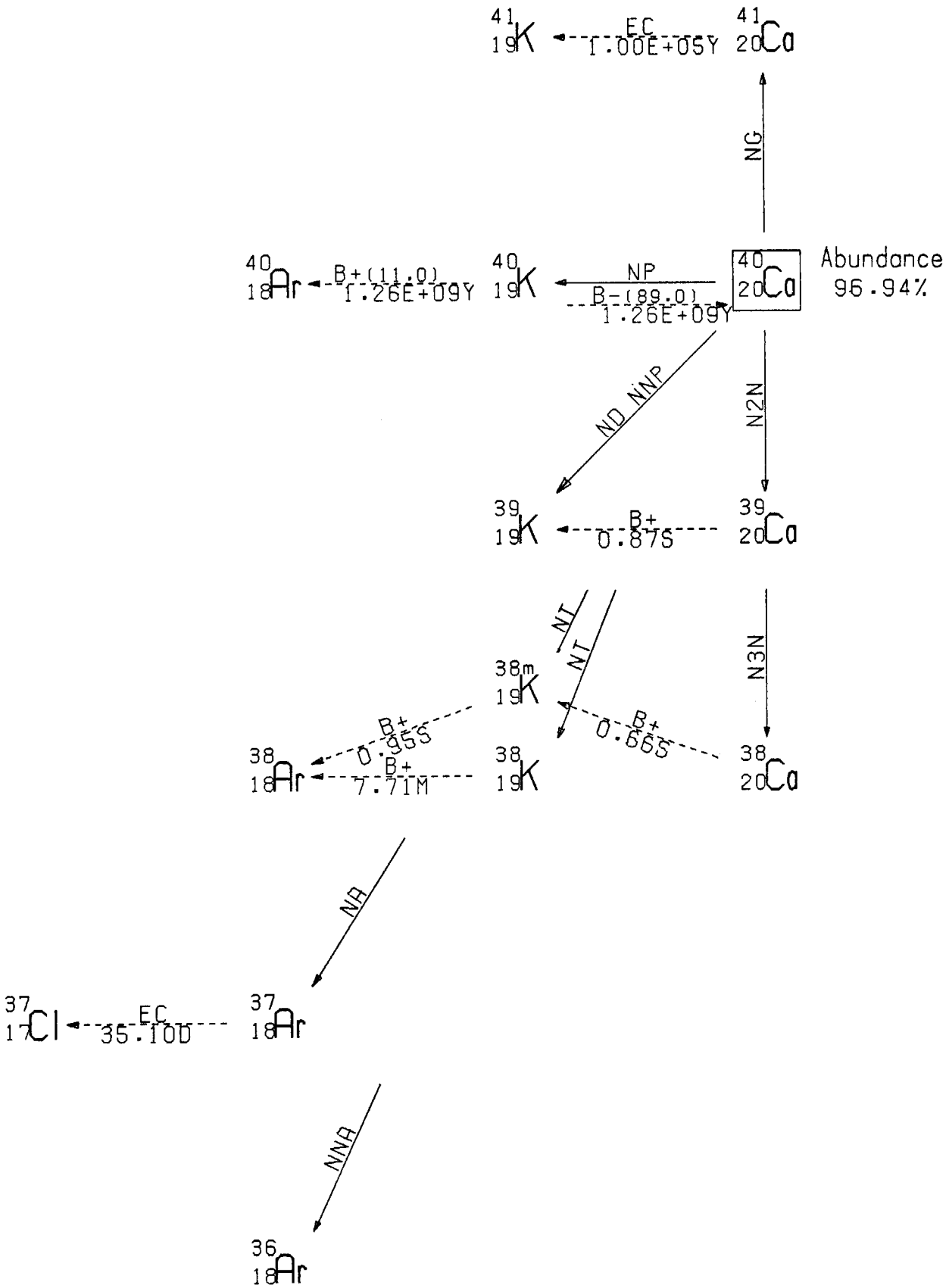
NO INPUT IN DECAY GAMMA-RAY TABLE

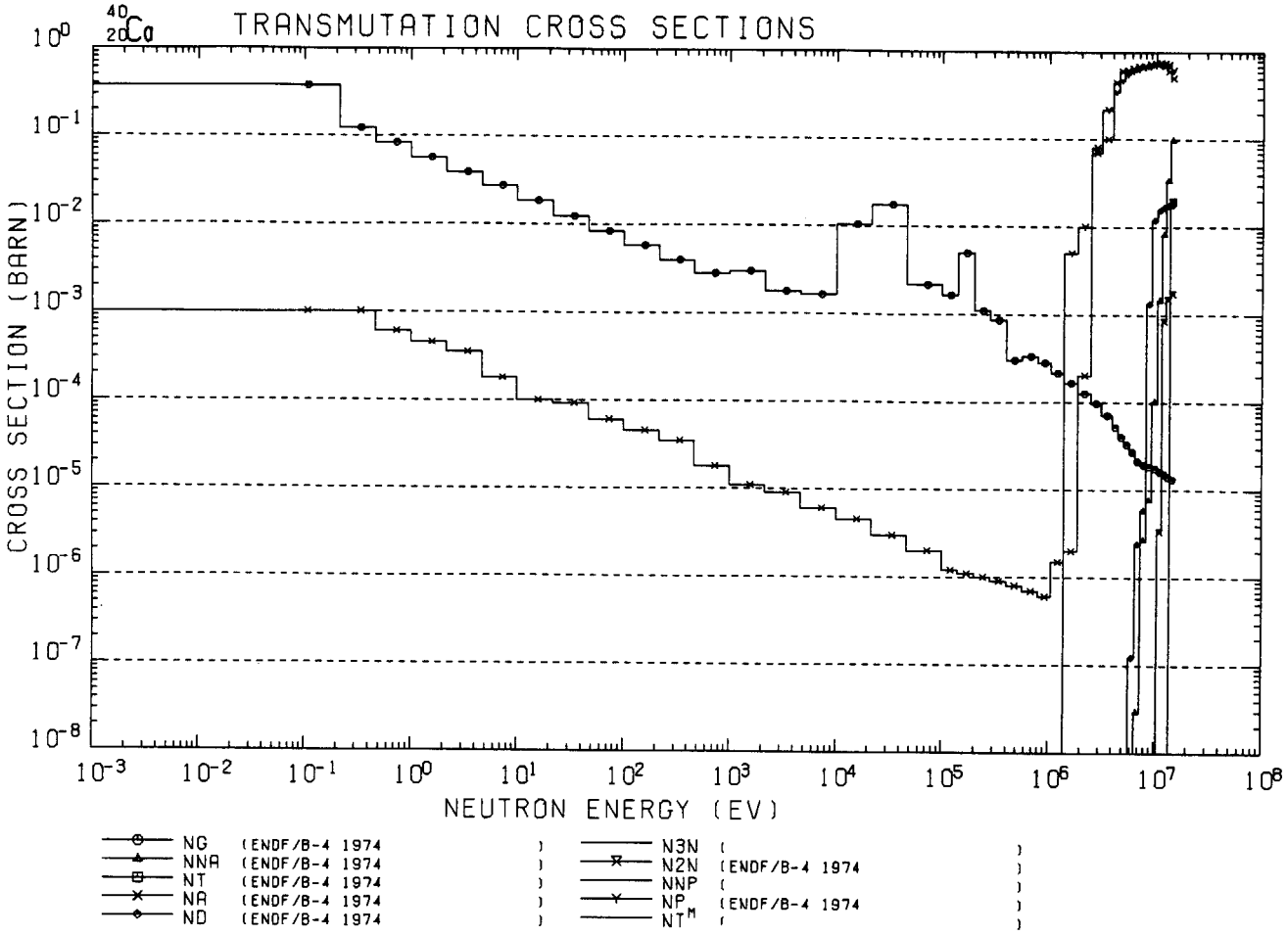

42 19K
B-
12.36H
42 20Ca
NG
41 18Ar
NP
B-
1.85H
41 19K
Abundance
6.73%
ND NNP
N2N
40 18Ar
B+(11.0)
1.26E+09Y
40 19K
B-(89.0)
1.26E+09Y
40 20Ca
NHE3
N3N
39 17Cl
B-
55.50M
39 18Ar
B-
269.0Y
39 19K
NA
38 17Cl
B-
37.10M
38 18Ar



$^{41}_{19}K$ DECAY GAMMA-RAY TABLE

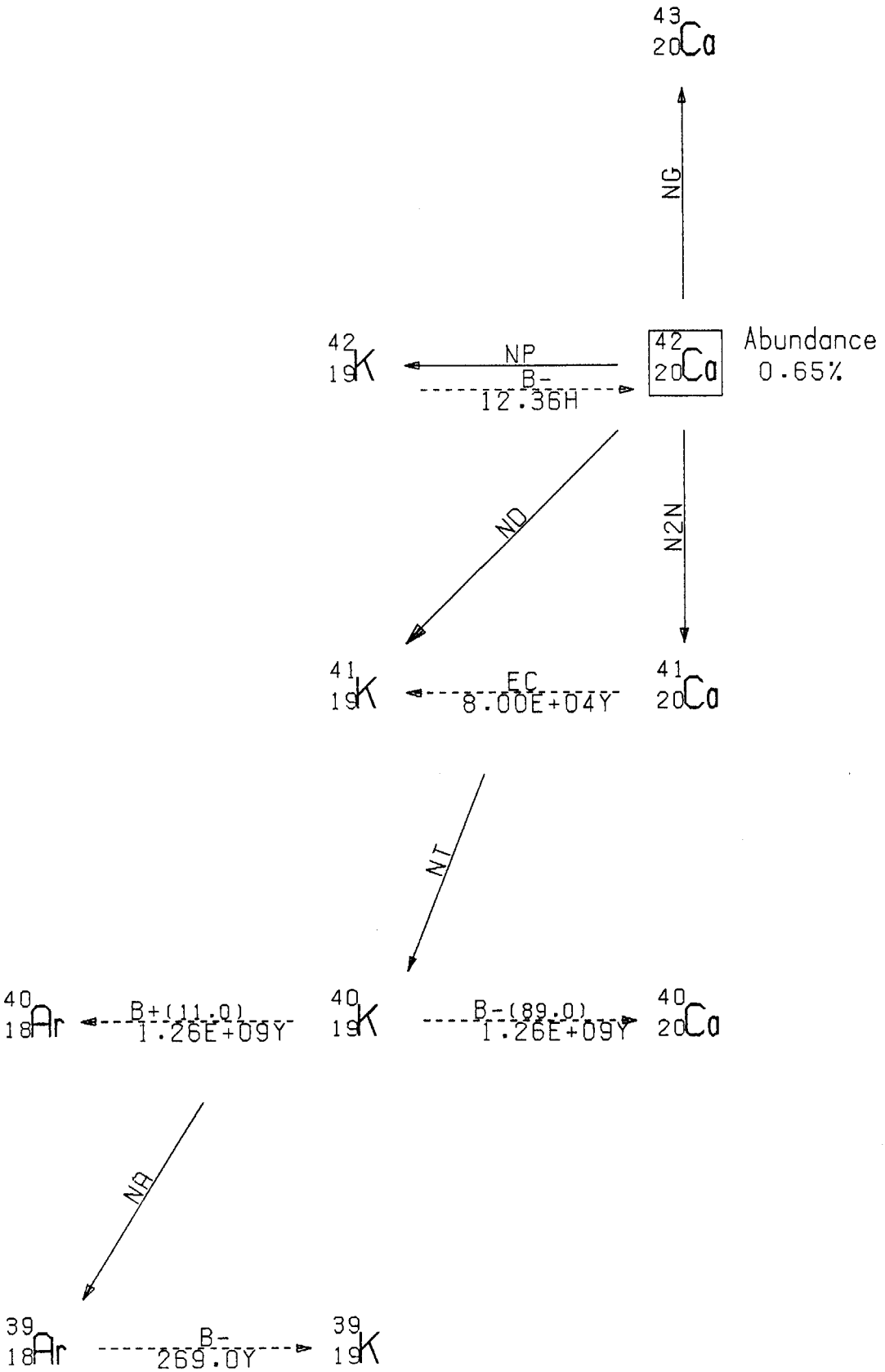
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-								
$^{39}_{17}Cl$	55.50 M	5.11E+05	1.27E+06	2.50E+05	1.52E+06	1.31E+06	1.09E+06	9.86E+05	1.56E+06	1.24E+06
		0.00	54.30	47.05	38.57	29.11	2.56	2.18	0.32	0.12
$^{42}_{19}K$	12.36 H	5.11E+05	1.52E+06	3.13E+06						
		0.00	18.80	0.35						
$^{38}_{17}Cl$	37.10 M	5.11E+05	2.17E+06	1.64E+06						
		0.00	42.00	32.40						
$^{40}_{19}K$	1.26E+09Y	5.11E+05	1.46E+06							
		0.00	10.67							
$^{41}_{18}Ar$	1.85 H	5.11E+05	1.29E+06							
		0.00	99.16							
$^{39}_{18}Ar$	269.0 Y									

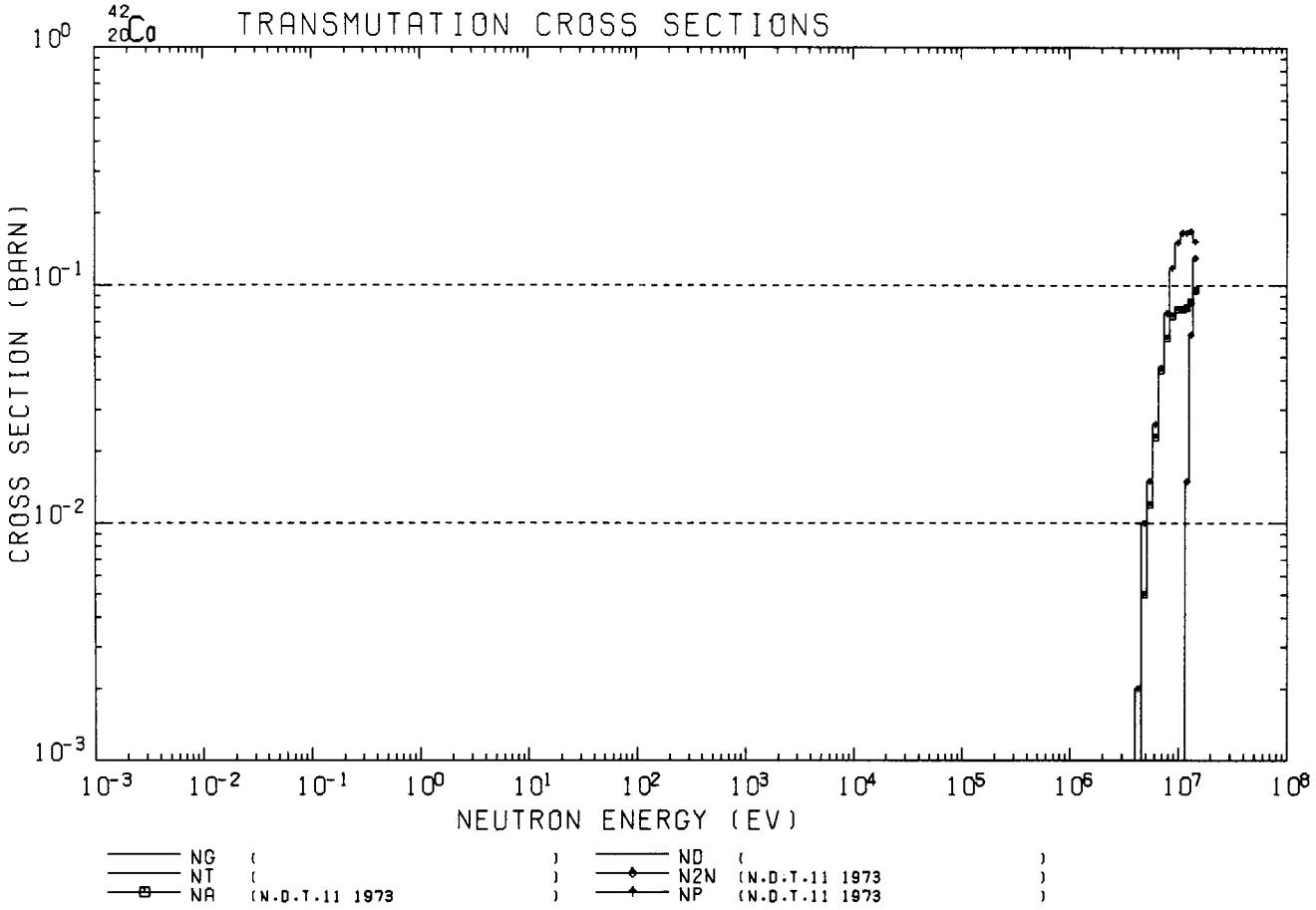

41 19 K
EC
1.00E+05Y
41 20 Ca
NG
40 18 Ar
B+(11.0)
1.26E+09Y
40 19 K
NP
B-(89.0)
1.26E+09Y
40 20 Ca
Abundance
96.94%
ND NNP
N2N
39 19 K
B+
0.87S
39 20 Ca
NT
NT
N3N
38m 19 K
B+
0.95S
B+
0.66S
38 18 Ar
B+
7.71M
38 19 K
38 20 Ca
NA
37 17 Cl
EC
35.10D
37 18 Ar
NNA
36 18 Ar



40 20Ca DECAY GAMMA-RAY TABLE

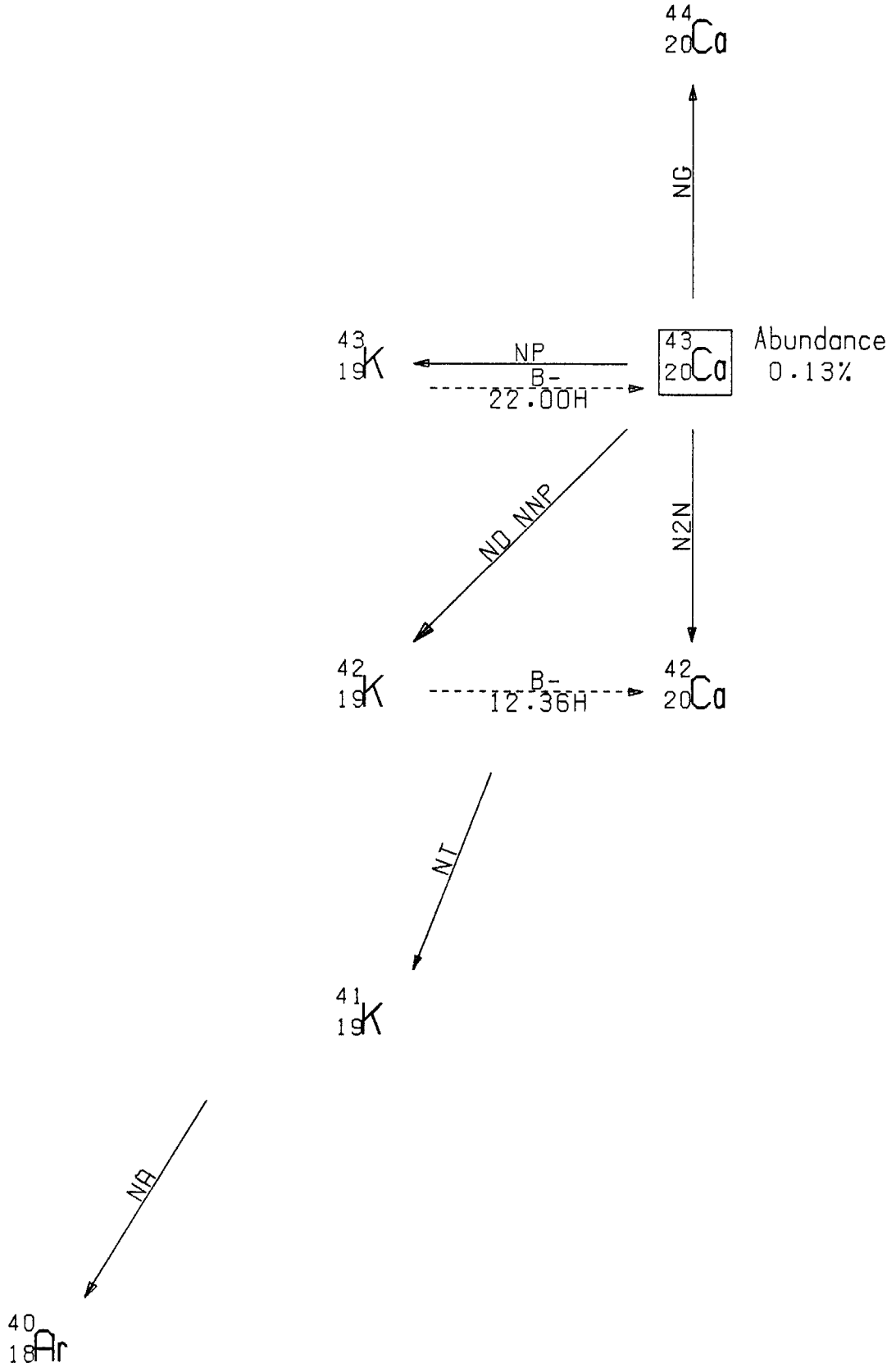
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-		
41 20Ca	1.00E+05Y			
38 19K	7.71 M	5.11E+05	2.17E+06	3.94E+06
		200.00	99.80	0.20
37 18Ar	35.10 D			
38 20Ca	0.66 S	5.11E+05	1.57E+06	3.21E+06
		200.00	25.00	0.60
38m 19K	0.95 S	5.11E+05		
		200.00		
39 20Ca	0.87 S	5.11E+05		
		200.00		
40 19K	1.26E+09Y	5.11E+05	1.46E+06	
		0.00	10.67	

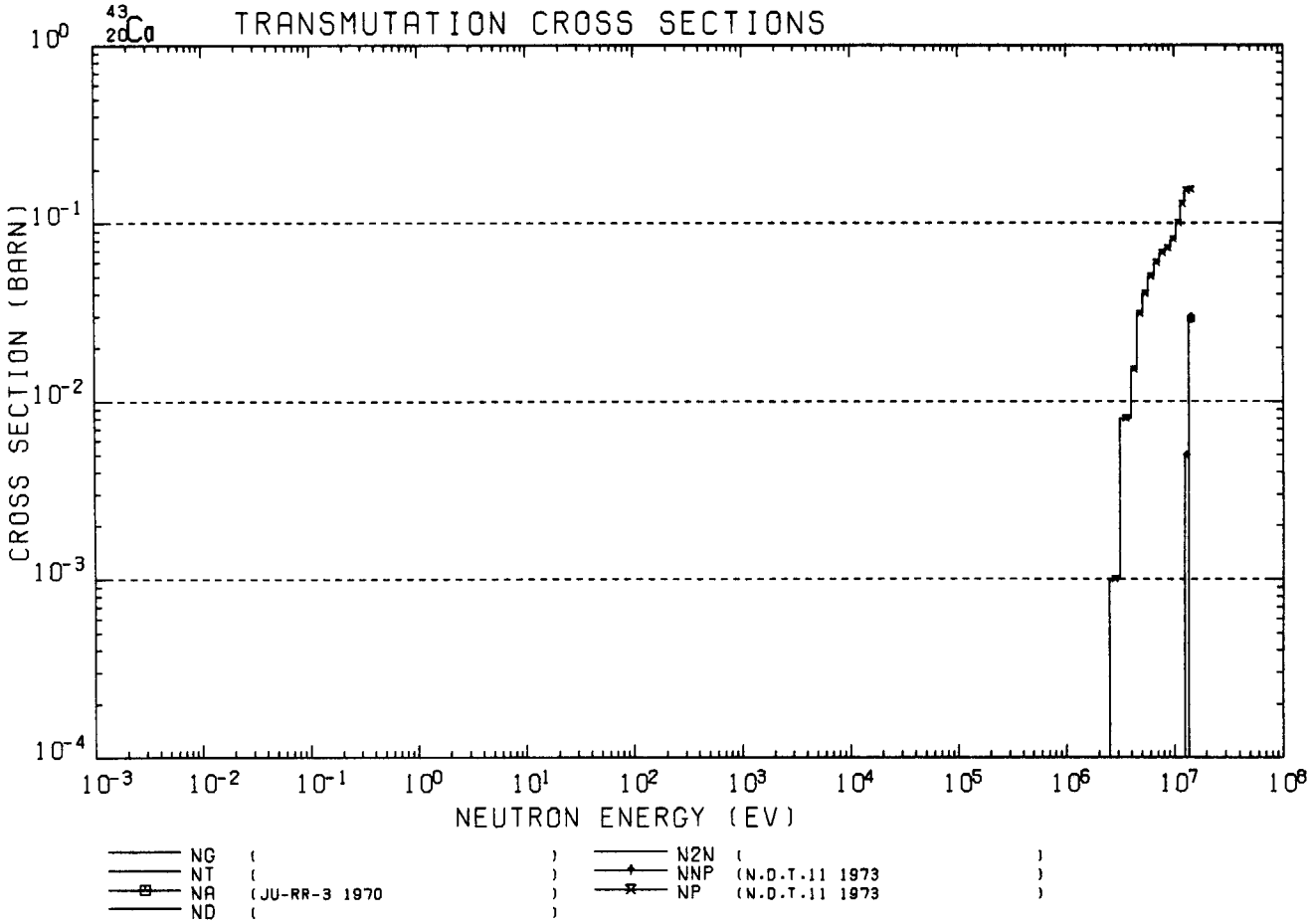

43 20 Ca
NG
42 19 K
NP
B-
12.36H
42 20 Ca
Abundance
0.65%
ND
N2N
41 19 K
EC
8.00E+04Y
41 20 Ca
NT
40 18 Ar
B+(11.0)
1.26E+09Y
40 19 K
B-(89.0)
1.26E+09Y
40 20 Ca
NA
39 18 Ar
B-
269.0Y
39 19 K



$^{42}_{20}Ca$ DECAY GAMMA-RAY TABLE

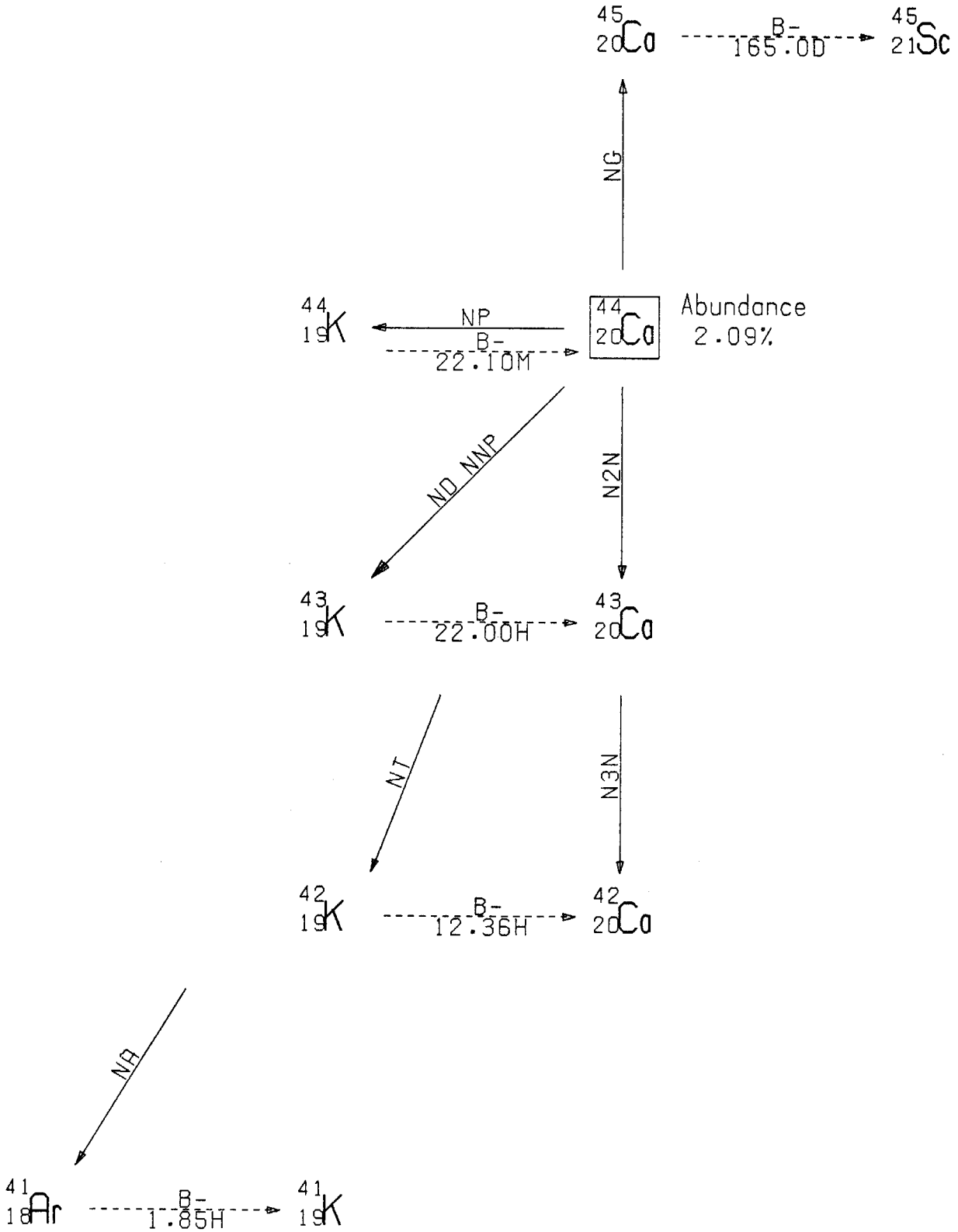
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-		
$^{40}_{19}K$	1.26E+09Y	5.11E+05	1.46E+06	
		0.00	10.67	
$^{39}_{18}Ar$	269.0 Y			
$^{41}_{20}Ca$	8.00E+04Y			
$^{42}_{19}K$	12.36 H	5.11E+05	1.52E+06	3.13E+05
		0.00	18.80	0.35

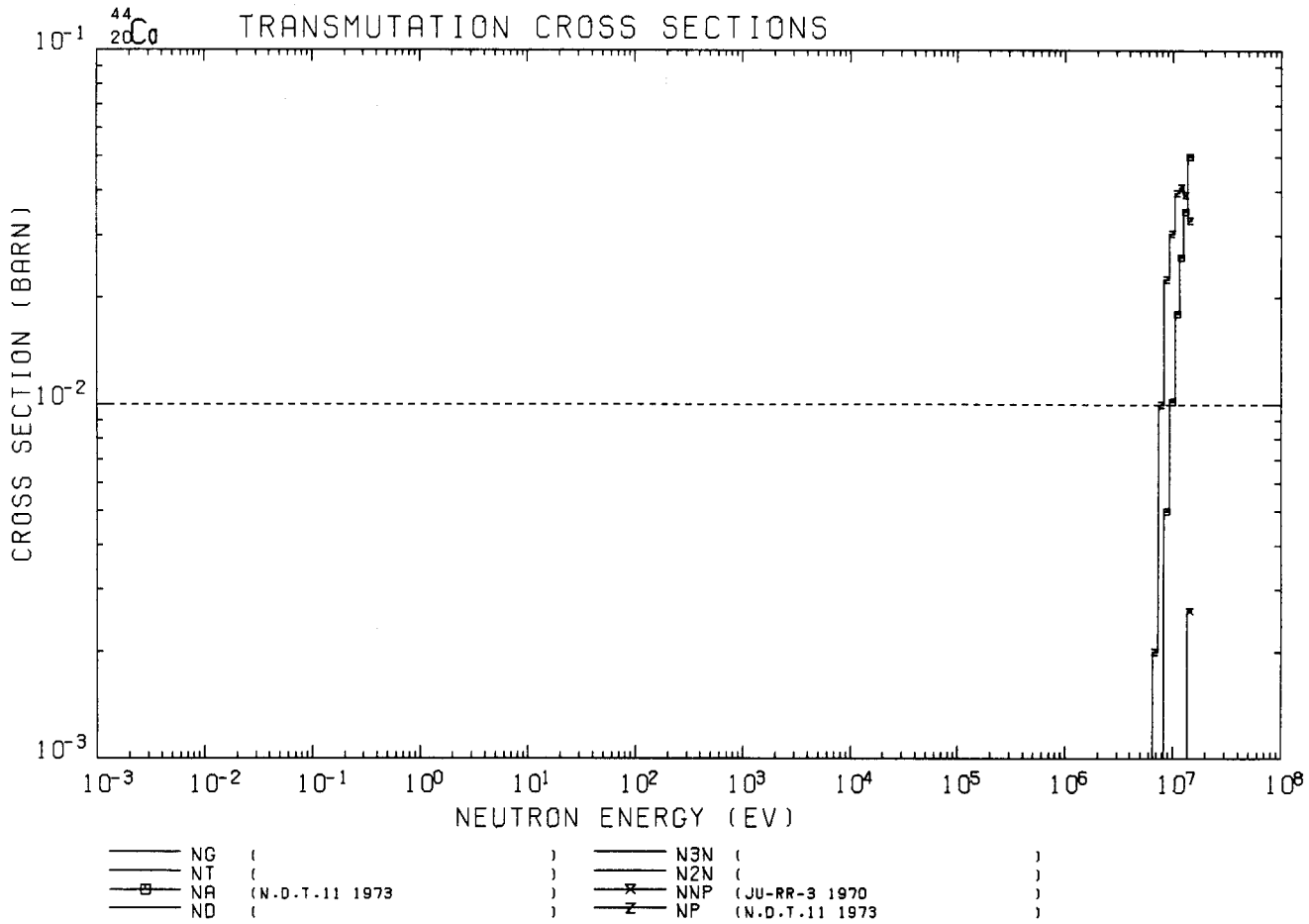

44 20 Ca
NG
43 19 K
NP
B-
22.00H
43 20 Ca
Abundance
0.13%
ND NNP
N2N
42 19 K
B-
12.36H
42 20 Ca
NT
41 19 K
NA
40 18 Ar



$^{43}_{20}Ca$ DECAY GAMMA-RAY TABLE

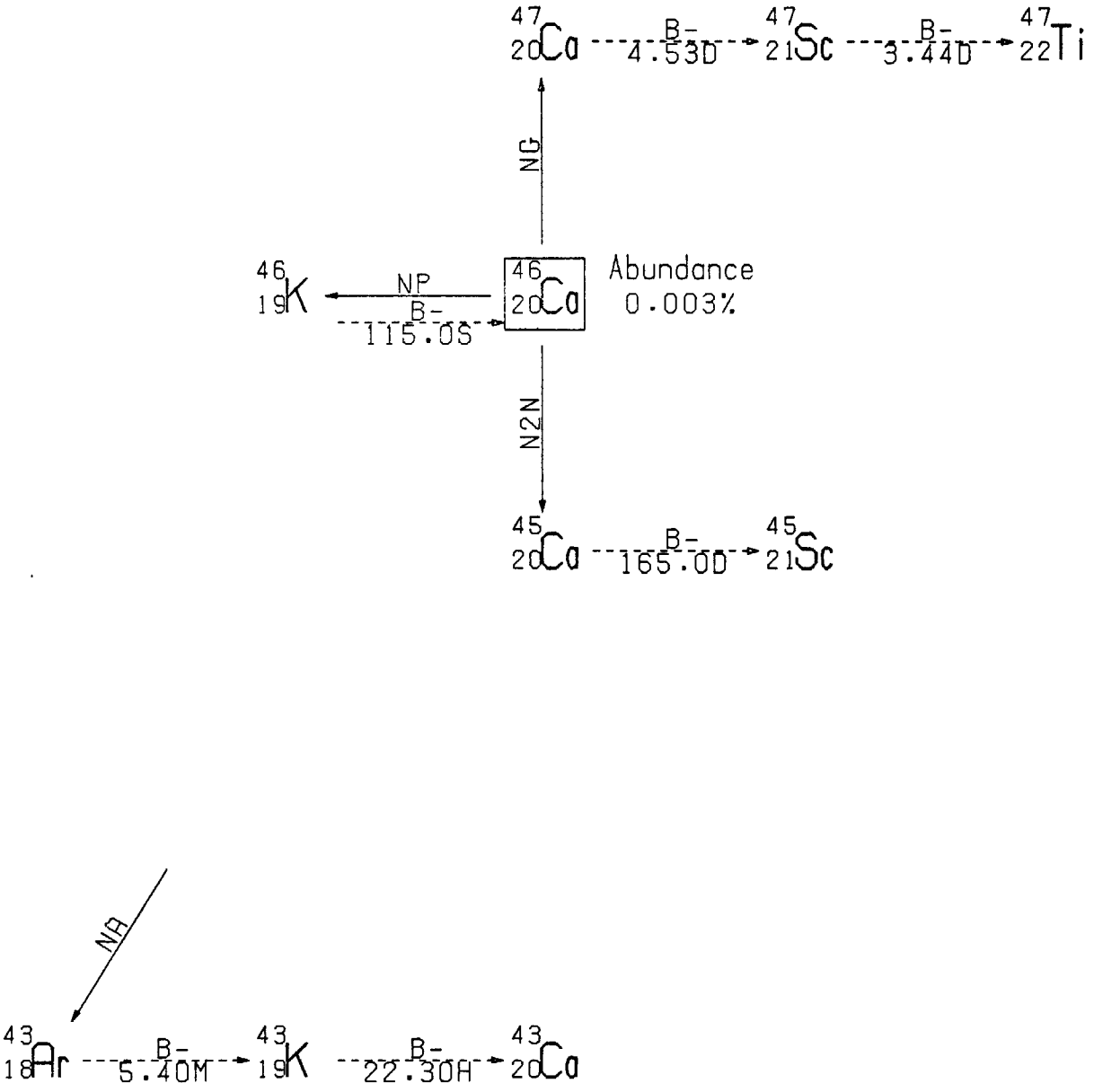
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{42}_{19}K$	12.36 H	5.11E+05	1.52E+06	3.13E+05							
		0.00	18.80	0.36							
$^{43}_{19}K$	22.00 H	5.11E+05	3.73E+05	6.18E+05	3.87E+05	5.94E+05	2.21E+05	1.02E+06	9.68E+05	1.64E+05	1.02E+06
		0.00	87.60	80.00	11.50	11.10	4.13	1.69	0.33	0.27	0.16

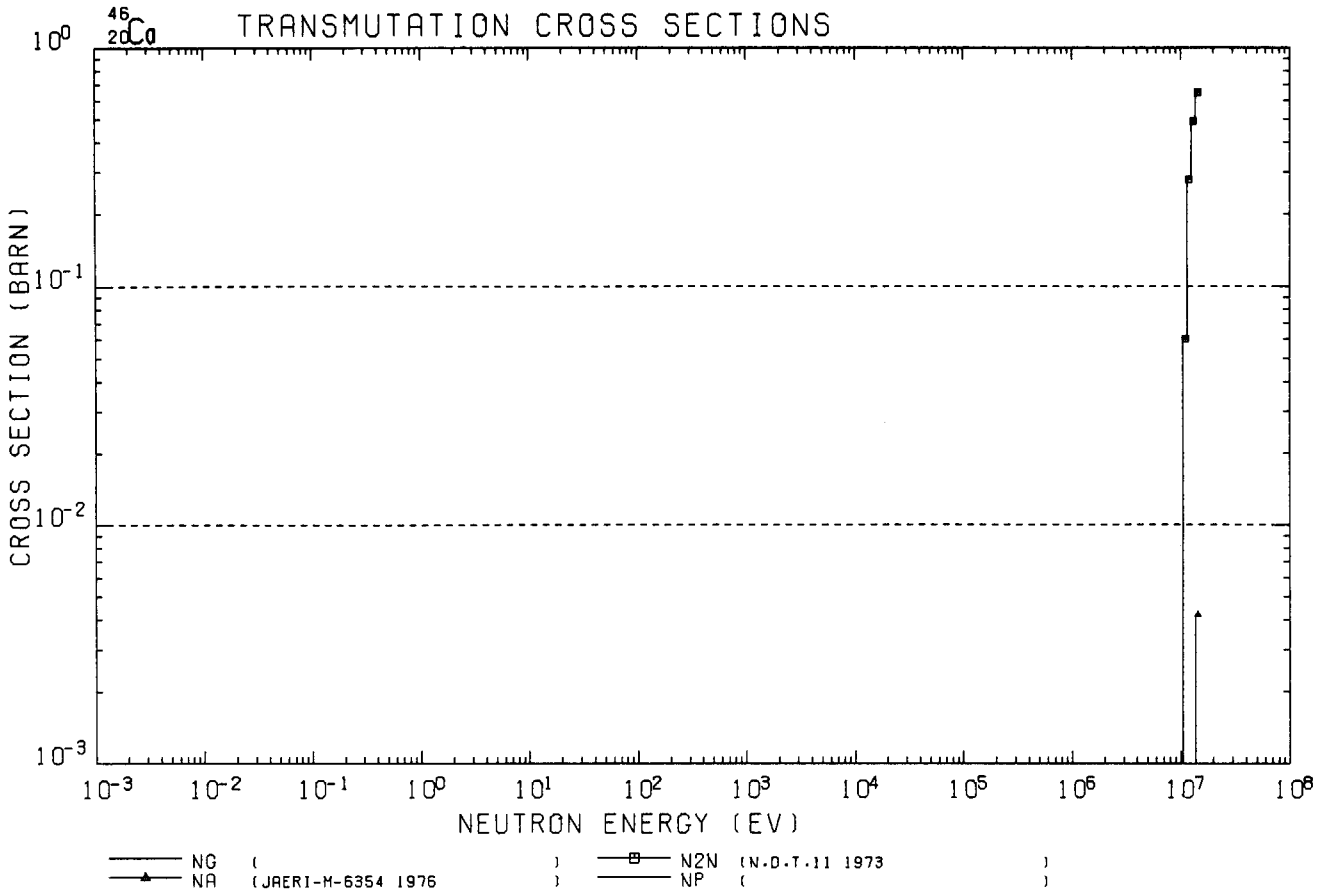

45 20 Ca
B-
165.0D
45 21 Sc
NG
44 19 K
NP
B-
22.10M
44 20 Ca
Abundance
2.09%
ND NNP
N2N
43 19 K
B-
22.00H
43 20 Ca
NT
N3N
42 19 K
B-
12.36H
42 20 Ca
NA
41 18 Ar
B-
1.85H
41 19 K



$^{44}_{20}Ca$ DECAY GAMMA-RAY TABLE

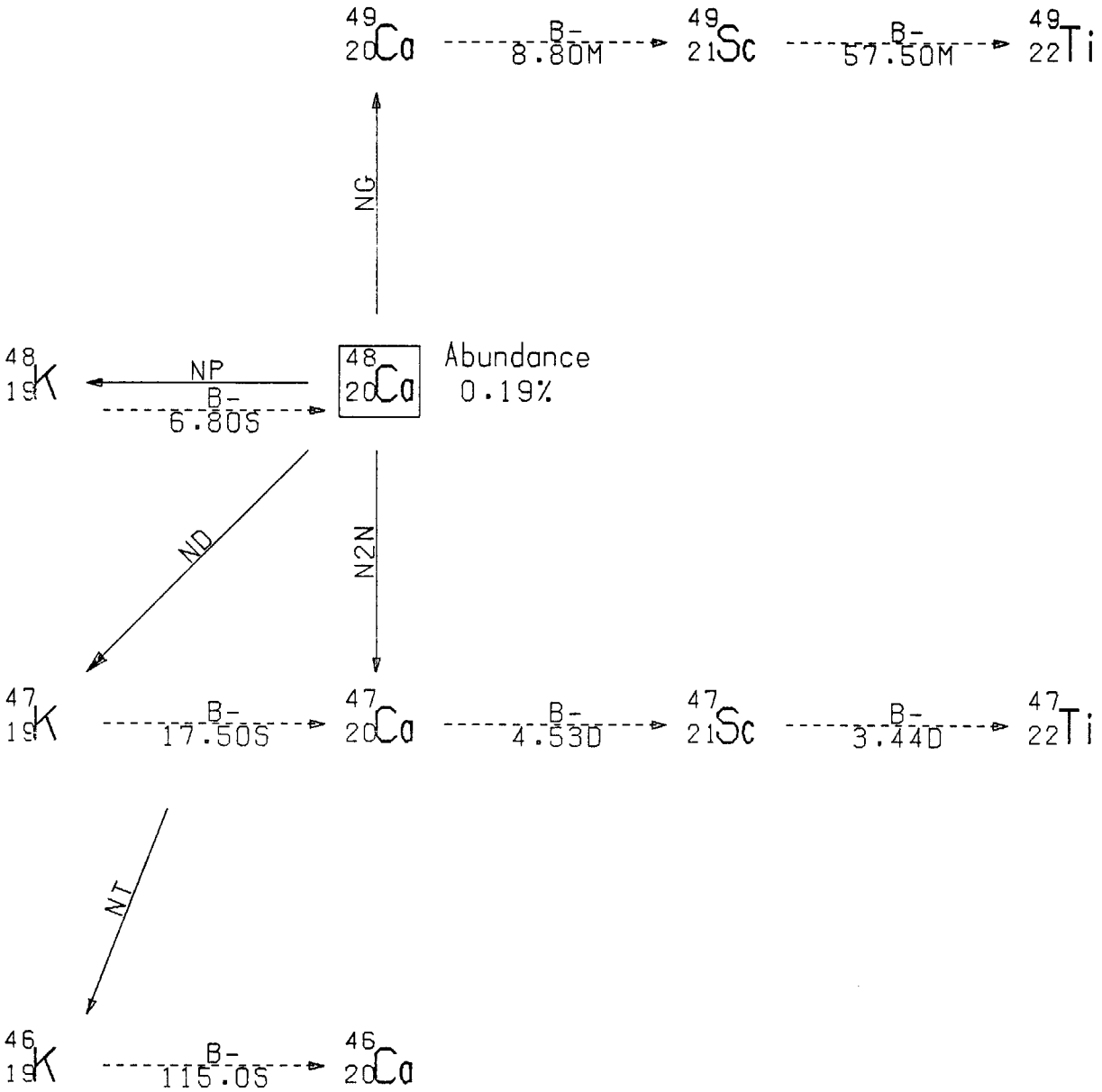
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{45}_{20}Ca$	165.0	D										
$^{42}_{19}K$	12.36	H	5.11E+05	1.52E+06	3.13E+05							
			0.00	18.80	0.35							
$^{41}_{18}Ar$	1.85	H	5.11E+05	1.29E+06								
			0.00	99.16								
$^{43}_{19}K$	22.00	H	5.11E+05	3.73E+05	6.18E+05	3.97E+05	5.94E+05	2.21E+05	1.02E+06	9.68E+05	1.84E+05	1.02E+06
			0.00	87.80	80.00	11.50	11.10	4.13	1.89	0.33	0.27	0.16
$^{44}_{19}K$	22.10	M	5.11E+05	2.52E+06	1.50E+06	1.13E+06	1.02E+06	3.66E+05	1.16E+06	1.75E+06	7.26E+05	6.51E+05
			0.00	98.54	79.81	77.28	67.85	61.96	58.00	41.29	38.40	30.74

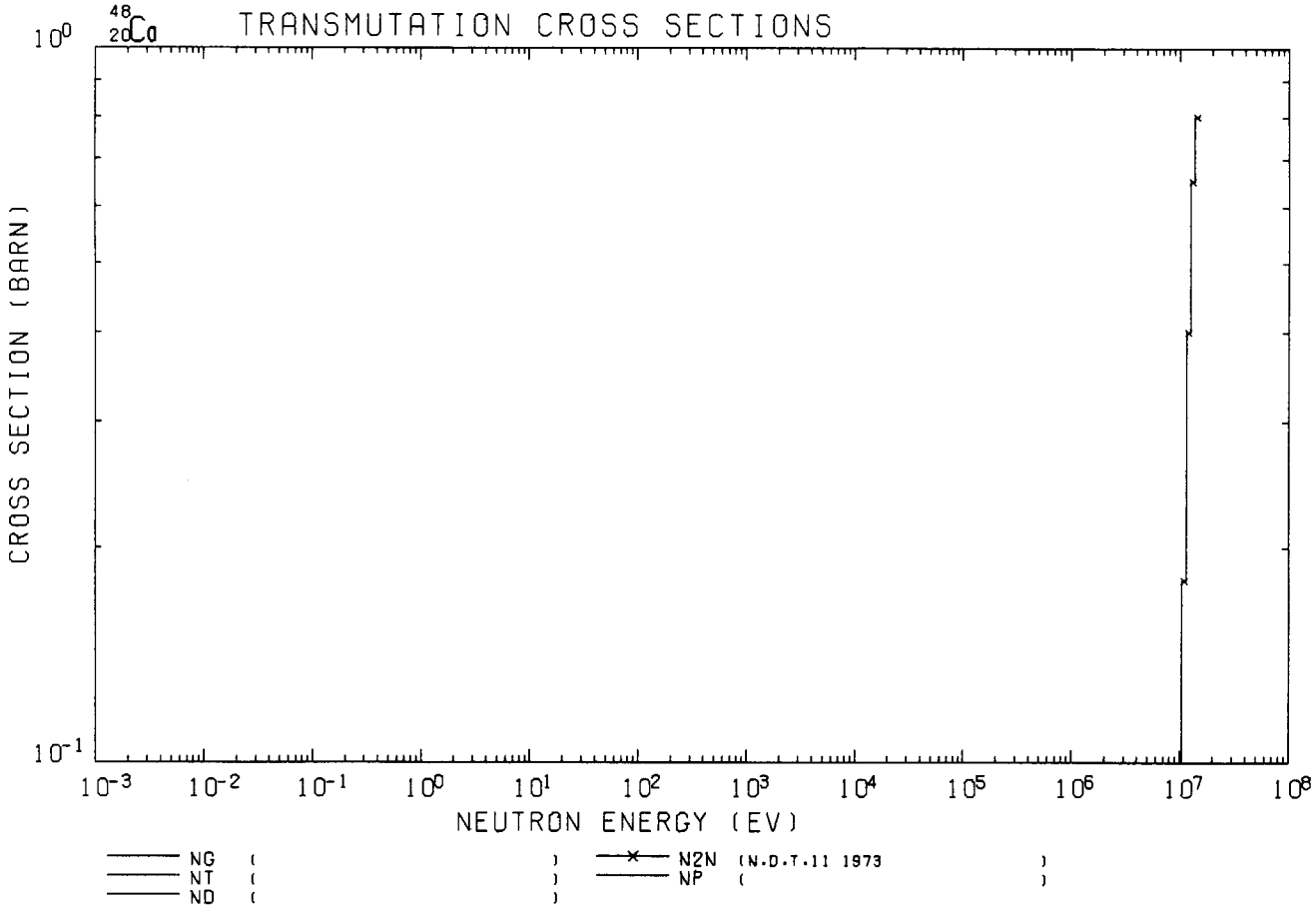

47 20 Ca
B-
4.53D
47 21 Sc
B-
3.44D
47 22 Ti
NG
46 19 K
NP
B-
115.0S
46 20 Ca
Abundance
0.003%
N2N
45 20 Ca
B-
165.0D
45 21 Sc
NA
43 18 Ar
B-
5.40M
43 19 K
B-
22.30H
43 20 Ca



$^{46}_{20}Ca$ DECAY GAMMA-RAY TABLE

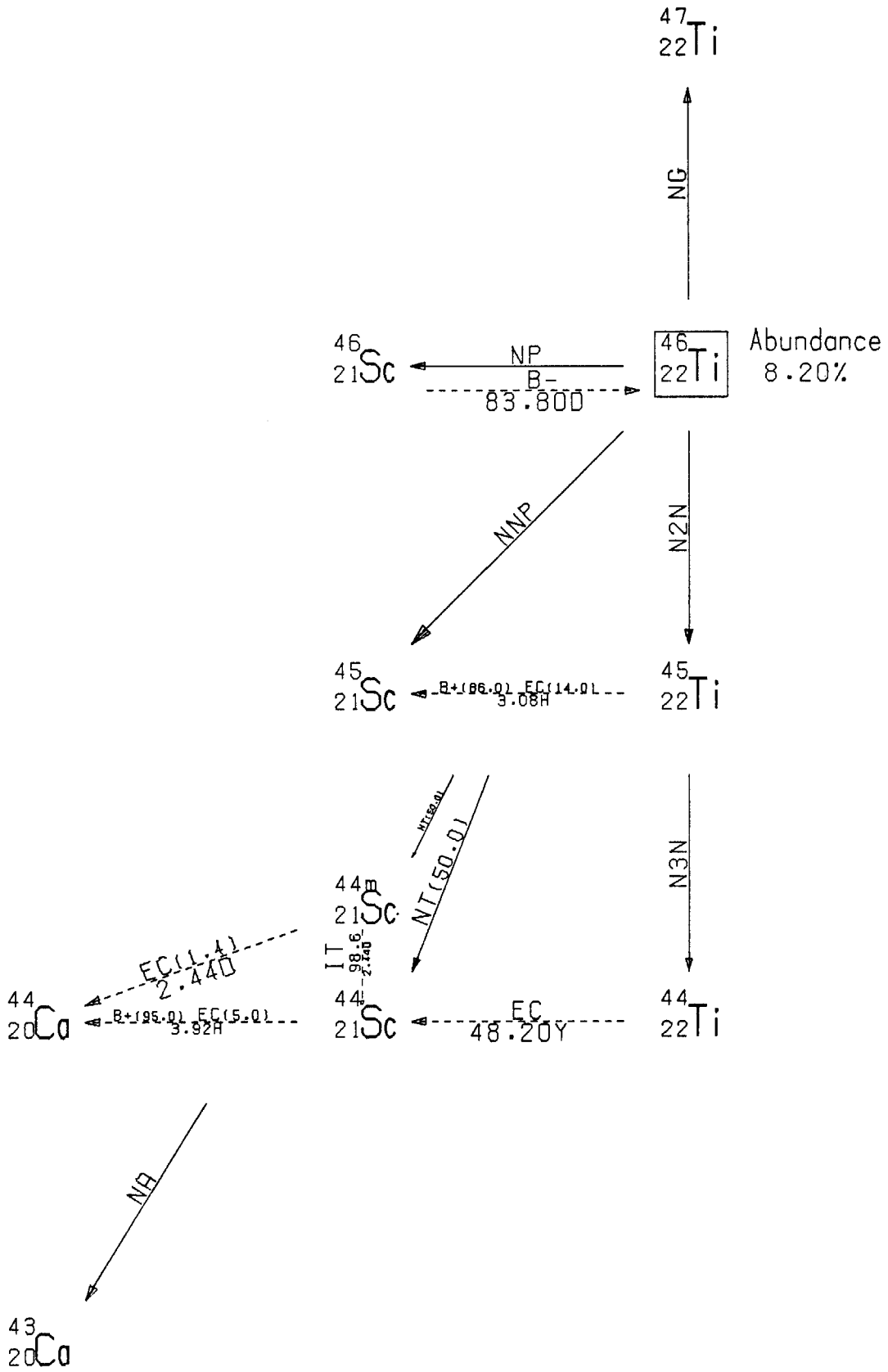
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{47}_{20}Ca$	4.53	D	5.11E+05	1.30E+06	4.89E+05	8.08E+05	7.67E+05					
			0.00	77.00	6.83	6.83	0.20					
$^{47}_{21}Sc$	3.44	D	5.11E+05	1.59E+05								
			0.00	68.50								
$^{45}_{20}Ca$	165.0	D										
$^{43}_{18}Ar$	5.40	M										
$^{43}_{19}K$	22.30	H	5.11E+05	3.73E+05	6.18E+05	3.97E+05	5.94E+05	2.21E+05	1.02E+06	9.88E+05	1.84E+05	1.02E+06
			0.00	87.80	80.00	11.60	11.10	4.13	1.89	0.33	0.27	0.16
$^{46}_{19}K$	115.0	S	5.11E+05	1.35E+06	3.70E+06	3.02E+06	2.27E+06	1.78E+06	1.67E+06	1.44E+06		
			0.00	91.40	28.42	9.60	8.68	8.41	4.75	2.92		

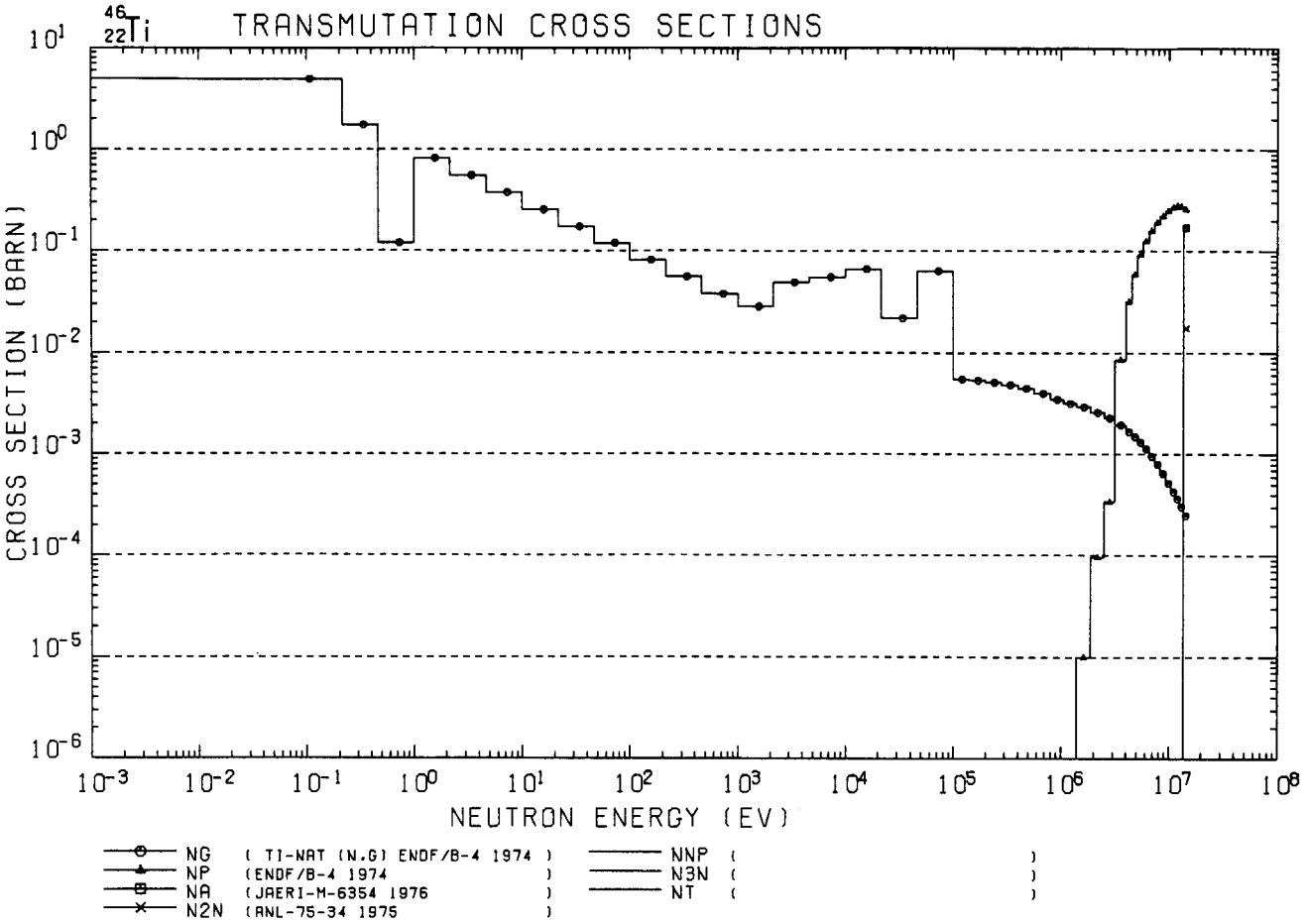

49 20 Ca
B-
8.80M
49 21 Sc
B-
57.50M
49 22 Ti
NG
48 19 K
NP
B-
6.80S
48 20 Ca
Abundance
0.19%
ND
N2N
47 19 K
B-
17.50S
47 20 Ca
B-
4.53D
47 21 Sc
B-
3.44D
47 22 Ti
NT
46 19 K
B-
115.0S
46 20 Ca



$^{48}_{20}Ca$ DECAY GAMMA-RAY TABLE

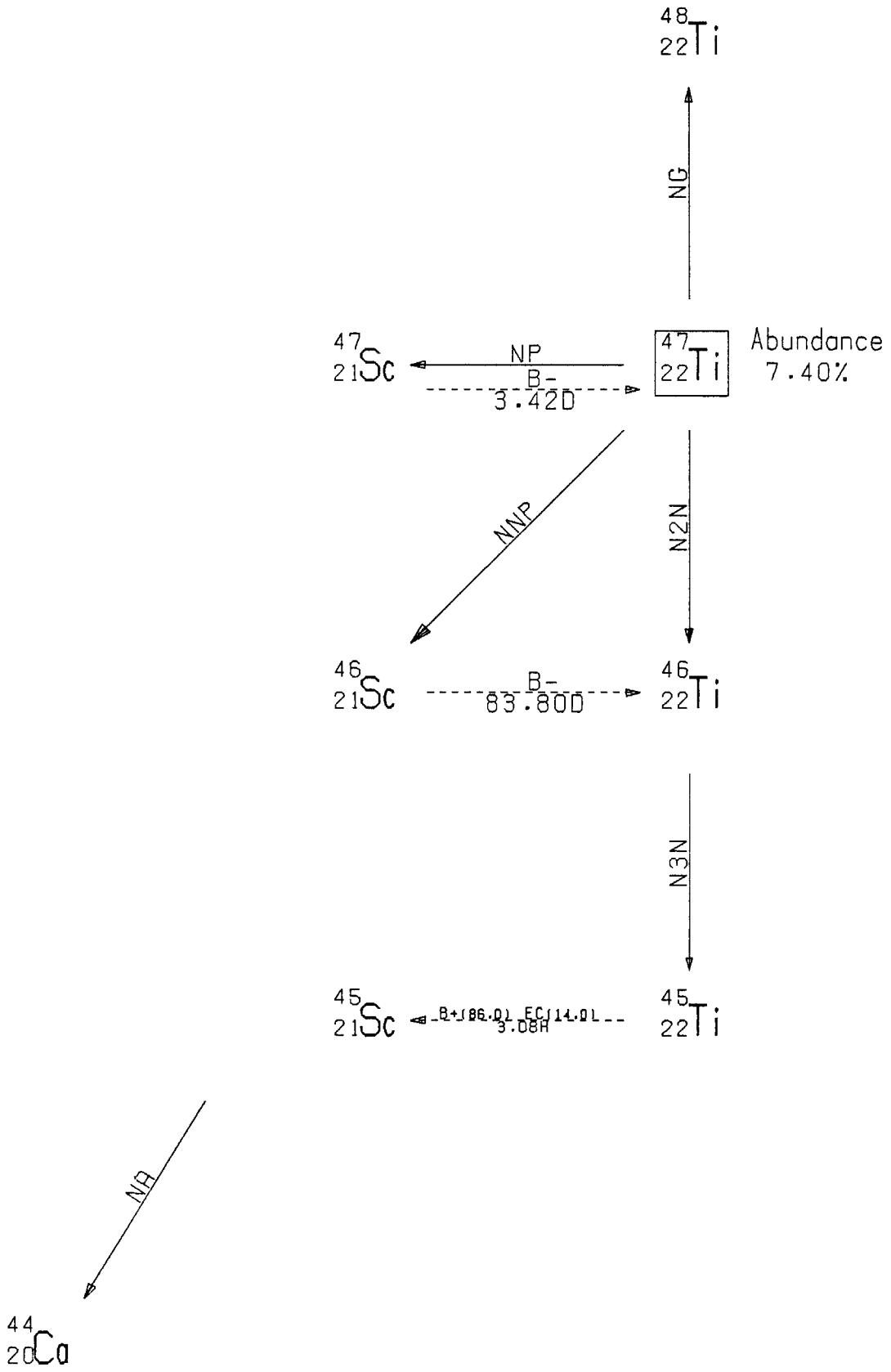
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{49}_{20}Ca$	8.80	M	5.11E+05	3.08E+06	4.07E+06	1.41E+06	2.37E+06	4.74E+06	2.23E+06	8.66E+05	1.14E+06	
			0.00	92.10	7.01	0.63	0.49	0.22	0.20	0.13	0.11	
$^{49}_{21}Sc$	57.50	M	5.11E+05									
			0.00									
$^{47}_{19}K$	17.50	S	5.11E+05	2.01E+06	5.86E+05	5.65E+05						
			0.00	100.00	85.00	15.00						
$^{47}_{20}Ca$	4.53	D	5.11E+05	1.30E+06	4.69E+05	8.08E+05	7.67E+05					
			0.00	77.00	6.83	6.83	0.20					
$^{47}_{21}Sc$	3.44	D	5.11E+05	1.59E+05								
			0.00	68.50								
$^{46}_{19}K$	115.0	S	5.11E+05	1.35E+06	3.70E+06	3.02E+06	2.27E+06	1.78E+05	1.67E+06	1.44E+06		
			0.00	91.40	28.42	9.60	8.68	8.41	4.76	2.92		
$^{48}_{19}K$	6.80	S	5.11E+05	3.83E+06	7.80E+05	6.76E+05	2.79E+06	1.54E+06	6.61E+06	1.32E+06	2.39E+06	7.93E+06
			0.00	80.00	31.89	17.37	16.69	15.15	13.63	13.07	10.98	9.92

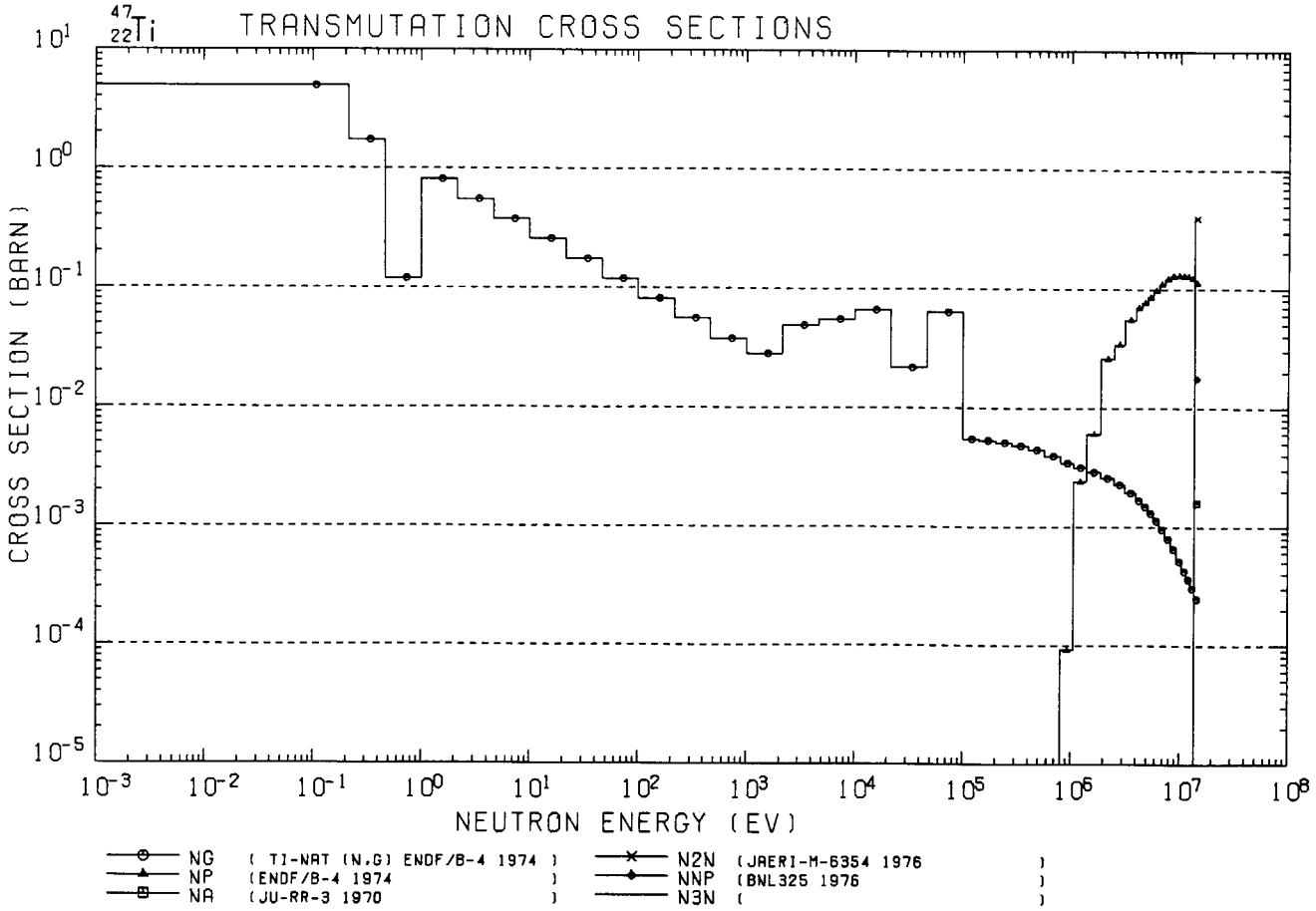

47 22 Ti
NG
46 21 Sc
NP
B-
83.800
46 22 Ti
Abundance
8.20%
NNP
N2N
45 21 Sc
B+(86.0) EC(14.0)
3.08H
45 22 Ti
NT(50.0)
44m 21 Sc
IT
98.6
2.44D
N3N
EC(1.4)
2.44D
44 20 Ca
B+(95.0) EC(5.0)
3.92H
44 21 Sc
EC
48.20Y
44 22 Ti
NA
43 20 Ca



$^{46}_{22}Ti$ DECAY GAMMA-RAY TABLE

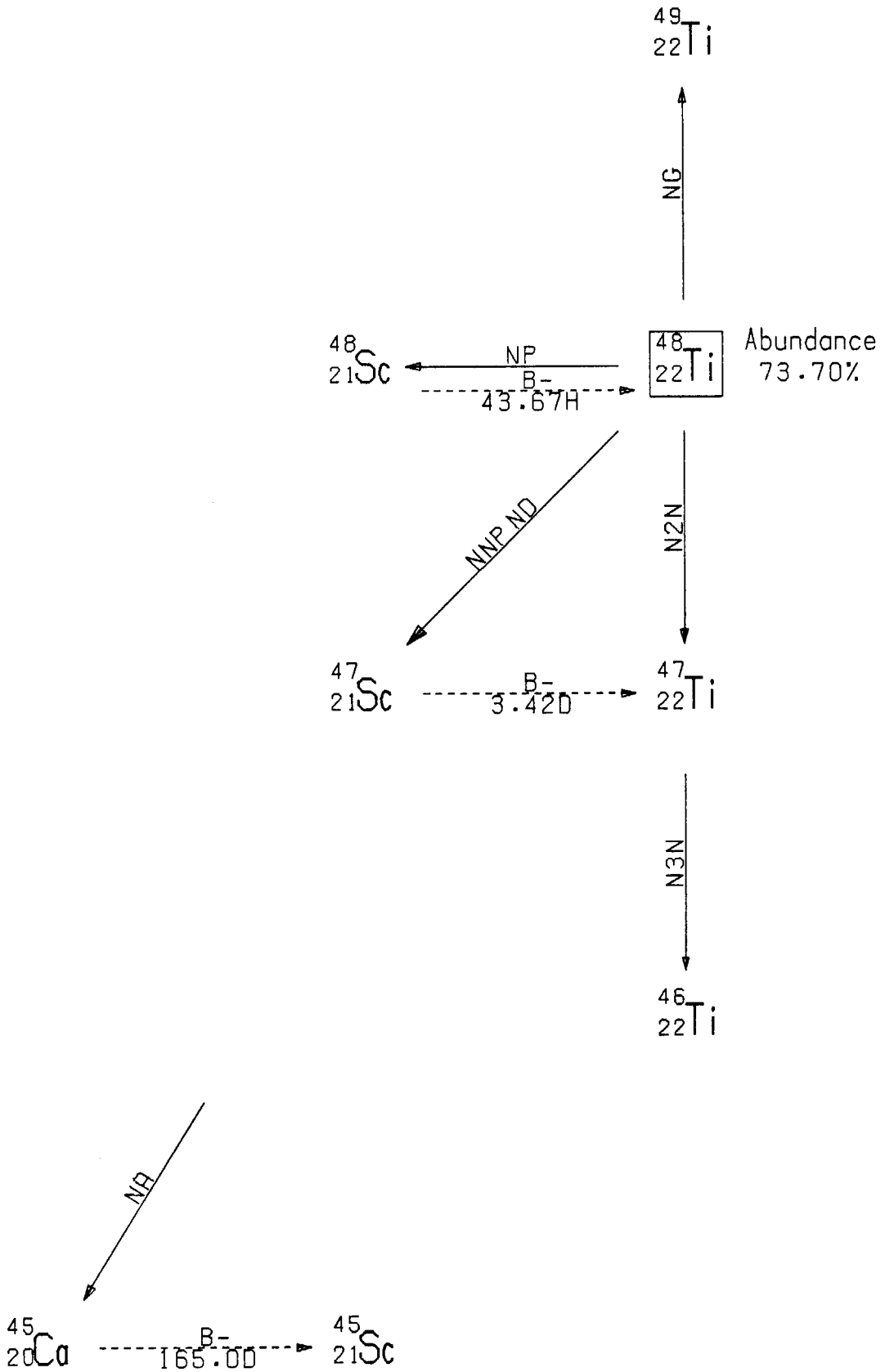
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
$^{46}_{21}Sc$	83.80	D	5.11E+05	8.89E+05	1.12E+06	
			0.00	100.00	100.00	
$^{45}_{22}Ti$	3.08	H	6.11E+05	7.20E+05		
			172.00	0.15		
$^{44}_{22}Ti$	48.20	Y	5.11E+05	7.84E+04	6.78E+04	1.46E+05
			0.00	95.22	88.00	0.40
$^{44}_{21}Sc$	3.92	H	5.11E+05	1.16E+06	1.50E+06	2.66E+06
			188.00	99.89	0.91	0.11
$^{44m}_{21}Sc$	2.44	D	5.11E+05	1.00E+06	1.13E+06	1.16E+06
			0.00	1.58	1.58	1.58

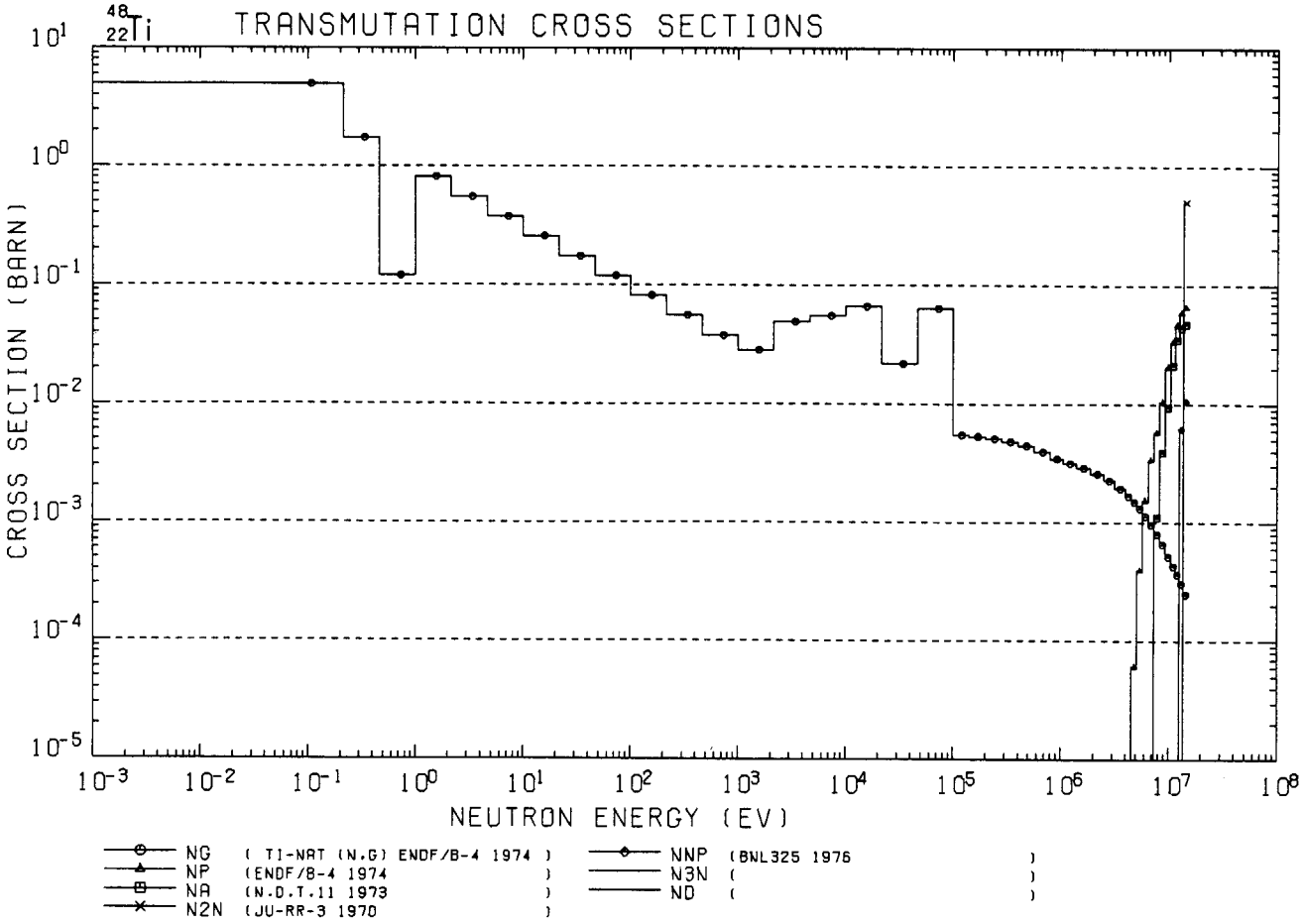

48 22 Ti
NG
47 21 Sc
NP
B-
3.42D
47 22 Ti
Abundance
7.40%
NNP
N2N
46 21 Sc
B-
83.80D
46 22 Ti
N3N
45 21 Sc
B+/86.0% EC/14.0%
3.08H
45 22 Ti
NA
44 20 Ca



$^{47}_{22}Ti$ DECAY GAMMA-RAY TABLE

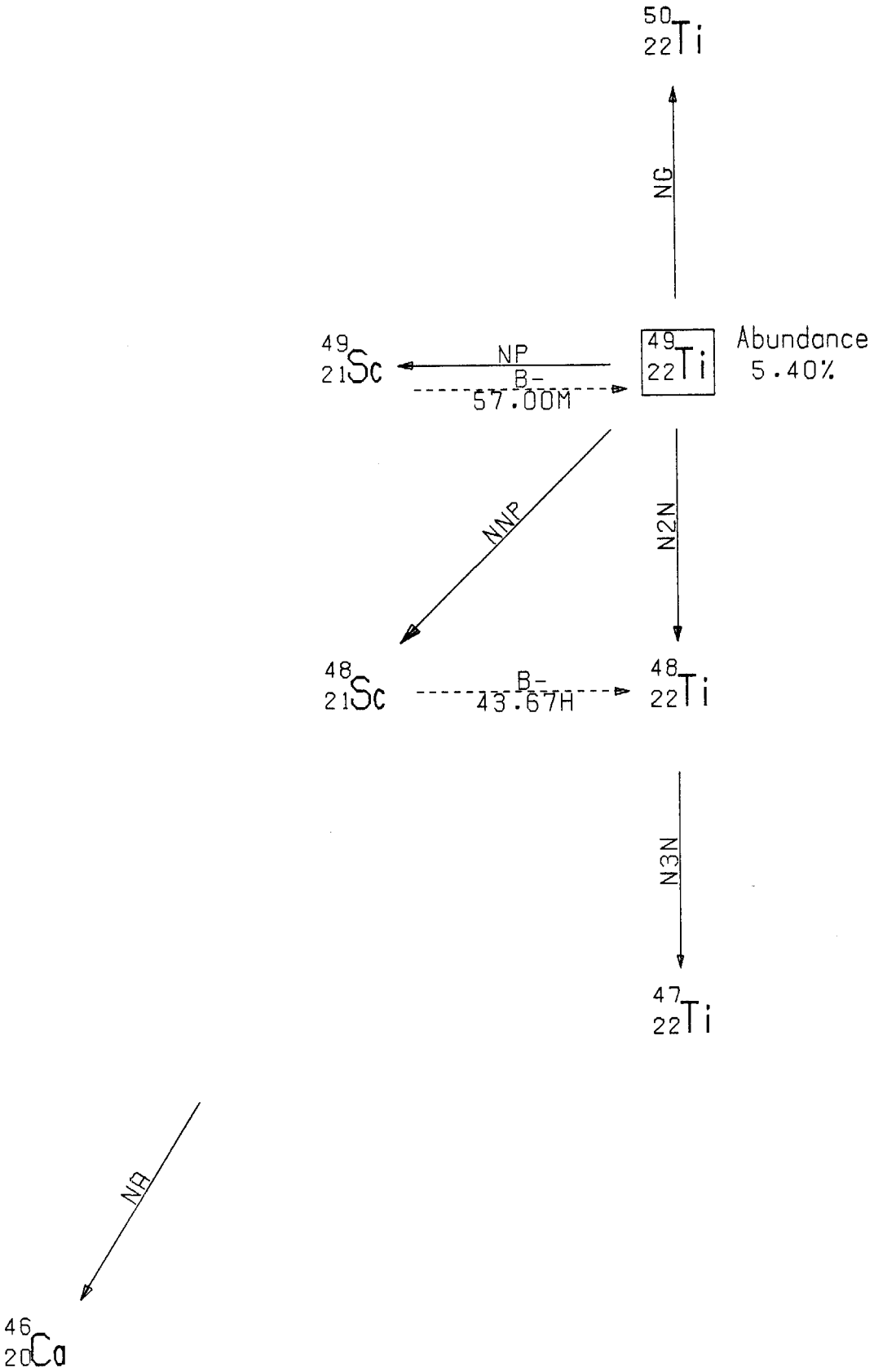
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-		
$^{47}_{21}Sc$	3.42	D	5.11E+05	1.59E+05	
			0.00	68.50	
$^{46}_{21}Sc$	83.80	D	5.11E+05	8.89E+05	1.12E+06
			0.00	100.00	100.00
$^{45}_{22}Ti$	3.08	H	5.11E+05	7.20E+05	
			172.00	0.15	

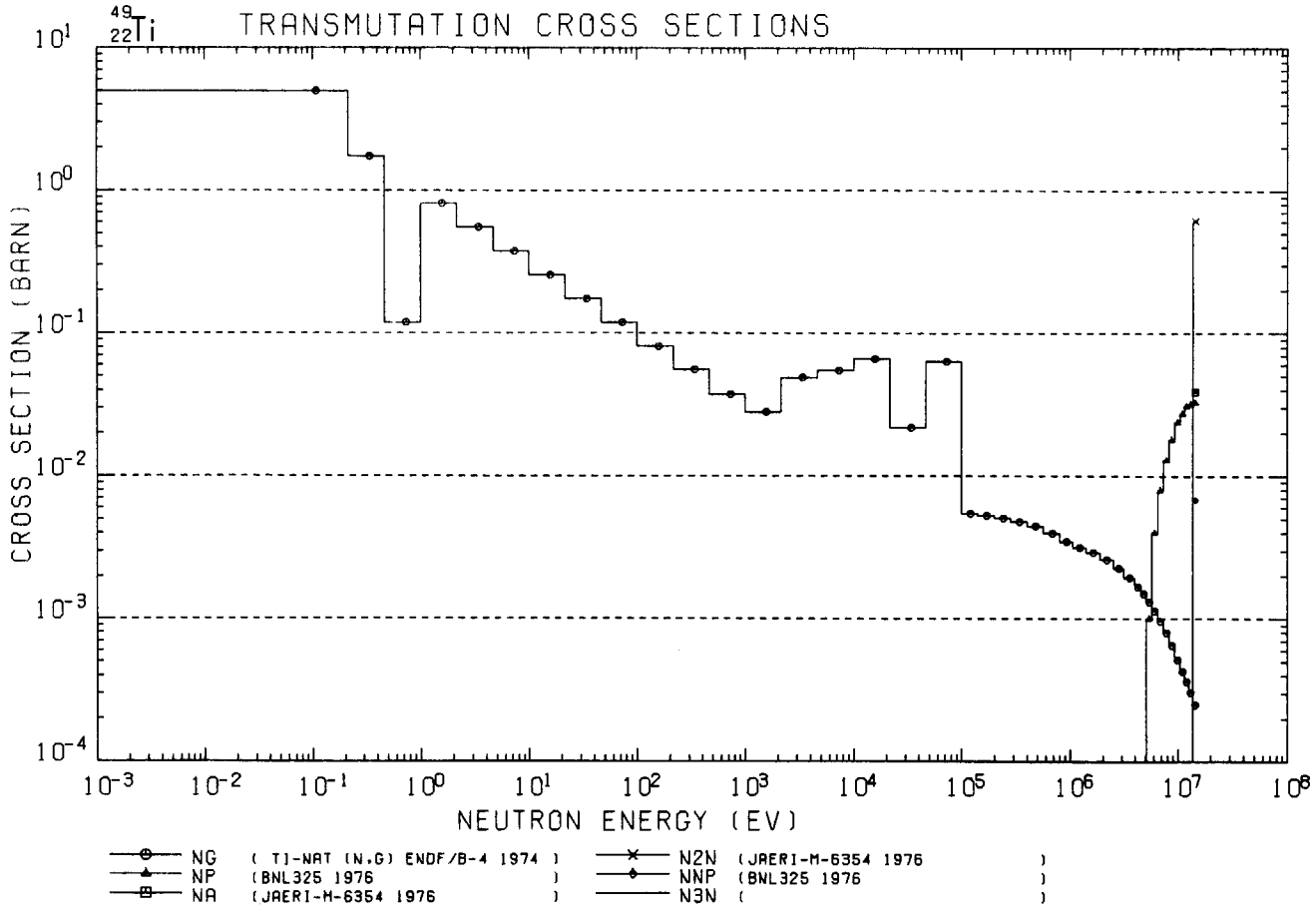

49 22 Ti
NG
48 21 Sc
NP
B-
43.67H
48 22 Ti
Abundance
73.70%
NNP ND
N2N
47 21 Sc
B-
3.42D
47 22 Ti
N3N
46 22 Ti
NA
45 20 Ca
B-
165.0D
45 21 Sc



$^{48}_{22}Ti$ DECAY GAMMA-RAY TABLE

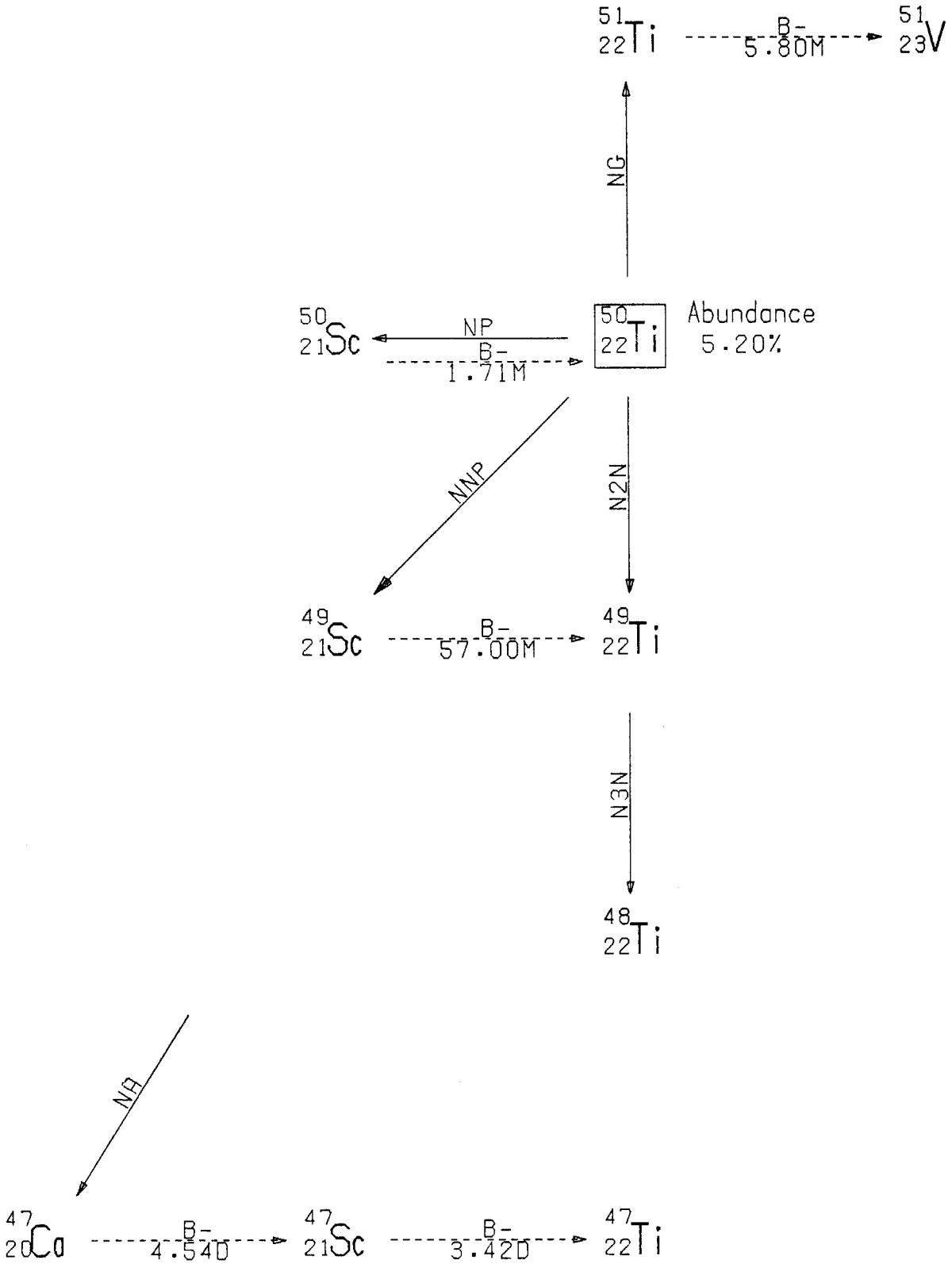
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-					
$^{48}_{21}Sc$	43.67 H	5.11E+05	9.83E+05	1.31E+06	1.04E+06	1.75E+06	1.21E+06
		0.00	100.00	100.00	97.50	7.47	2.38
$^{45}_{20}Ca$	165.0 D						
$^{47}_{21}Sc$	3.42 D	5.11E+05	1.59E+05				
		0.00	68.50				

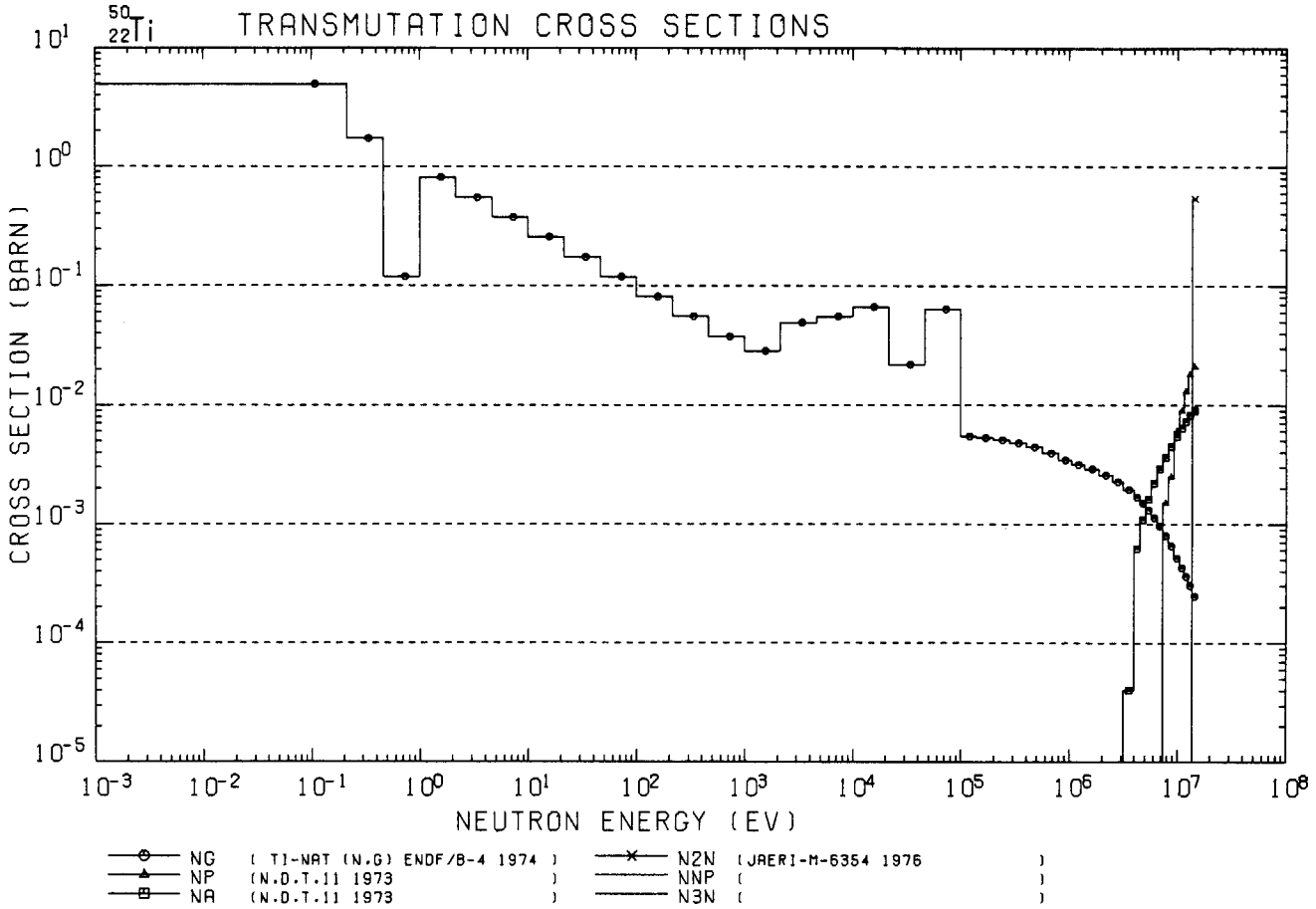

50 22Ti
NG
49 21Sc
NP
B-
57.00M
49 22Ti
Abundance
5.40%
NNP
N2N
48 21Sc
B-
43.67H
48 22Ti
N3N
47 22Ti
NA
46 20Ca



$^{49}_{22}Ti$ DECAY GAMMA-RAY TABLE

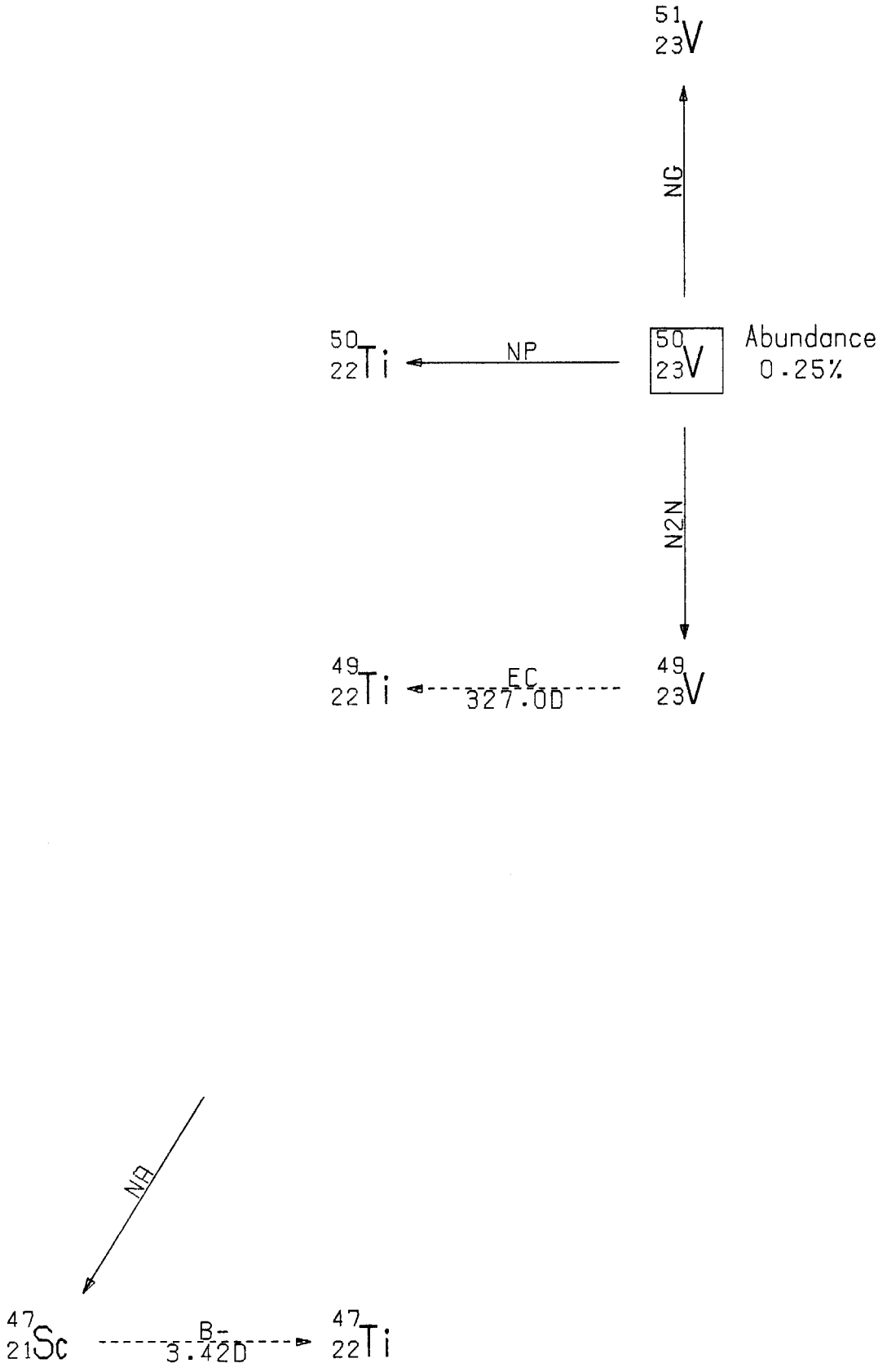
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-					
$^{49}_{21}Sc$	57.00	M	5.11E+05 0.00					
$^{48}_{21}Sc$	43.67	H	5.11E+05 0.00	9.83E+05 100.00	1.31E+06 100.00	1.04E+06 97.50	1.75E+05 7.47	1.21E+06 2.38

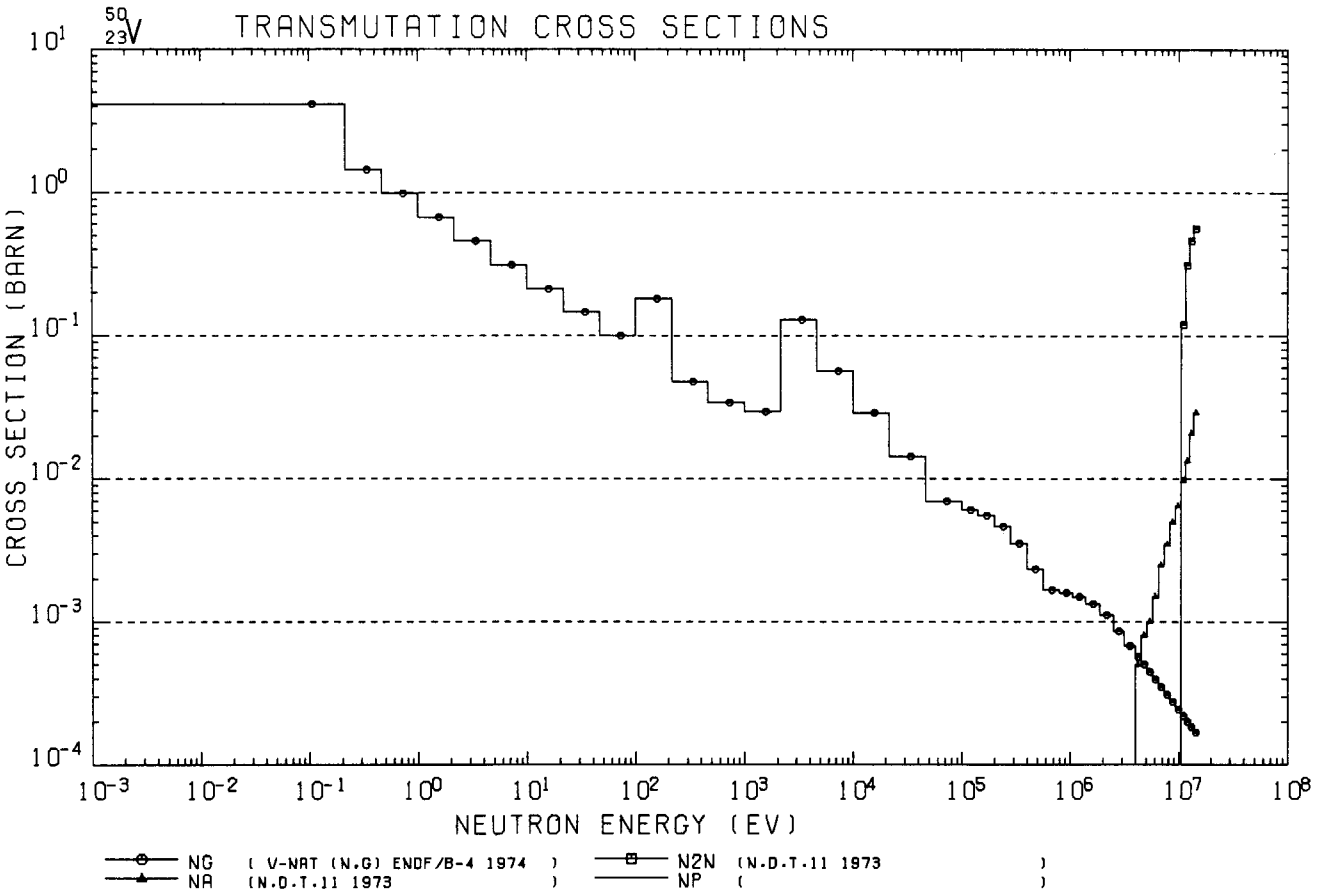

51 22 Ti
B-
5.80M
51 23 V
NG
50 21 Sc
NP
B-
1.71M
50 22 Ti
Abundance
5.20%
NNP
N2N
49 21 Sc
B-
57.00M
49 22 Ti
N3N
48 22 Ti
NA
47 20 Co
B-
4.54D
47 21 Sc
B-
3.42D
47 22 Ti



50 22Ti DECAY GAMMA-RAY TABLE

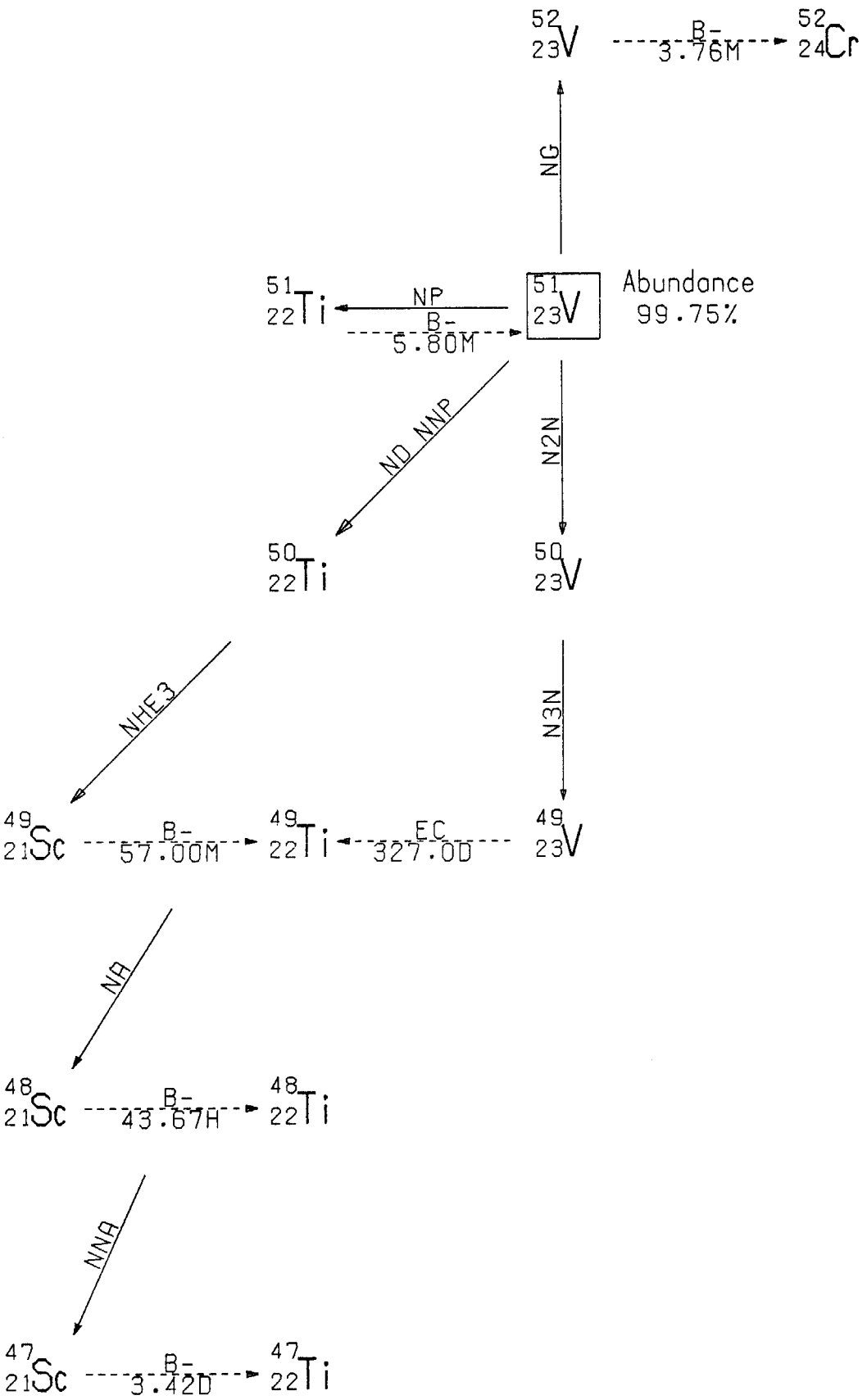
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-				
51 22Ti	5.80	M	5.11E+05	3.19E+05	9.27E+05	6.08E+05	
			0.00	93.40	8.41	1.26	
50 21Sc	1.71	M	5.11E+05	1.65E+06	1.12E+06	5.23E+05	
			0.00	100.00	98.04	86.27	
47 20Ca	4.54	D	5.11E+05	1.30E+06	4.89E+05	8.08E+05	7.67E+05
			0.00	77.00	6.83	6.83	0.20
47 21Sc	3.42	D	5.11E+05	1.59E+05			
			0.00	68.50			
49 21Sc	57.00	M	5.11E+05				
			0.00				

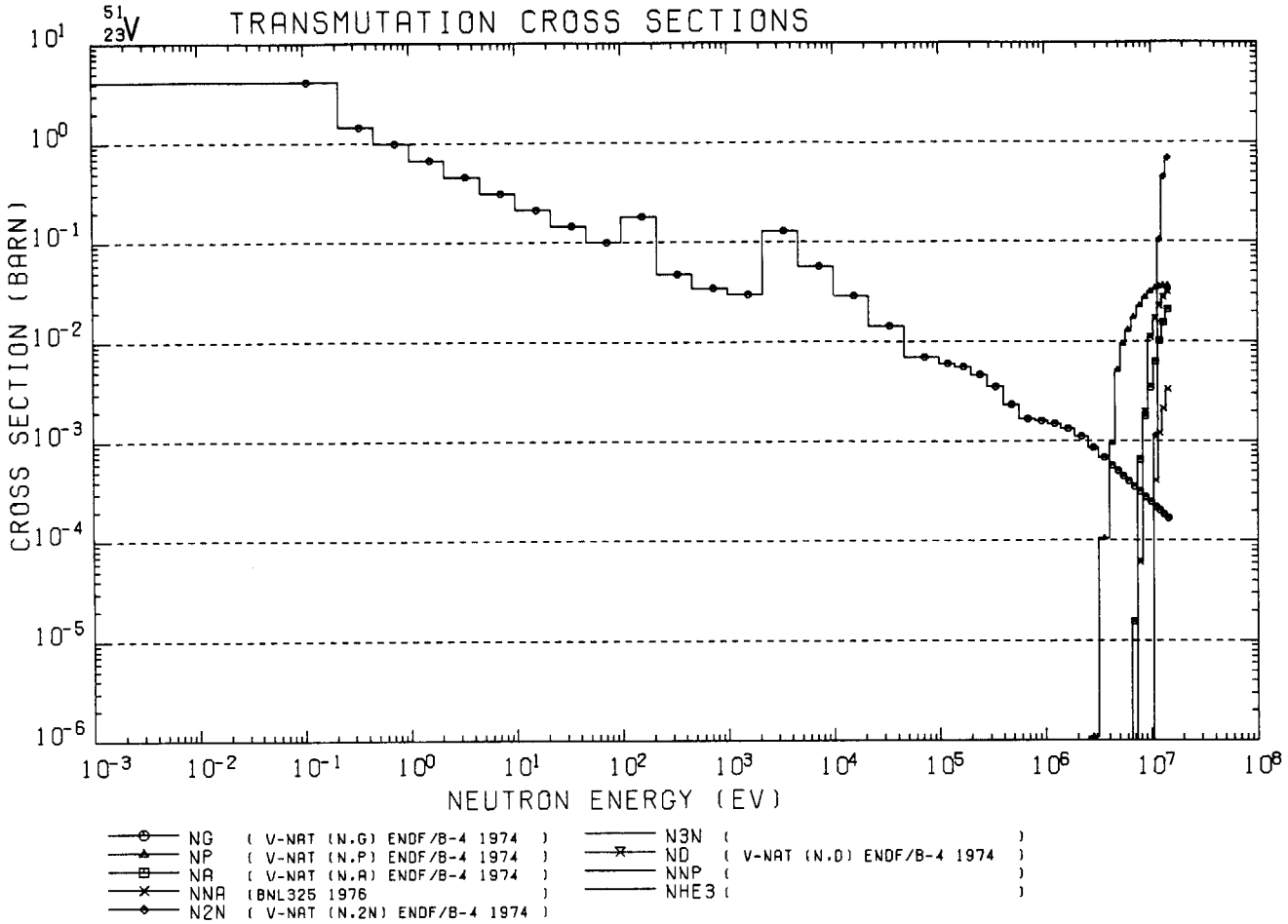

51 23V
NG
50 22Ti
NP
50 23V
Abundance 0.25%
N2N
49 22Ti
EC
327.0D
49 23V
NA
47 21Sc
B-
3.42D
47 22Ti



50 23V DECAY GAMMA-RAY TABLE

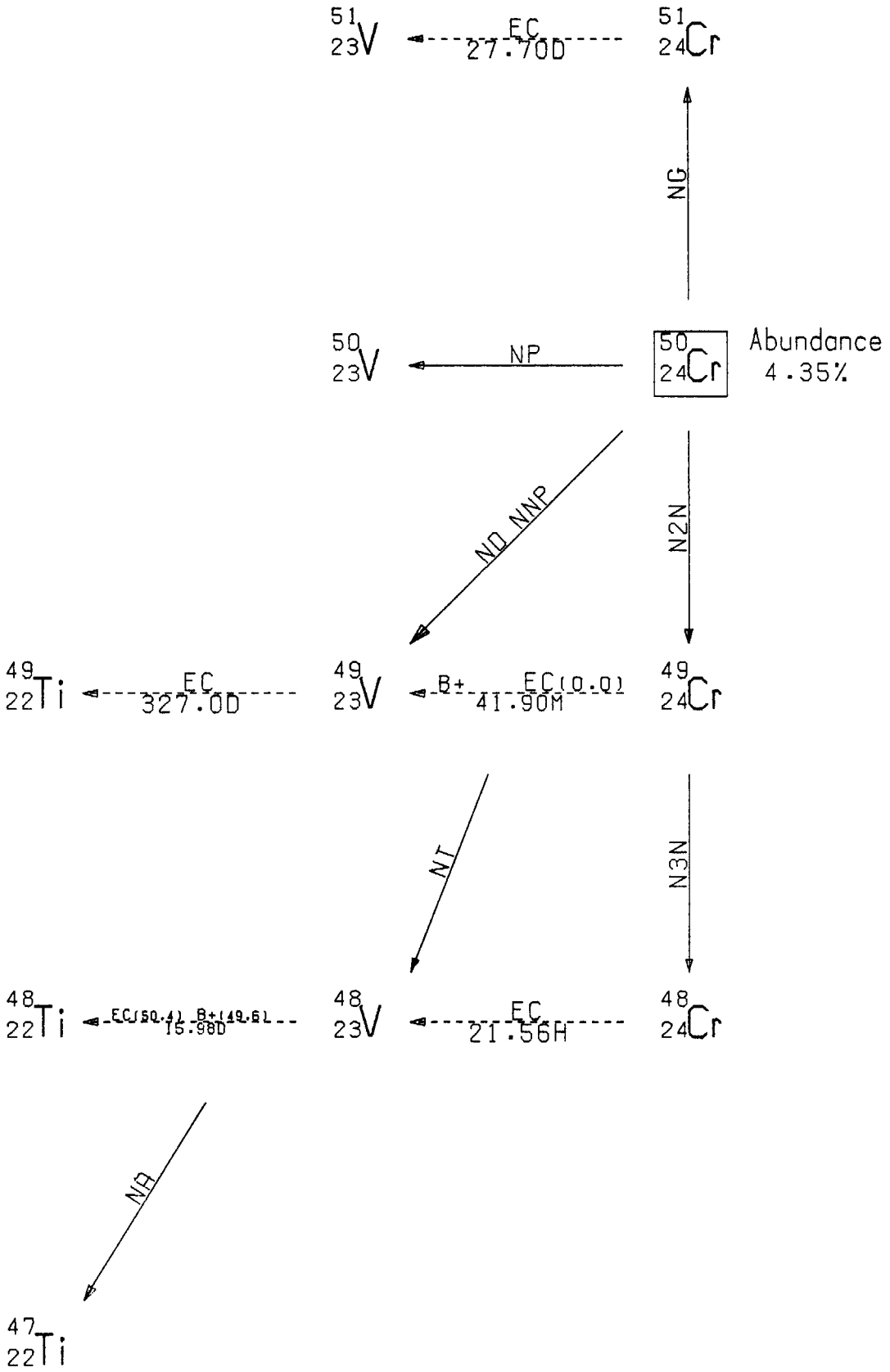
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-	
47 21Sc	3.42	D	5.11E+05	1.59E+05
			0.00	68.50
49 23V	327.0	D		

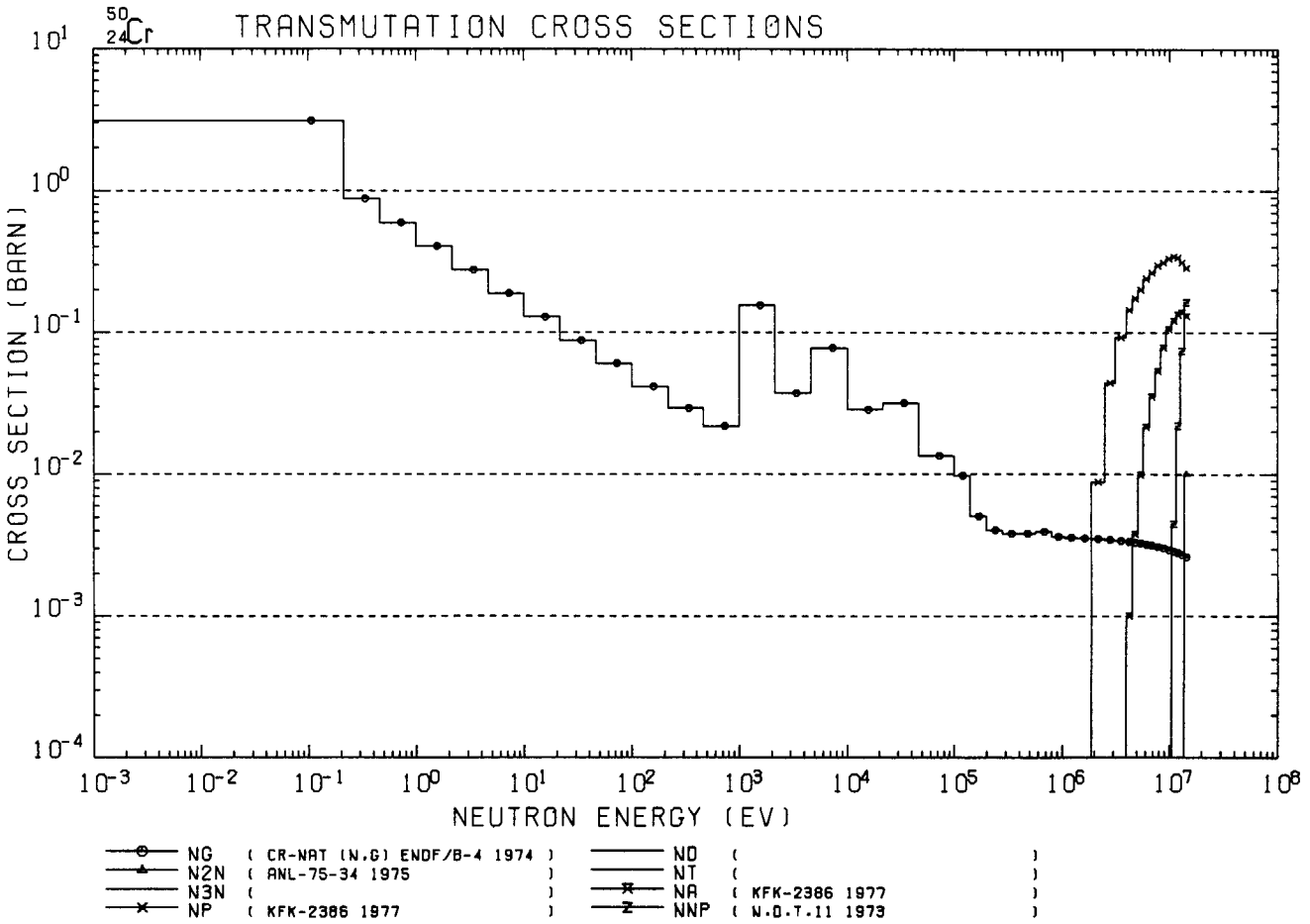

52 23V
B-
3.76M
52 24Cr
NG
51 22Ti
NP
B-
5.80M
51 23V
Abundance
99.75%
ND NNP
N2N
50 22Ti
50 23V
NHE3
N3N
49 21Sc
B-
57.00M
49 22Ti
EC
327.0D
49 23V
NA
48 21Sc
B-
43.67H
48 22Ti
NNA
47 21Sc
B-
3.42D
47 22Ti



$^{51}_{23}V$ DECAY GAMMA-RAY TABLE

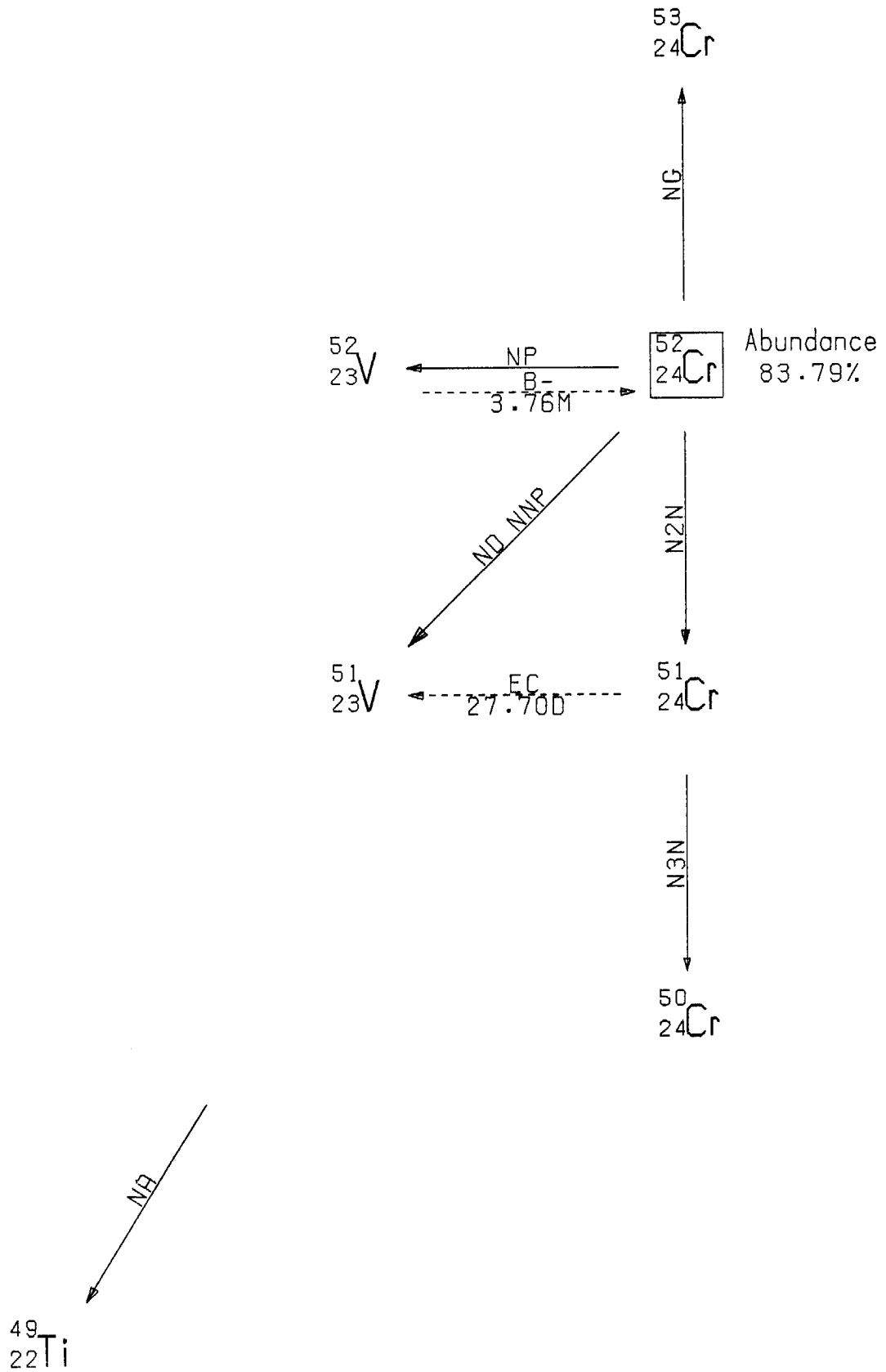
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-					
$^{52}_{23}V$	3.76	M	5.11E+05	1.43E+06	1.33E+06	1.53E+06		
			0.00	100.00	0.59	0.12		
$^{51}_{22}Ti$	5.80	M	5.11E+05	3.19E+05	9.27E+05	6.08E+05		
			0.00	93.40	8.41	1.25		
$^{48}_{21}Sc$	43.67	H	5.11E+05	9.83E+05	1.31E+06	1.04E+06	1.75E+05	1.21E+06
			0.00	100.00	100.00	97.50	7.47	2.38
$^{47}_{21}Sc$	3.42	D	5.11E+05	1.59E+05				
			0.00	68.50				
$^{49}_{23}V$	327.0	D						
$^{49}_{21}Sc$	57.00	M	5.11E+05					
			0.00					

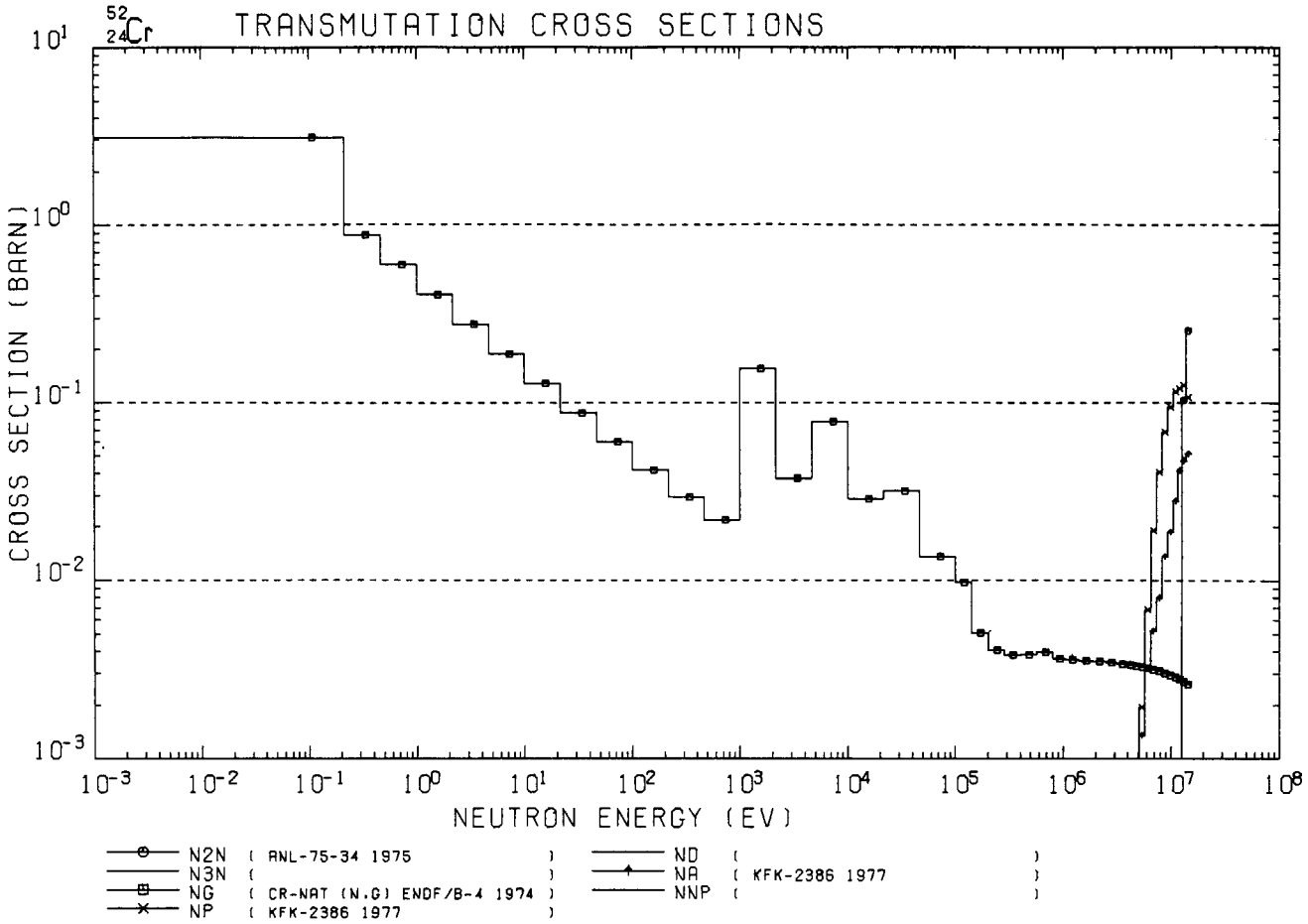

51 23V
EC
27.70D
51 24Cr
NG
50 23V
NP
50 24Cr
Abundance
4.35%
ND NNP
N2N
49 22Ti
EC
327.0D
49 23V
B+ EC(0.0)
41.90M
49 24Cr
NT
N3N
48 22Ti
EC(50.4) B+(49.6)
15.98D
48 23V
EC
21.56H
48 24Cr
NA
47 22Ti



50 24Cr DECAY GAMMA-RAY TABLE

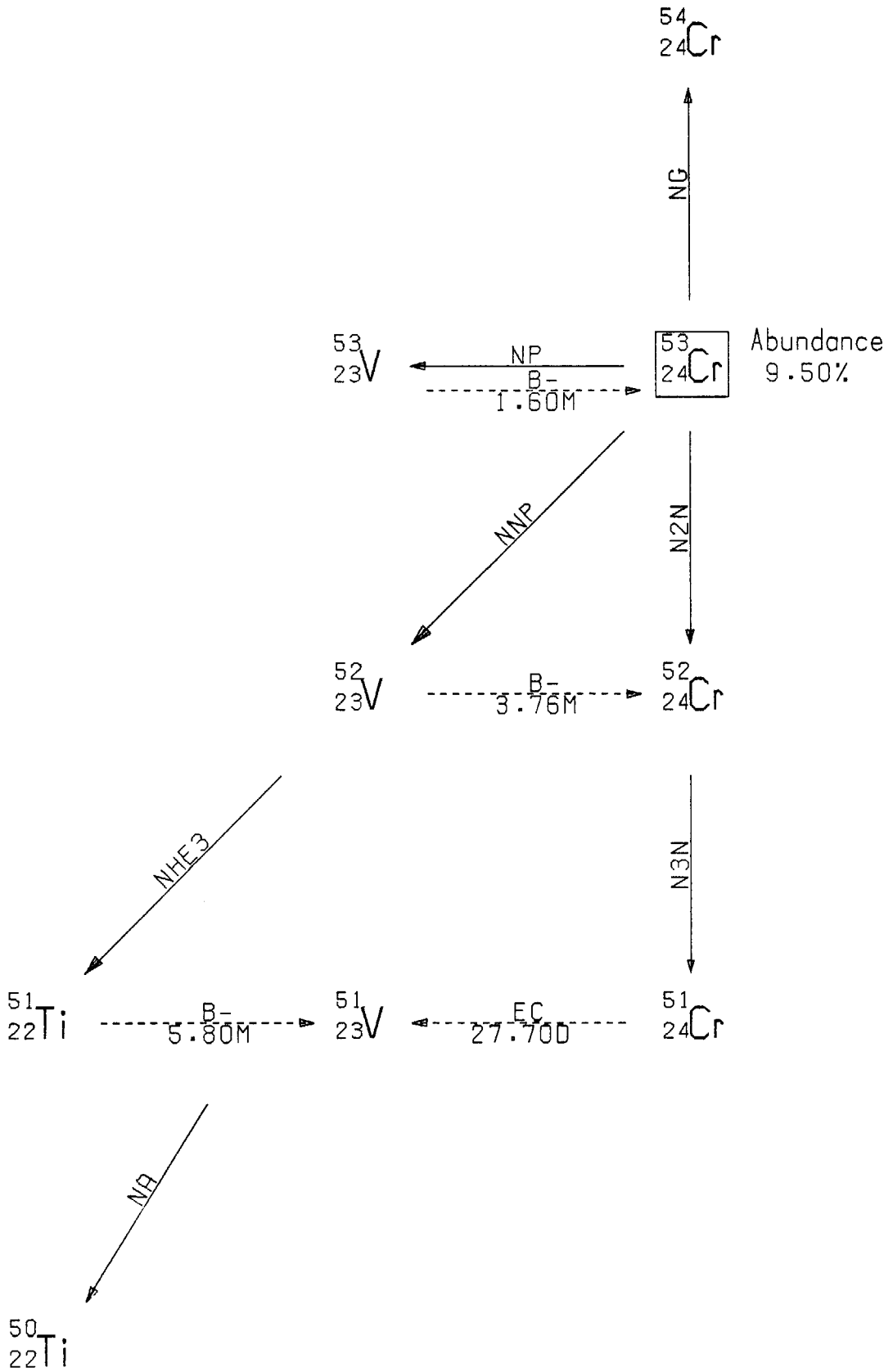
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-							
51 24Cr	27.70	D	5.11E+05	3.20E+05						
			0.00	10.20						
49 24Cr	41.90	M	5.11E+05	9.06E+04	1.53E+05	6.23E+04				
			200.00	51.00	29.29	15.84				
48 24Cr	21.56	H	5.11E+05	3.05E+05	1.16E+05					
			0.00	99.42	94.55					
49 23V	327.0	D								
48 23V	15.98	D	5.11E+05	9.83E+05	1.31E+06	9.44E+05	2.24E+06	9.28E+05	8.03E+06	1.44E+06
			200.00	100.00	97.50	7.76	2.41	0.77	0.15	0.12

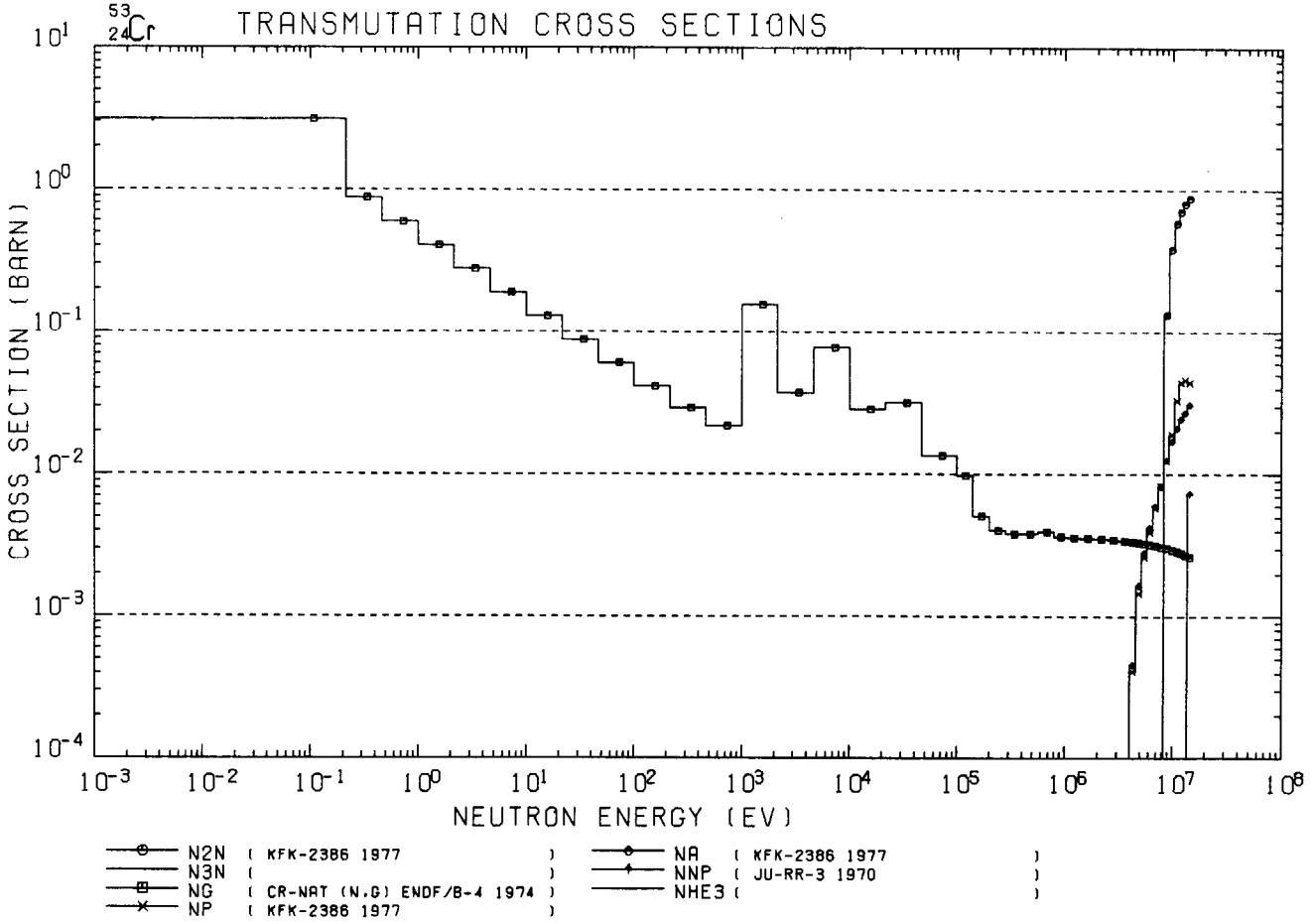

53 24Cr
NG
52 23V
NP
B-
3.76M
52 24Cr
Abundance
83.79%
ND NNP
N2N
51 23V
EC
27.70D
51 24Cr
N3N
50 24Cr
NA
49 22Ti



52 24Cr DECAY GAMMA-RAY TABLE

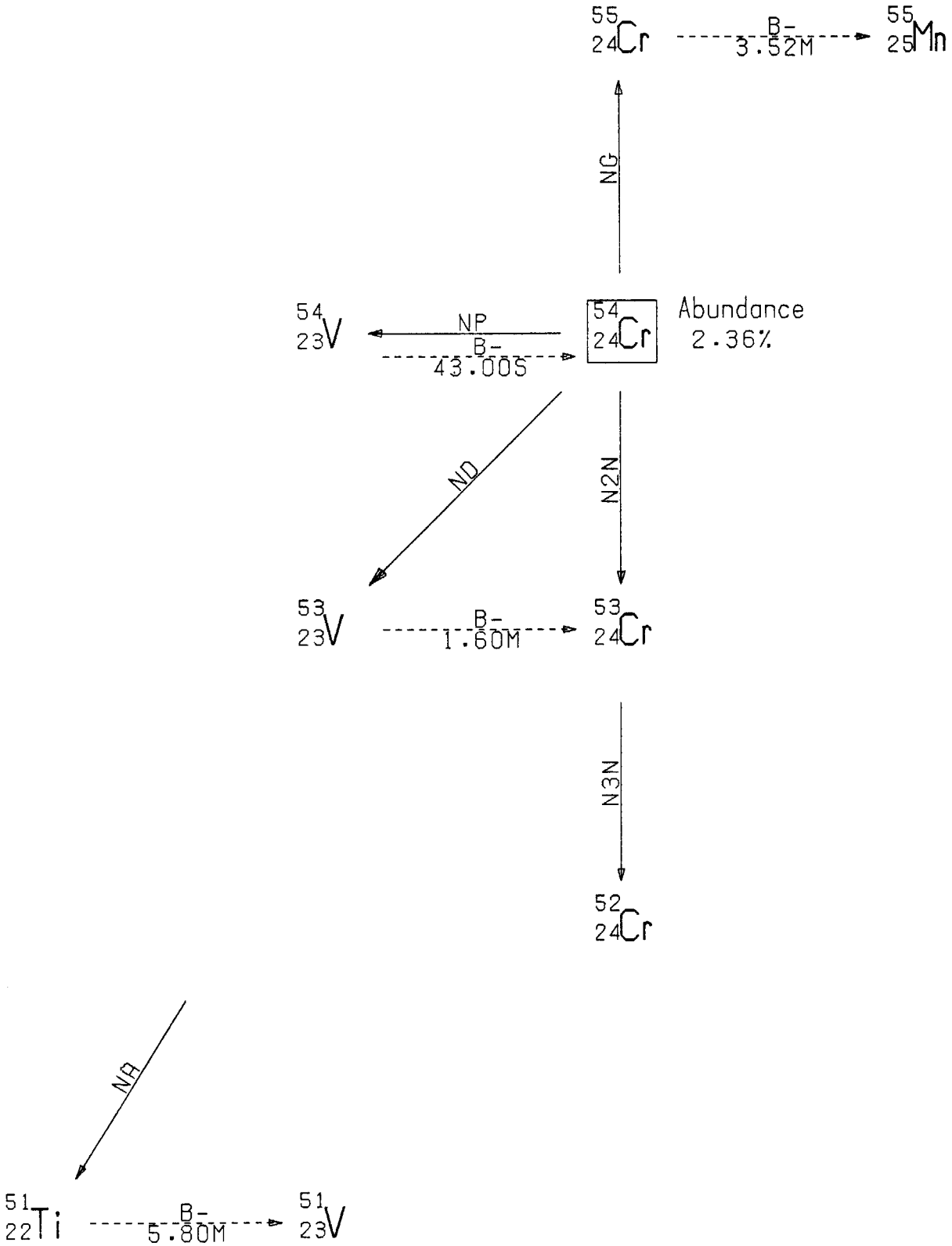
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-			
51 24Cr	27.70	D	5.11E+05	3.20E+05		
			0.00	10.20		
52 23V	3.76	M	5.11E+05	1.43E+06	1.88E+06	1.53E+06
			0.00	100.00	0.59	0.12

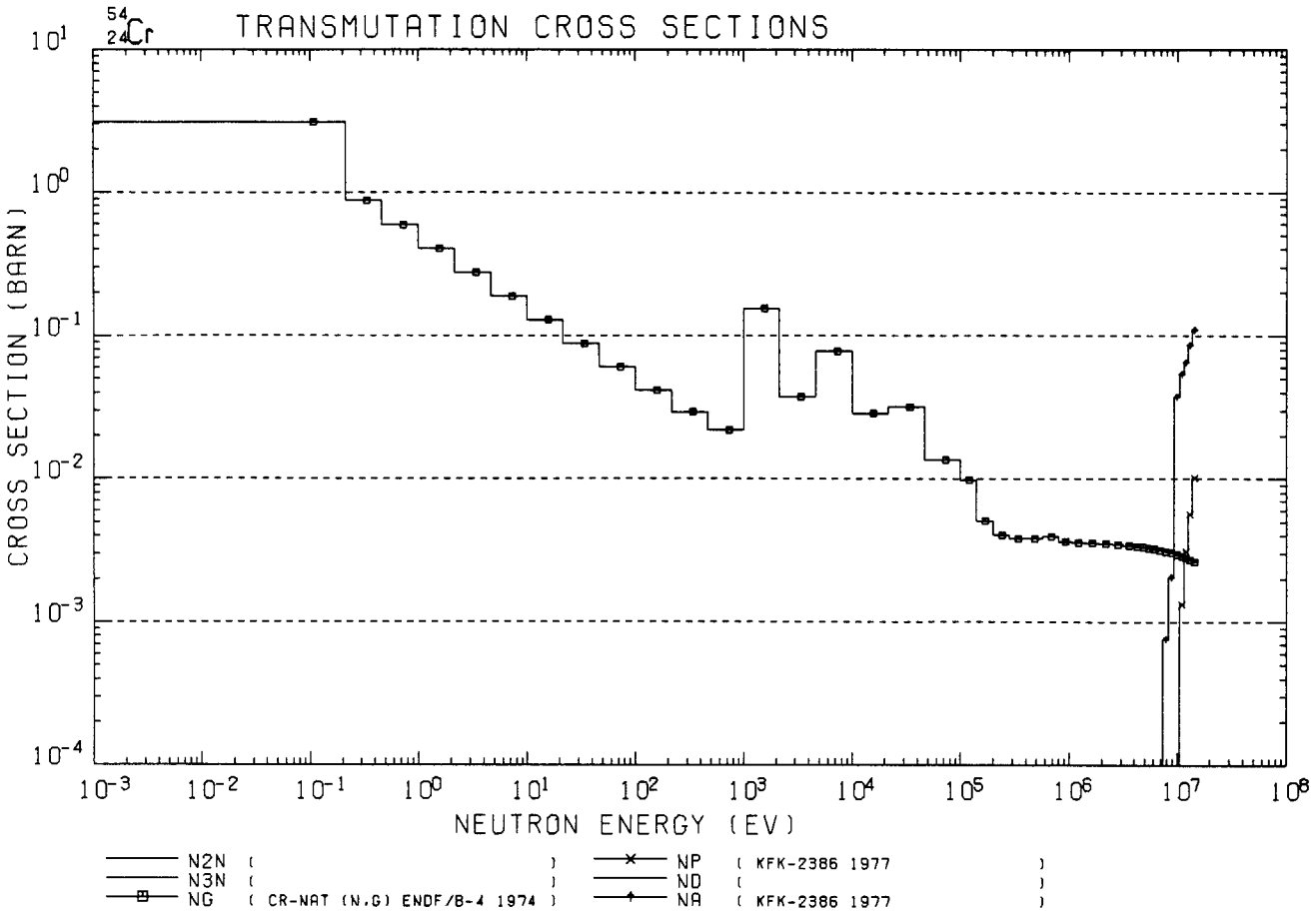

54 24Cr
NG
53 23V
NP
B-
1.60M
53 24Cr
Abundance
9.50%
NNP
N2N
52 23V
B-
3.76M
52 24Cr
NHE3
N3N
51 22Ti
B-
5.80M
51 23V
EC
27.70D
51 24Cr
NA
50 22Ti



$^{53}_{24}Cr$ DECAY GAMMA-RAY TABLE

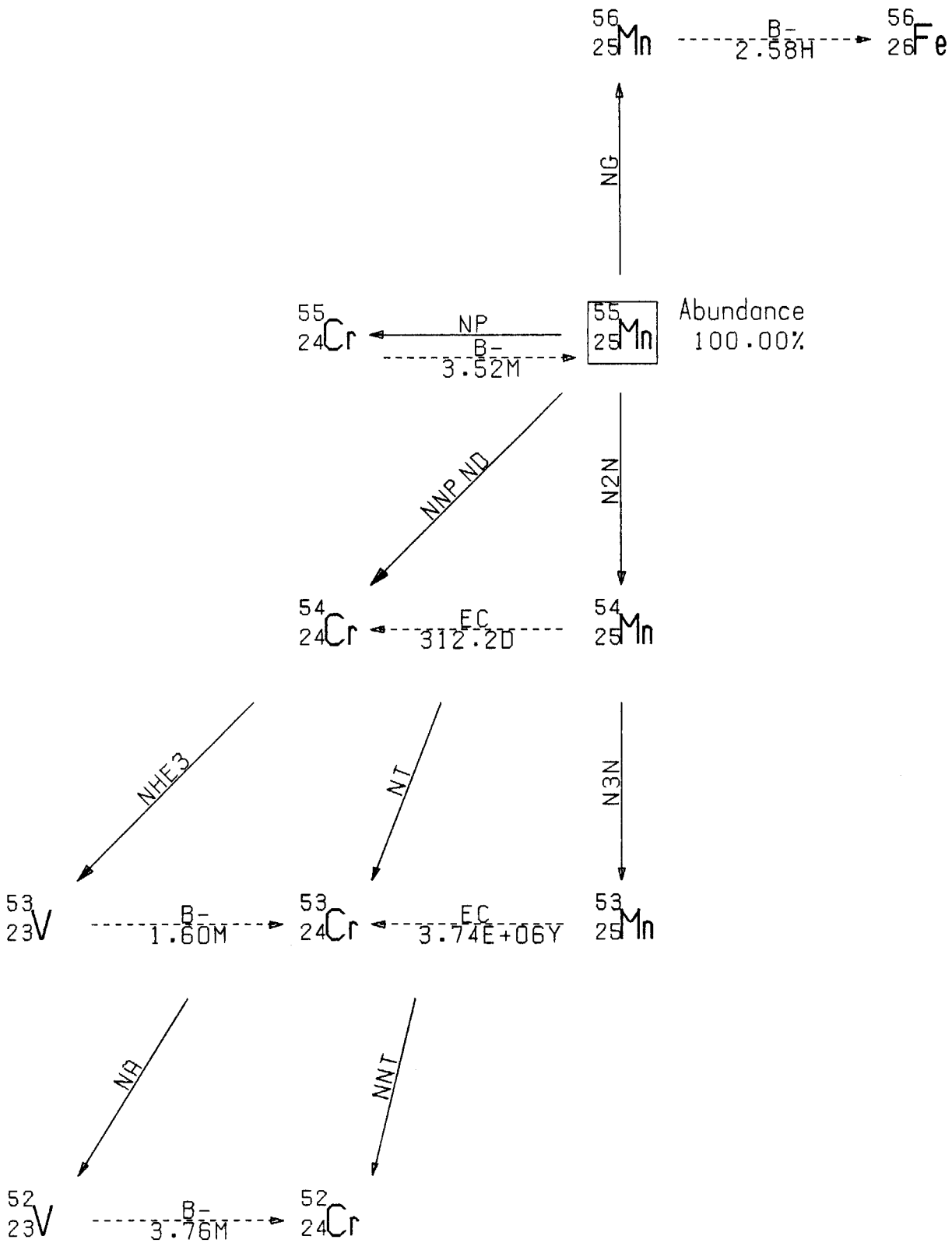
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-						
$^{51}_{24}Cr$	27.70	D	5.11E+05	3.20E+05					
			0.00	10.20					
$^{53}_{23}V$	1.60	M	5.11E+05	5.64E+05	1.29E+05	2.83E+05	4.43E+05	2.47E+05	5.31E+05
			0.00	90.00	1.01	0.77	0.39	0.18	0.18
$^{52}_{23}V$	3.76	M	5.11E+05	1.43E+06	1.39E+06	1.53E+06			
			0.00	100.00	0.59	0.12			
$^{51}_{22}Ti$	5.80	M	5.11E+05	3.19E+05	9.27E+05	6.08E+05			
			0.00	93.40	8.41	1.25			

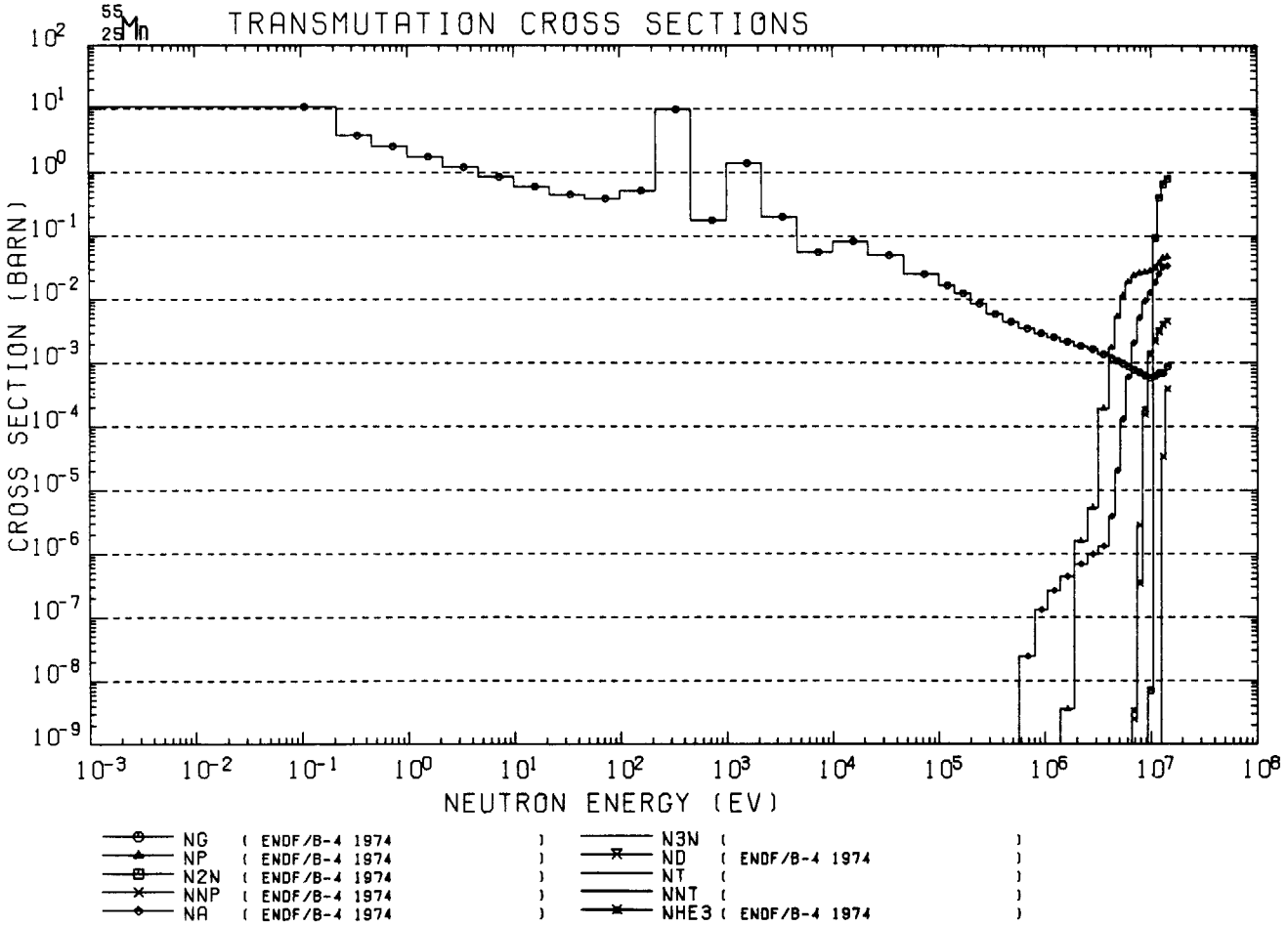

55 24 Cr
B-
3.52M
55 25 Mn
NG
54 23 V
NP
B-
43.00S
54 24 Cr
Abundance
2.36%
ND
N2N
53 23 V
B-
1.60M
53 24 Cr
N3N
52 24 Cr
NA
51 22 Ti
B-
5.80M
51 23 V



$^{54}_{24}Cr$ DECAY GAMMA-RAY TABLE

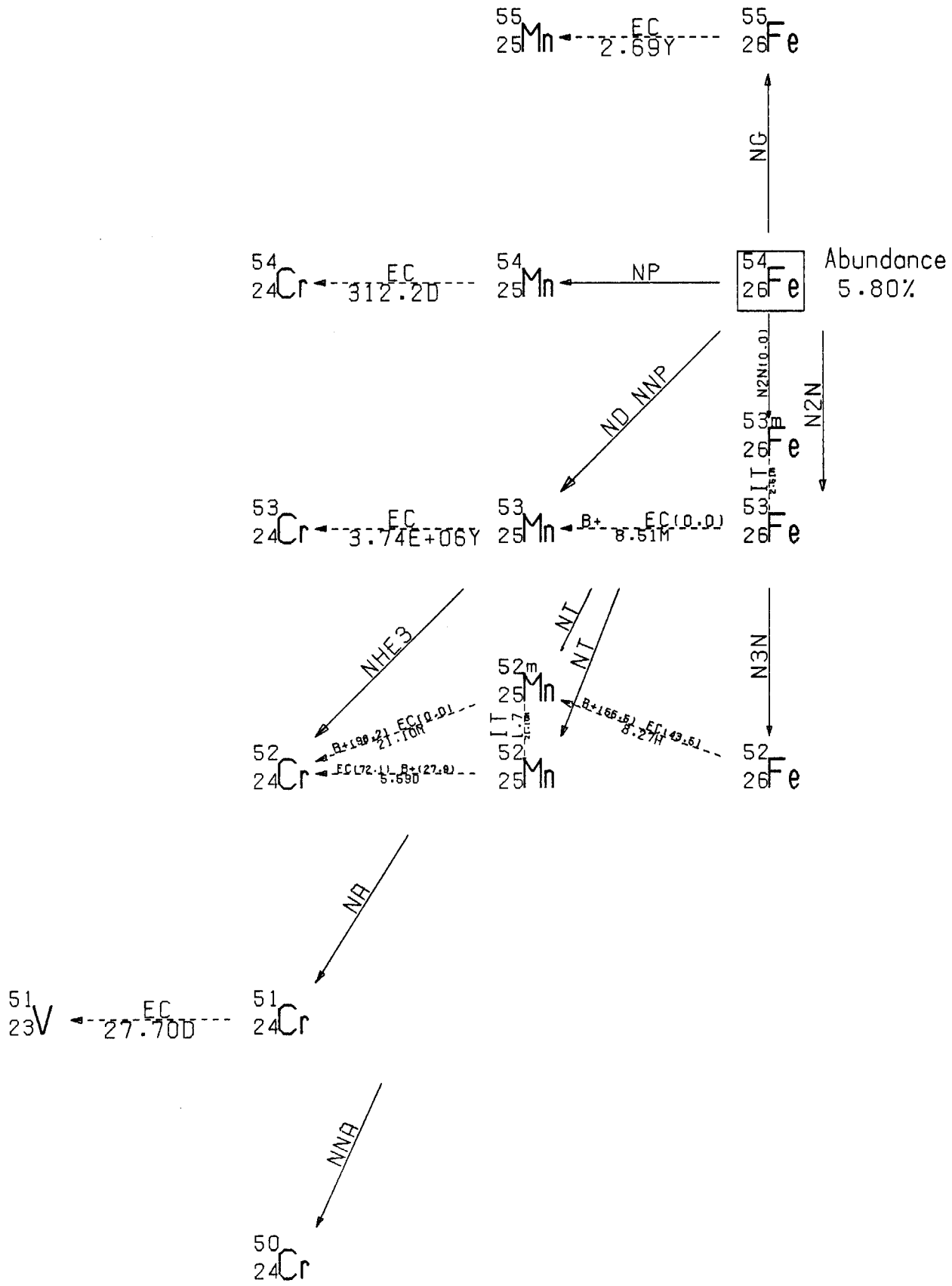
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{53}_{23}V$	1.60	M	5.11E+05	5.64E+05	1.29E+06	2.83E+05	4.43E+05	2.47E+05	5.31E+05			
			0.00	90.00	1.01	0.77	0.39	0.18	0.18			
$^{51}_{22}Ti$	5.80	M	5.11E+05	3.19E+05	9.27E+06	6.08E+06						
			0.00	93.40	6.41	1.25						
$^{55}_{24}Cr$	3.52	M	5.11E+05									
			0.00									
$^{54}_{23}V$	43.00	S	5.11E+05	8.35E+05	9.85E+05	2.25E+06	3.17E+06	2.95E+06	1.78E+06	1.46E+06	1.82E+06	1.96E+06
			0.00	100.00	81.80	50.00	11.80	11.50	7.30	6.90	4.90	4.80

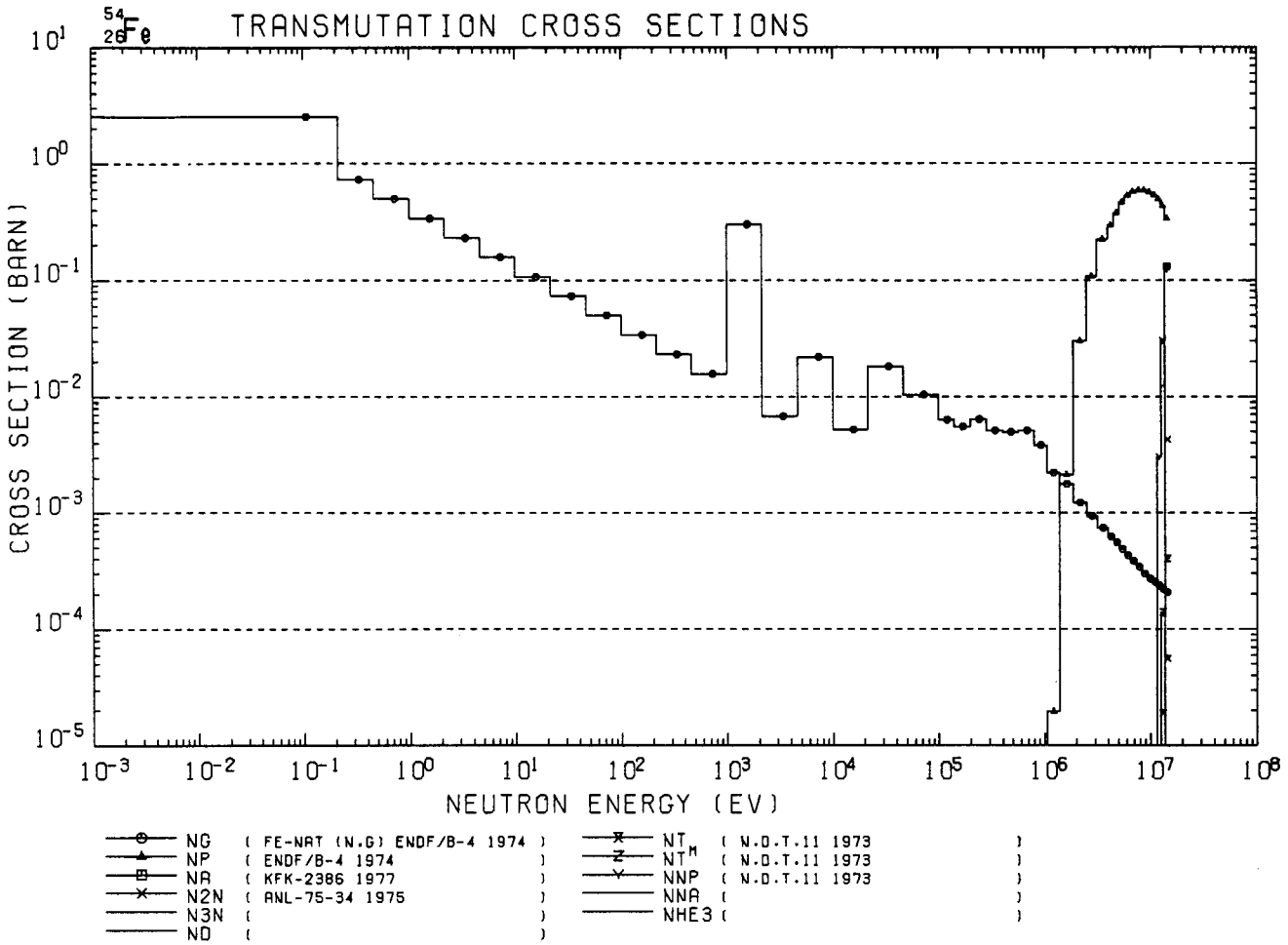

56 25 Mn
B-
2.58H
56 26 Fe
NG
55 24 Cr
NP
B-
3.52M
55 25 Mn
Abundance
100.00%
NNP ND
N2N
54 24 Cr
EC
312.2D
54 25 Mn
NHE3
NT
N3N
53 23 V
B-
1.60M
53 24 Cr
EC
3.74E+06Y
53 25 Mn
NA
NNT
52 23 V
B-
3.76M
52 24 Cr



55 25Mn DECAY GAMMA-RAY TABLE

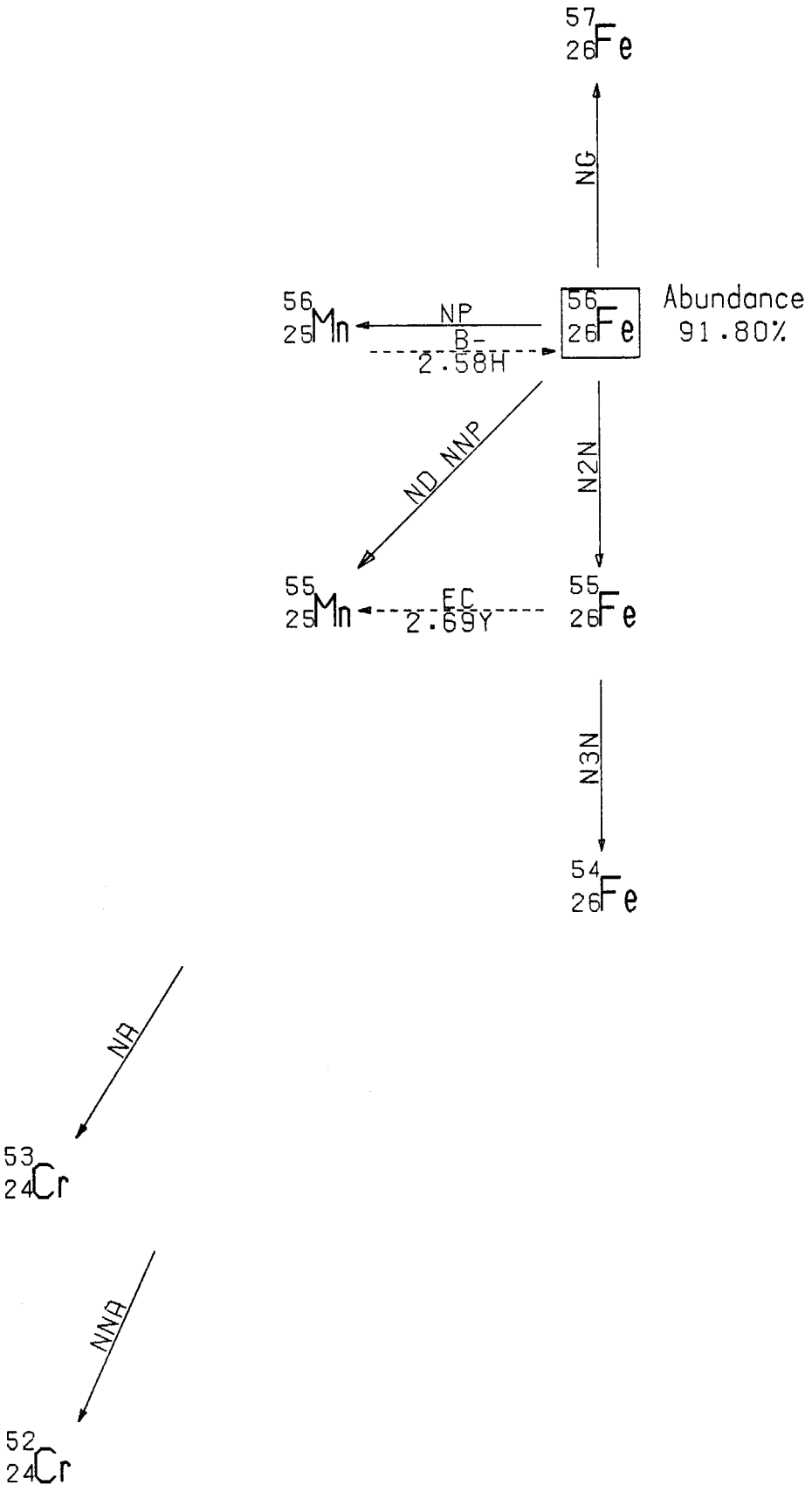
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-							
56 25Mn	2.58 H	5.11E+05	8.47E+05	1.81E+06	2.11E+06	2.52E+06	2.66E+06	2.98E+06	3.37E+06
		0.00	98.87	27.27	14.38	0.99	0.65	0.31	0.17
55 24Cr	3.52 M								
54 25Mn	312.2 D	5.11E+05	8.35E+05						
		0.00	100.00						
52 23V	3.76 M								
53 25Mn	3.74E+06Y								
53 23V	1.60 M								

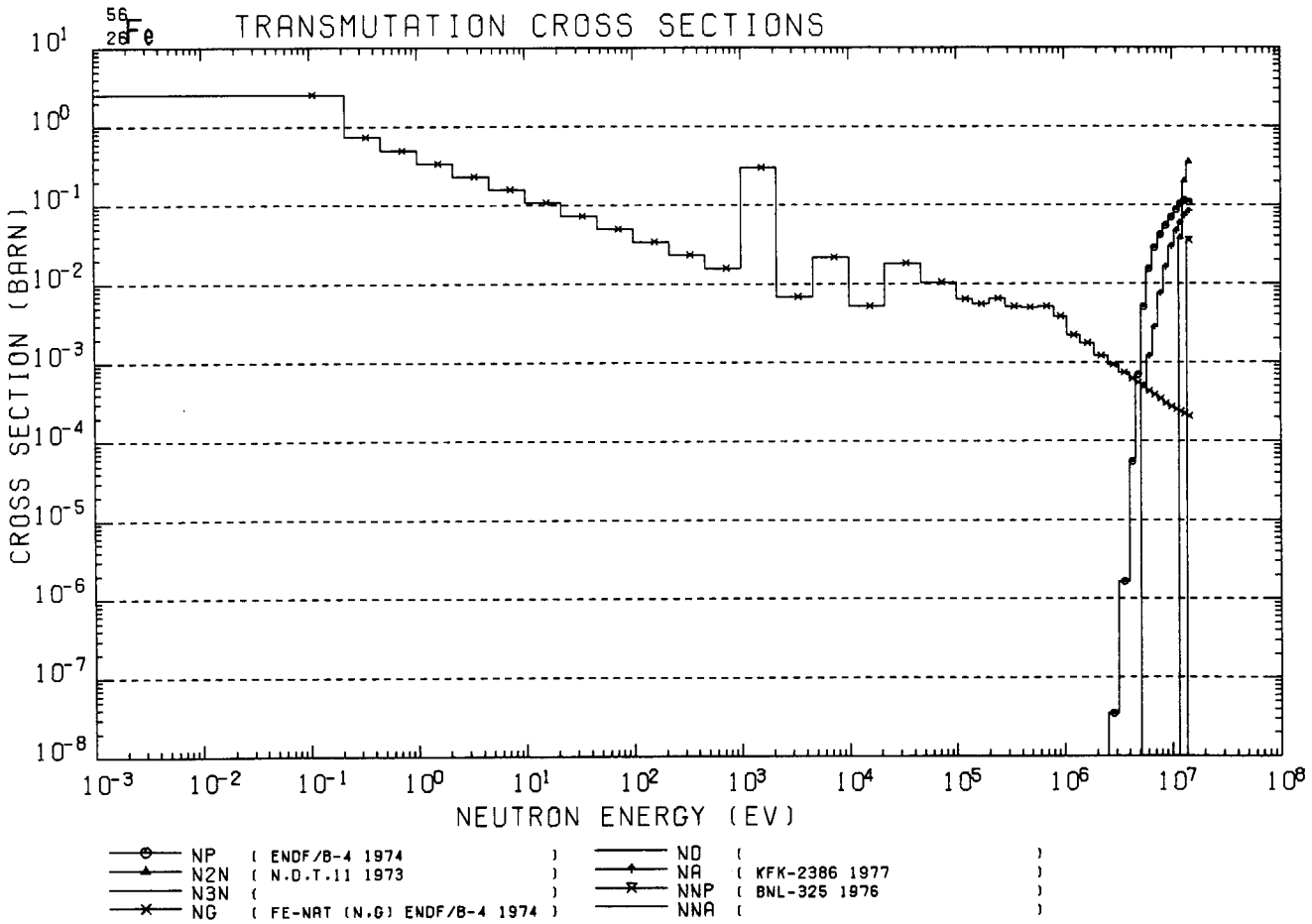

55 25 Mn
EC
2.69Y
55 26 Fe
NG
54 24 Cr
EC
312.2D
54 25 Mn
NP
54 26 Fe
Abundance
5.80%
N2N(0.0)
ND NNP
53m 26 Fe
IT 2.5m
N2N
53 24 Cr
EC
3.74E+06Y
53 25 Mn
B+ EC(0.0)
8.51M
53 26 Fe
NHE3
NT
NT
N3N
52m 25 Mn
IT 21.1m
B+(66.5) EC(43.5)
8.27M
52 24 Cr
EC(72.1) B+(27.8)
5.69D
52 25 Mn
52 26 Fe
NA
51 23 V
EC
27.70D
51 24 Cr
NNA
50 24 Cr



$^{54}_{26}Fe$ DECAY GAMMA-RAY TABLE

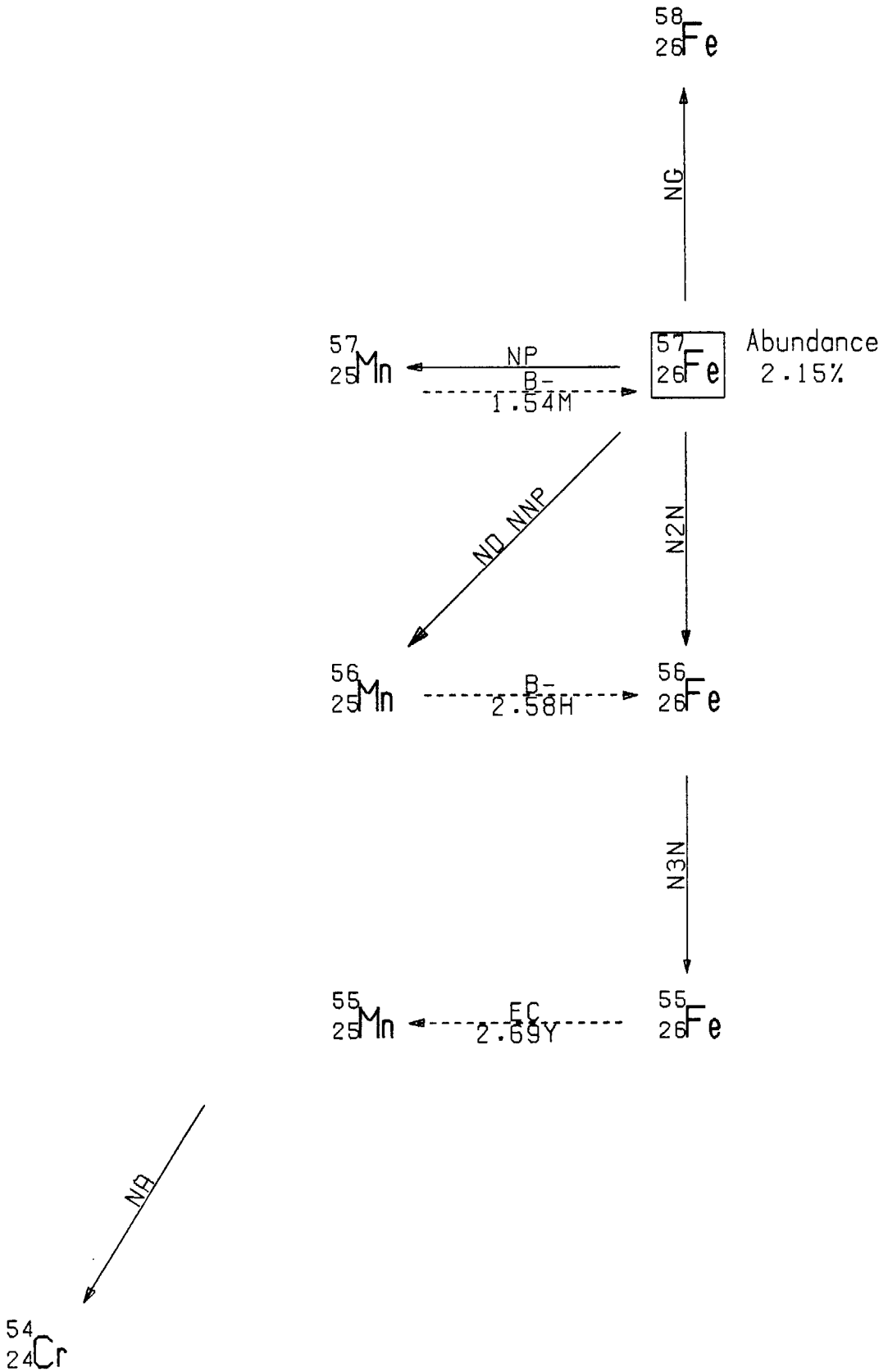
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{55}_{26}Fe$	2.69 Y										
$^{54}_{25}Mn$	312.2 D										
$^{51}_{24}Cr$	27.70 D										
$^{53}_{26}Fe$	8.51 M	5.11E+05 196.00	9.78E+05 42.00	2.27E+06 38.56	2.75E+06 14.47	1.62E+06 0.51					
$^{53}_{25}Mn$	3.74E+06Y										
$^{53m}_{26}Fe$	2.51 M	5.11E+05 0.00	7.01E+05 98.60	1.33E+06 86.60	1.81E+06 85.71	2.34E+06 13.02	1.71E+06 1.29				
$^{52}_{26}Fe$	8.27 H	5.11E+05 114.00	1.69E+05 99.20								
$^{52m}_{25}Mn$	21.10 M	5.11E+05 196.50	1.43E+06 98.27	3.78E+05 1.68	1.73E+06 0.22						
$^{52}_{25}Mn$	5.59 D	5.11E+05 67.00	1.43E+06 100.00	9.35E+05 94.50	7.44E+05 90.00	1.33E+06 5.07	1.25E+06 4.21	8.48E+05 3.32	3.46E+05 0.98	6.47E+05 0.40	6.00E+05 0.39

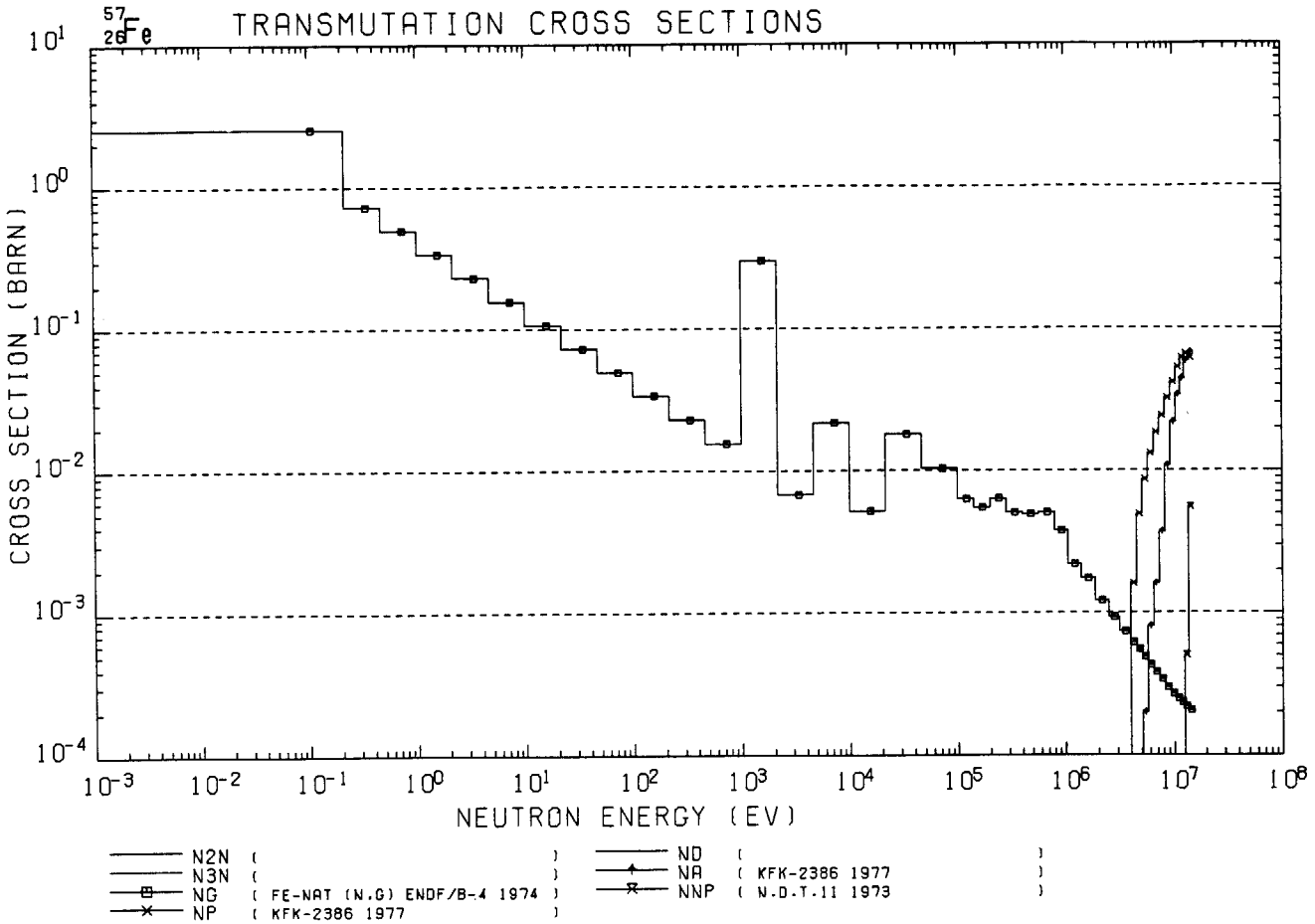

57 26 Fe
NG
56 25 Mn
NP
B-
2.58H
56 26 Fe
Abundance
91.80%
ND NNP
N2N
55 25 Mn
EC
2.69Y
55 26 Fe
N3N
54 26 Fe
NA
53 24 Cr
NNA
52 24 Cr



56 26Fe DECAY GAMMA-RAY TABLE

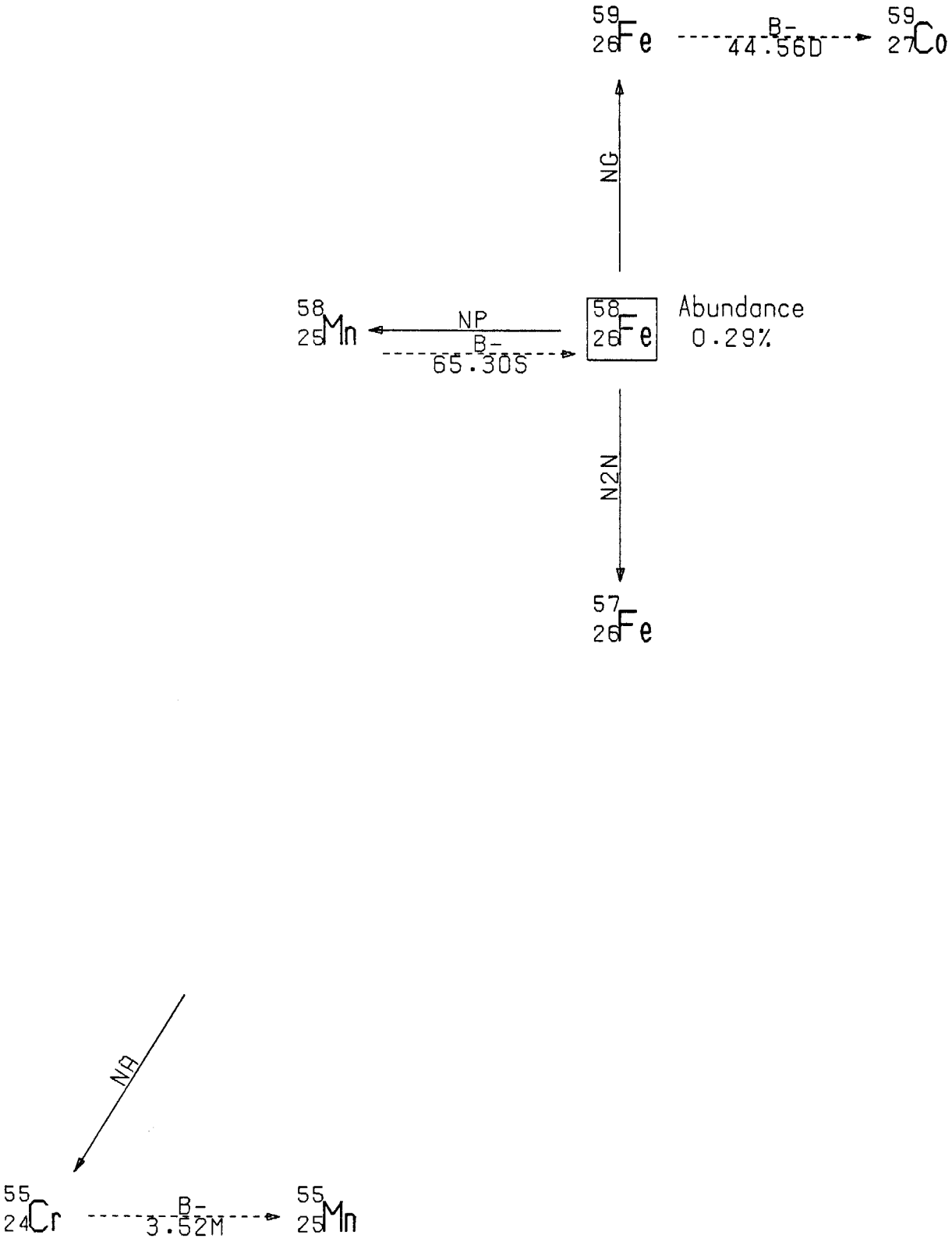
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
56 25Mn	2.58 H	
55 26Fe	2.69 Y	

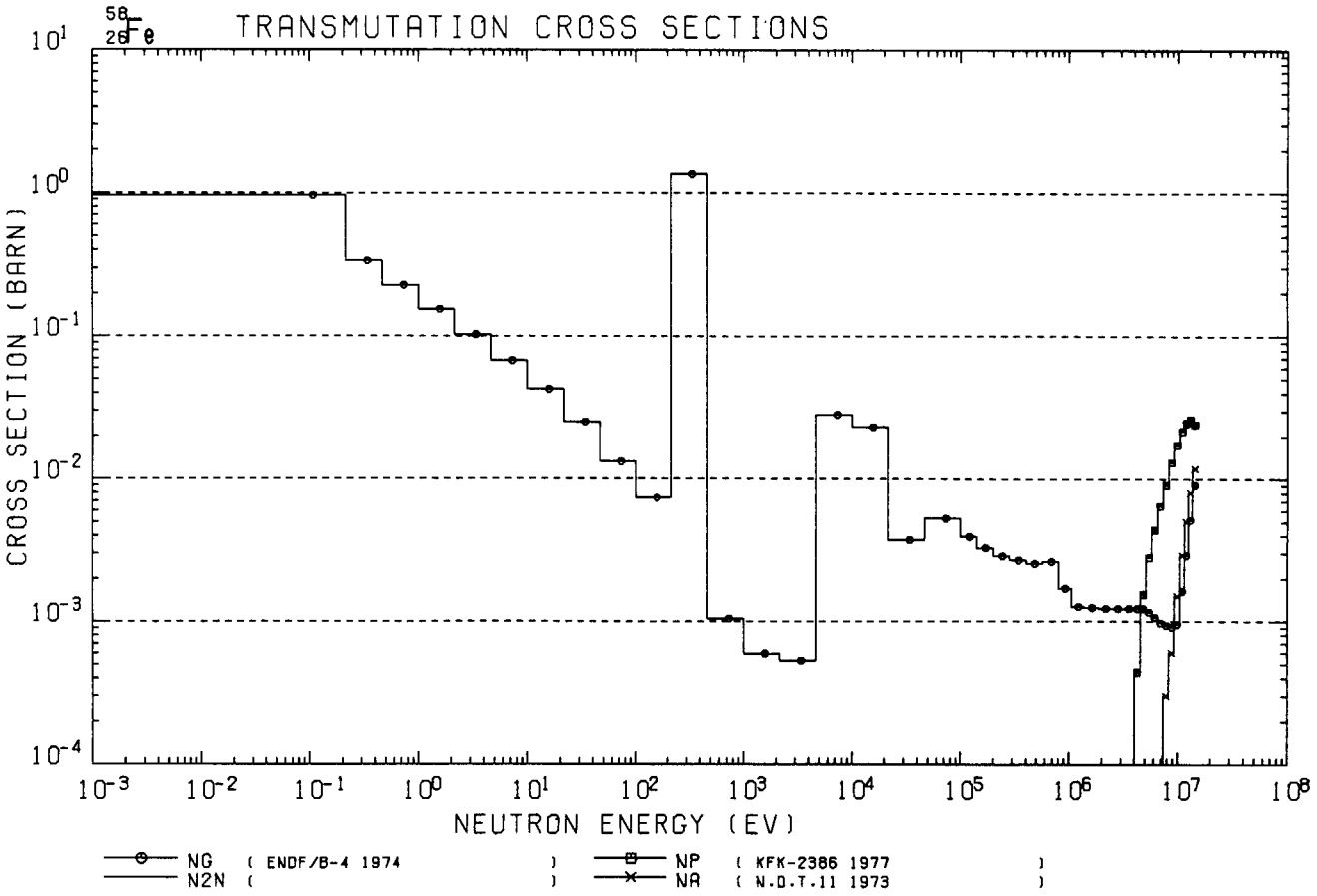

58 26 Fe
NG
57 25 Mn
NP
B-
1.54M
57 26 Fe
Abundance
2.15%
ND NNP
N2N
56 25 Mn
B-
2.58H
56 26 Fe
N3N
55 25 Mn
EC
2.69Y
55 26 Fe
NA
54 24 Cr



$^{57}_{26}Fe$ DECAY GAMMA-RAY TABLE

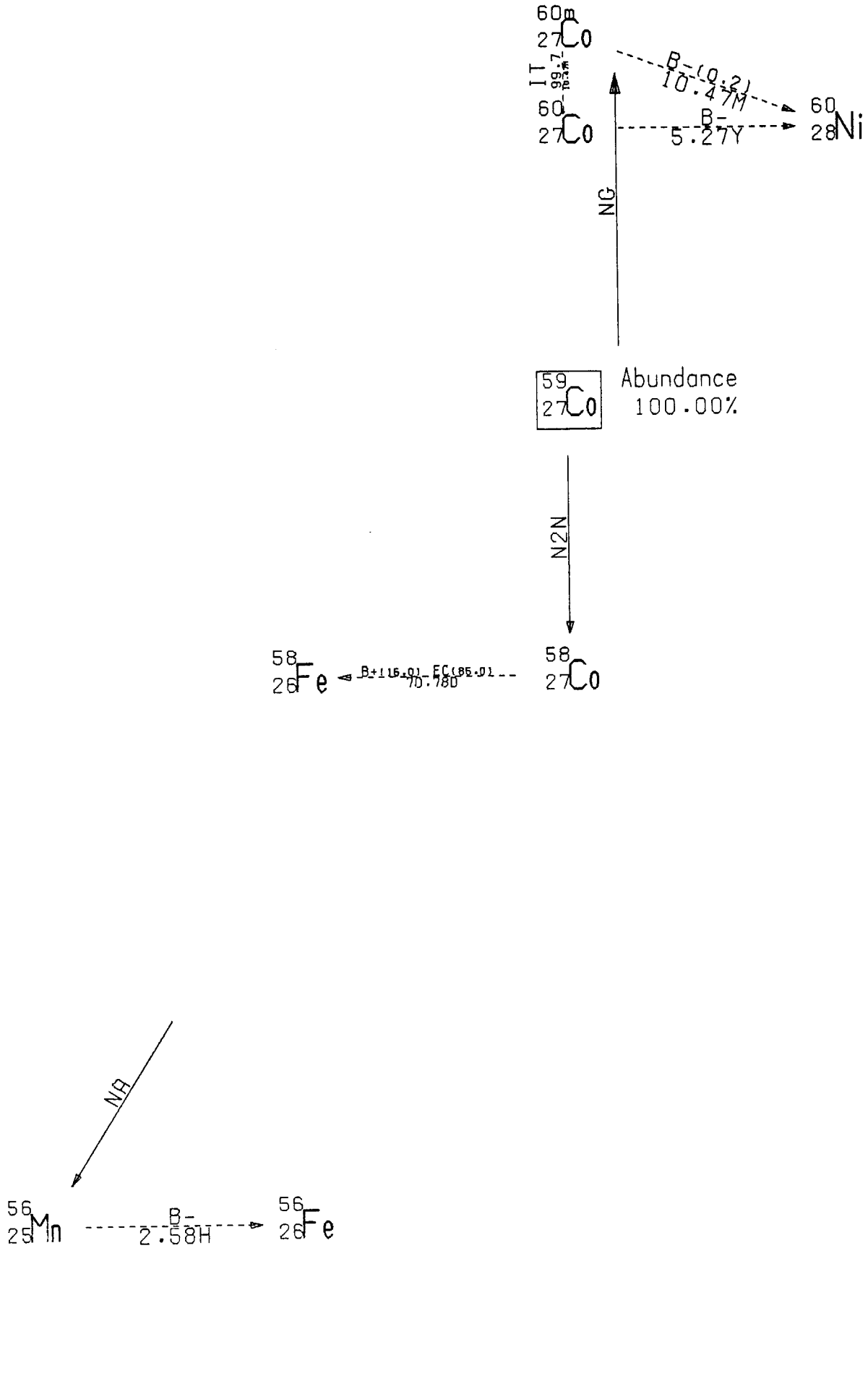
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{55}_{26}Fe$	2.69	Y										
$^{57}_{25}Mn$	1.54	M	6.11E+05	1.22E+06	6.92E+05	3.52E+05	1.36E+06	1.61E+06	5.70E+05	3.67E+05	1.26E+06	8.71E+05
			0.00	10.30	4.09	1.55	1.43	0.55	0.38	0.30	0.24	0.19
$^{56}_{25}Mn$	2.58	H										

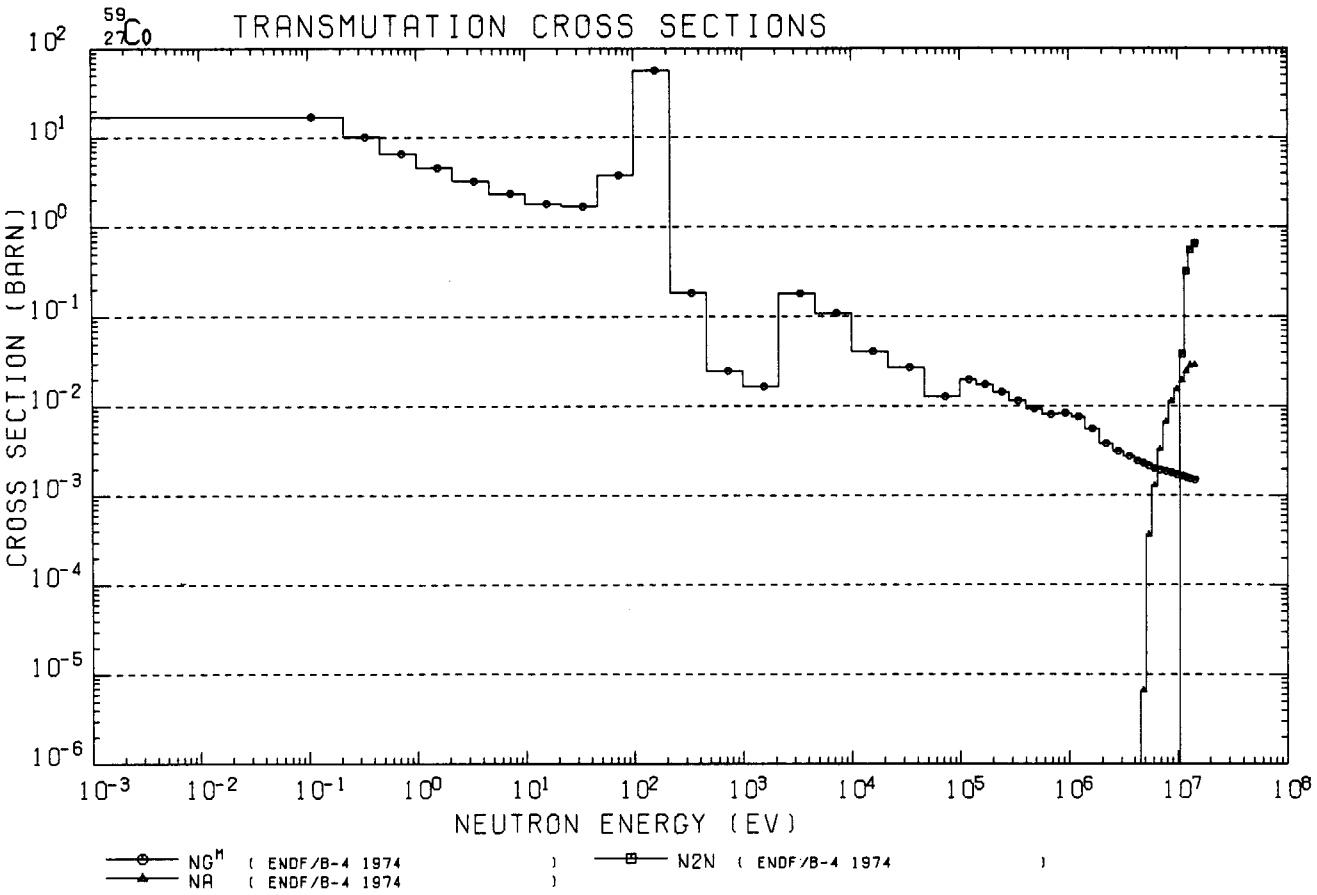

59 26 Fe
B-
44.56D
59 27 Co
NG
58 25 Mn
NP
B-
65.30S
58 26 Fe
Abundance
0.29%
N2N
57 26 Fe
NA
55 24 Cr
B-
3.52M
55 25 Mn



$^{58}_{26}Fe$ DECAY GAMMA-RAY TABLE

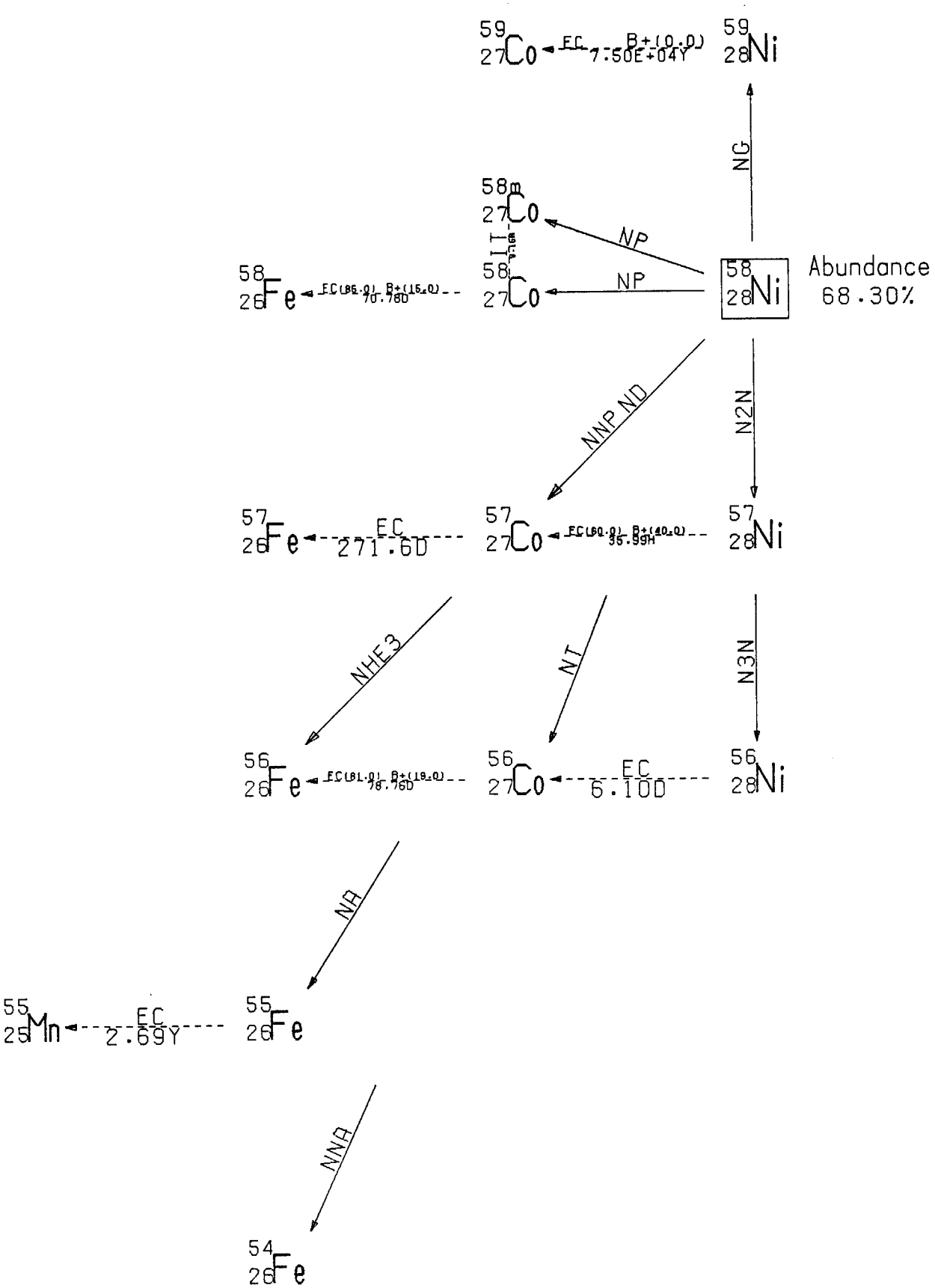
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{59}_{26}Fe$	44.56 D	5.11E+05	1.10E+06	1.29E+06	1.92E+05	1.43E+05	3.35E+05				
		0.00	56.50	43.50	2.66	0.87	0.27				
$^{58}_{25}Mn$	65.30 S	5.11E+05	8.11E+05	1.32E+06	4.59E+05	8.64E+05	1.67E+06	1.27E+05	5.24E+05	1.77E+06	1.79E+06
		0.00	62.20	55.19	19.98	13.81	10.85	8.47	3.44	2.95	2.66
$^{55}_{24}Cr$	3.52 M										

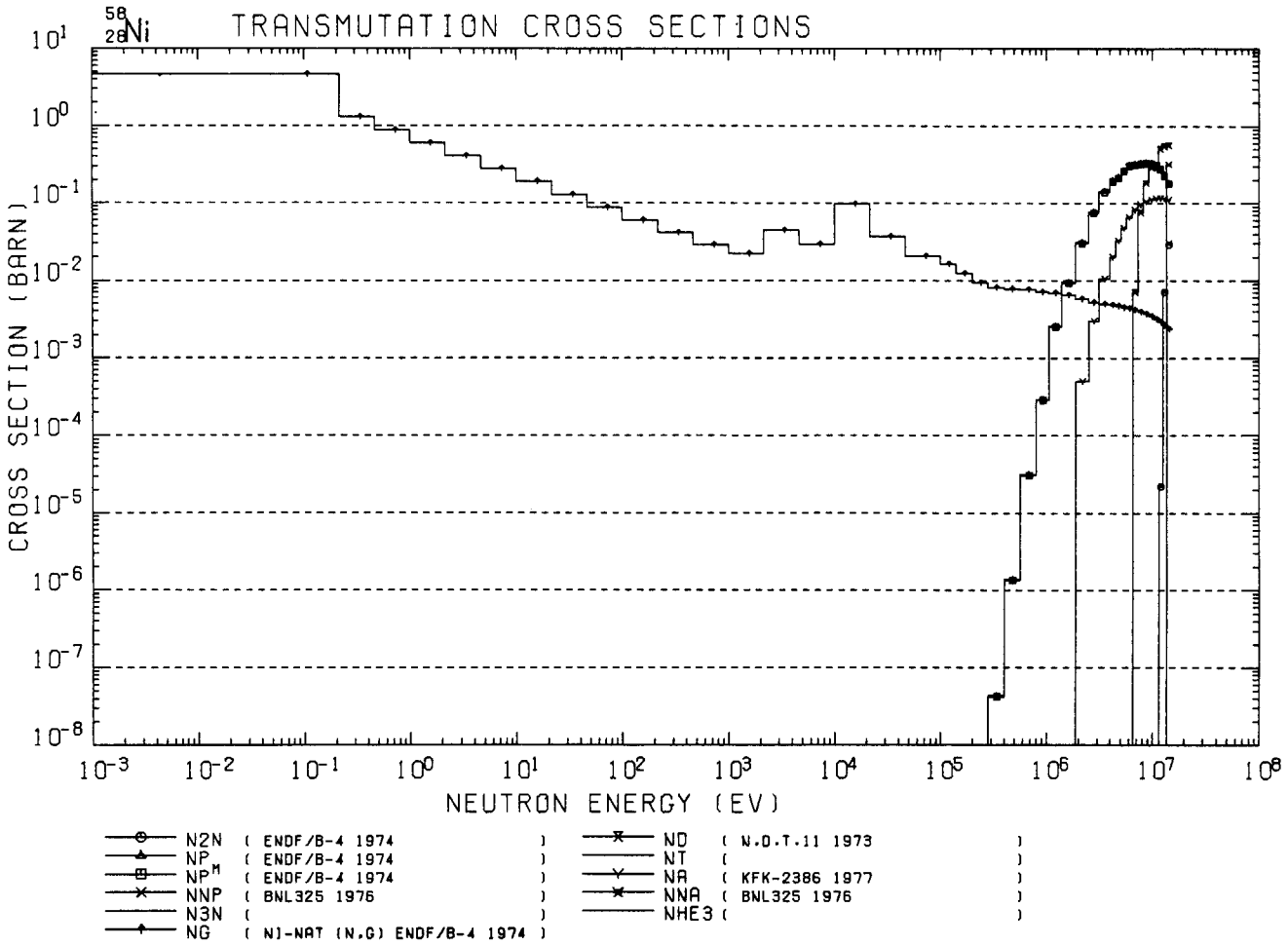

60m 27Co
IT
99.7
60 27Co
B-(0.2) 10.47M
B- 5.27Y
60 28Ni
NG
59 27Co
Abundance 100.00%
N2N
58 26Fe
B+ 115.01 EC 85.01
70.78D
58 27Co
NA
56 25Mn
B- 2.58H
56 26Fe



59 27Co DECAY GAMMA-RAY TABLE

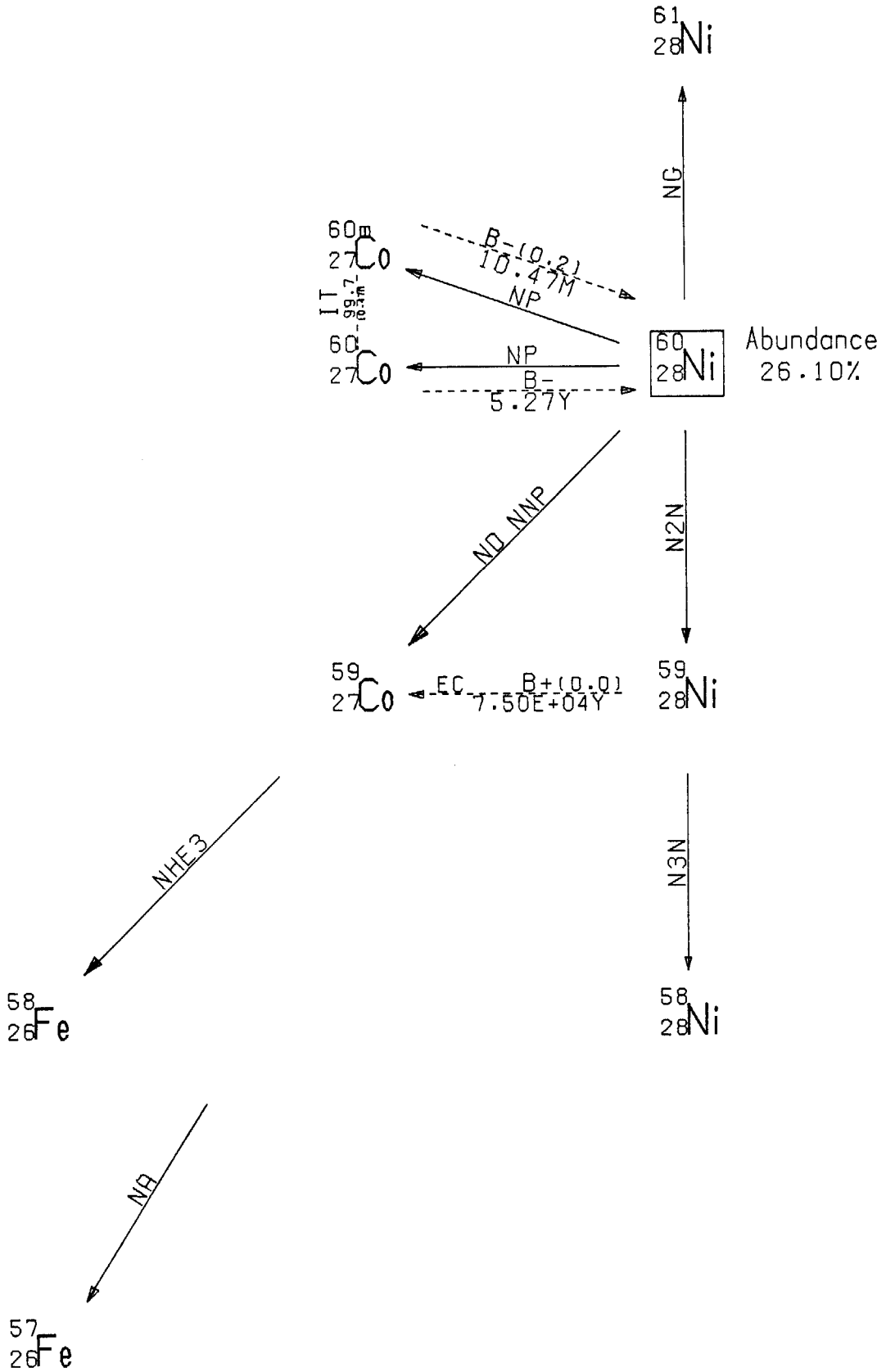
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
60 27Co	5.27	Y	5.11E+05	1.17E+06	1.33E+06	
			0.00	100.00	100.00	
56 25Mn	2.58	H				
58 27Co	70.78	D	5.11E+05	8.11E+05	8.64E+05	1.67E+06
			30.00	99.44	0.74	0.54
60m 27Co	10.47	M	5.11E+05	5.90E+04	1.33E+06	
			0.00	2.00	0.24	

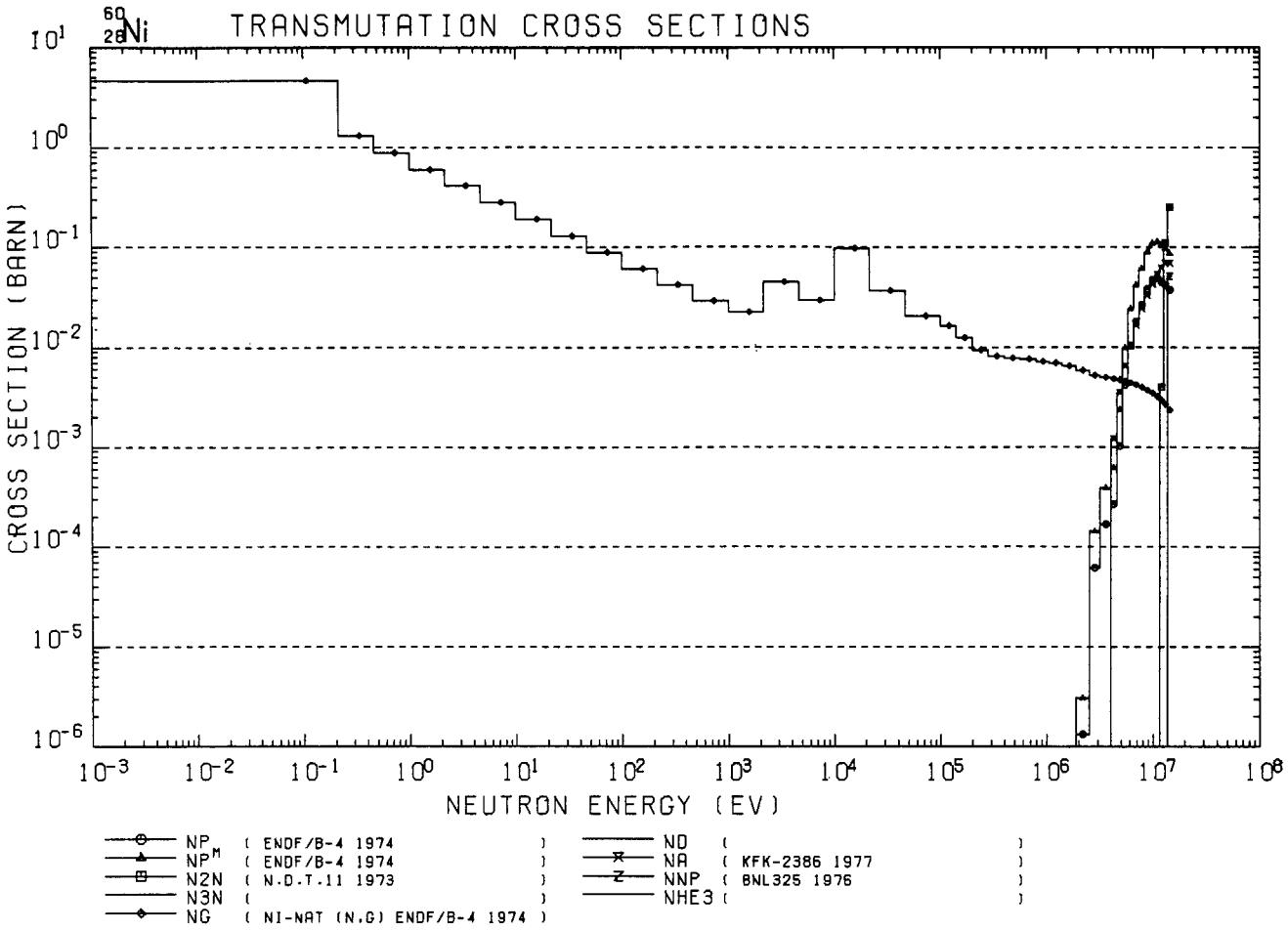

59 27 Co
EC B+(0.0)
7.50E+04Y
59 28 Ni
NG
58m 27 Co
IT 9.15H
NP
58 28 Ni
Abundance
68.30%
58 26 Fe
EC(86.0) B+(16.0)
70.78D
58 27 Co
NP
NNP ND
N2N
57 26 Fe
EC
271.6D
57 27 Co
EC(60.0) B+(40.0)
35.99H
57 28 Ni
NHE3
NT
N3N
56 26 Fe
EC(81.0) B+(19.0)
78.76D
56 27 Co
EC
6.10D
56 28 Ni
NA
55 25 Mn
EC
2.69Y
55 26 Fe
NNA
54 26 Fe



58 28Ni DECAY GAMMA-RAY TABLE

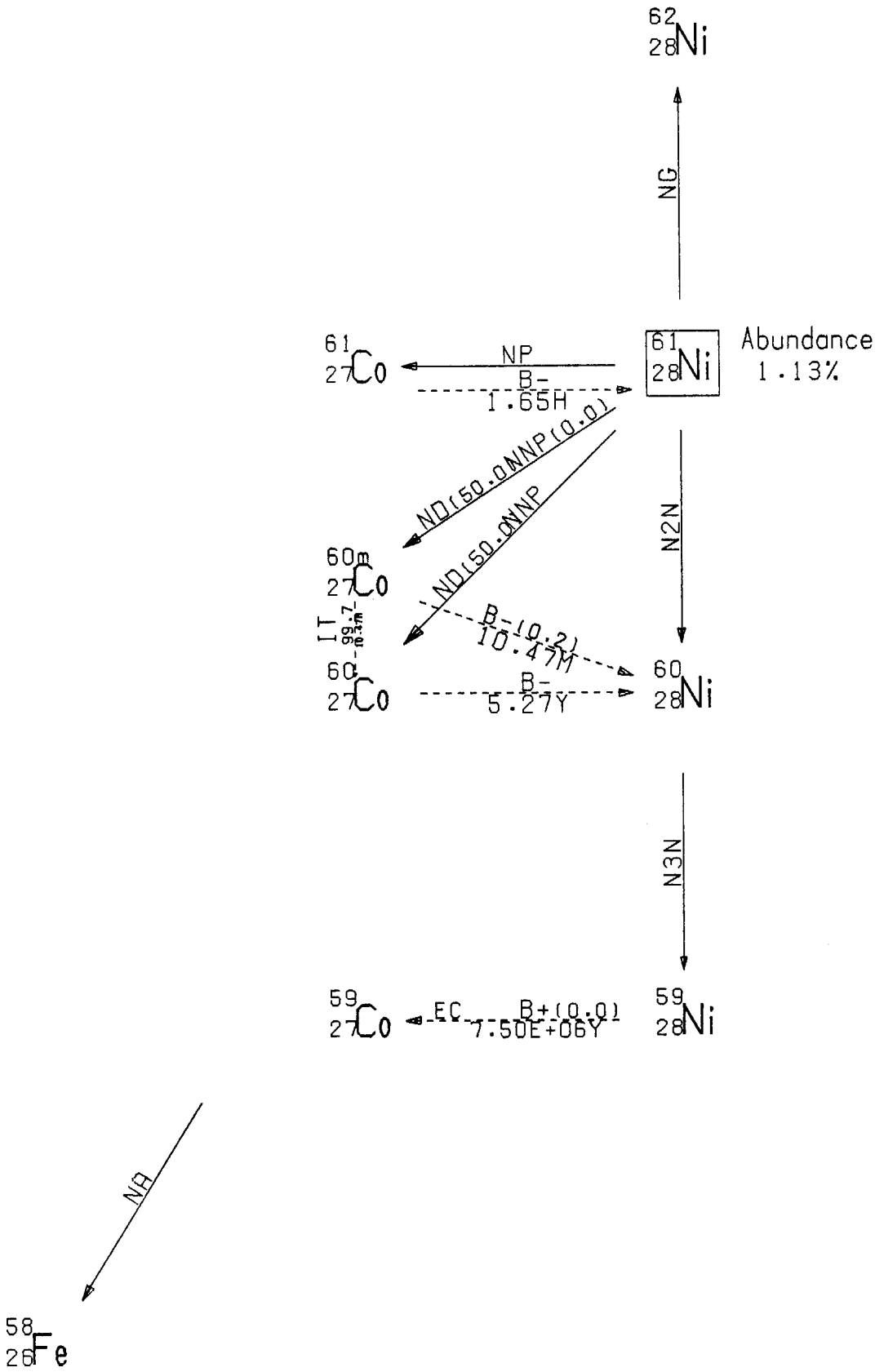
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
57 28Ni	35.99 H	5.11E+05	1.38E+06	1.92E+06	1.27E+05	1.76E+05					
		80.00	77.60	14.69	12.90	7.13					
57 27Co	271.6 D	5.11E+05	1.22E+05	1.36E+05	1.44E+04	6.92E+05					
		0.00	85.60	11.17	9.78	0.16					
58 27Co	70.78 D	5.11E+05	8.11E+05	8.64E+05	1.67E+06						
		30.00	99.44	0.74	0.54						
58m 27Co	9.15 H	5.11E+05									
		0.00									
56 28Ni	6.10 D	5.11E+05	1.58E+05	8.12E+05	7.50E+05	2.69E+05	4.80E+05	1.56E+05			
		0.00	98.80	74.15	47.85	34.01	31.83	13.21			
59 28Ni	7.50E+04Y										
56 27Co	78.76 D	5.11E+05	8.47E+05	1.24E+06	2.60E+06	1.77E+06	1.04E+06	2.03E+06	3.25E+06	1.36E+06	2.02E+06
		40.00	99.96	67.67	16.89	15.69	13.99	7.89	7.41	4.33	3.08
55 26Fe	2.69 Y										

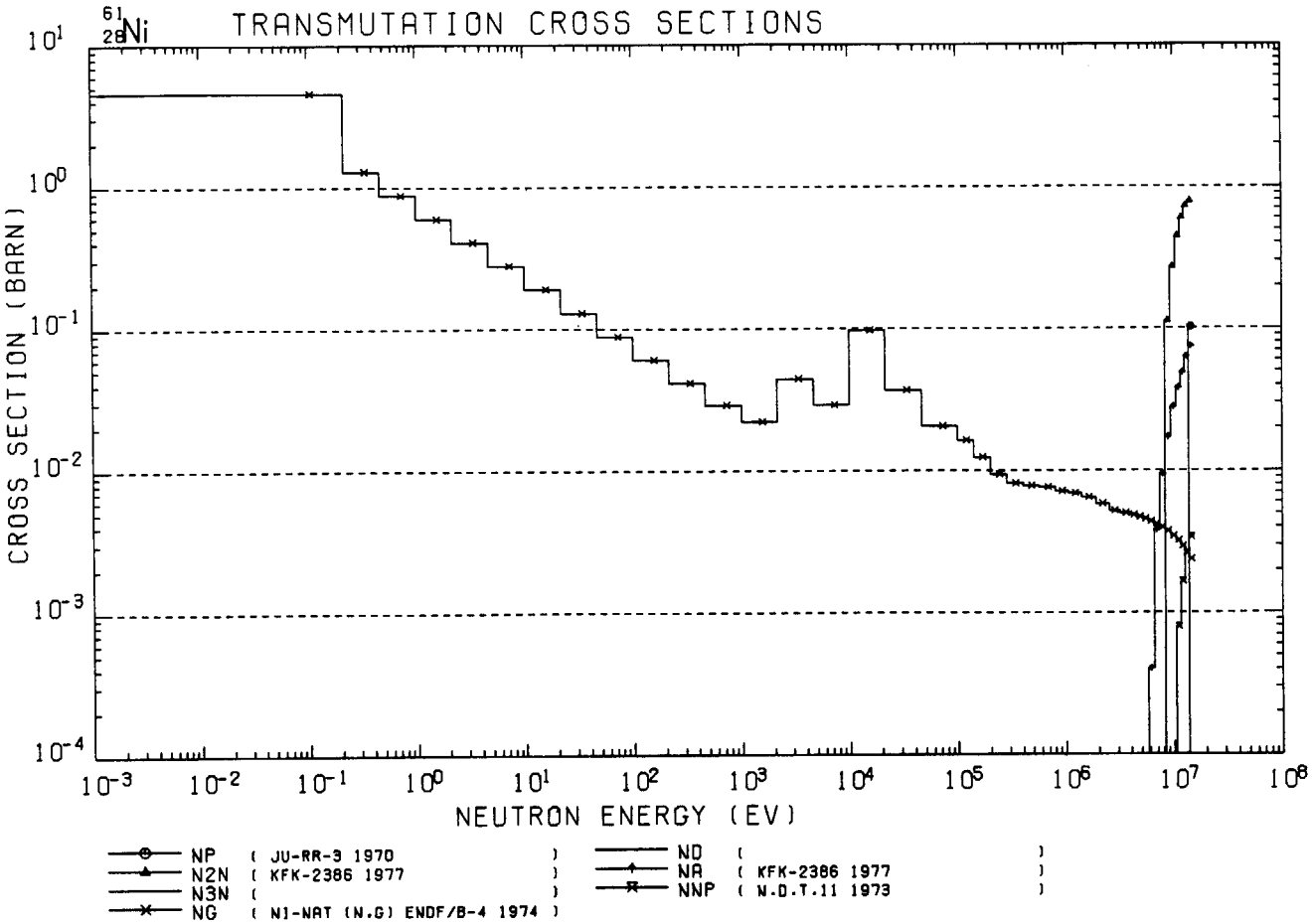

61 28 Ni
NG
60m 27 Co
B-(0.2) 10.47M
IT 99.7 10.5m
NP
60 27 Co
NP
B- 5.27Y
60 28 Ni
Abundance 26.10%
ND NNP
N2N
59 27 Co
EC B+(0.0) 7.50E+04Y
59 28 Ni
NHE3
N3N
58 26 Fe
58 28 Ni
NA
57 26 Fe



$^{60}_{28}Ni$ DECAY GAMMA-RAY TABLE

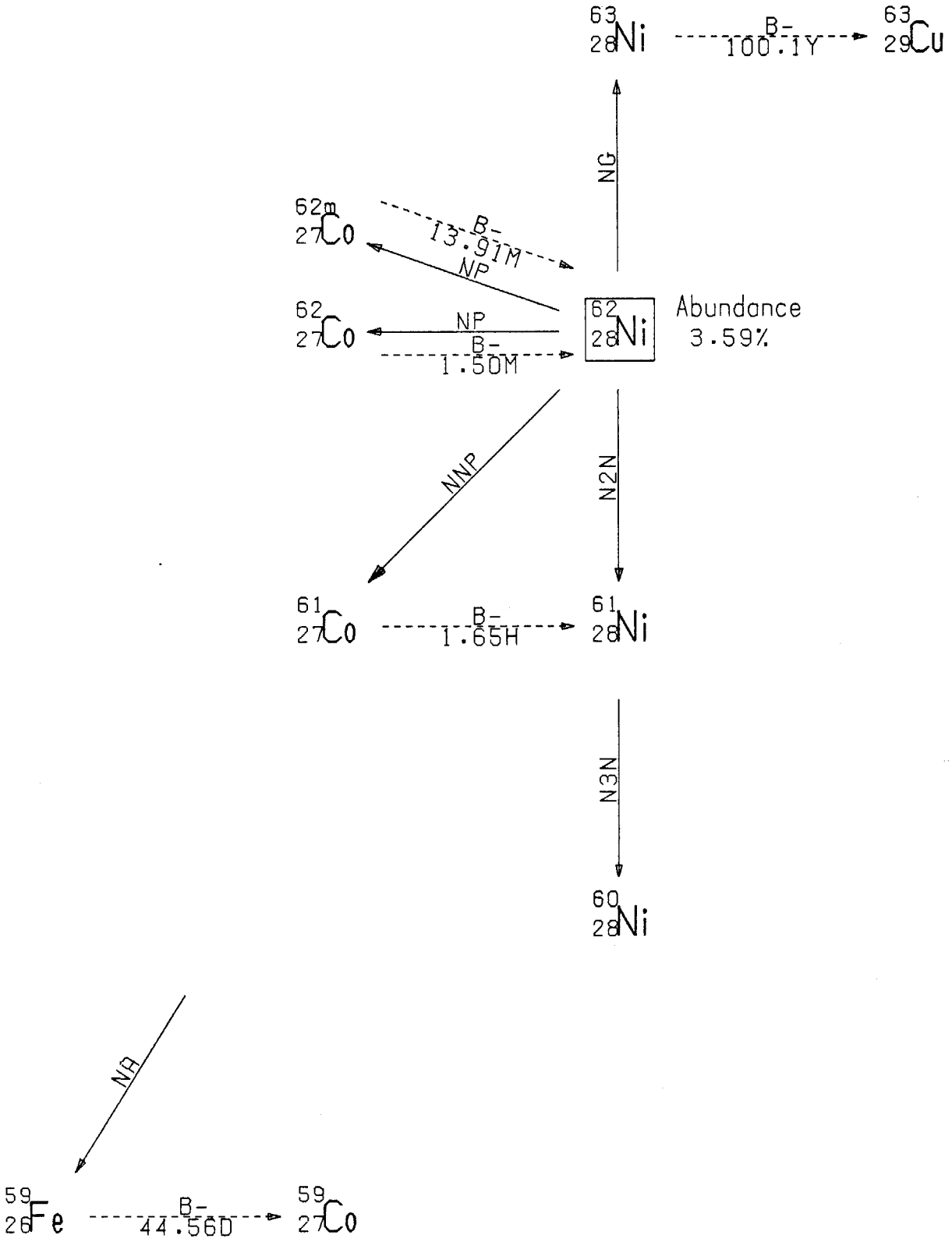
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY		
		YIELD (%) --GREATER THAN 0.1-		
$^{60}_{27}Co$	5.27 Y	5.11E+05	1.17E+06	1.33E+06
		0.00	100.00	100.00
$^{60m}_{27}Co$	10.47 M	5.11E+05	5.90E+04	1.33E+06
		0.00	2.00	0.24
$^{59}_{28}Ni$	7.50E+04Y			

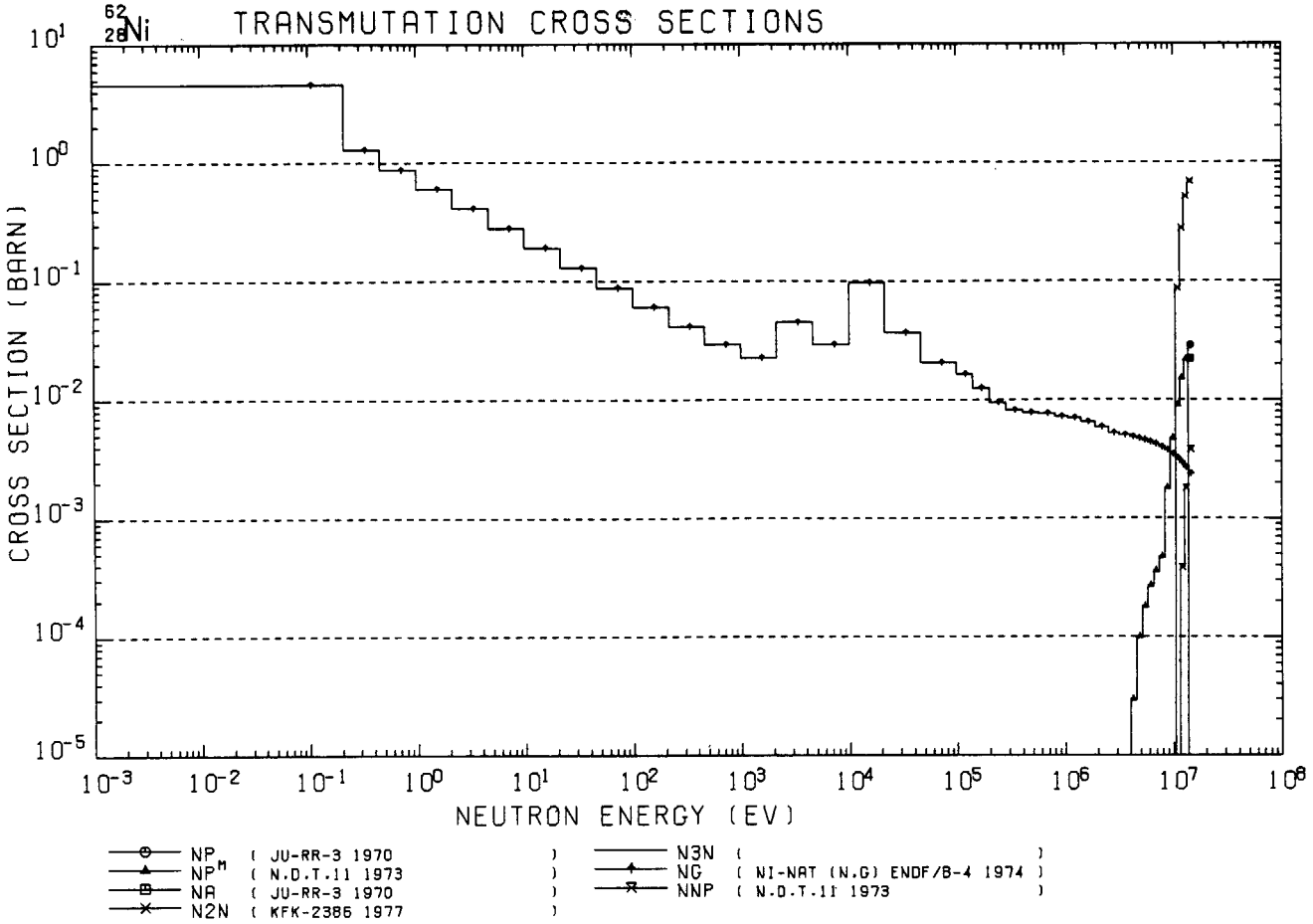

62 28Ni
NG
61 27Co
NP
B-
1.65H
61 28Ni
Abundance
1.13%
ND(50.0)NP(0.0)
ND(50.0)NP
N2N
60m 27Co
IT
99.7
10.47M
B-(0.2)
60 27Co
B-
5.27Y
60 28Ni
N3N
59 27Co
EC
B+(0.0)
7.50E+06Y
59 28Ni
NA
58 26Fe



61 28Ni DECAY GAMMA-RAY TABLE

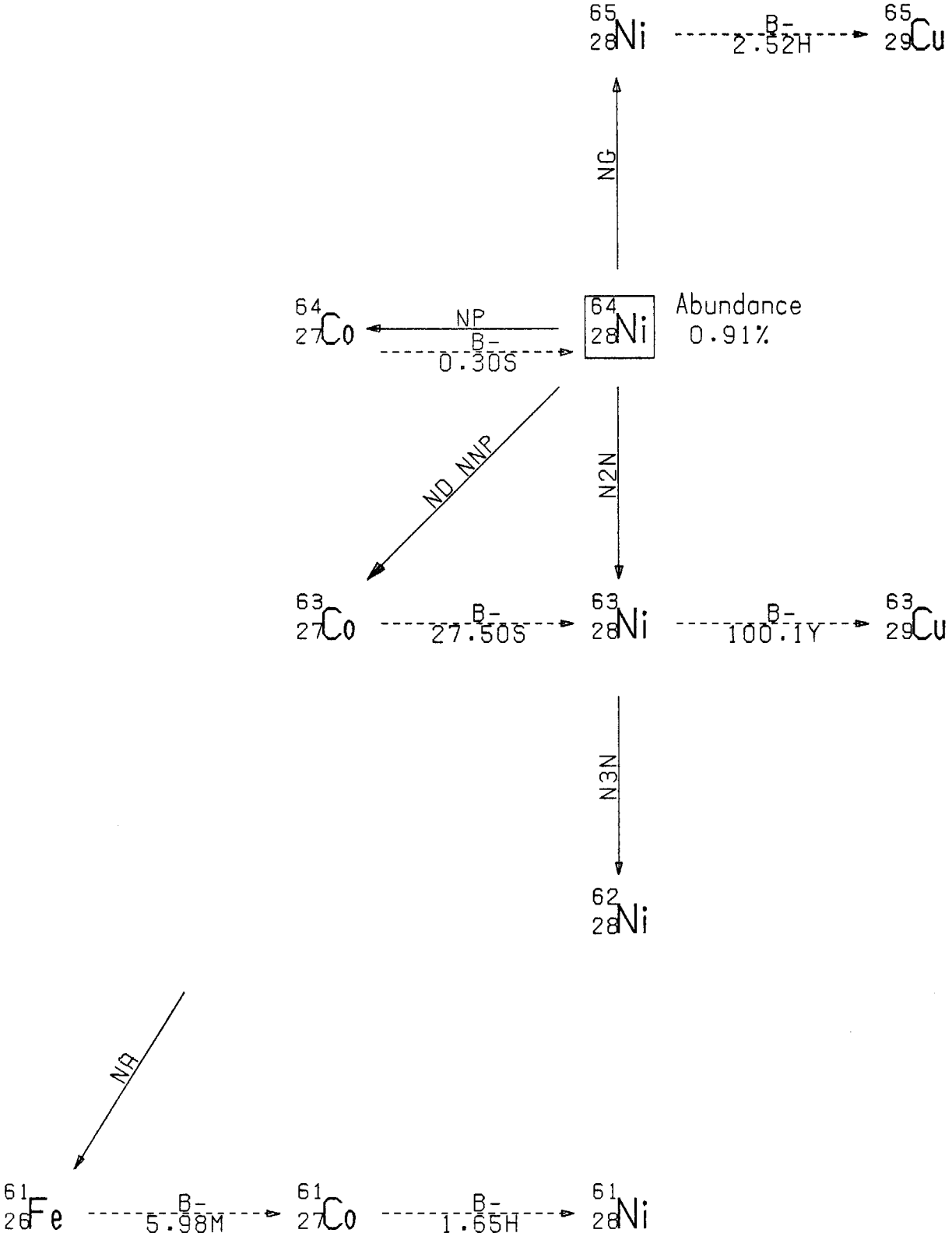
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
61 27Co	1.65 H	6.11E+05	6.71E+04	9.09E+05	8.42E+05
		0.00	86.00	3.02	0.60
60 27Co	5.27 Y	6.11E+05	1.17E+06	1.33E+06	
		0.00	100.00	100.00	
60m 27Co	10.47 M	6.11E+05	5.90E+04	1.33E+06	
		0.00	2.00	0.24	
59 28Ni	7.50E+06Y				

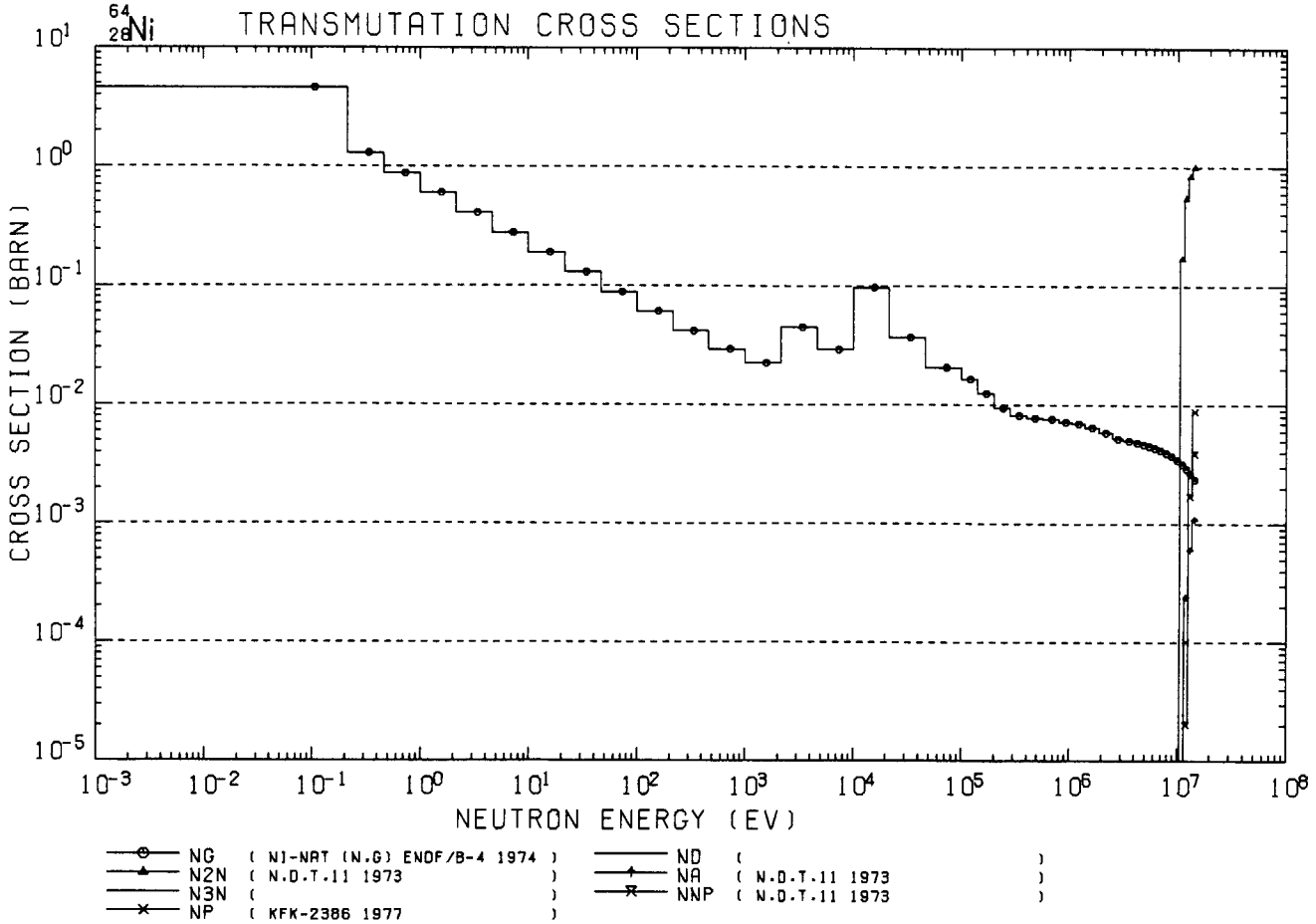

63 28 Ni
B-
100.1Y
63 29 Cu
NG
62m 27 Co
B-
13.91M
NP
62 27 Co
NP
B-
1.50M
62 28 Ni
Abundance
3.59%
NNP
N2N
61 27 Co
B-
1.65H
61 28 Ni
N3N
60 28 Ni
NA
59 26 Fe
B-
44.56D
59 27 Co



$^{62}_{28}Ni$ DECAY GAMMA-RAY TABLE

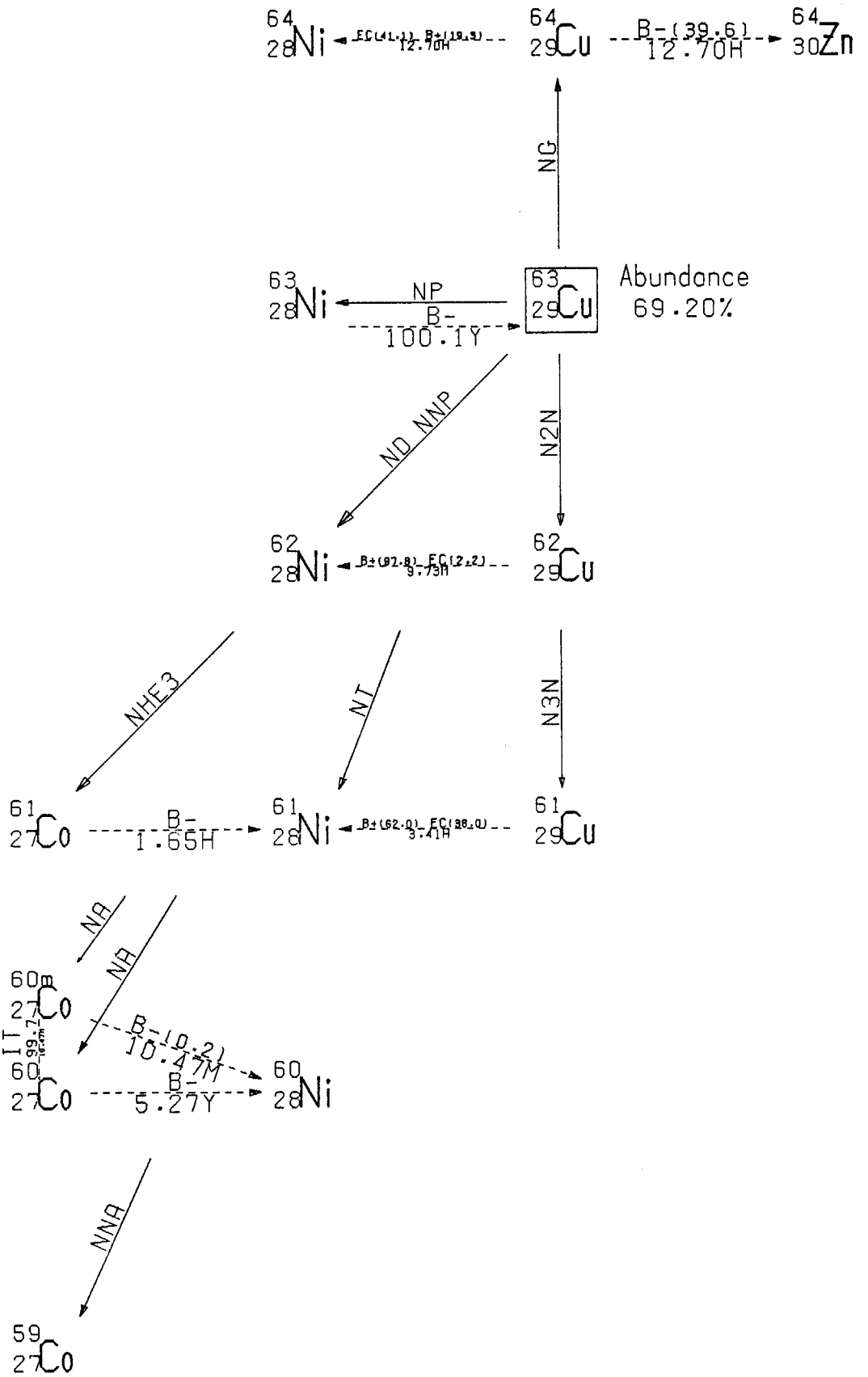
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{62}_{27}Co$	1.50 M	5.11E+05	1.17E+06	2.30E+06	1.13E+06	1.99E+06	2.36E+06	3.16E+06	1.89E+06	3.37E+06	3.27E+06
		0.00	82.60	15.97	13.54	2.36	1.11	0.84	0.44	0.43	0.29
$^{62m}_{27}Co$	13.91 M	5.11E+05	1.17E+06	1.18E+06	2.00E+06	1.72E+06	2.10E+06	7.78E+05	2.30E+06	8.76E+05	1.13E+06
		0.00	97.90	69.04	18.59	7.00	6.32	2.00	1.70	1.39	1.39
$^{59}_{26}Fe$	44.56 D	5.11E+05	1.10E+06	1.29E+06	1.92E+05	1.43E+05	3.35E+05				
		0.00	56.50	43.50	2.66	0.87	0.27				
$^{61}_{27}Co$	1.65 H	5.11E+05	6.71E+04	9.09E+05	6.42E+05						
		0.00	86.00	3.02	0.60						
$^{63}_{28}Ni$	100.1 Y										

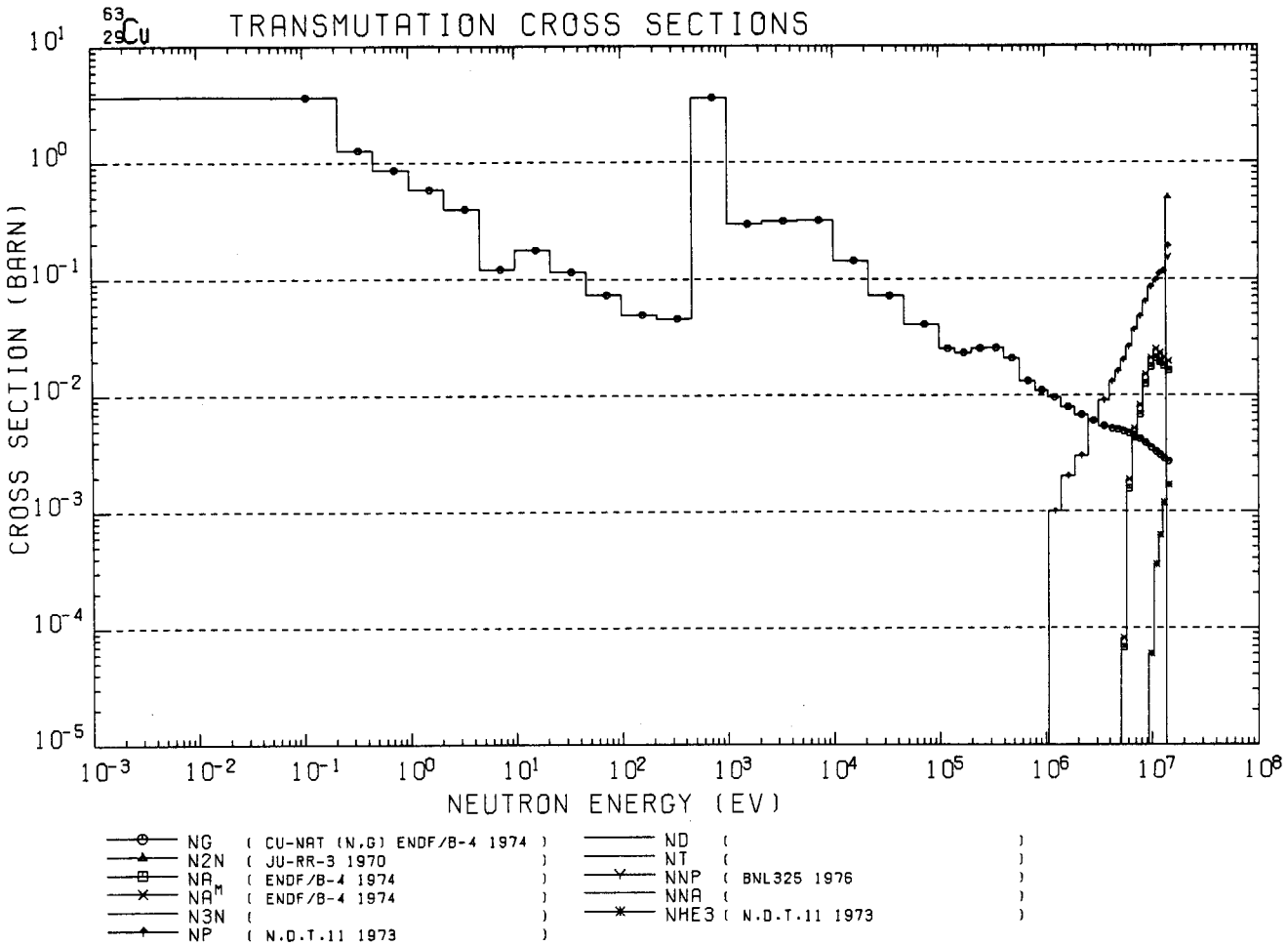

65 28 Ni
B-
2.52H
65 29 Cu
NG
64 27 Co
NP
B-
0.30S
64 28 Ni
Abundance
0.91%
ND NNP
N2N
63 27 Co
B-
27.50S
63 28 Ni
B-
100.1Y
63 29 Cu
N3N
62 28 Ni
NA
61 26 Fe
B-
5.98M
61 27 Co
B-
1.65H
61 28 Ni



$^{64}_{28}Ni$ DECAY GAMMA-RAY TABLE

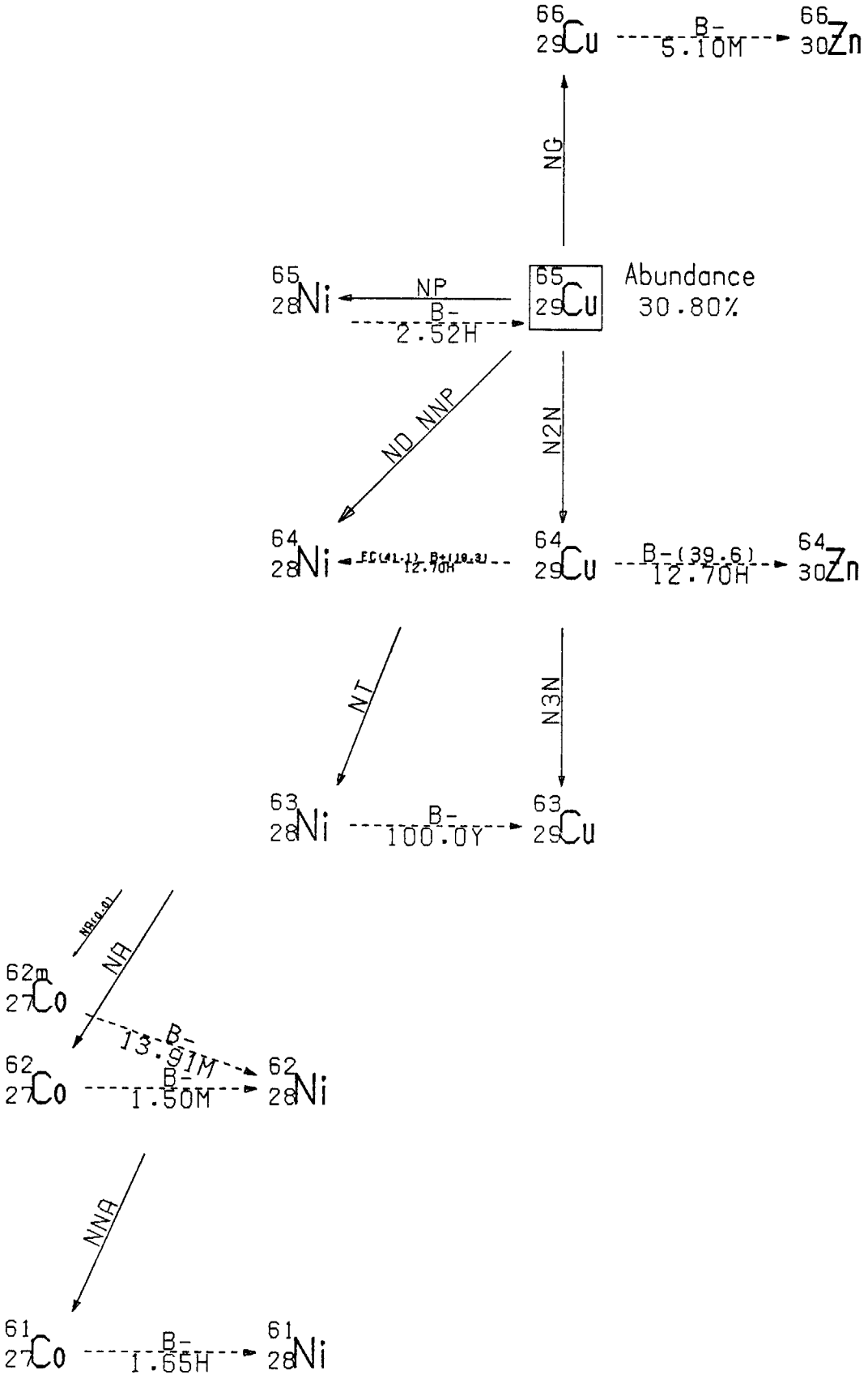
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{65}_{28}Ni$	2.52 H	5.11E+05	1.48E+06	1.12E+06	3.66E+05	1.62E+06	1.72E+06	5.08E+05	6.09E+05		
		0.00	23.50	15.19	4.78	0.49	0.40	0.30	0.15		
$^{63}_{28}Ni$	100.1 Y										
$^{64}_{27}Co$	0.30 S	5.11E+05	1.35E+06	9.31E+05							
		0.00	10.00	5.00							
$^{63}_{27}Co$	27.50 S	5.11E+05	8.71E+04	9.62E+05	1.56E+05	1.07E+06	2.17E+06	9.14E+05			
		0.00	49.30	2.64	1.78	1.65	1.27	0.46			
$^{61}_{26}Fe$	5.98 M	5.11E+06	1.21E+06	1.03E+06	2.98E+06	1.66E+06	1.20E+05	2.01E+06	1.78E+05	6.18E+05	7.48E+05
		0.00	43.60	42.96	22.42	7.01	5.36	4.44	2.02	0.93	0.81
$^{61}_{27}Co$	1.65 H	5.11E+05	6.71E+04	9.09E+05	8.42E+05						
		0.00	86.00	3.02	0.60						

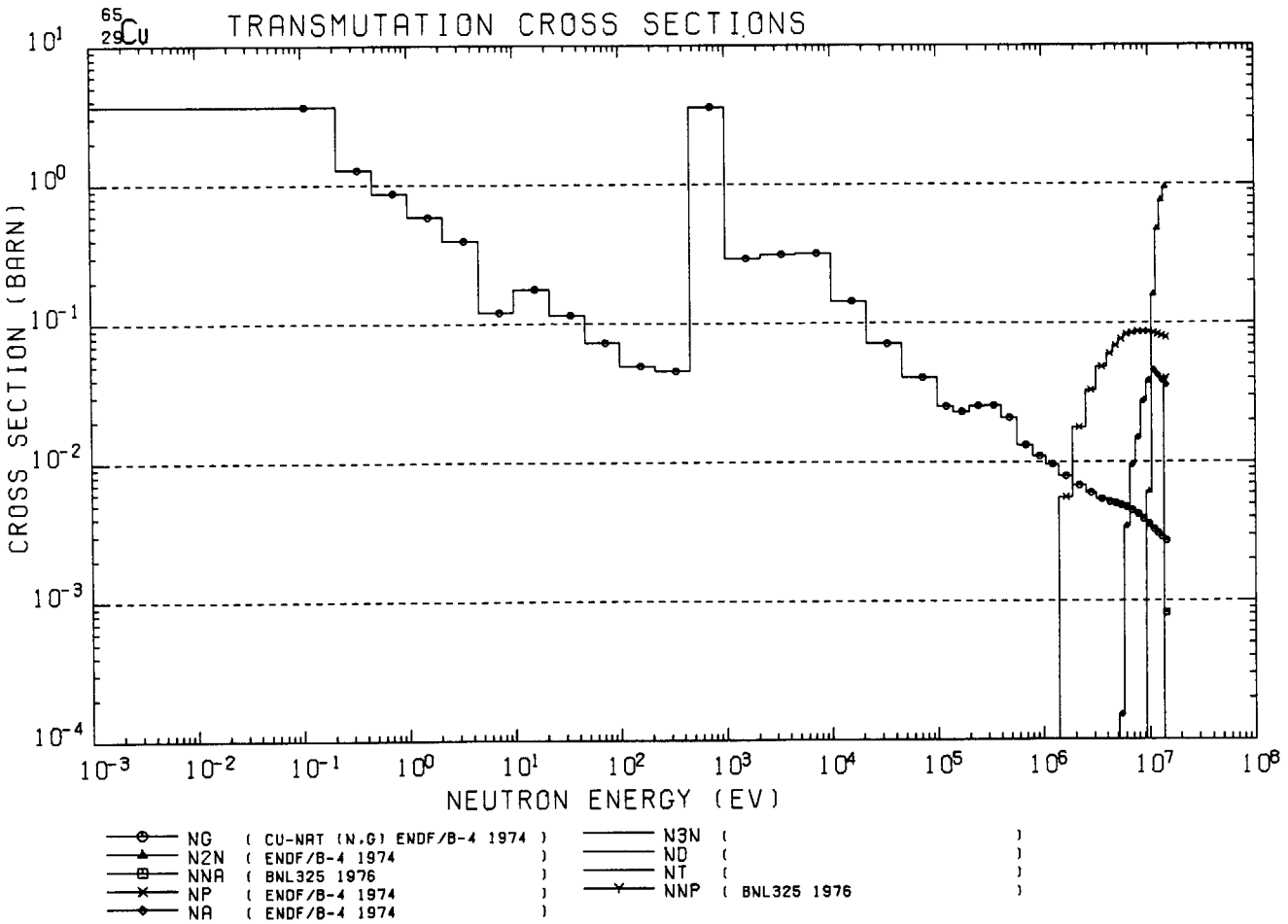

64 28 Ni
EC(41.1) B+(18.9)
12.70H
64 29 Cu
B-(39.6)
12.70H
64 30 Zn
NG
63 28 Ni
NP
B-
100.1Y
63 29 Cu
Abundance
69.20%
ND NNP
N2N
62 28 Ni
B+(97.8) EC(2.2)
9.73H
62 29 Cu
NHE3
NT
N3N
61 27 Co
B-
1.65H
61 28 Ni
B+(62.0) EC(38.0)
3.41H
61 29 Cu
NA
NA
60m 27 Co
IT
99.76%
B-(0.2)
10.47M
60 27 Co
B-
5.27Y
60 28 Ni
NNA
59 27 Co



$^{63}_{29}Cu$ DECAY GAMMA-RAY TABLE

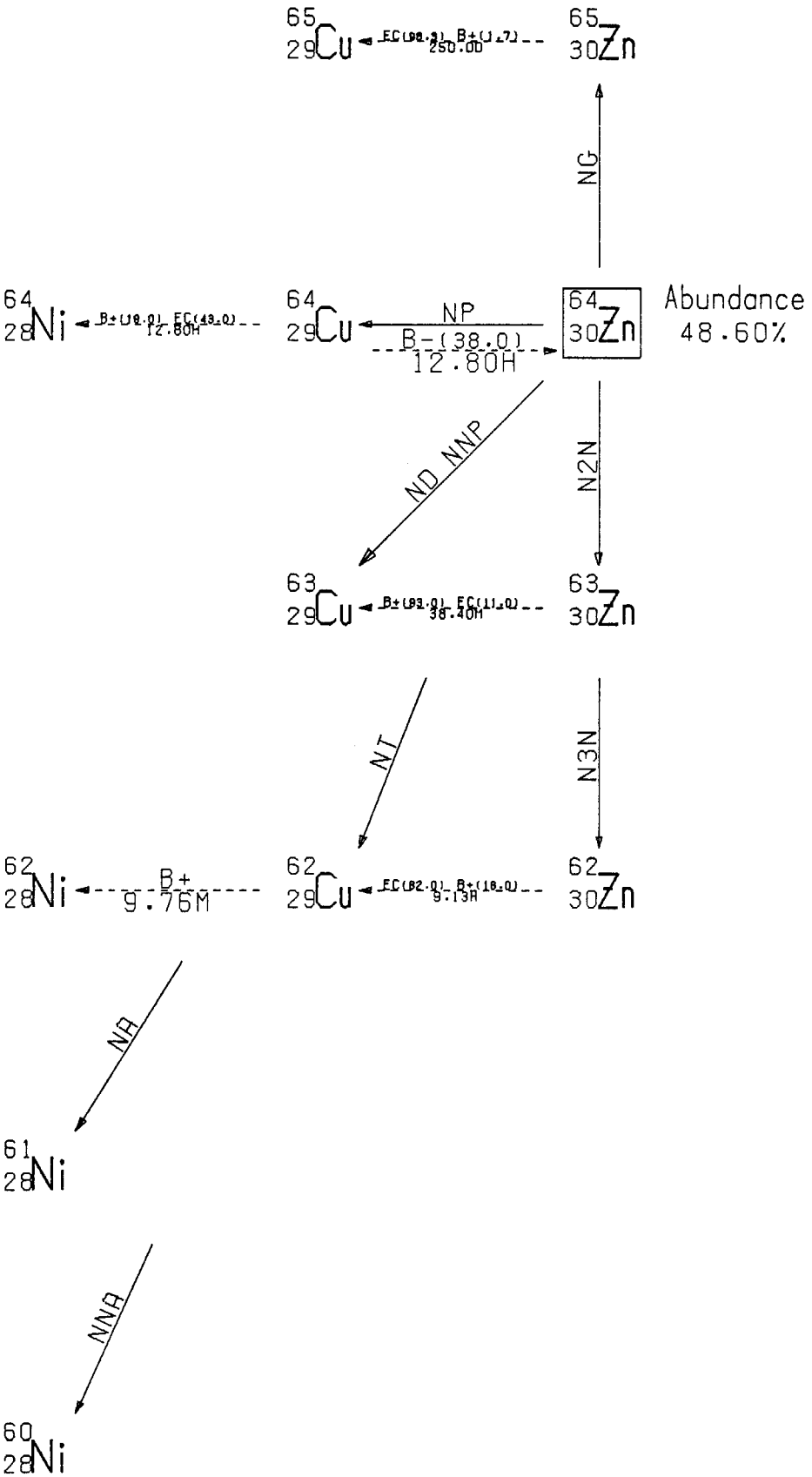
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{64}_{29}Cu$	12.70 H	5.11E+05	1.35E+05								
		38.00	0.60								
$^{62}_{29}Cu$	9.73 M	5.11E+05	1.17E+06	8.78E+05							
		196.00	0.36	0.16							
$^{60}_{27}Co$	5.27 Y	5.11E+05	1.17E+06	1.33E+06							
		0.00	100.00	100.00							
$^{60m}_{27}Co$	10.47 M	5.11E+05	5.80E+04	1.33E+06							
		0.00	2.00	0.24							
$^{61}_{29}Cu$	3.41 H	5.11E+05	2.84E+05	6.66E+05	6.71E+04	1.19E+06	3.73E+05	9.09E+05	5.89E+05	5.29E+05	8.16E+05
		0.00	13.20	11.79	5.93	4.92	2.34	1.28	1.25	0.60	0.46
$^{63}_{28}Ni$	100.1 Y										
$^{61}_{27}Co$	1.65 H	5.11E+05	6.71E+04	9.09E+05	8.42E+05						
		0.00	86.00	3.02	0.60						

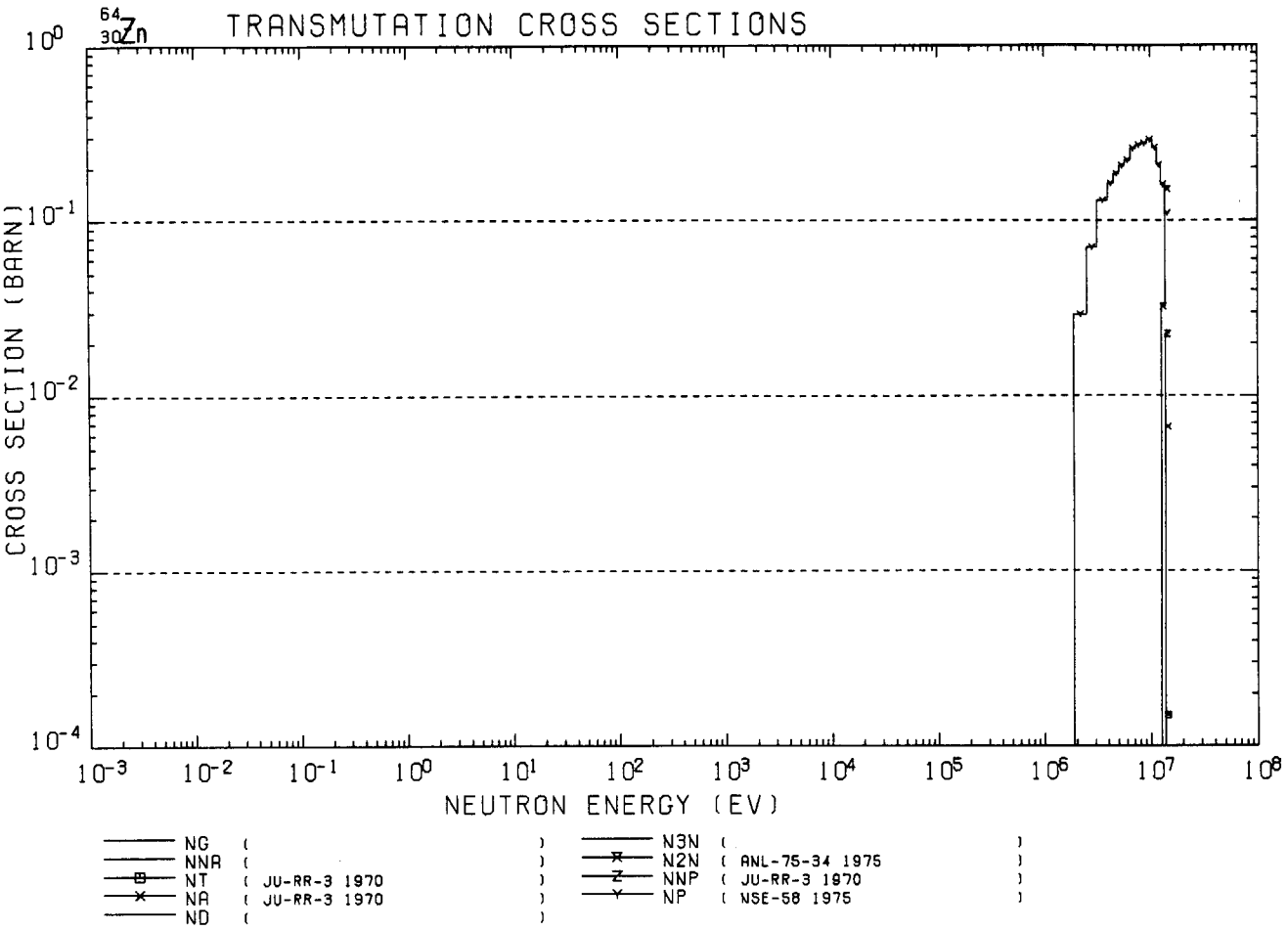

66 29 Cu
B-
5.10M
66 30 Zn
NG
65 28 Ni
NP
B-
2.52H
65 29 Cu
Abundance
30.80%
ND NNP
N2N
64 28 Ni
64 29 Cu
B-(39.6)
12.70H
64 30 Zn
NT
N3N
63 28 Ni
B-
100.0Y
63 29 Cu
NA
62m 27 Co
13.9M
B-
62 27 Co
B-
1.50M
62 28 Ni
NNA
61 27 Co
B-
1.65H
61 28 Ni



$^{65}_{29}Cu$ DECAY GAMMA-RAY TABLE

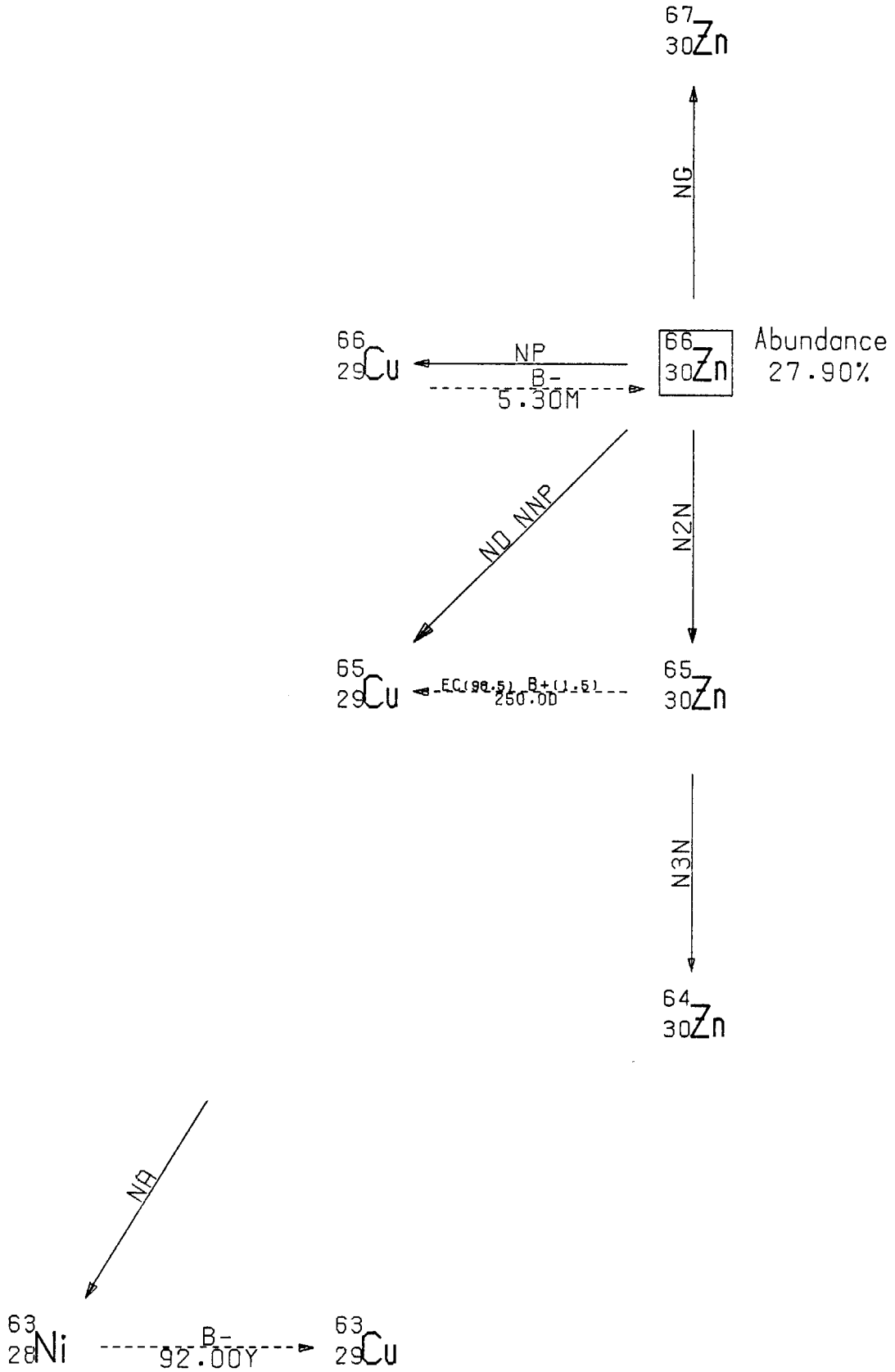
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{66}_{29}Cu$	5.10 M	5.11E+05	1.04E+06	8.33E+05							
		0.00	8.00	0.14							
$^{64}_{29}Cu$	12.70 H	5.11E+05	1.35E+06								
		38.00	0.60								
$^{61}_{27}Co$	1.65 H	5.11E+05	6.71E+04	9.09E+05	8.42E+05						
		0.00	86.00	3.02	0.60						
$^{65}_{28}Ni$	2.52 H	5.11E+05	1.48E+06	1.12E+06	3.66E+05	1.62E+06	1.72E+06	5.08E+05	8.09E+05		
		0.00	23.50	15.19	4.78	0.49	0.40	0.30	0.15		
$^{62m}_{27}Co$	13.91 M	5.11E+05	1.17E+06	1.16E+06	2.00E+06	1.72E+06	2.10E+06	7.78E+05	2.30E+06	8.76E+05	1.13E+06
		0.00	97.90	69.04	18.59	7.00	5.32	2.00	1.78	1.39	1.39
$^{62}_{27}Co$	1.50 M	5.11E+05	1.17E+06	2.30E+06	1.13E+06	1.99E+06	2.35E+06	3.16E+06	1.89E+06	3.37E+06	3.27E+06
		0.00	82.60	15.97	13.54	2.36	1.11	0.84	0.44	0.43	0.29
$^{63}_{28}Ni$	100.0 Y										

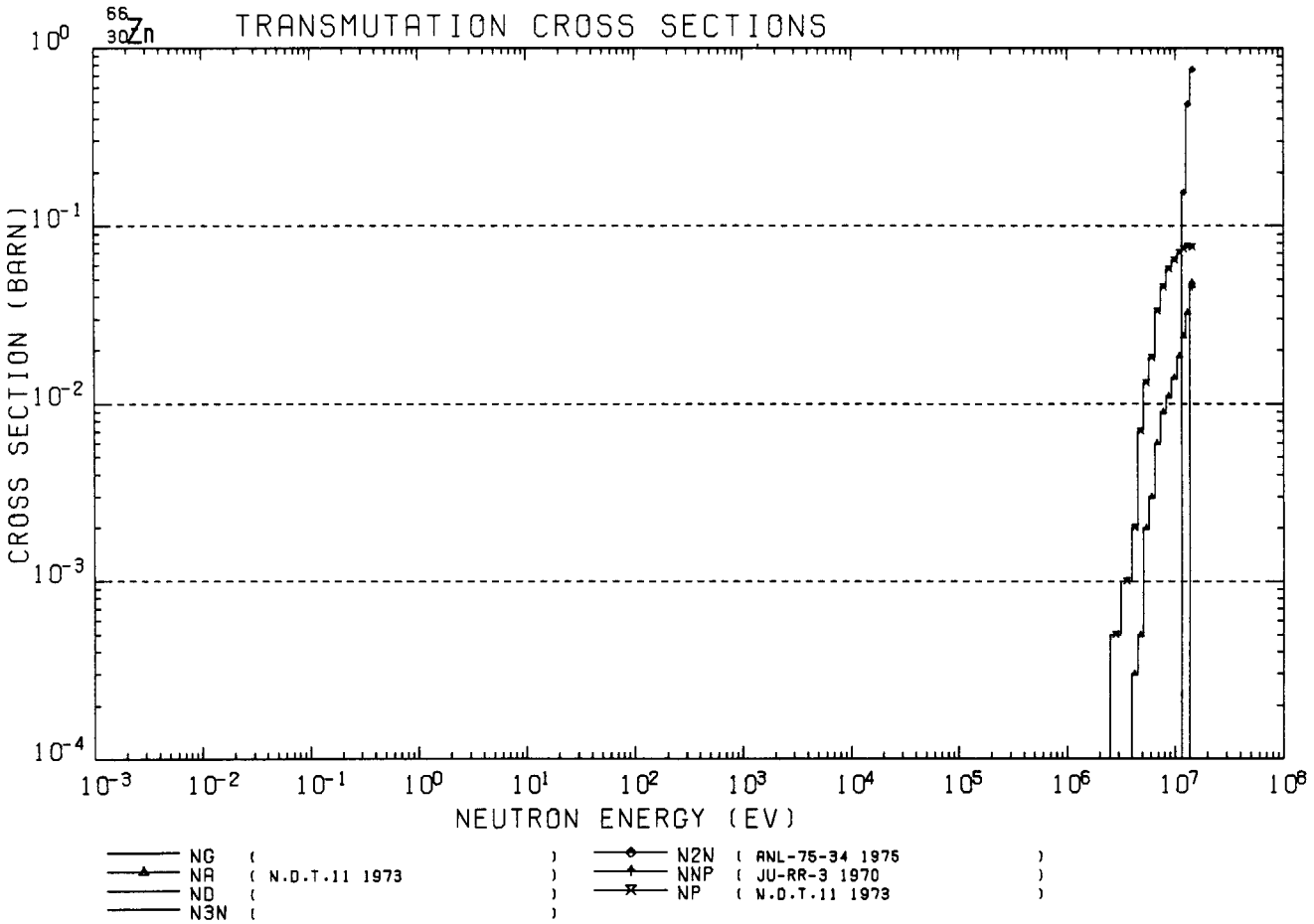

65 29Cu
EC(98.3) B+(1.7)
250.0D
65 30Zn
NG
64 28Ni
B+(98.0) EC(43.0)
12.80H
64 29Cu
NP
B-(38.0)
12.80H
64 30Zn
Abundance
48.60%
ND NNP
N2N
63 29Cu
B+(93.0) EC(1.0)
38.40M
63 30Zn
NT
N3N
62 28Ni
B+
9.76M
62 29Cu
EC(82.0) B+(18.0)
9.13H
62 30Zn
NA
61 28Ni
NNA
60 28Ni



$^{64}_{30}Zn$ DECAY GAMMA-RAY TABLE

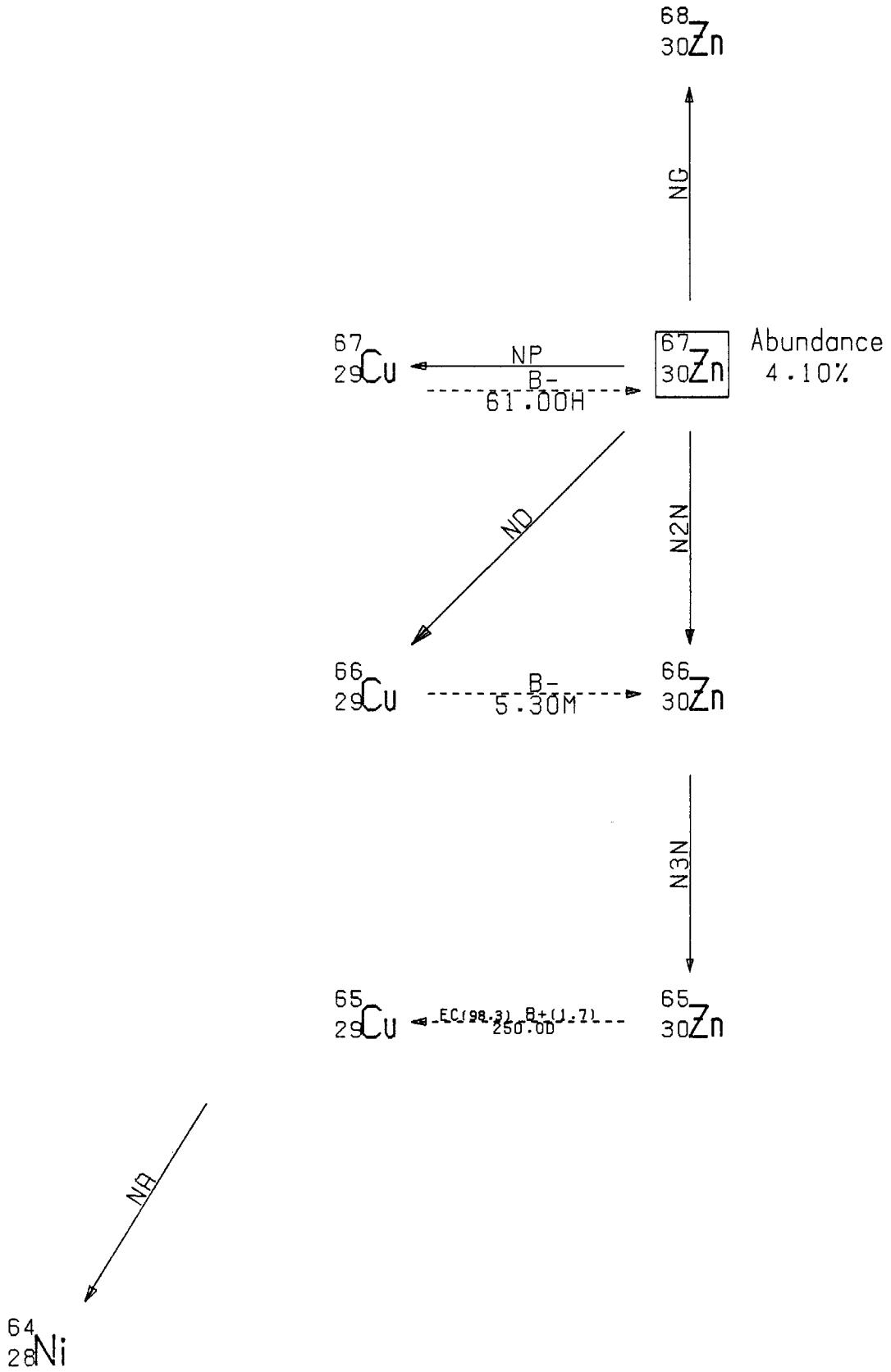
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{62}_{30}Zn$	9.13 H	5.11E+05	5.97E+05	4.09E+04	5.48E+05	5.08E+05	2.43E+05	3.94E+05	2.47E+05	2.60E+05	3.50E+05
		47.00	24.00	23.94	14.41	13.92	2.37	2.10	1.78	1.27	0.42
$^{65}_{30}Zn$	250.0 D	5.11E+05	1.12E+06								
		3.40	50.75								
$^{62}_{29}Cu$	9.76 M	5.11E+05	1.17E+06	8.75E+05							
		196.00	0.36	0.16							
$^{63}_{30}Zn$	38.40 M	5.11E+05	5.70E+05	9.62E+05	1.41E+06	4.50E+05	1.55E+06	1.12E+06			
		186.00	8.40	6.65	0.77	0.24	0.13	0.11			
$^{64}_{29}Cu$	12.80 H	5.11E+05	1.35E+06								
		38.00	0.60								

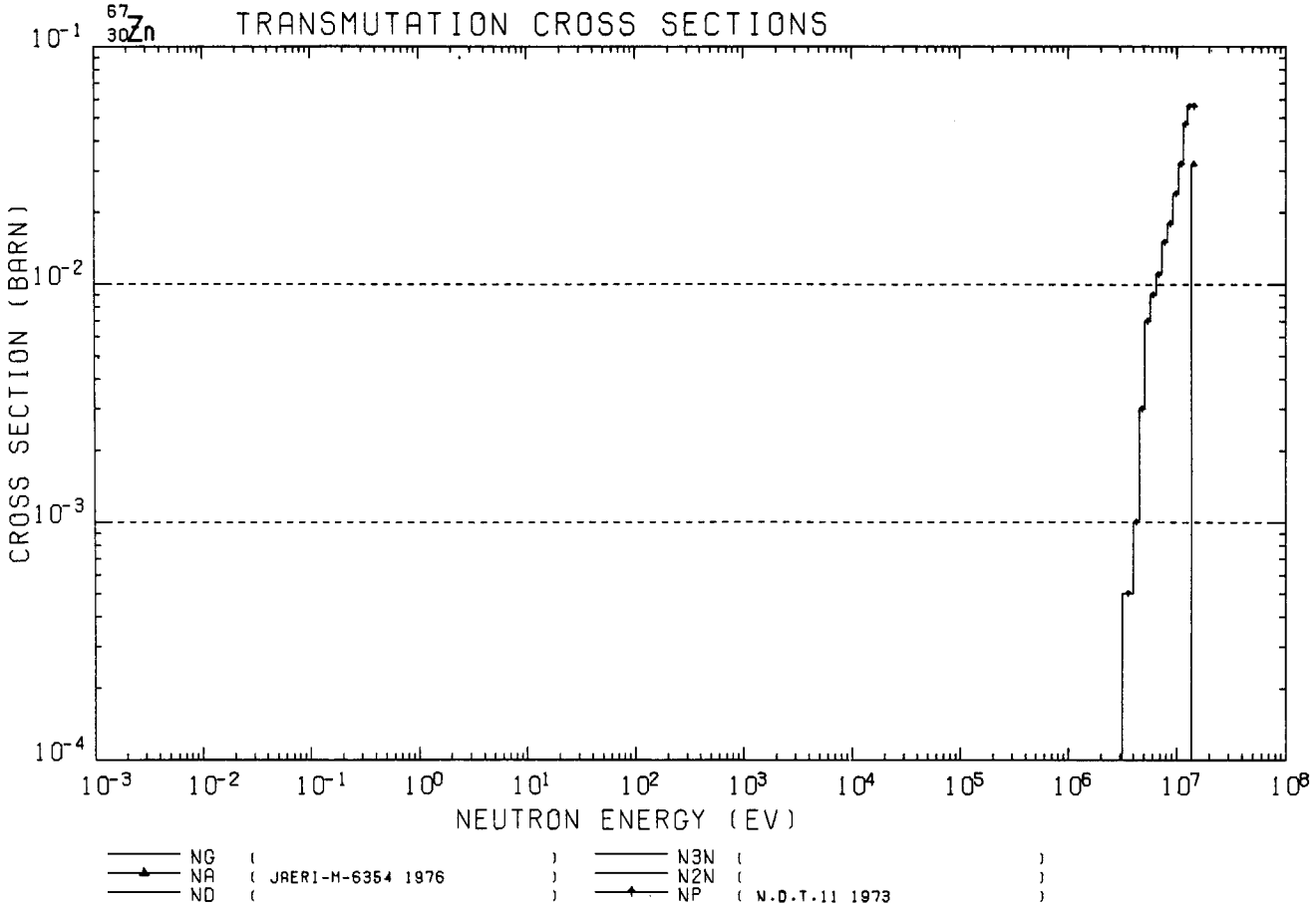

67 30Zn
NG
66 29Cu
NP
B-
5.30M
66 30Zn
Abundance
27.90%
ND NNP
N2N
65 29Cu
EC(98.5) B+(1.5)
250.0D
65 30Zn
N3N
64 30Zn
NA
63 28Ni
B-
92.00Y
63 29Cu



66 30Zn DECAY GAMMA-RAY TABLE

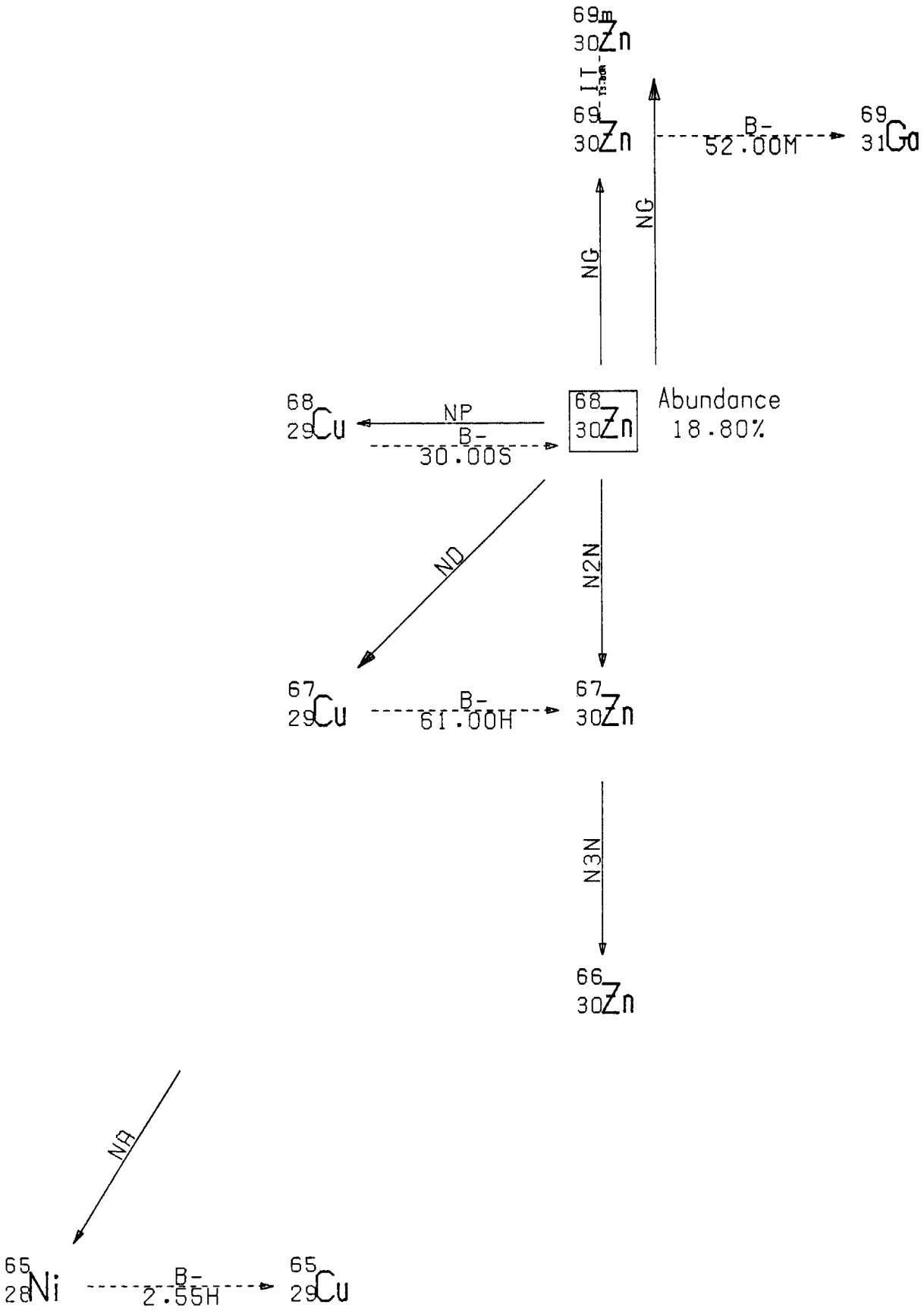
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-		
63 28Ni	92.00	Y			
65 30Zn	250.0	D	5.11E+05 3.40	1.12E+06 50.75	
66 29Cu	5.30	M	5.11E+05 0.00	1.04E+06 8.00	8.33E+05 0.14

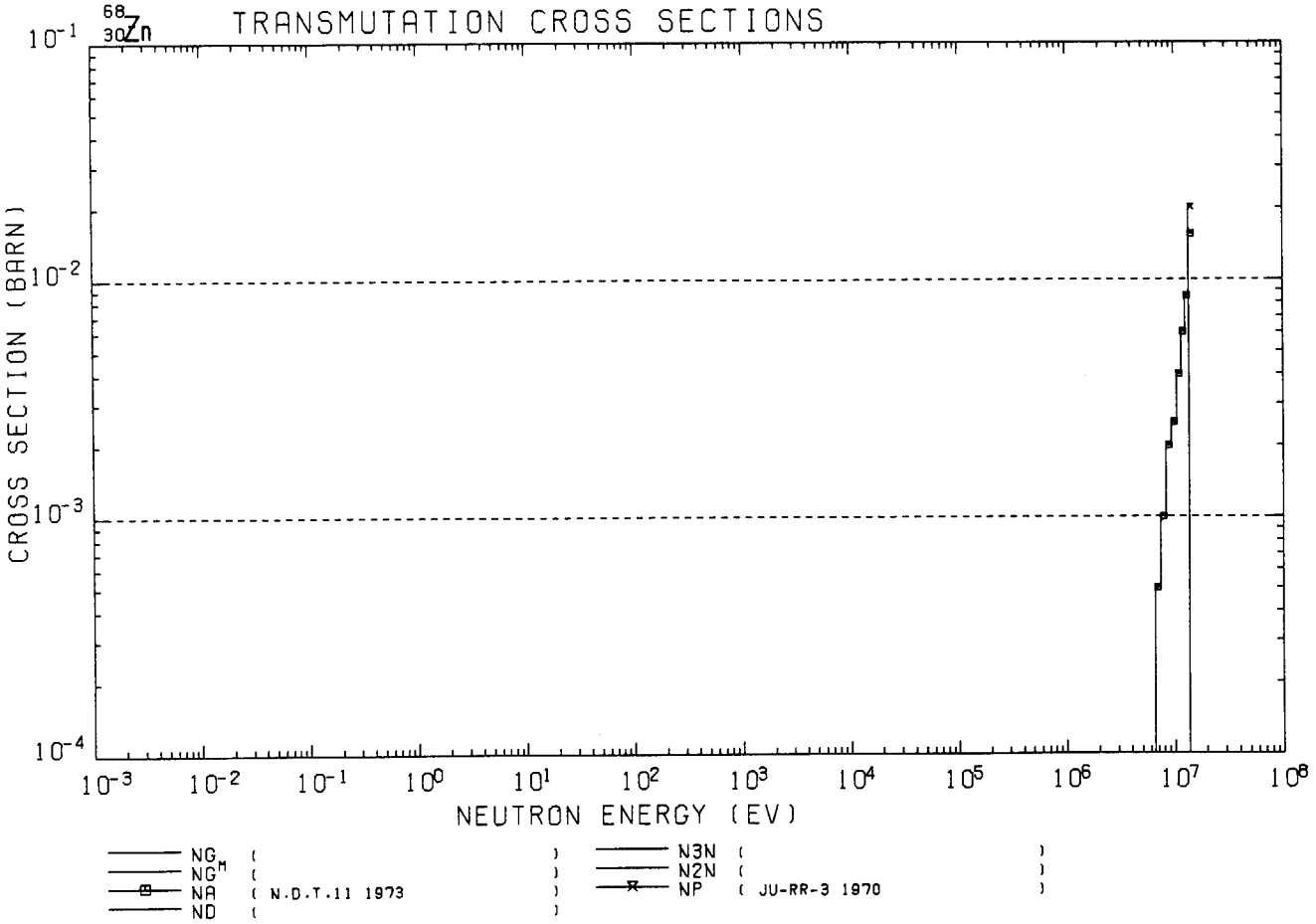

68 30Zn
NG
67 29Cu
NP
B-
61.00H
67 30Zn
Abundance
4.10%
ND
N2N
66 29Cu
B-
5.30M
66 30Zn
N3N
65 29Cu
EC(98.3) B+(1.7)
250.0D
65 30Zn
NA
64 28Ni



$^{67}_{30}Zn$ DECAY GAMMA-RAY TABLE

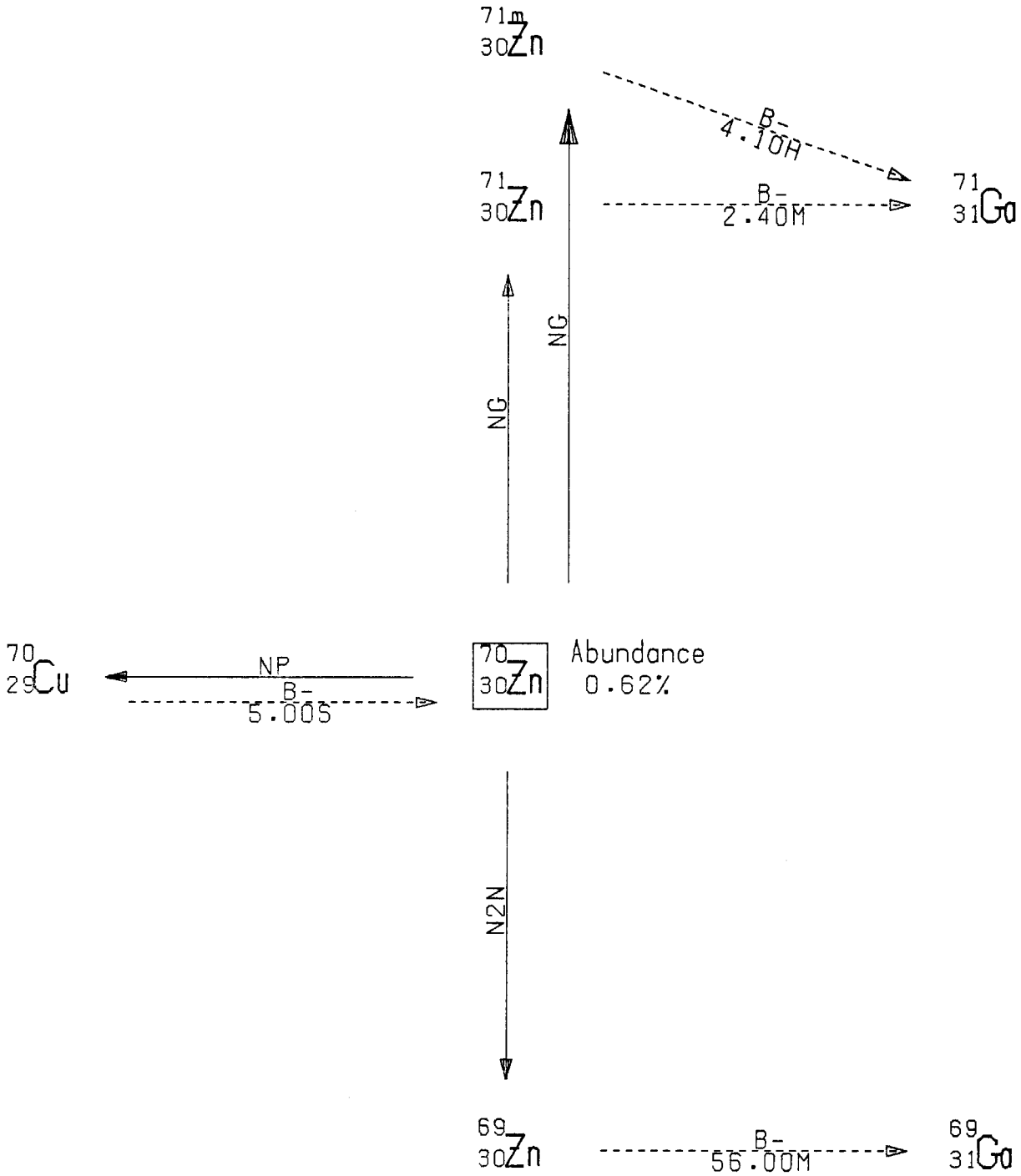
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-						
$^{66}_{29}Cu$	5.30 M	5.11E+05	1.04E+06	8.33E+05				
		0.00	8.00	0.14				
$^{65}_{30}Zn$	250.0 D	6.11E+06	1.12E+06					
		3.40	50.75					
$^{67}_{29}Cu$	61.00 H	5.11E+05	1.85E+05	9.33E+04	9.13E+04	3.00E+05	3.94E+05	2.08E+05
		0.00	47.00	16.93	7.29	0.74	0.20	0.11

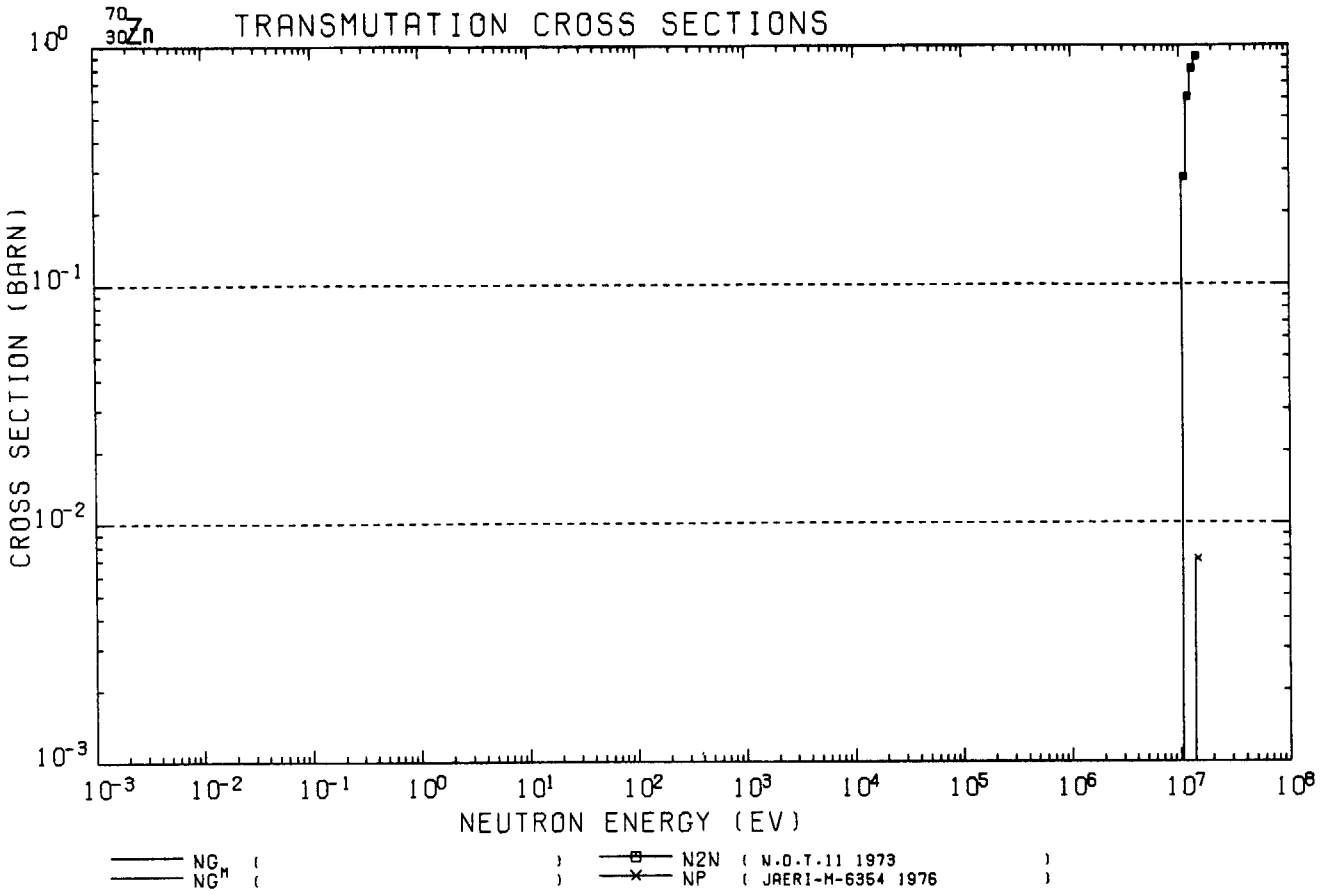

69m 30Zn
IT 13.80H
69 30Zn
B- 52.00M
69 31Ga
NG
NG
68 29Cu
NP
B- 30.00S
68 30Zn
Abundance 18.80%
ND
N2N
67 29Cu
B- 61.00H
67 30Zn
N3N
66 30Zn
NA
65 28Ni
B- 2.55H
65 29Cu



$^{68}_{30}Zn$ DECAY GAMMA-RAY TABLE

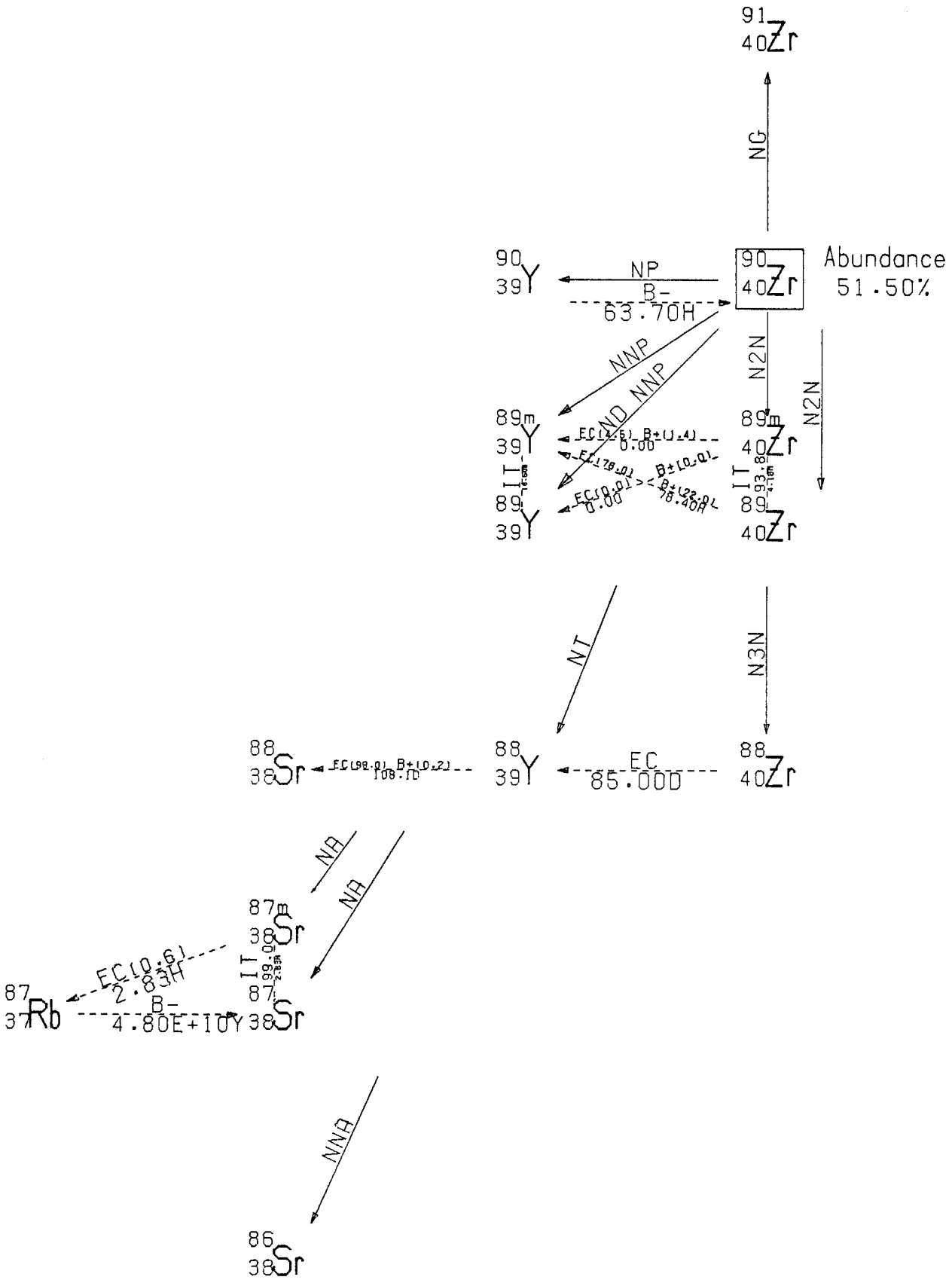
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{69}_{30}Zn$	52.00	M	5.11E+05									
			0.00									
$^{69m}_{30}Zn$	13.80	H	5.11E+05	4.39E+05								
			0.00	94.80								
$^{65}_{28}Ni$	2.55	H	5.11E+05	1.48E+06	1.12E+06	3.66E+05	1.62E+06	1.72E+06	5.08E+05	6.09E+05		
			0.00	23.50	15.19	4.78	0.49	0.40	0.30	0.15		
$^{67}_{29}Cu$	61.00	H	5.11E+05	1.85E+05	9.33E+04	9.13E+04	3.00E+05	3.94E+05	2.09E+05			
			0.00	47.00	16.93	7.29	0.74	0.20	0.11			
$^{68}_{29}Cu$	30.00	S	5.11E+05	5.26E+05	8.46E+04	1.08E+06	1.11E+05	1.26E+06	1.34E+06	6.37E+05	1.04E+06	1.52E+06
			0.00	74.50	71.86	63.73	16.62	12.53	10.44	8.35	8.21	5.50

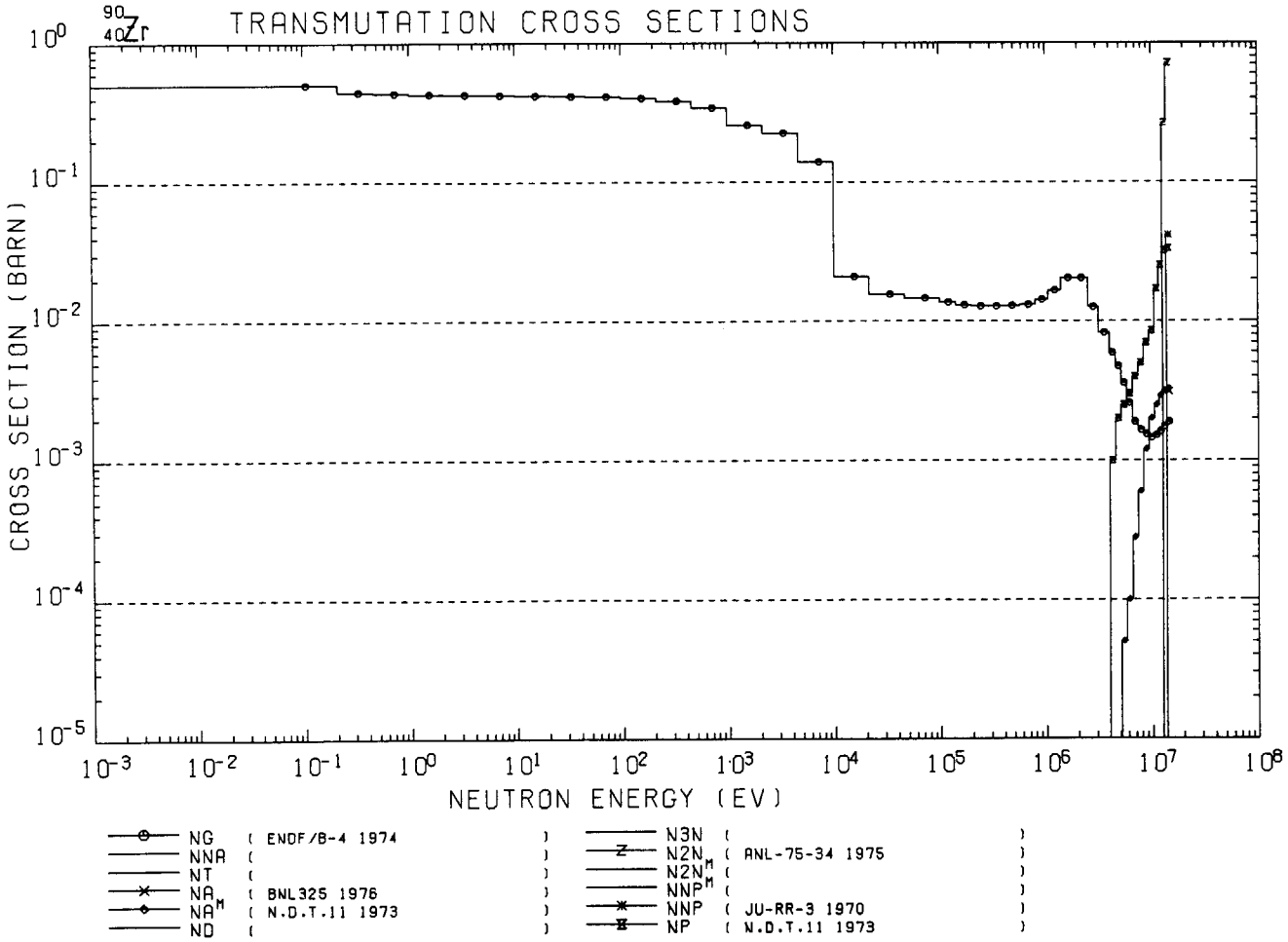

71m 30Zn
B- 4.10H
71 30Zn
B- 2.40M
71 31Ga
NG
NG
70 29Cu
NP
B- 5.00S
70 30Zn
Abundance 0.62%
N2N
69 30Zn
B- 56.00M
69 31Ga



$^{70}_{30}Zn$ DECAY GAMMA-RAY TABLE

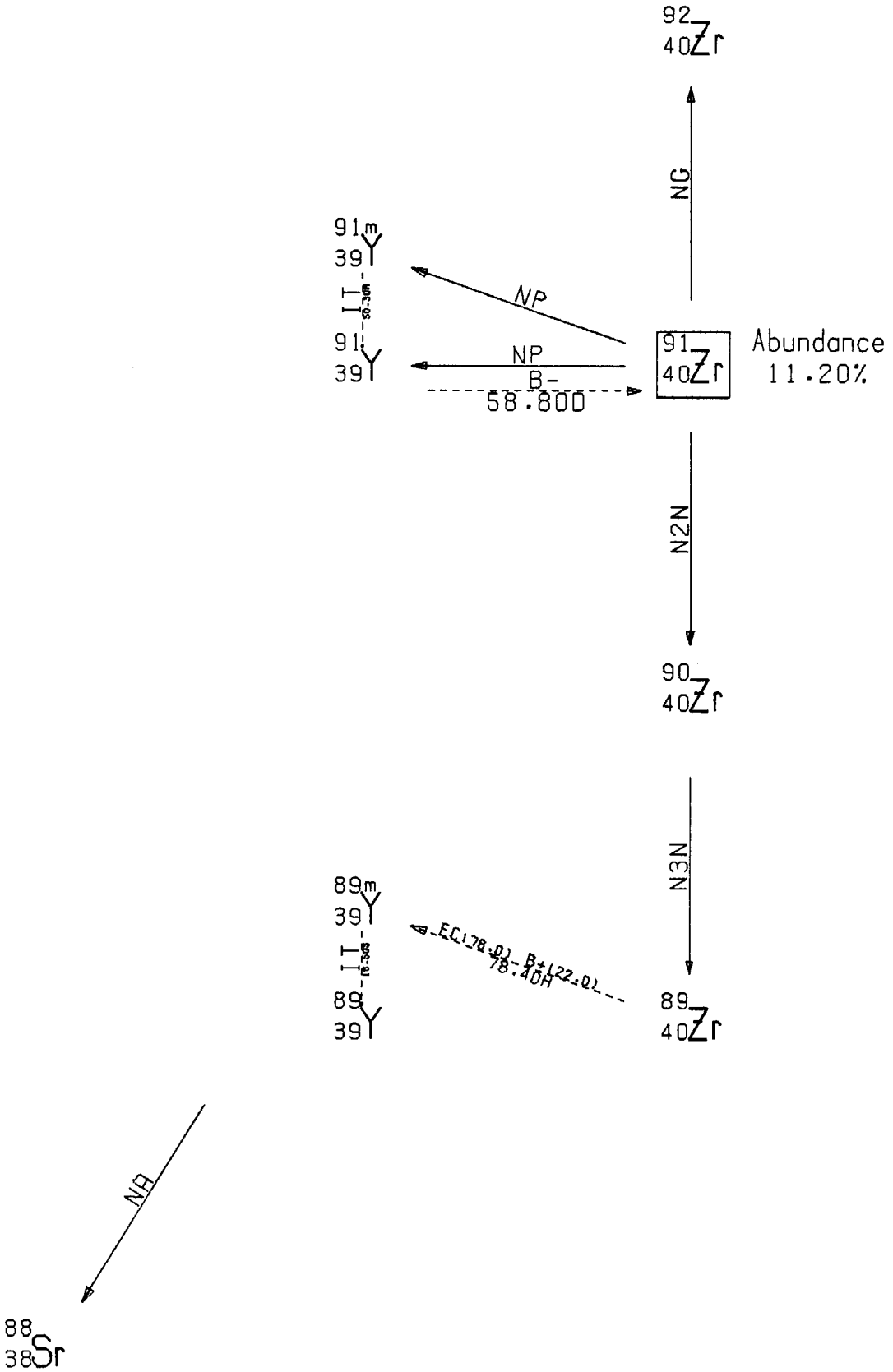
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{71}_{30}Zn$	2.40 M	5.11E+05	5.12E+05	9.10E+05	3.90E+05	1.22E+05	1.12E+05	6.67E+05	9.65E+05	3.99E+05	7.21E+05
		0.00	30.00	7.36	3.63	2.82	2.06	0.85	0.73	0.58	0.52
$^{71m}_{30}Zn$	4.10 H	5.11E+05	3.86E+05	4.67E+05	6.20E+05	5.12E+05	5.96E+05	1.43E+05	9.65E+05	7.63E+05	1.21E+05
		0.00	92.00	62.25	56.70	28.23	27.93	5.61	4.30	3.26	2.89
$^{69}_{30}Zn$	56.00 M	5.11E+05									
		0.00									
$^{70}_{29}Cu$	5.00 S	5.11E+05	8.65E+05	1.86E+06							
		0.00	54.00	2.22							

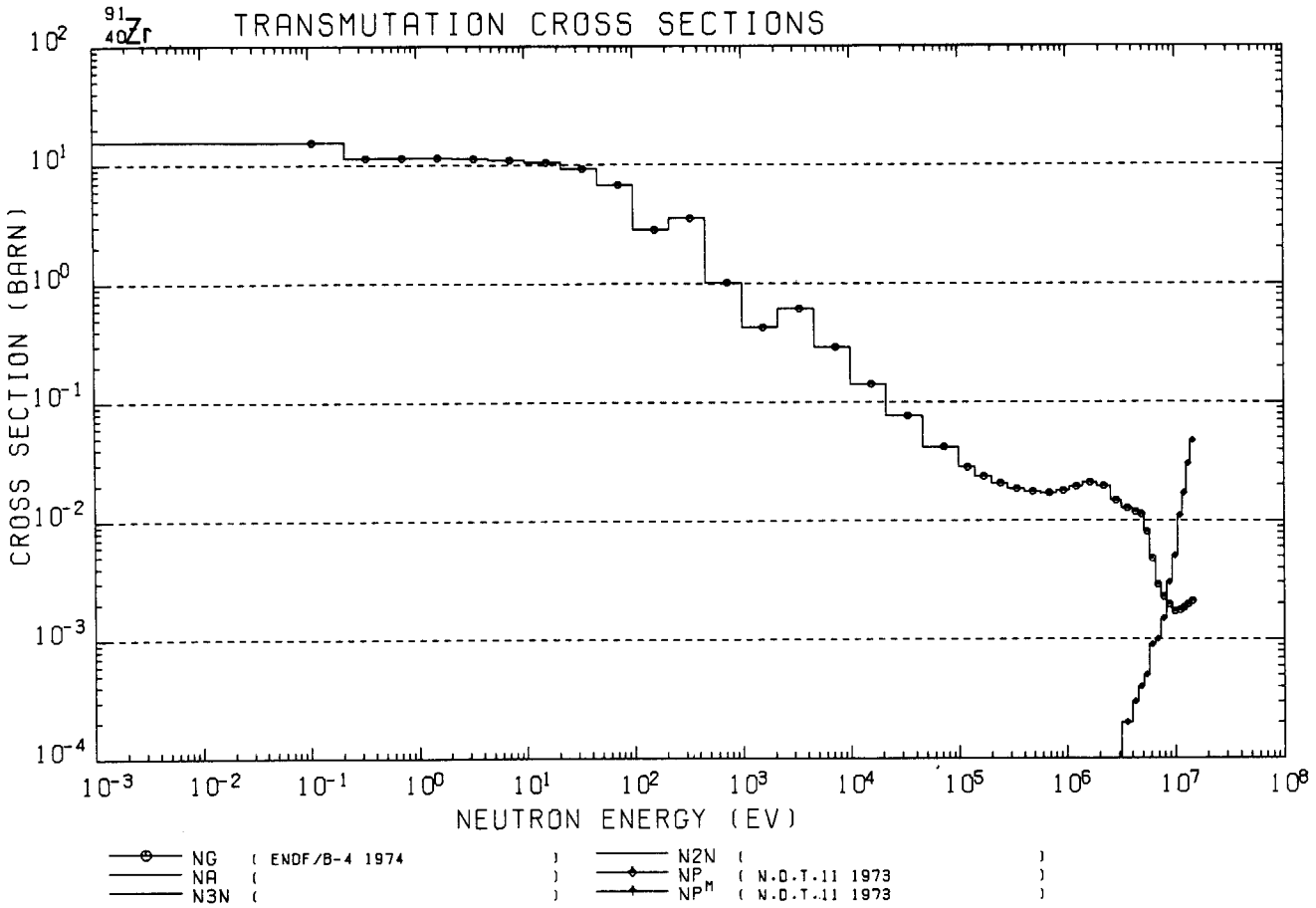

91 40 Zr
NG
90 39 Y
NP
B-
63.70H
90 40 Zr
Abundance
51.50%
NNP
ND NNP
N2N
N2N
89m 39 Y
89 39 Y
89m 40 Zr
89 40 Zr
NT
N3N
88 38 Sr
88 39 Y
EC
85.00D
88 40 Zr
NA
NA
87m 38 Sr
87 37 Rb
B-
4.80E+10Y
87 38 Sr
NNA
86 38 Sr



$^{90}_{40}Zr$ DECAY GAMMA-RAY TABLE

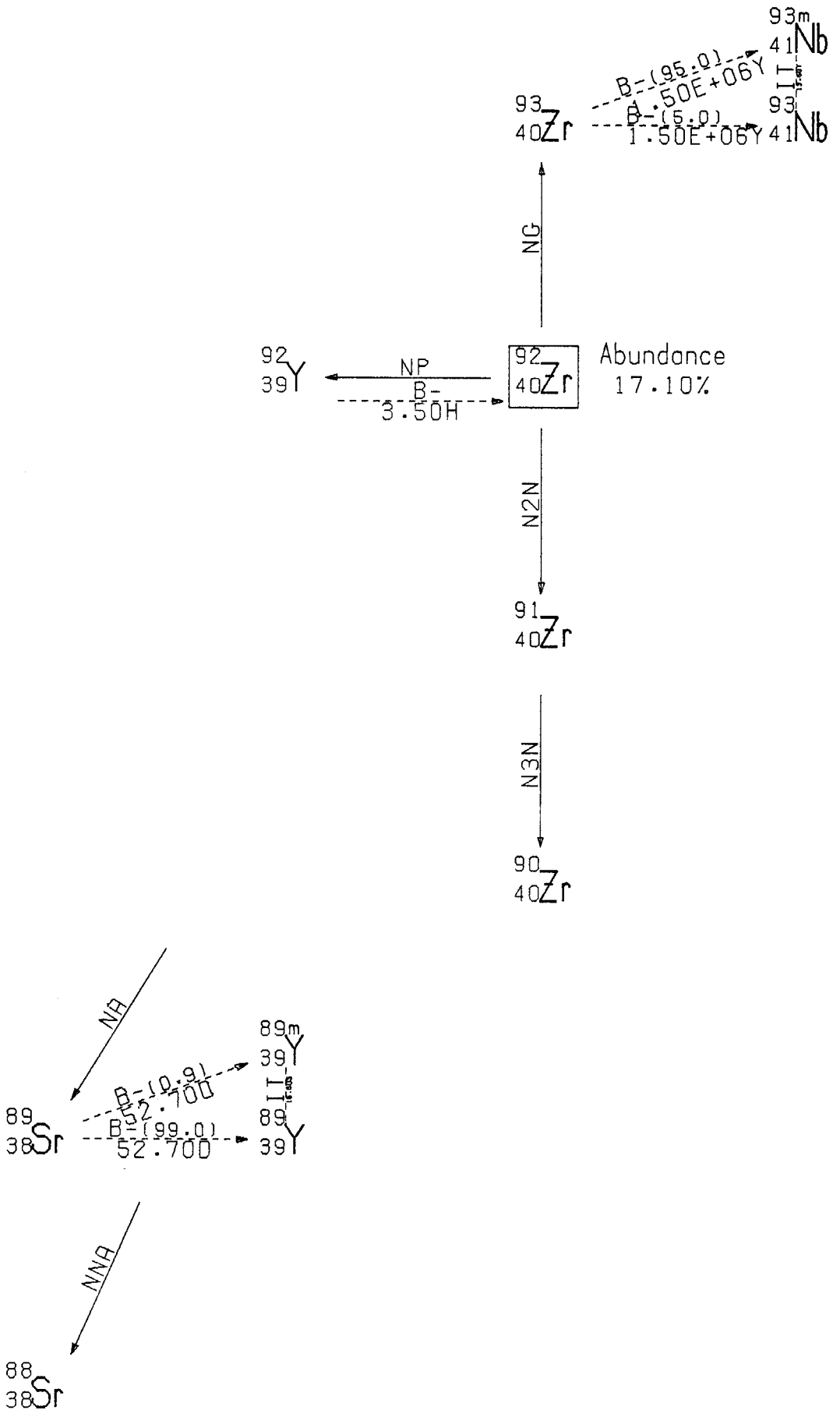
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
$^{87m}_{38}Sr$	2.83 H	5.11E+05	3.88E+05		
		0.00	82.00		
$^{87}_{37}Rb$	4.80E+10Y				
$^{88}_{40}Zr$	85.00 D	5.11E+05	3.94E+05		
		0.00	97.30		
$^{88}_{39}Y$	108.1 D	5.11E+05	1.84E+06	8.98E+05	2.73E+06
		0.00	99.34	91.37	0.72
$^{89}_{40}Zr$	78.40 H	5.11E+05	9.09E+05	1.71E+06	1.74E+06
		44.00	99.01	0.77	0.13
$^{89m}_{40}Zr$	4.18 M	5.11E+05	5.88E+05	1.51E+06	
		2.97	89.50	6.52	
$^{89m}_{39}Y$	16.50 S	5.11E+05	9.09E+05		
		0.00	99.14		
$^{90}_{39}Y$	63.70 H				

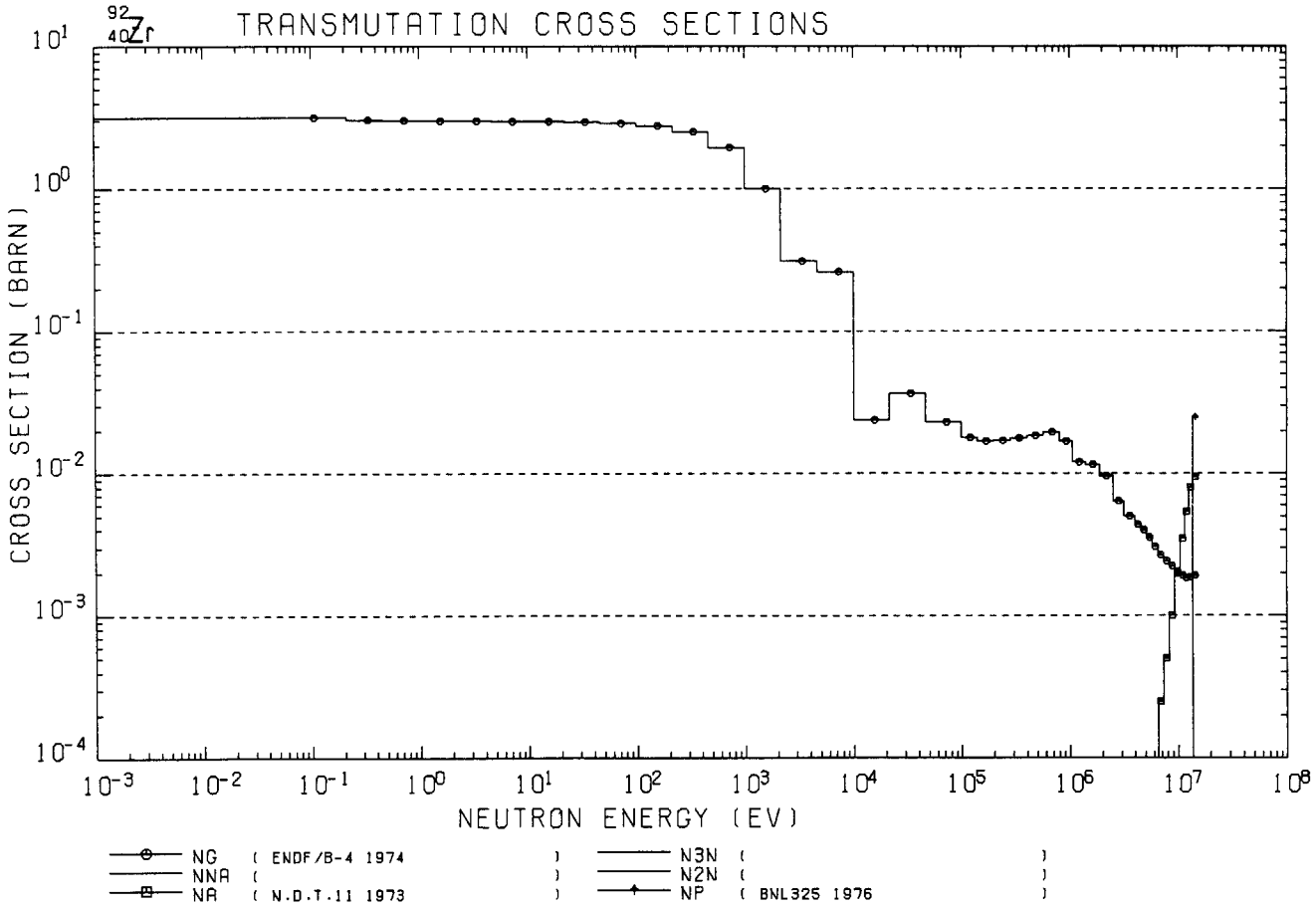

92 40Zr
NG
91m 39Y
IT
50.30h
91 39Y
NP
NP
B-
58.800
91 40Zr
Abundance
11.20%
N2N
90 40Zr
N3N
89m 39Y
IT
16.06h
89 39Y
EC 78.0% B+ 22.0%
78.40h
89 40Zr
NA
88 38Sr



$^{91}_{40}Zr$ DECAY GAMMA-RAY TABLE

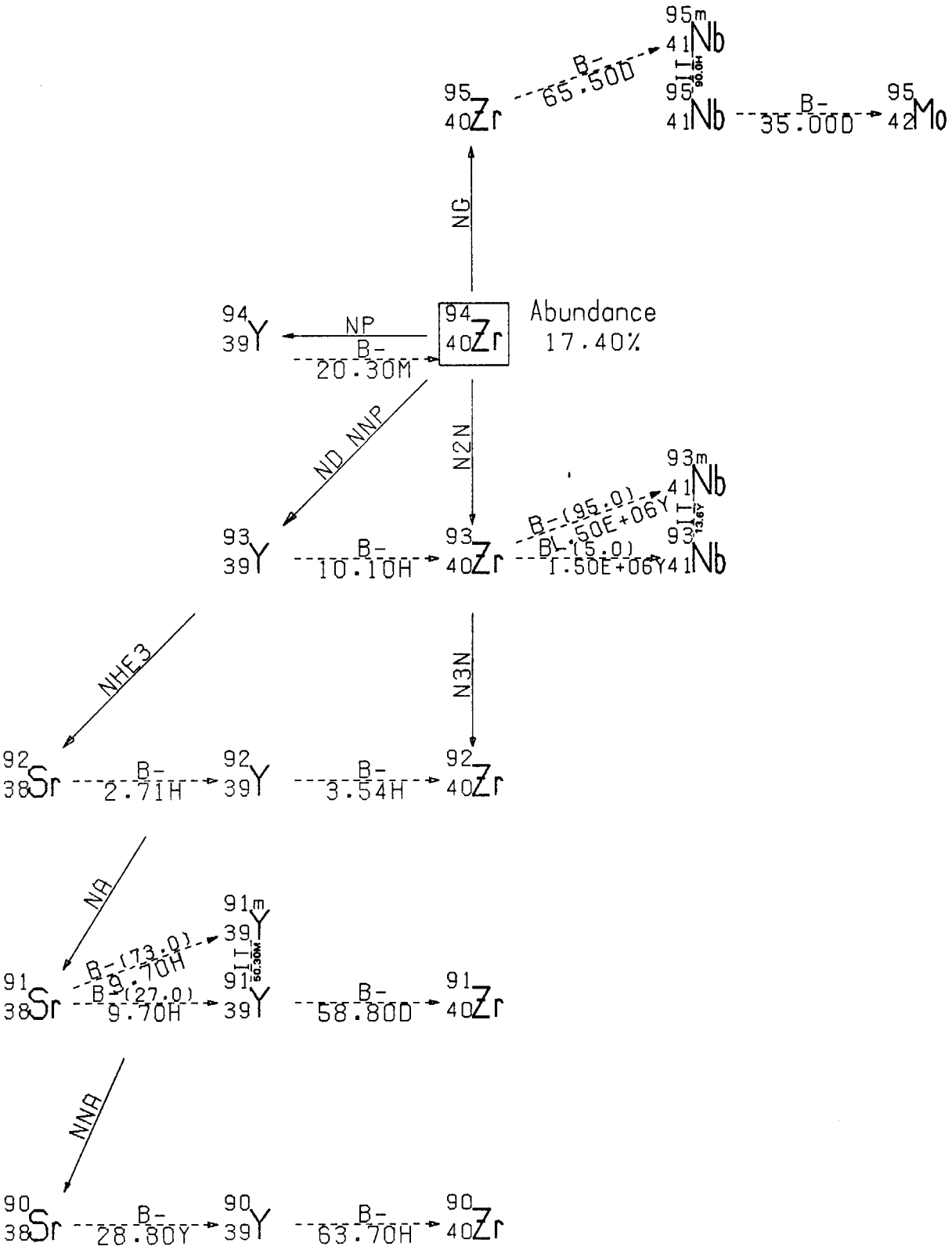
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
$^{89}_{40}Zr$	78.40	H	5.11E+05	9.09E+05	1.71E+06	1.74E+06
			44.00	99.01	0.77	0.13
$^{89m}_{39}Y$	16.50	S	5.11E+05	9.09E+05		
			0.00	99.14		
$^{91}_{39}Y$	58.80	D	5.11E+05	1.20E+06		
			0.00	0.30		
$^{91m}_{39}Y$	50.30	M	5.11E+05	5.56E+05		
			0.00	94.90		

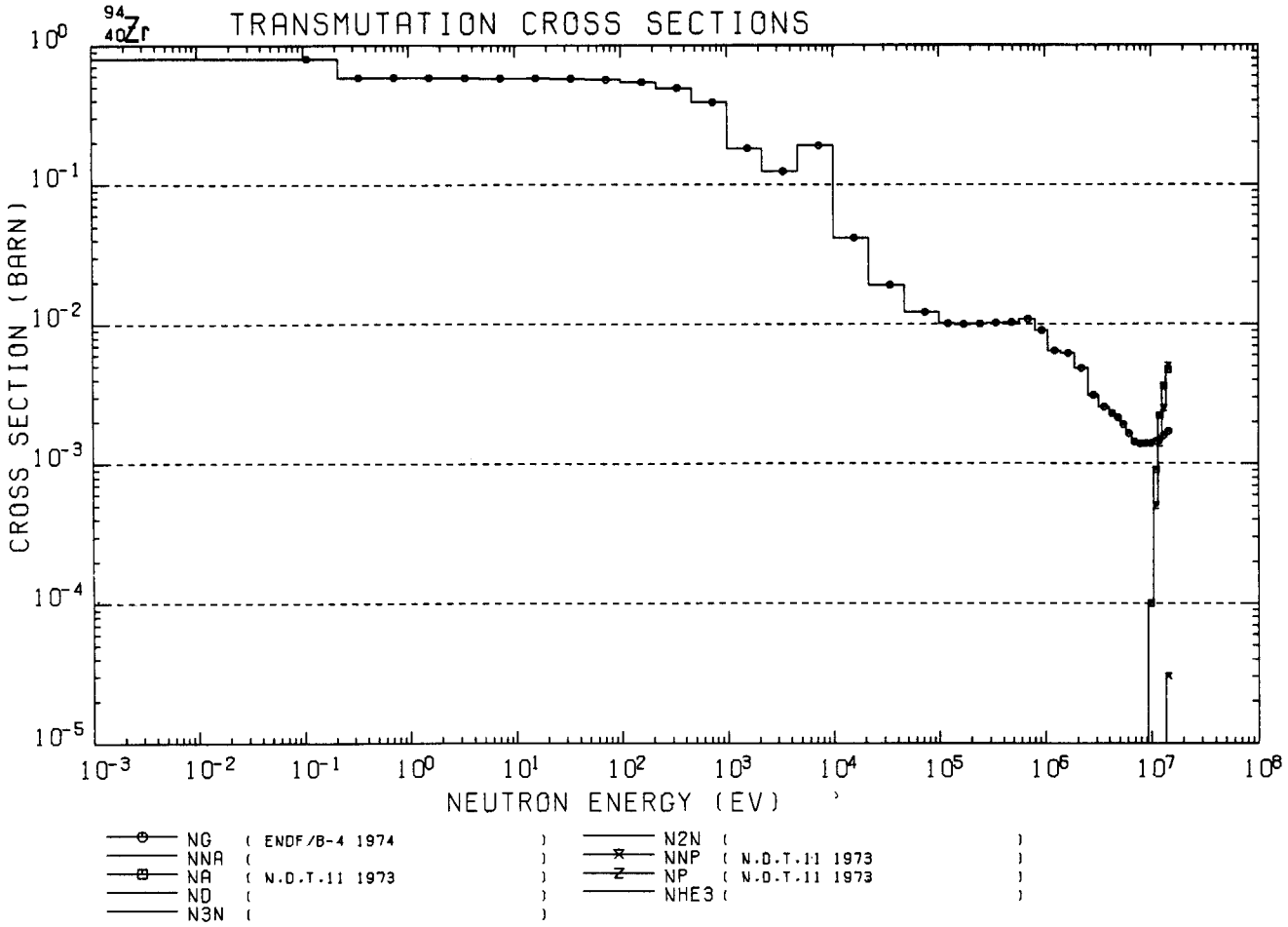

93m 41 Nb
B- (95.0)
1.50E+06Y
93 40 Zr
B- (5.0)
1.50E+06Y
93 41 Nb
IT
NG
92 39 Y
NP
B-
3.50H
92 40 Zr
Abundance
17.10%
N2N
91 40 Zr
N3N
90 40 Zr
NA
89m 39 Y
B- (0.9)
52.70D
89 38 Sr
B- (99.0)
52.70D
89 39 Y
IT
NNA
88 38 Sr



$^{92}_{40}Zr$ DECAY GAMMA-RAY TABLE

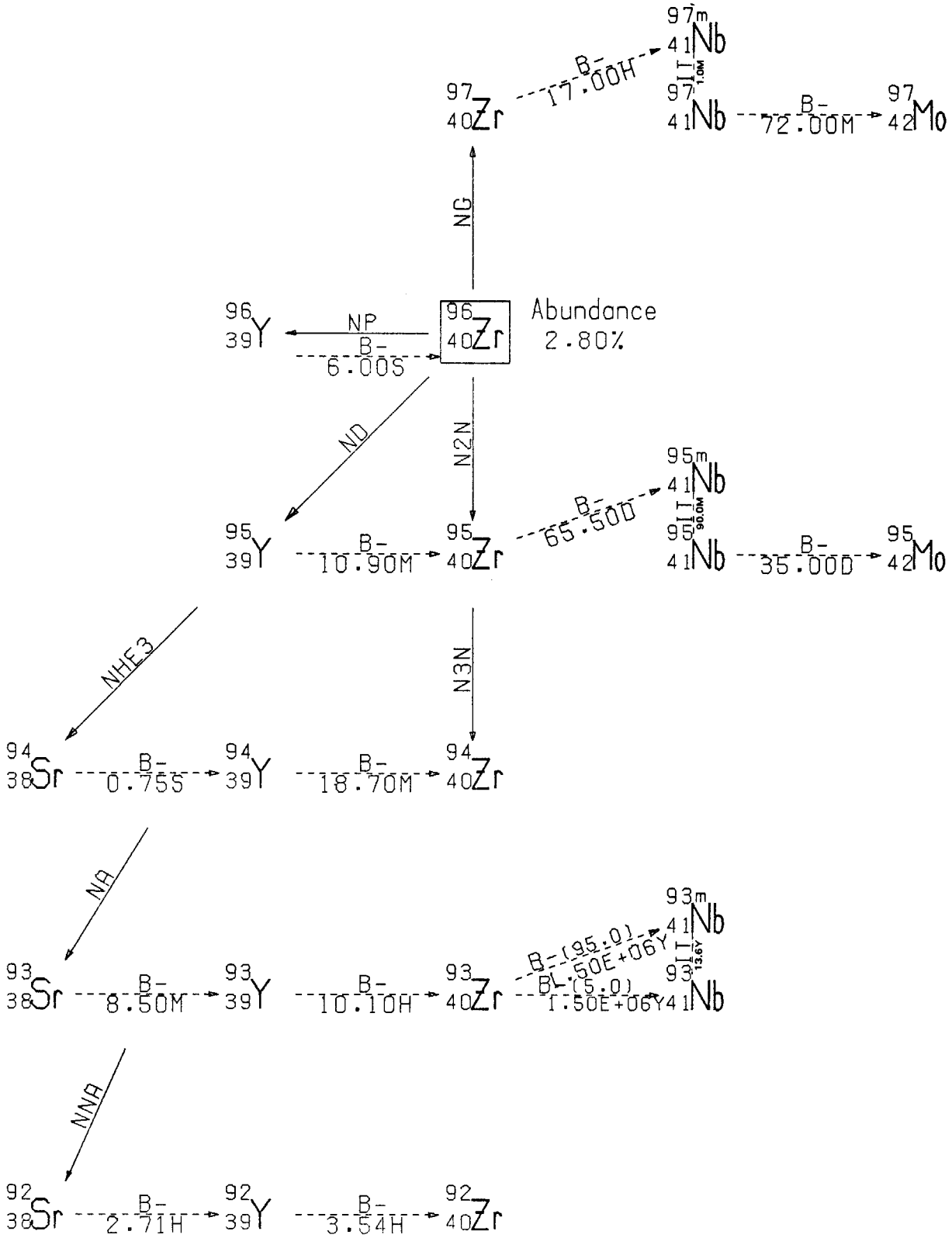
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{93}_{40}Zr$	1.50E+06Y										
$^{93m}_{41}Nb$	13.60 Y										
$^{89}_{38}Sr$	52.70 D										
$^{89m}_{39}Y$	16.80 S	5.11E+05	9.09E+05								
		0.00	99.14								
$^{92}_{39}Y$	3.50 H	6.11E+05	9.35E+05	1.41E+06	5.61E+05	4.49E+05	8.44E+05	9.13E+05	4.93E+05	1.85E+06	1.13E+06
		0.00	13.90	4.79	2.41	2.34	1.25	0.63	0.49	0.36	0.24

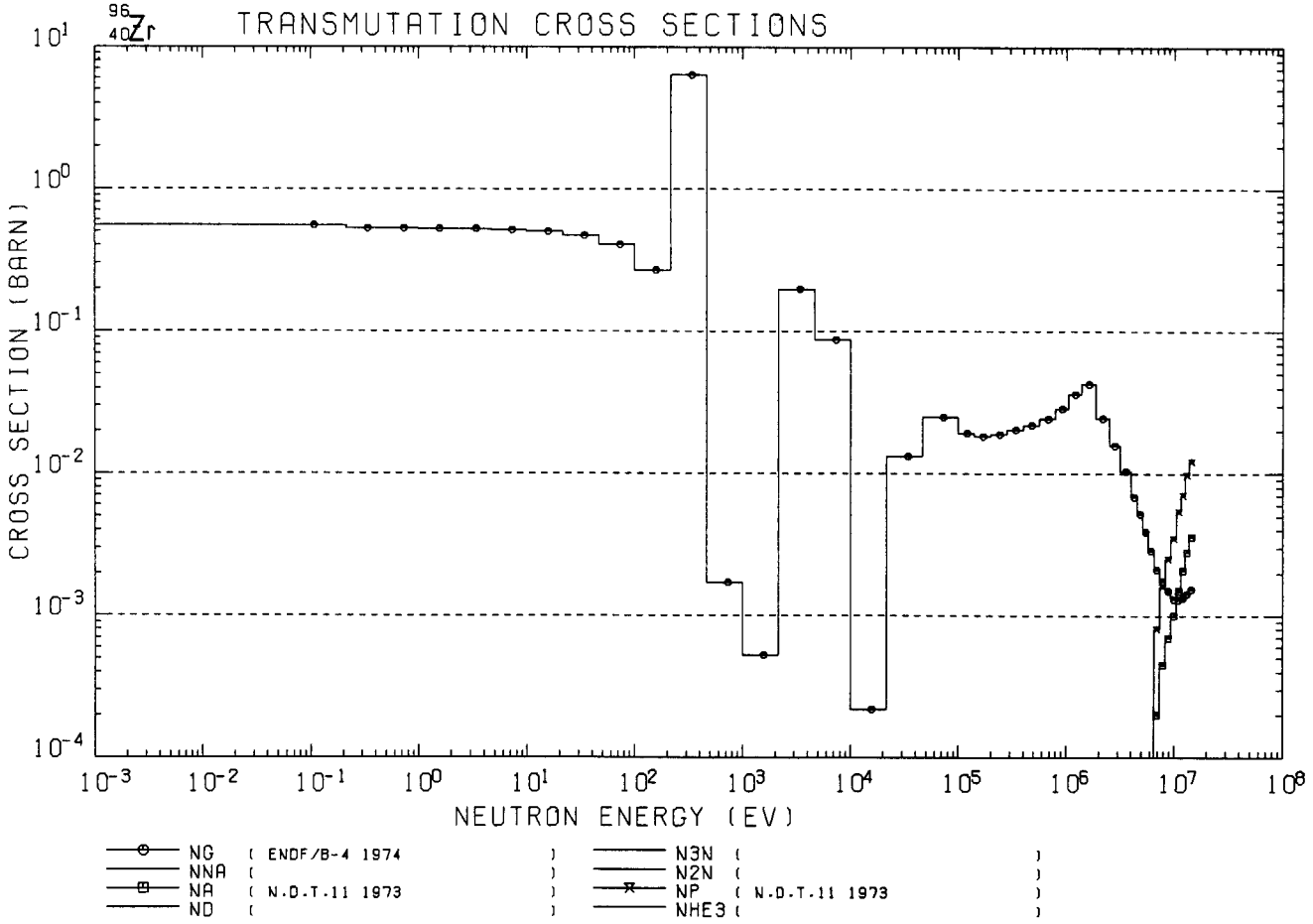

95m 41 Nb
IT 90.0H
B- 65.50D
95 40 Zr
95 41 Nb
B- 35.00D
95 42 Mo
NG
94 39 Y
NP
B- 20.30M
94 40 Zr
Abundance 17.40%
ND NNP
N2N
93m 41 Nb
IT 13.6Y
B- (95.0) 1.50E+06Y
BL- (5.0) 1.50E+06Y
93 39 Y
B- 10.10H
93 40 Zr
93 41 Nb
NHE3
N3N
92 38 Sr
B- 2.71H
92 39 Y
B- 3.54H
92 40 Zr
NA
91m 39 Y
IT 50.30M
B- (73.0) 9.70H
B- (27.0) 9.70H
91 38 Sr
91 39 Y
B- 58.80D
91 40 Zr
NNA
90 38 Sr
B- 28.80Y
90 39 Y
B- 63.70H
90 40 Zr



$^{94}_{40}Zr$ DECAY GAMMA-RAY TABLE

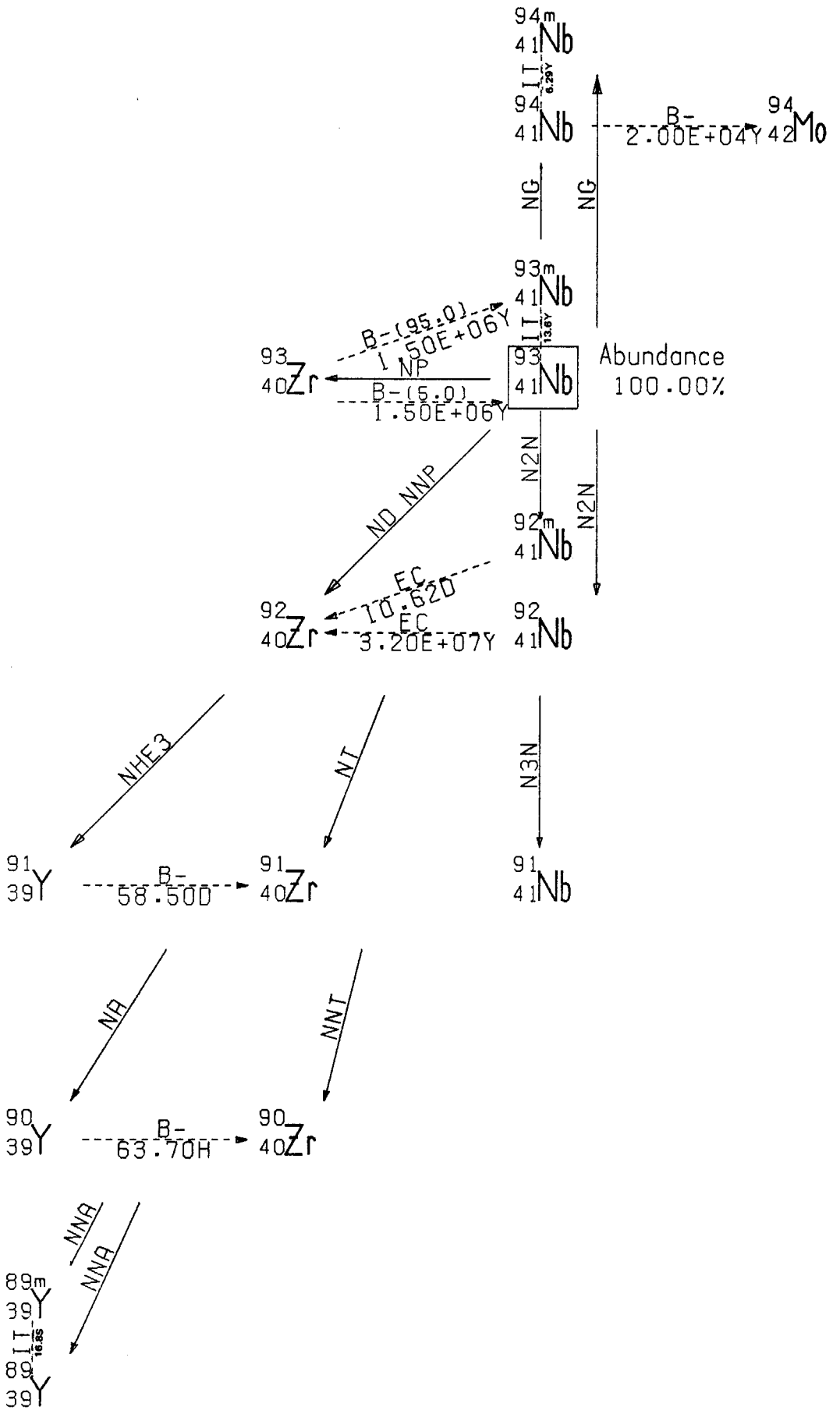
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{95}_{40}Zr$	65.50 D	5.11E+05	7.67E+05	7.24E+05	2.36E+05						
		0.00	54.60	44.27	0.24						
$^{95m}_{41}Nb$	90.00 H	5.11E+05	2.36E+05	2.04E+05							
		0.00	25.65	2.40							
$^{95}_{41}Nb$	35.00 D	5.11E+05	7.66E+05								
		0.00	99.82								
$^{90}_{38}Sr$	28.80 Y										
$^{90}_{39}Y$	63.70 H										
$^{91}_{38}Sr$	9.70 H	5.11E+05	5.56E+05	1.02E+06	7.50E+05	6.63E+05	6.63E+05	9.26E+05	6.62E+05	6.20E+05	2.75E+05
		0.00	61.12	33.00	23.01	7.70	4.71	3.96	2.89	1.74	1.13
$^{91m}_{39}Y$	50.30 M										
$^{91}_{39}Y$	58.80 D										
$^{93}_{39}Y$	10.10 H	5.11E+05	2.67E+06	9.47E+05	1.92E+06	6.80E+05	1.45E+06	1.43E+06	2.19E+06	2.18E+06	1.20E+06
		0.00	6.80	1.95	1.40	0.61	0.34	0.24	0.17	0.16	0.10
$^{93}_{40}Zr$	1.50E+06Y										
$^{93m}_{41}Nb$	13.60 Y										
$^{94}_{39}Y$	20.30 M	5.11E+05	9.19E+05	1.14E+06	6.51E+05	1.67E+06	3.82E+05	7.63E+05	2.14E+06	1.16E+06	1.88E+06
		0.00	56.00	6.06	4.98	2.43	2.04	1.42	0.97	0.70	0.39
$^{92}_{38}Sr$	2.71 H	5.11E+05	1.38E+06	9.63E+05	4.31E+05	2.42E+05	1.14E+06	6.51E+05	4.91E+05	8.92E+05	
		0.00	90.00	3.62	3.35	2.98	2.90	0.37	0.26	0.10	
$^{92}_{39}Y$	3.54 H										

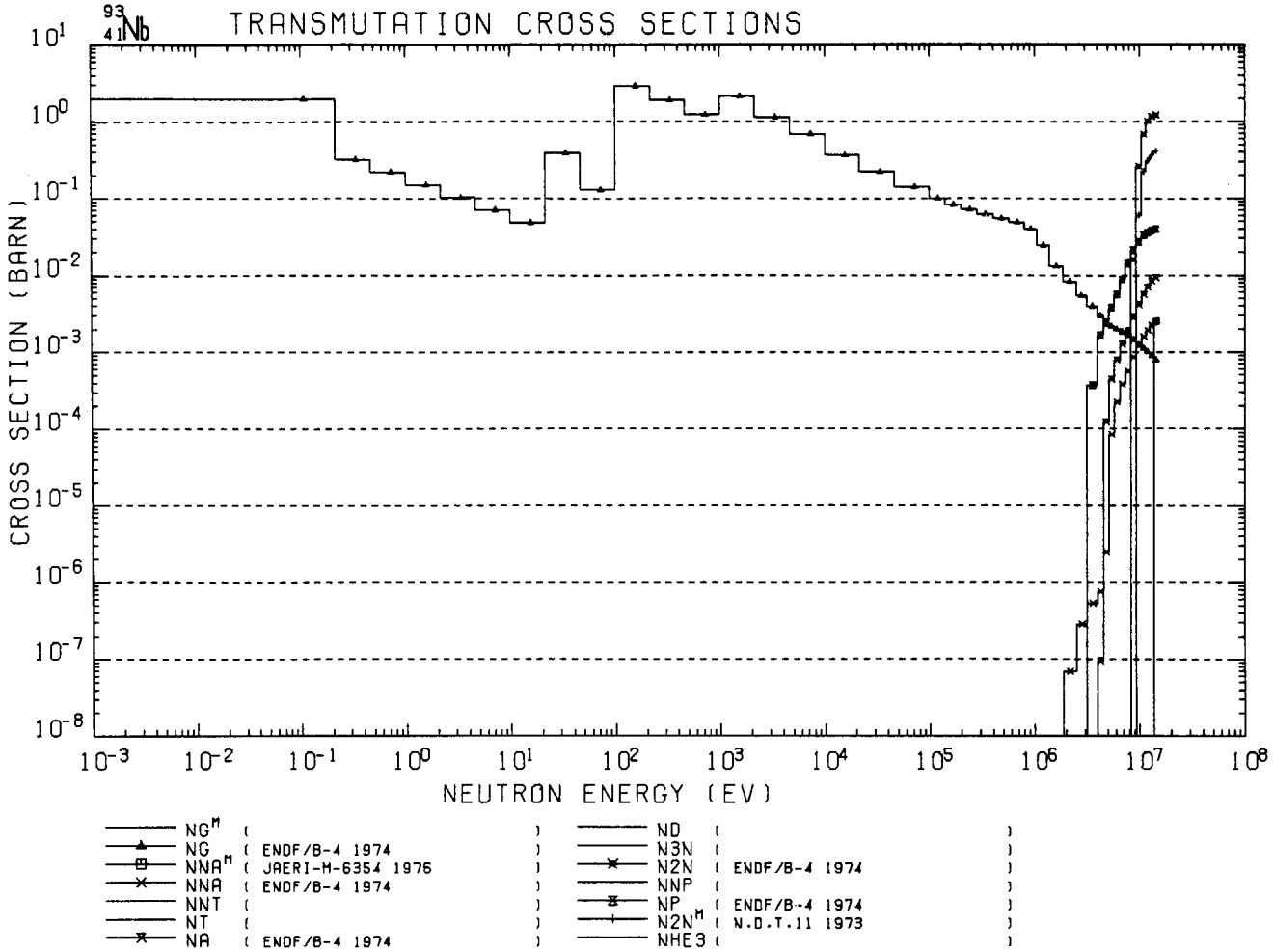

97m 41Nb
97 40Zr
B-
17.00H
97 41Nb
1.0M
B-
72.00M
97 42Mo
NG
96 39Y
NP
B-
6.00S
96 40Zr
Abundance
2.80%
ND
N2N
95m 41Nb
95 39Y
B-
10.90M
95 40Zr
B-
65.50D
95 41Nb
90.0M
B-
35.00D
95 42Mo
NHE3
N3N
94 38Sr
B-
0.75S
94 39Y
B-
18.70M
94 40Zr
NA
93m 41Nb
93 38Sr
B-
8.50M
93 39Y
B-
10.10H
93 40Zr
B-(95.0)
EC 1.50E+06Y
EC(5.0)
1.50E+06Y
93 41Nb
13.6Y
NNA
92 38Sr
B-
2.71H
92 39Y
B-
3.54H
92 40Zr



96 40Zr DECAY GAMMA-RAY TABLE

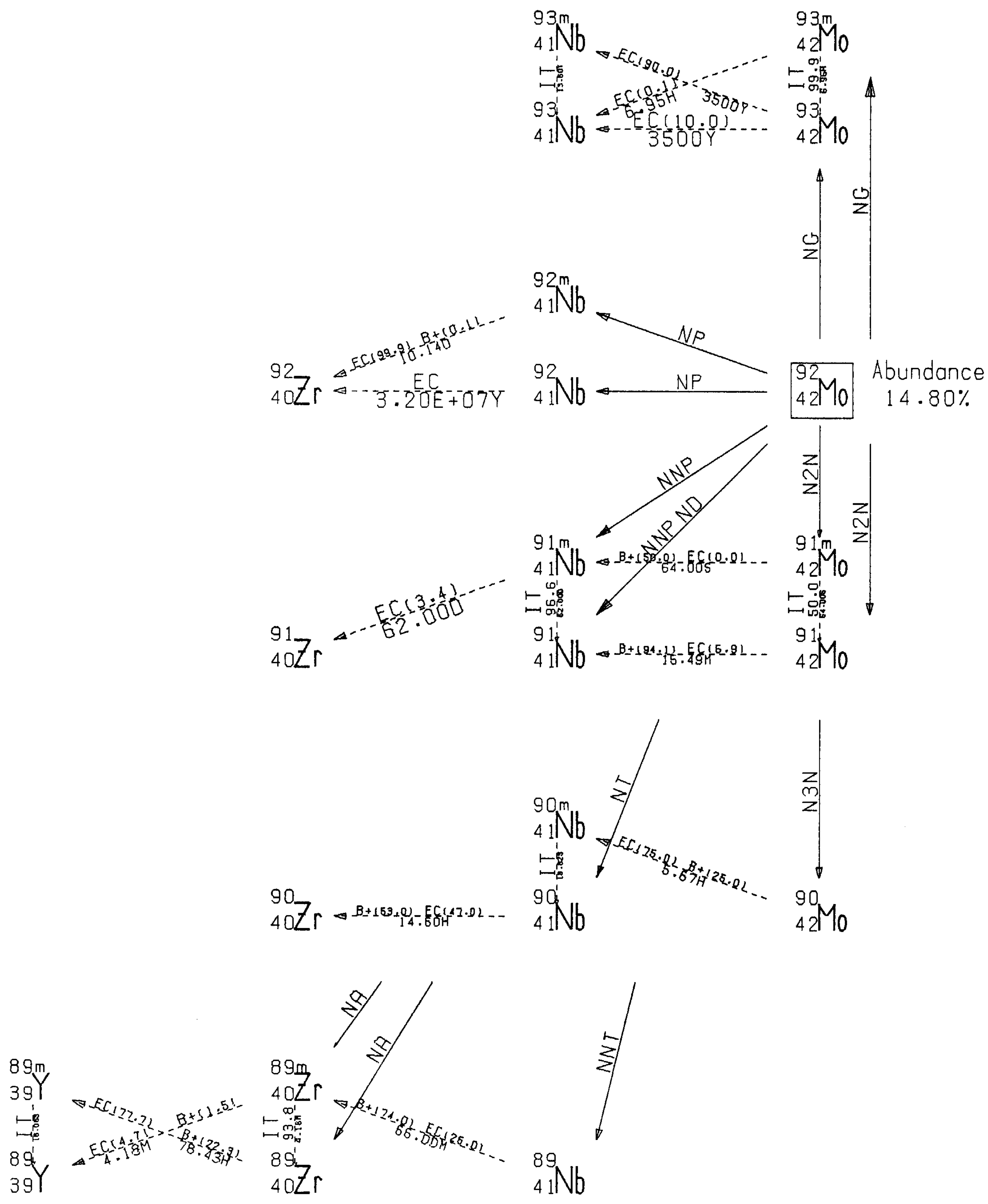
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
97 40Zr	17.00 H	5.11E+05	7.43E+05	5.08E+05	1.15E+06	3.55E+05	6.02E+05	1.02E+06	1.36E+06	1.75E+06	2.54E+06
		0.00	92.80	5.07	2.65	2.28	1.39	1.35	1.35	1.35	1.25
97m 41Nb	1.00 M	5.11E+05	7.43E+05								
		0.00	97.90								
97 41Nb	72.00 M	5.11E+05	6.58E+05	1.02E+06	1.27E+06	1.52E+06					
		0.00	98.20	1.09	0.16	0.12					
92 38Sr	2.71 H	5.11E+05	1.38E+06	9.53E+05	4.31E+05	2.42E+05	1.14E+06	6.51E+05	4.91E+05	8.92E+05	
		0.00	90.00	3.62	3.35	2.98	2.80	0.37	0.26	0.10	
92 39Y	3.54 H										
93 38Sr	8.50 M	5.11E+05	5.90E+05	8.76E+05	8.88E+05	7.10E+05	1.68E+05	1.27E+06	2.60E+05	1.70E+06	5.46E+05
		0.00	73.00	25.48	24.74	21.42	19.95	8.10	7.79	4.31	3.93
93 39Y	10.10 H	5.11E+05	2.67E+05	9.47E+05	1.92E+06	6.80E+05	1.45E+06	1.43E+06	2.19E+06	2.18E+06	1.20E+06
		0.00	6.80	1.95	1.40	0.61	0.34	0.24	0.17	0.16	0.10
95 39Y	10.90 M	5.11E+05	9.54E+05	2.18E+06	3.58E+06	1.32E+06	2.63E+06	1.94E+06	4.32E+05	1.62E+06	1.81E+06
		0.00	19.00	8.28	7.70	5.32	5.13	2.78	2.02	1.76	1.50
95 40Zr	65.50 D	5.11E+05	7.57E+05	7.24E+05	2.36E+05						
		0.00	54.60	44.27	0.24						
95m 41Nb	90.00 H	5.11E+05	2.36E+05	2.04E+05							
		0.00	25.65	2.40							
95 41Nb	35.00 D	5.11E+05	7.66E+05								
		0.00	99.82								
94 38Sr	0.75 S	5.11E+05	1.43E+06	7.24E+05	7.04E+05	6.22E+05	8.06E+05				
		0.00	95.40	2.50	2.12	2.08	1.79				
94 39Y	18.70 M	5.11E+05	9.19E+05	1.14E+06	5.61E+05	1.67E+06	3.82E+05	7.63E+05	2.14E+06	1.16E+06	1.89E+06
		0.00	56.00	6.06	4.98	2.43	2.04	1.42	0.97	0.70	0.39
96 39Y	6.00 S	5.11E+05	1.69E+06								
		0.00	25.00								
93 40Zr	1.50E+06Y										
93m 41Nb	13.60 Y										


94m 41 Nb
IT 6.29Y
94 41 Nb
B- 2.00E+04Y
94 42 Mo
NG
NG
93m 41 Nb
IT 13.6Y
B-(95.0) 1.50E+06Y
93 40 Zr
I NP
B-(5.0) 1.50E+06Y
93 41 Nb
Abundance 100.00%
N2N
N2N
ND NNP
92m 41 Nb
EC 10.62D
EC 3.20E+07Y
92 40 Zr
92 41 Nb
NHE3
NT
N3N
91 39 Y
B- 58.50D
91 40 Zr
91 41 Nb
NA
NNT
90 39 Y
B- 63.70H
90 40 Zr
NNA
NNA
89m 39 Y
IT 16.05S
89 39 Y

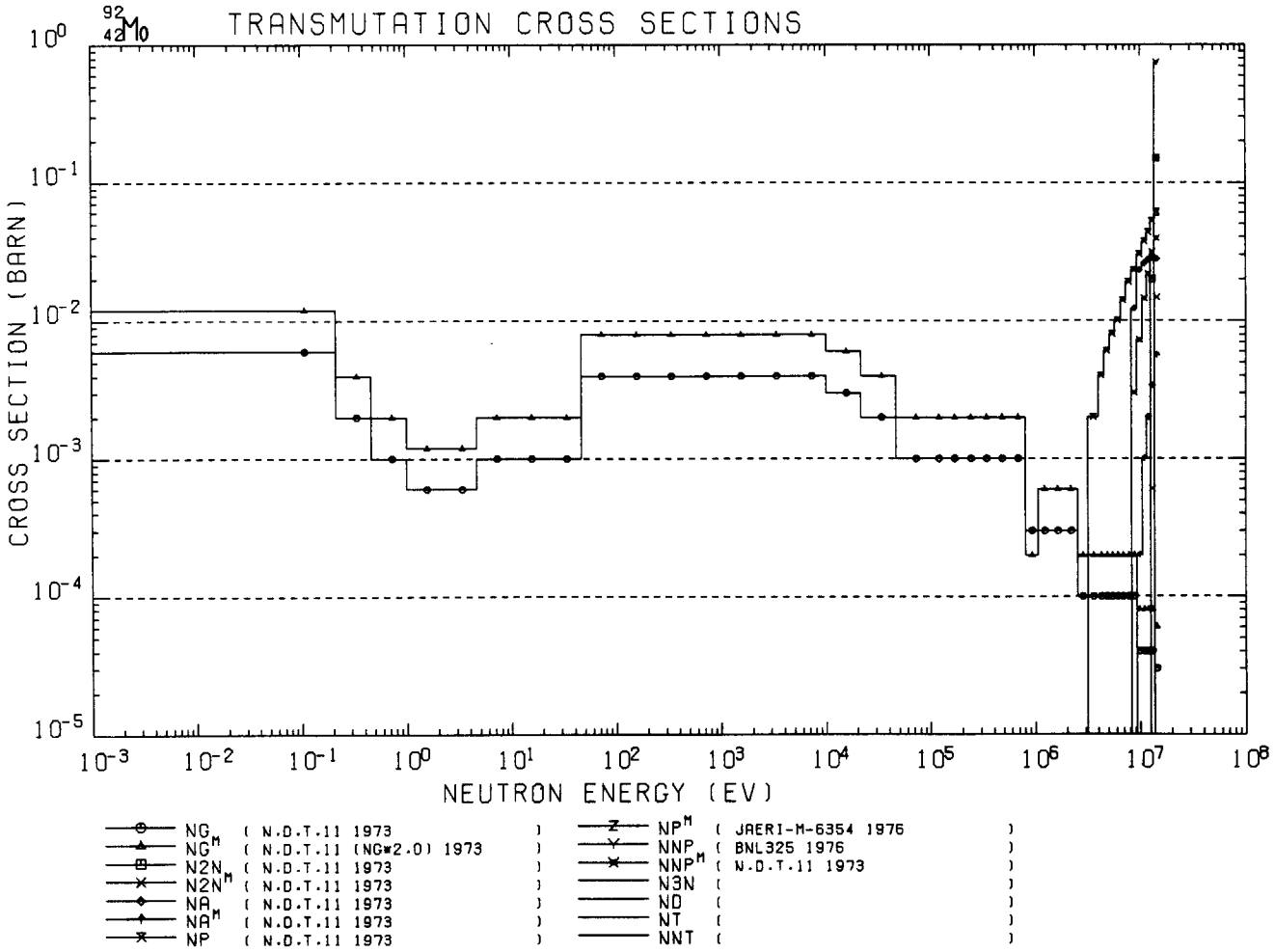


93 41Nb DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
91 39Y	58.50 D				
94m 41Nb	6.29 M	5.11E+05	8.71E+05		
		0.00	0.48		
94 41Nb	2.00E+04Y	5.11E+05	8.71E+05	7.03E+05	
		0.00	100.00	98.00	
89m 39Y	16.80 S				
90 39Y	63.70 H				
92m 41Nb	10.62 D	5.11E+05	9.34E+05	9.13E+05	1.85E+06
		0.00	99.20	1.69	0.79
93 40Zr	1.50E+06Y				
93m 41Nb	13.60 Y				
92 41Nb	3.20E+07Y	5.11E+05	9.34E+05	9.13E+05	1.85E+06
		0.00	99.20	1.69	0.79

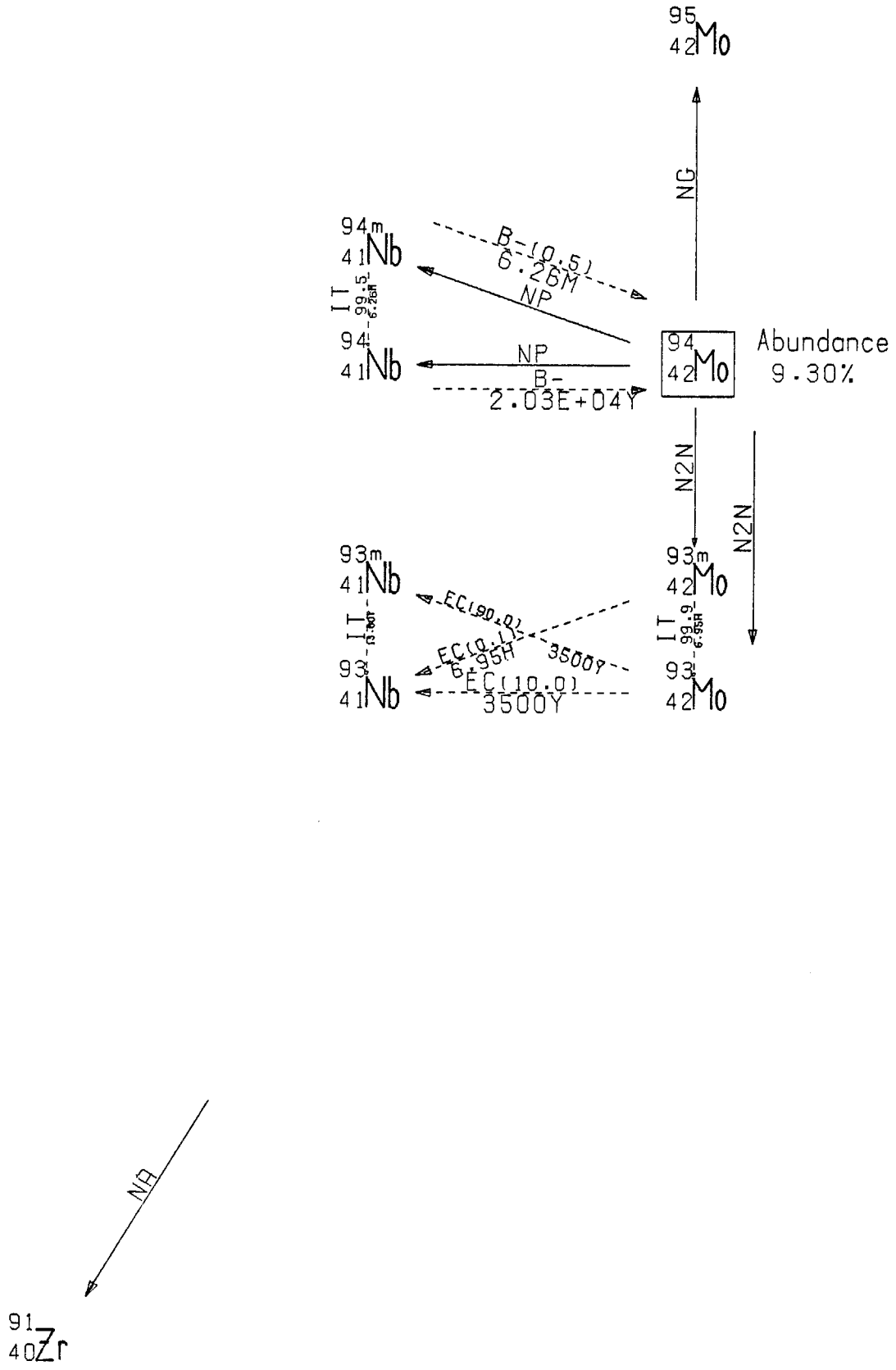


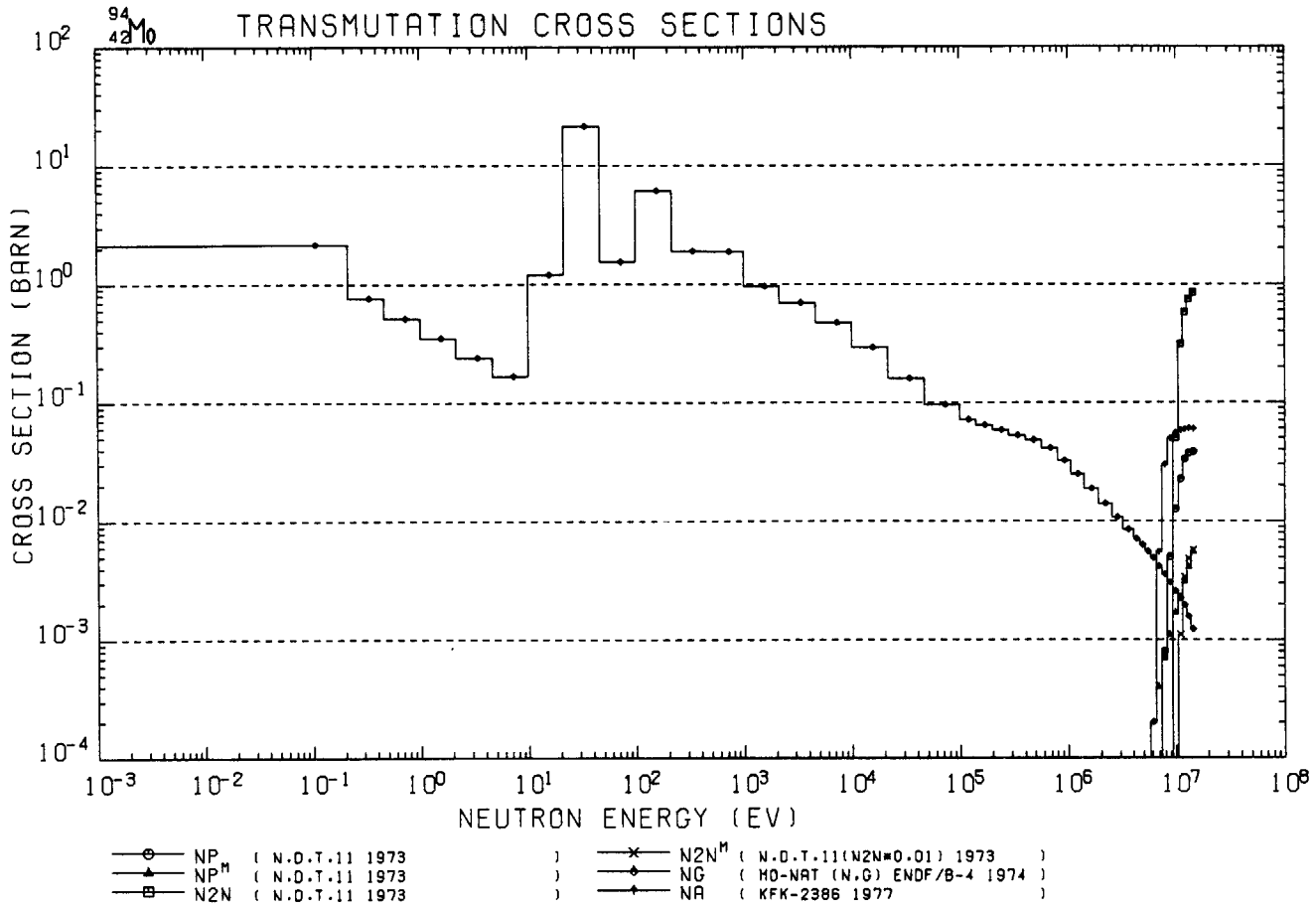
93m 41 Nb
93m 42 Mo
EC(90.0)
EC(0.1) 6.95H
3500Y
IT
IT 99.9 6.95H
93 41 Nb
93 42 Mo
EC(10.0) 3500Y
NG
NG
92m 41 Nb
EC(99.9) B+(0.1) 10.14D
NP
92 40 Zr
EC 3.20E+07Y
92 41 Nb
NP
92 42 Mo
Abundance 14.80%
NNP
NNP ND
N2N
N2N
91m 41 Nb
B+(50.0) EC(0.0) 64.00S
91m 42 Mo
IT 96.6 62.00D
IT 50.0 64.00S
EC(3.4) 62.00D
91 40 Zr
91 41 Nb
B+(94.1) EC(5.9) 15.49M
91 42 Mo
NT
N3N
90m 41 Nb
EC(75.0) B+(25.0) 5.67H
IT
90 40 Zr
B+(53.0) EC(47.0) 14.60H
90 41 Nb
90 42 Mo
NA
NA
NNT
89m 39 Y
EC(77.7) B+(1.5)
EC(4.7) 4.18M
B+(22.3) 78.43H
IT
89m 40 Zr
IT 93.8 4.18M
B+(74.0) EC(26.0) 66.00M
89 39 Y
89 40 Zr
89 41 Nb



$^{92}_{42}Mo$ DECAY GAMMA-RAY TABLE

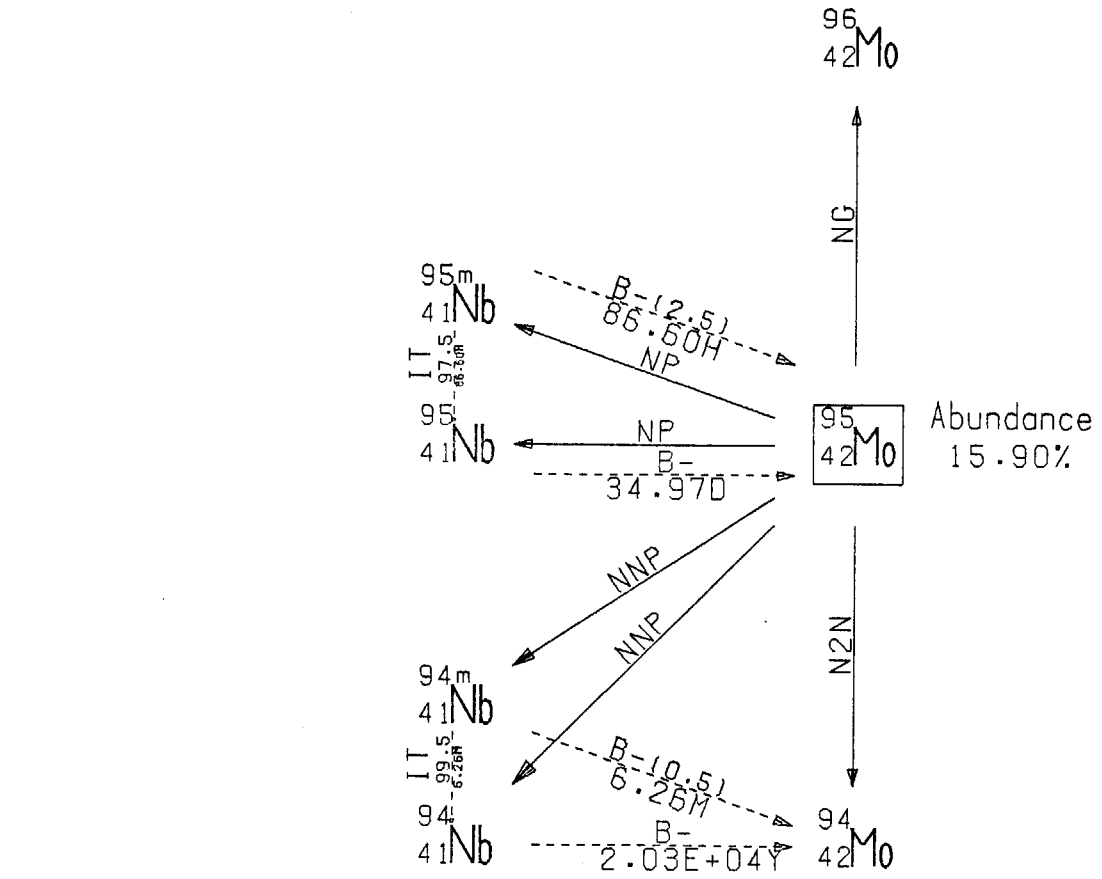
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{93}_{42}Mo$	3500 Y										
$^{93m}_{41}Nb$	13.60 Y										
$^{93m}_{42}Mo$	6.95 H	5.11E+05	6.85E+05	1.48E+06	2.63E+05	1.36E+06	1.14E+05	9.50E+05			
		10.00	99.68	99.10	56.80	0.79	0.68	0.12			
$^{91}_{42}Mo$	15.49 M	5.11E+05	1.64E+06	1.58E+06	2.69E+06						
		187.50	0.32	0.22	0.12						
$^{91m}_{42}Mo$	64.00 S	5.11E+05	6.53E+06	1.51E+06	1.21E+06	2.24E+06	1.03E+06	1.08E+06	1.15E+06	4.26E+06	7.33E+06
		70.79	48.10	24.25	18.67	0.73	0.63	0.50	0.28	0.17	0.17
$^{91m}_{41}Nb$	62.00 D	5.11E+05	1.21E+06	1.05E+06							
		0.00	3.42	0.56							
$^{89}_{40}Zr$	78.43 H										
$^{89m}_{39}Y$	16.06 S										
$^{89m}_{40}Zr$	4.18 M										
$^{92}_{41}Nb$	3.20E+07Y	5.11E+05	9.34E+05	9.13E+05	1.85E+06						
		0.00	99.20	1.69	0.79						
$^{92m}_{41}Nb$	10.14 D	5.11E+05	9.34E+05	9.13E+05	1.85E+06						
		0.00	99.20	1.69	0.79						
$^{90}_{42}Mo$	5.67 H	5.11E+05	2.67E+05	1.22E+05	3.23E+05	4.45E+05	1.63E+05	9.42E+05	1.27E+06	4.27E+04	1.45E+06
		50.00	77.60	64.15	6.29	6.02	5.95	5.62	4.09	2.14	1.88
$^{90m}_{41}Nb$	18.82 S	5.11E+05	1.22E+06								
		0.00	64.00								
$^{90}_{41}Nb$	14.60 H	5.11E+05	1.13E+06	2.32E+06	1.41E+06	2.19E+06	1.33E+06	1.61E+06	3.71E+05	8.91E+05	1.27E+06
		106.00	92.76	82.00	66.82	17.98	4.14	2.39	1.81	1.73	1.30
$^{89}_{41}Nb$	66.00 M	5.11E+05	5.88E+05	1.63E+06	1.83E+06	3.09E+06	2.67E+06	1.13E+06	1.51E+06	2.96E+06	9.21E+05
		200.00	89.65	3.60	3.39	3.18	2.77	2.20	2.00	1.83	1.50

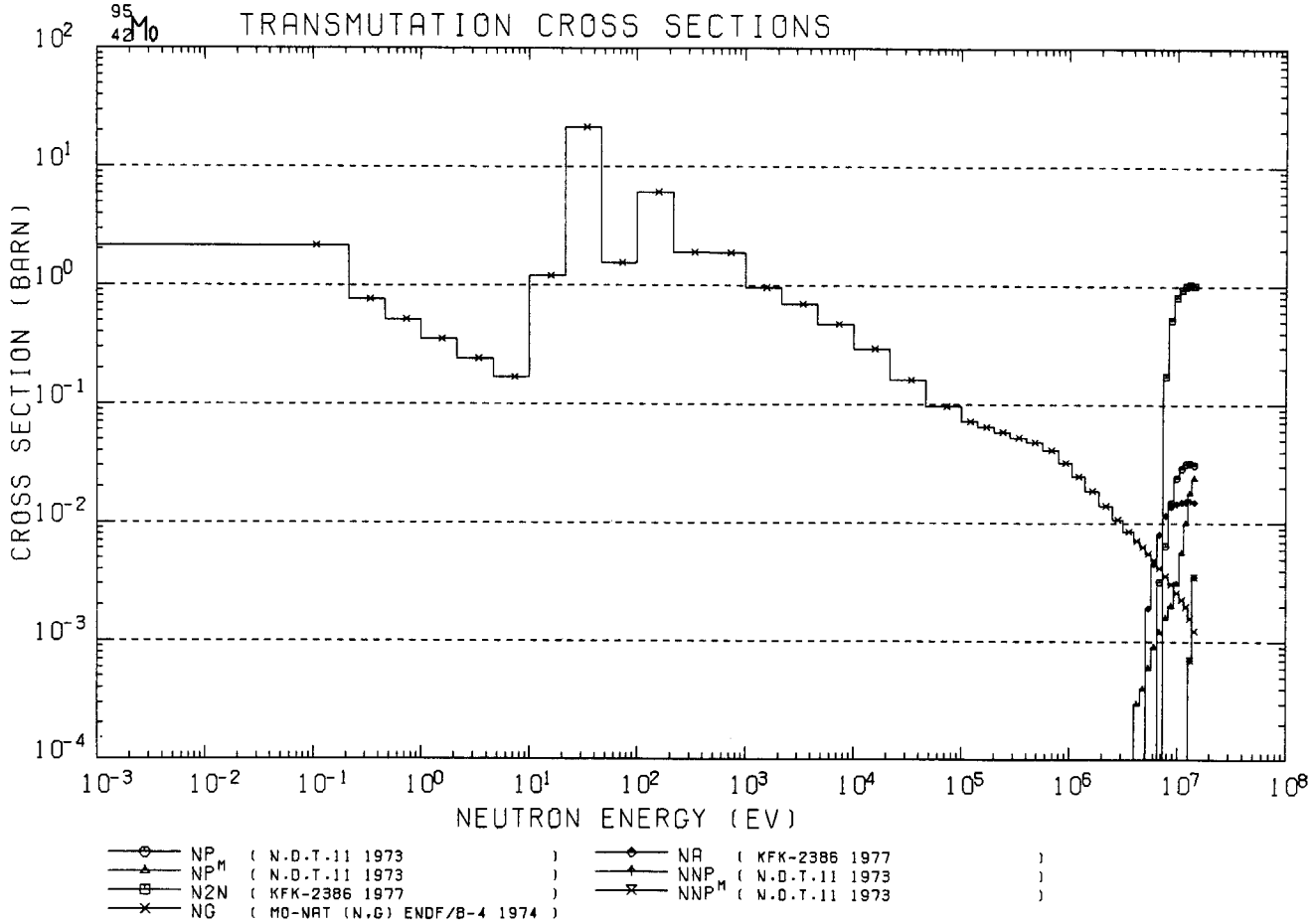

95 42 Mo
NG
94m 41 Nb
IT 99.5 6.26M
B- (0.5) 6.26M
NP
94 41 Nb
NP
B-
2.03E+04Y
94 42 Mo
Abundance 9.30%
N2N
N2N
93m 41 Nb
IT 13.60Y
EC(90.0)
EC(0.1) 6.95H 3500Y
93 41 Nb
EC(10.0) 3500Y
93m 42 Mo
IT 99.9 6.95H
93 42 Mo
NA
91 40 Zr



$^{94}_{42}Mo$ DECAY GAMMA-RAY TABLE

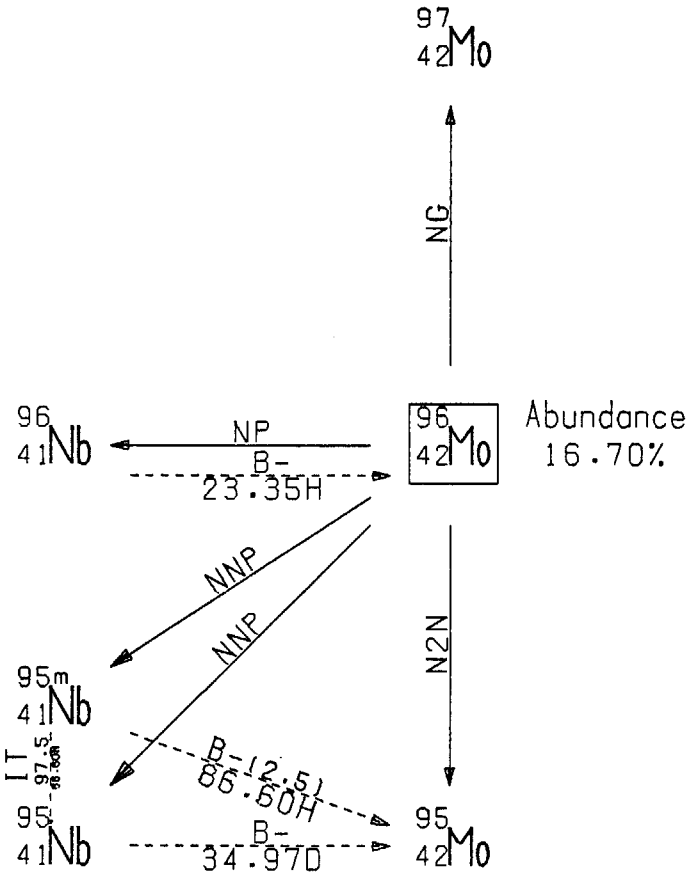
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
$^{94}_{41}Nb$	2.03E+04Y	
$^{94m}_{41}Nb$	6.26 M	
$^{93}_{42}Mo$	3500 Y	
$^{93m}_{41}Nb$	13.60 Y	
$^{93m}_{42}Mo$	6.95 H	

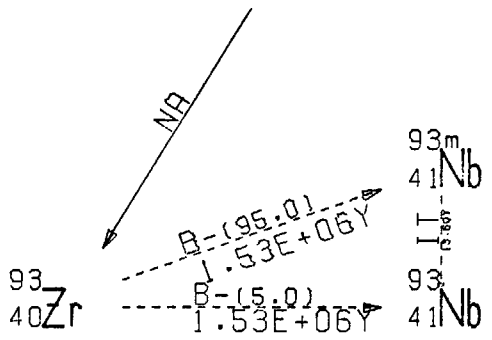

96 42Mo
NG
95m 41Nb
IT 97.5 86.60H
B- 12.5 86.60H
NP
95 41Nb
NP
B- 34.97D
95 42Mo
Abundance 15.90%
NNP
NNP
N2N
94m 41Nb
IT 99.5 6.26M
B- 10.5 6.26M
94 41Nb
B- 2.03E+04Y
94 42Mo
NA
92 40Zr

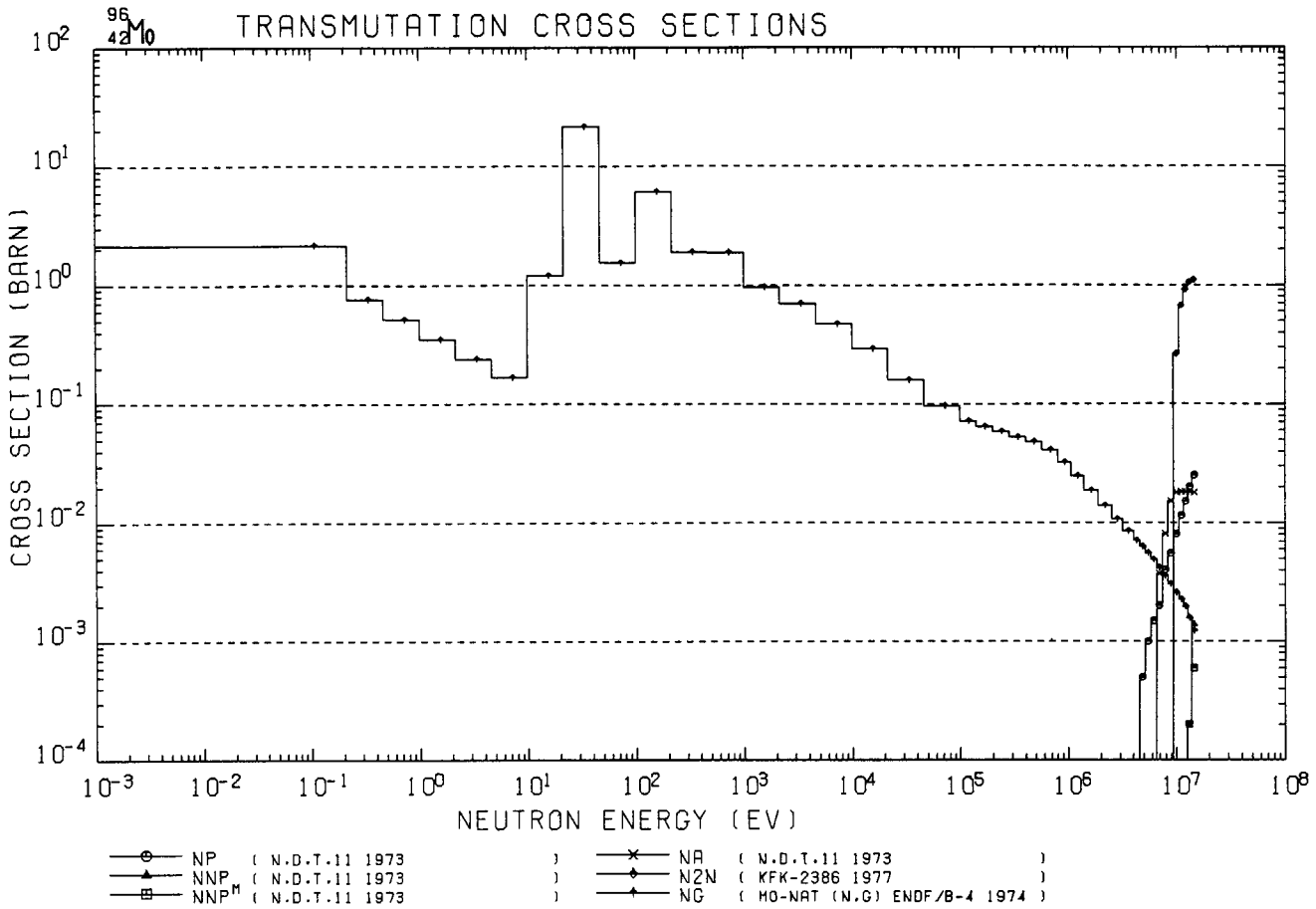


95 42Mo DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
95 41Nb	34.97 D	
95m 41Nb	86.60 H	
94 41Nb	2.03E+04Y	
94m 41Nb	6.26 M	

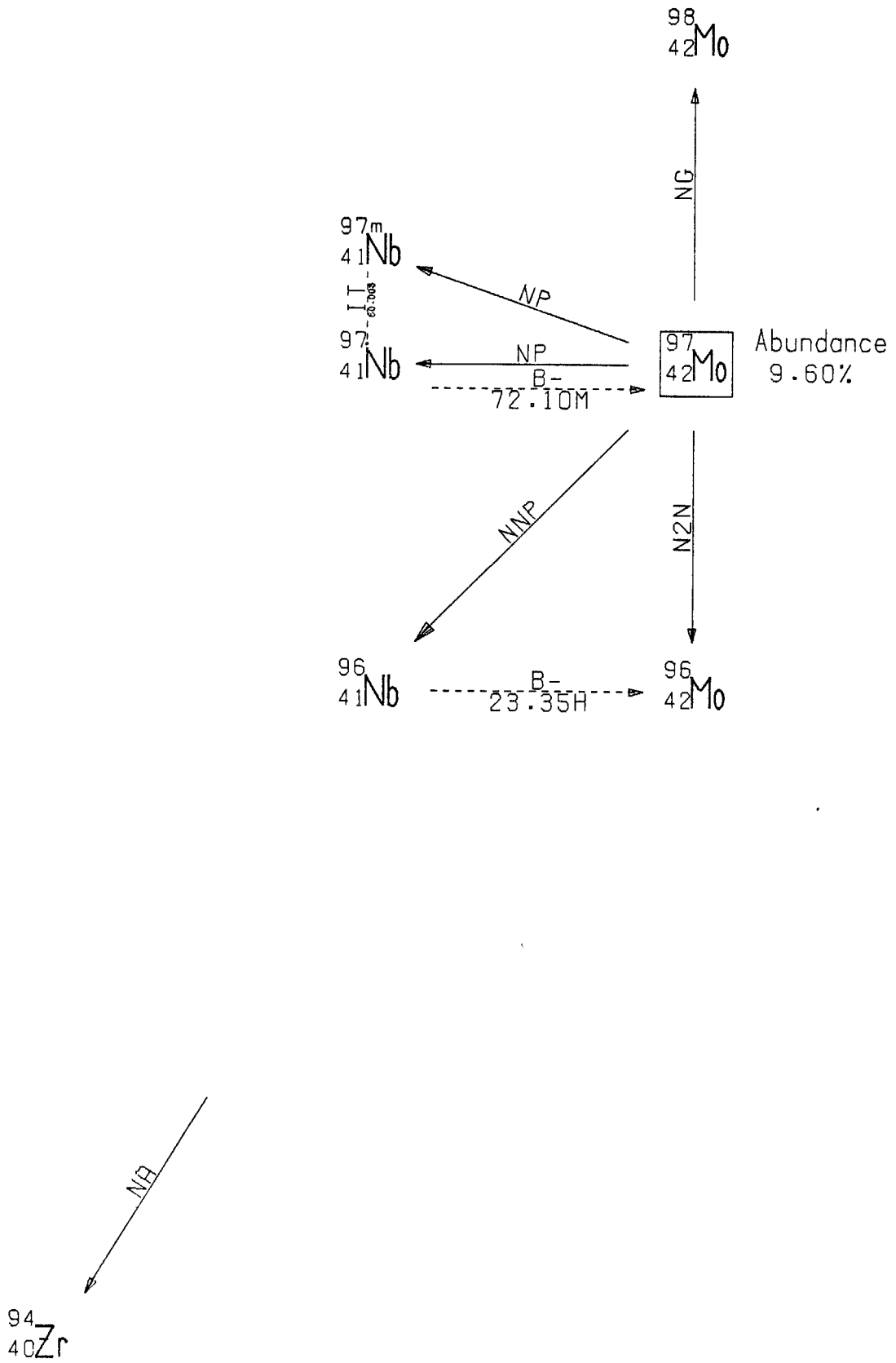

97 42 Mo
NG
96 41 Nb
NP
B-
23.35H
96 42 Mo
Abundance
16.70%
NNP
NNP
N2N
95m 41 Nb
IT
97.5
86.60H
B-(2.5)
95 41 Nb
B-
34.97D
95 42 Mo

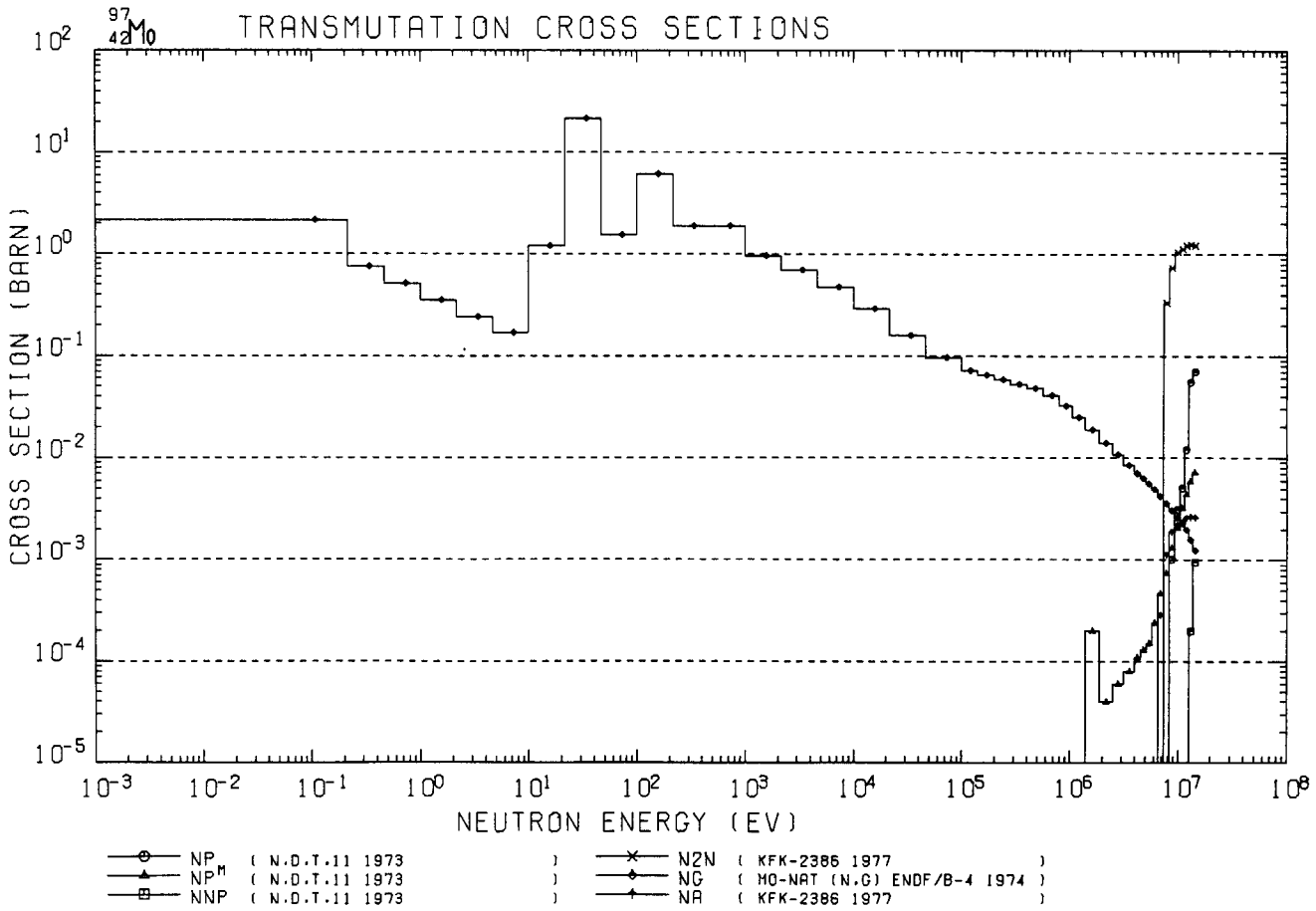

NA
93m 41 Nb
IT
B-(95.0)
1.53E+06Y
93 40 Zr
B-(5.0)
1.53E+06Y
93 41 Nb



$^{96}_{42}Mo$ DECAY GAMMA-RAY TABLE

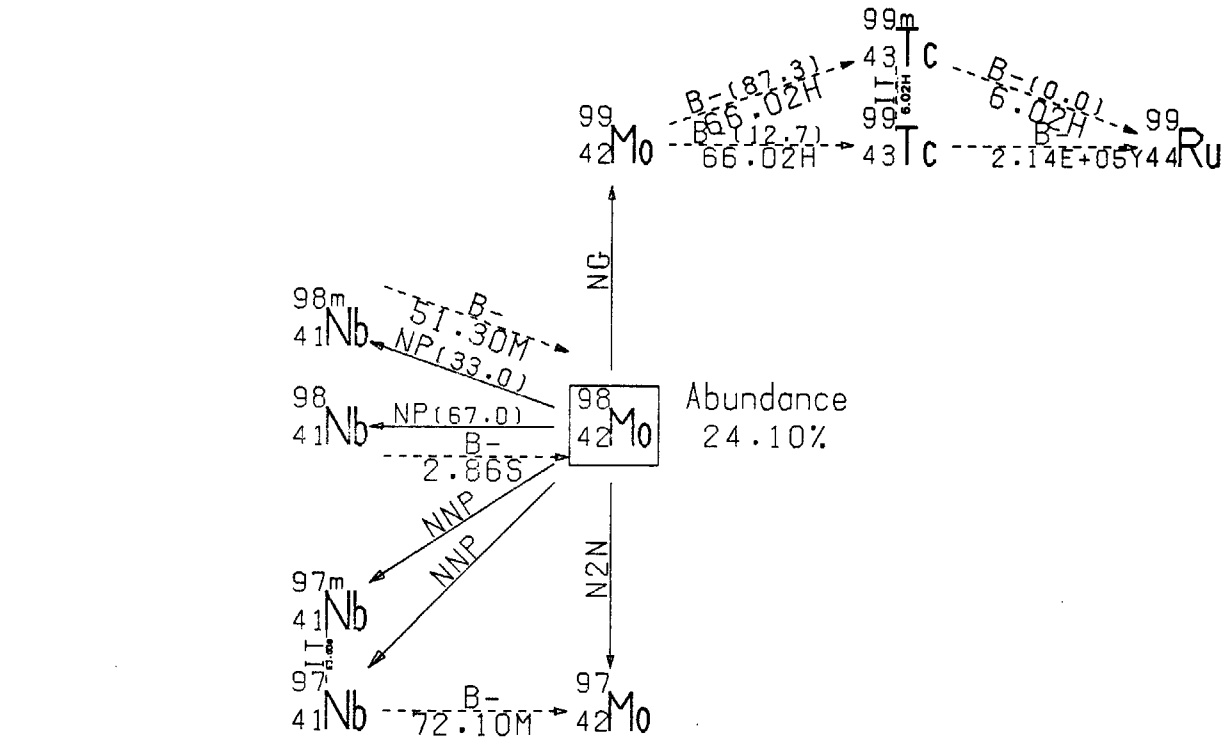
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY									
		YIELD (%) --GREATER THAN 0.1-									
		5.11E+05	7.78E+05	5.69E+05	1.09E+06	4.60E+05	8.50E+05	1.20E+06	8.10E+05	7.20E+05	4.81E+05
$^{96}_{41}Nb$	23.35 H	0.00	96.80	55.70	49.40	28.19	20.73	20.05	9.93	7.30	5.33
$^{95}_{41}Nb$	34.97 D										
$^{95m}_{41}Nb$	86.60 H										
$^{93}_{40}Zr$	1.53E+06Y										
$^{93m}_{41}Nb$	13.60 Y										

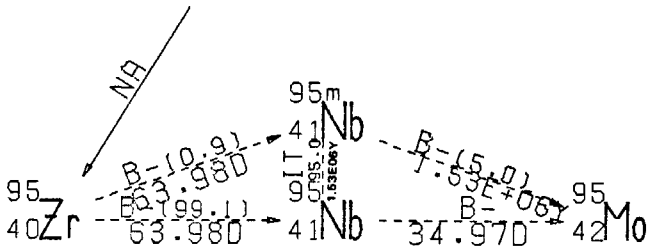

98 42Mo
NG
97m 41Nb
IT 60.9S
97 41Nb
NP
NP
B- 72.10M
97 42Mo
Abundance 9.60%
NNP
N2N
96 41Nb
B- 23.35H
96 42Mo
NA
94 40Zr

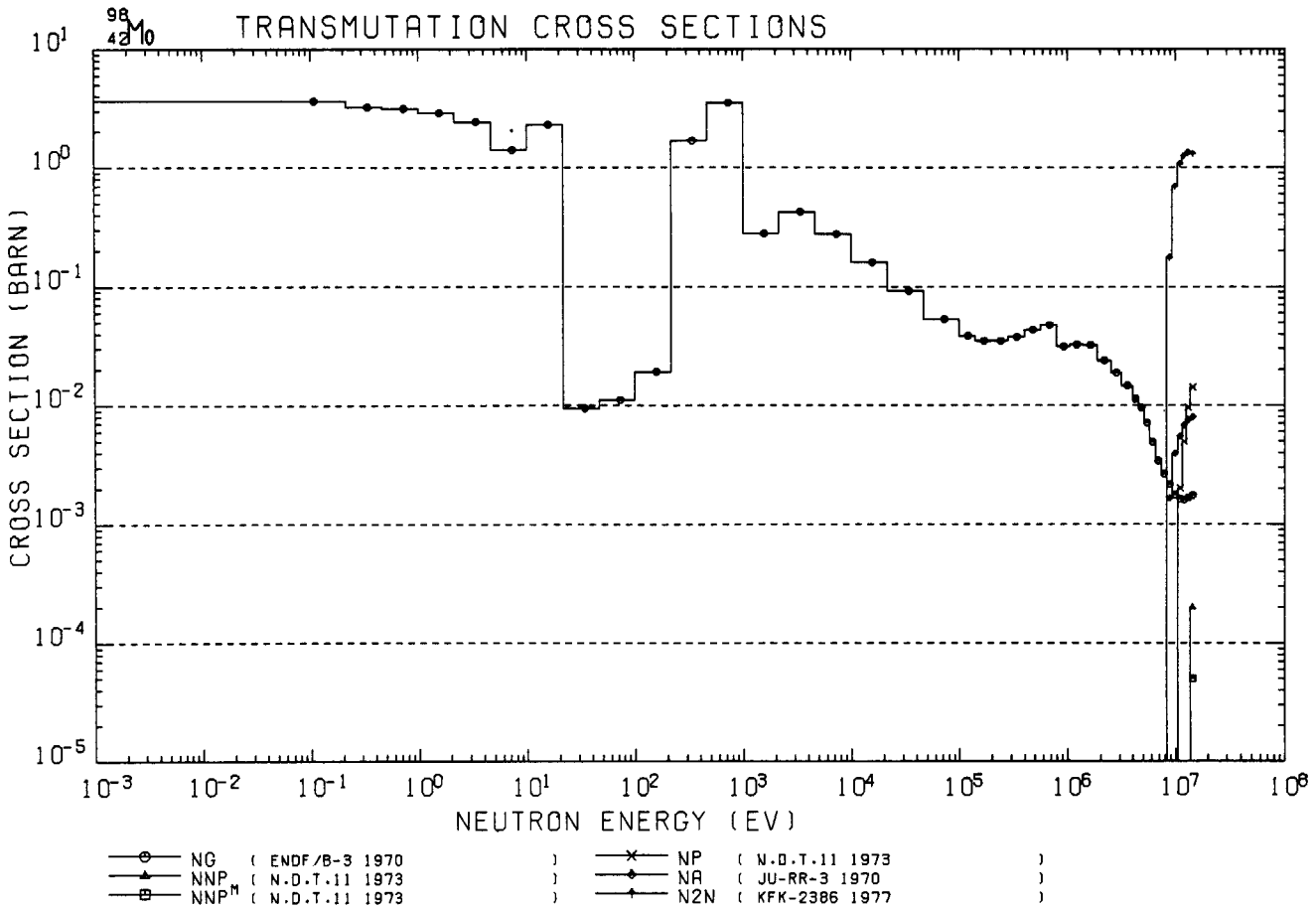


$^{97}_{42}Mo$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{97}_{41}Nb$	72.10	M										
$^{97m}_{41}Nb$	60.00	S										
$^{96}_{41}Nb$	23.35	H	5.11E+05	7.78E+05	5.69E+05	1.09E+06	4.60E+05	8.50E+05	1.20E+06	8.10E+05	7.20E+05	4.81E+05
			0.00	96.80	55.70	49.40	28.19	20.73	20.05	9.93	7.30	6.33

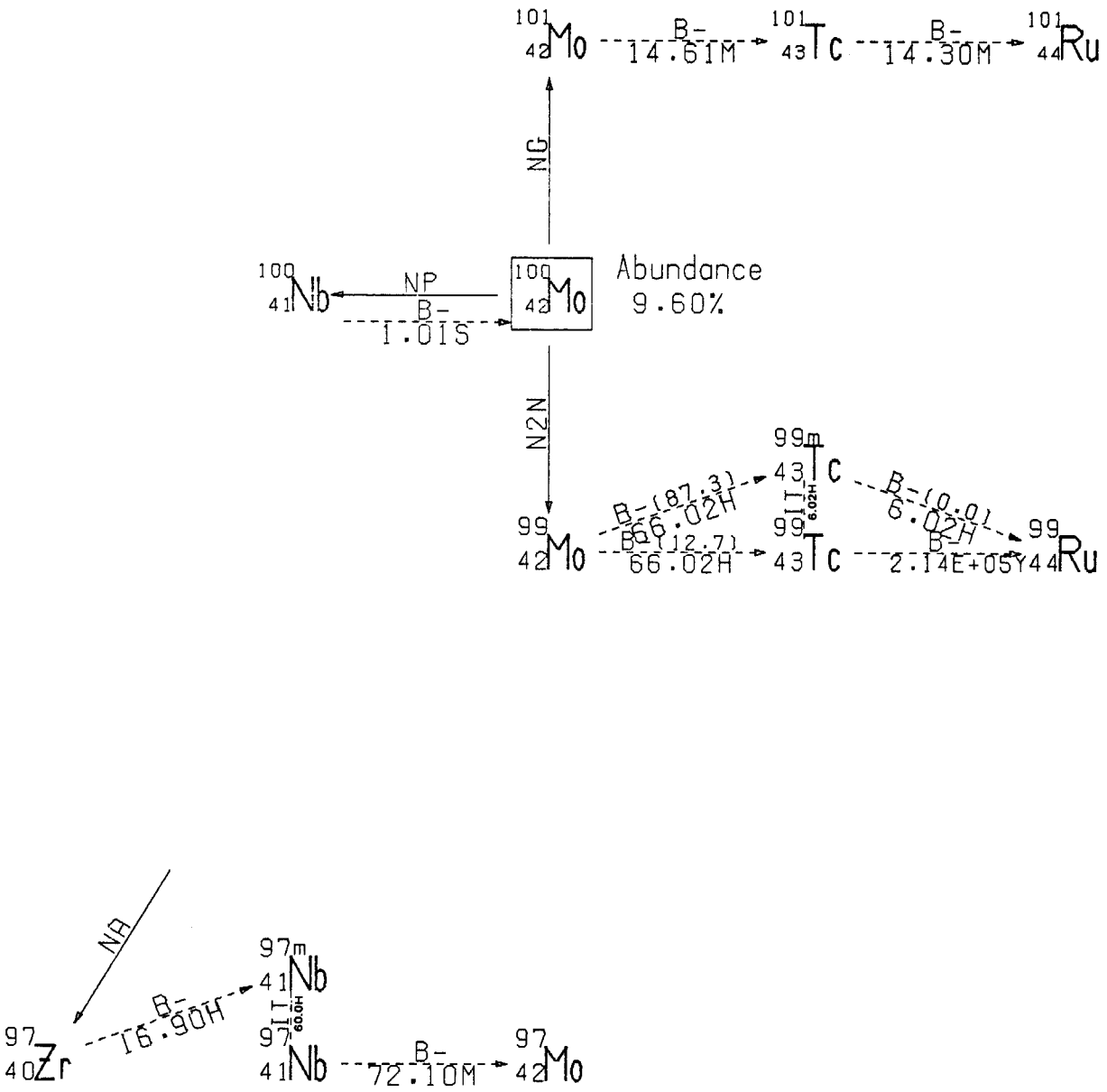

99m 43 Tc
B-(87.3)
6.02H
B-(12.7)
66.02H
99 42 Mo
99 43 Tc
2.14E+05Y
B-(0.0)
6.02H
99 44 Ru
NG
98m 41 Nb
51.30M
B-
NP(33.0)
98 41 Nb
NP(67.0)
B-
2.86S
98 42 Mo
Abundance
24.10%
NNP
NNP
N2N
97m 41 Nb
97 41 Nb
B-
72.10M
97 42 Mo

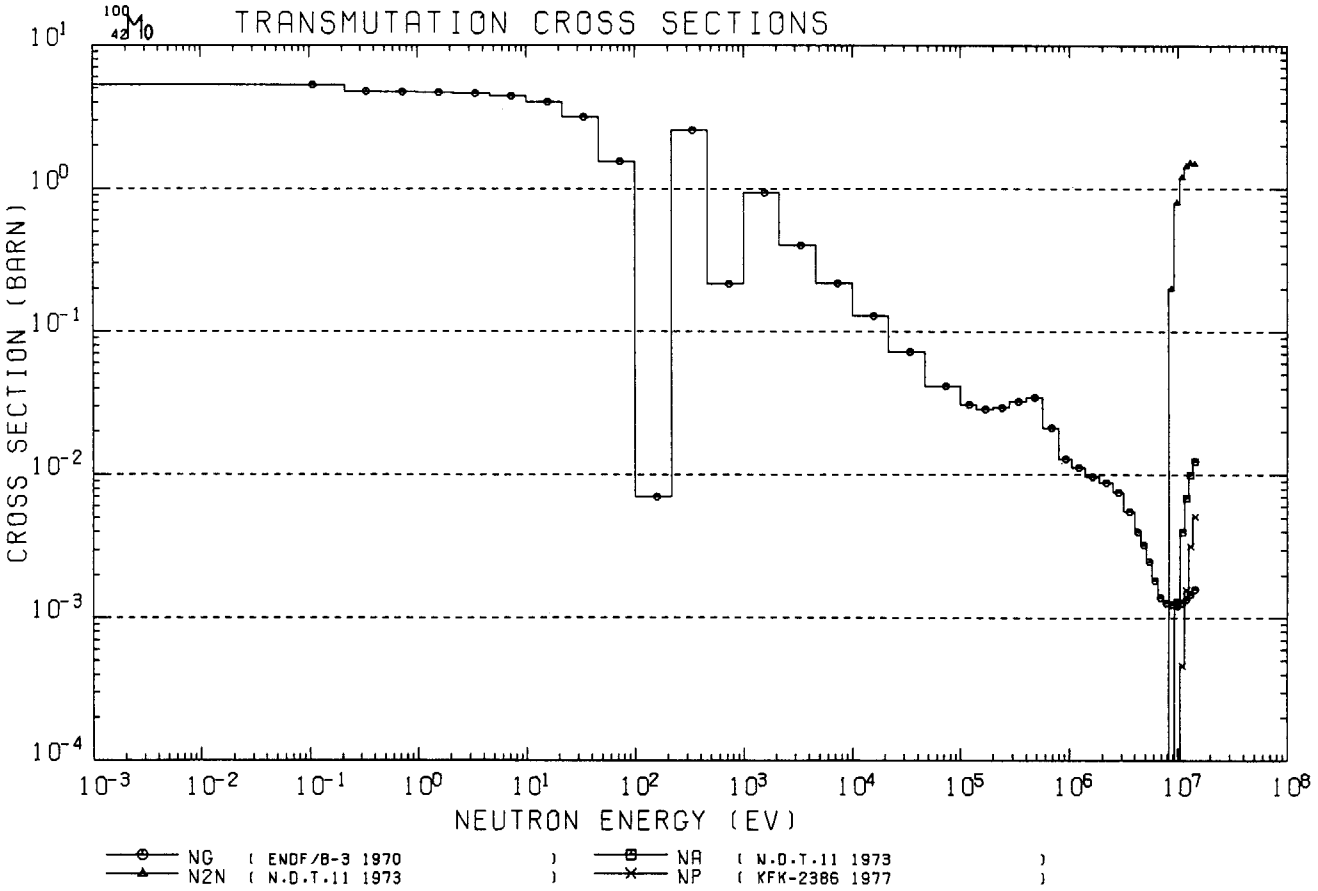

NA
95m 41 Nb
B-(10.9)
3.98D
B-(99.1)
53.98D
95 40 Zr
95 41 Nb
B-(5.0)
1.53E+05Y
B-
34.97D
95 42 Mo



98 42Mo DECAY GAMMA-RAY TABLE

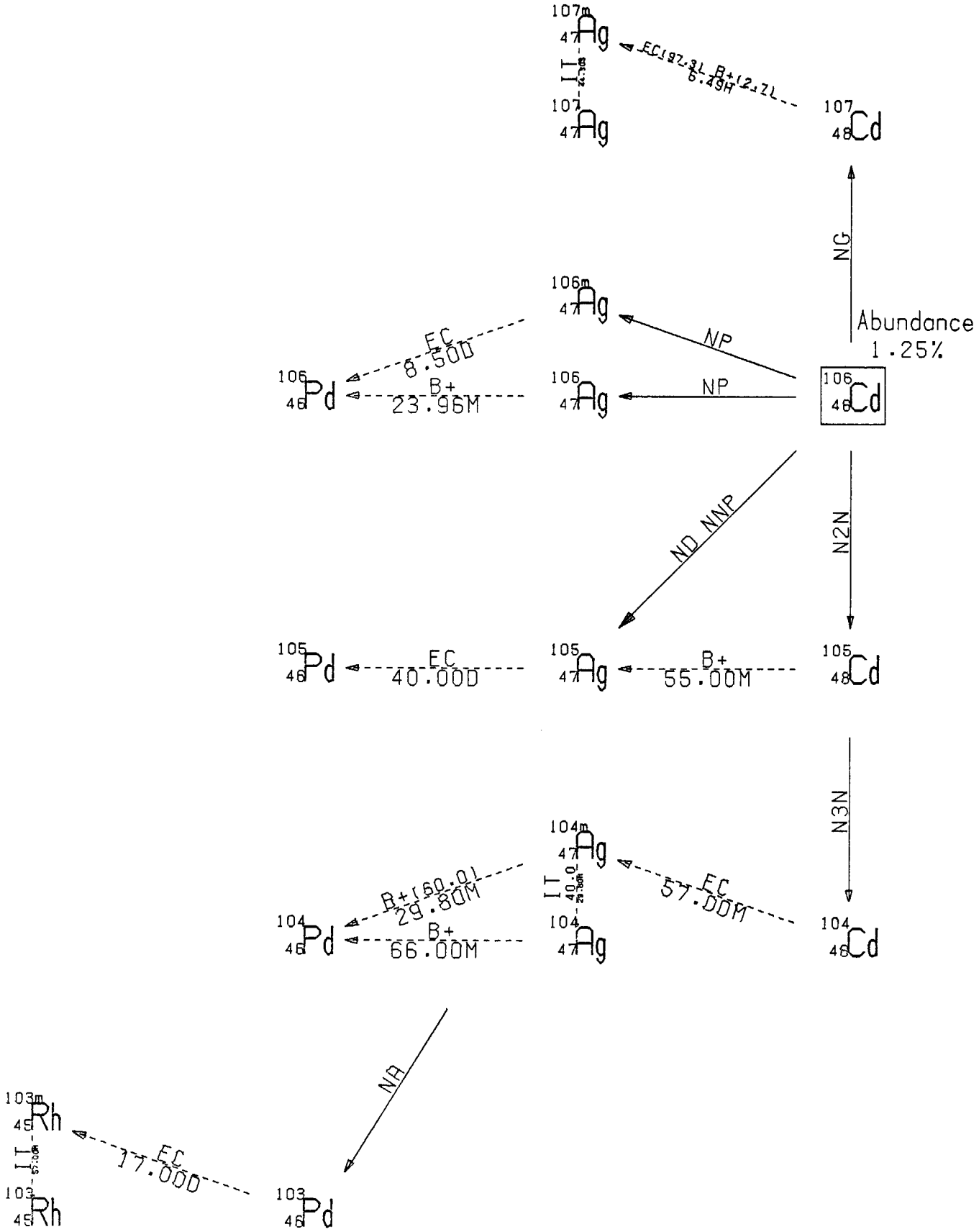
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-								
99 42Mo	66.02 H	5.11E+05	1.41E+05	7.39E+05	1.81E+05	7.78E+05	3.66E+05	4.06E+04	8.23E+05	
		0.00	89.32	12.60	6.33	4.43	1.36	0.89	0.14	
99m 43Tc	6.02 H	5.11E+05	1.41E+05	1.43E+05						
		0.00	89.00	6.44						
99 43Tc	2.14E+05Y									
97 41Nb	72.10 M									
97m 41Nb	60.00 S									
98 41Nb	2.86 S	5.11E+05	7.38E+05	7.87E+05	1.02E+06	1.43E+06	6.45E+05	9.72E+05	1.42E+06	1.26E+06	1.76E+06
		0.00	5.60	3.20	1.64	0.86	0.85	0.82	0.42	0.22	0.16
98m 41Nb	51.30 M	5.11E+05	7.87E+05	7.23E+05	1.17E+06	8.34E+05	3.36E+05	7.14E+05	1.70E+06	7.92E+05	6.45E+05
		0.00	93.20	73.66	17.84	10.85	9.53	9.15	8.86	7.82	5.61
95 40Zr	63.98 D										
95m 41Nb	1.53E+06Y										
95 41Nb	34.97 D										

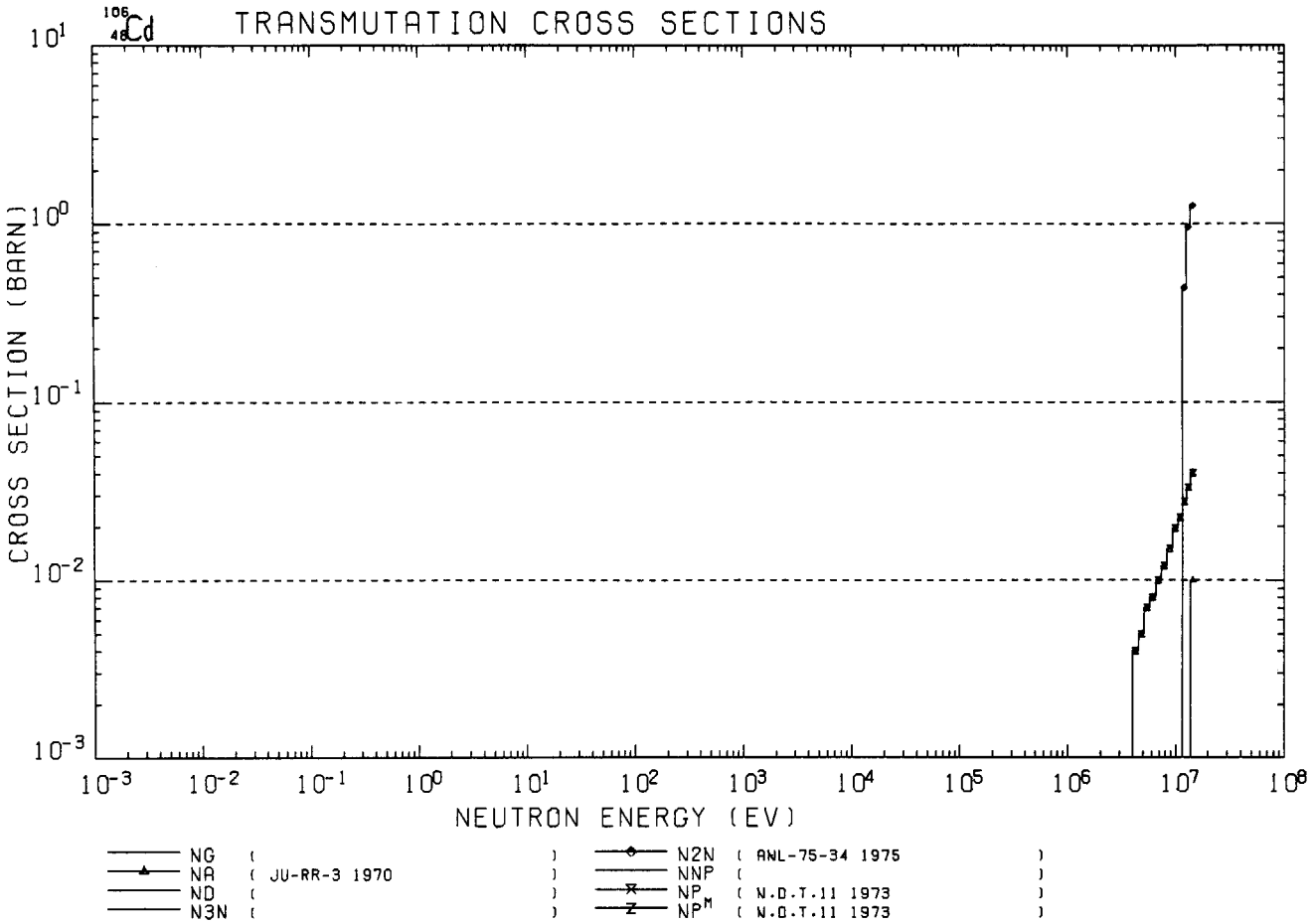

101 42 Mo
B-
14.61M
101 43 Tc
B-
14.30M
101 44 Ru
NG
100 41 Nb
NP
B-
1.01S
100 42 Mo
Abundance
9.60%
N2N
99m 43 Tc
IT 6.02H
B-(87.3)
B-(12.7)
66.02H
99 42 Mo
99 43 Tc
B-(10.0)
6.02H
B-
2.14E+05Y
99 44 Ru
NA
97m 41 Nb
IT 60.0H
B-
16.90H
97 40 Zr
97 41 Nb
B-
72.10M
97 42 Mo



$^{100}_{42}Mo$ DECAY GAMMA-RAY TABLE

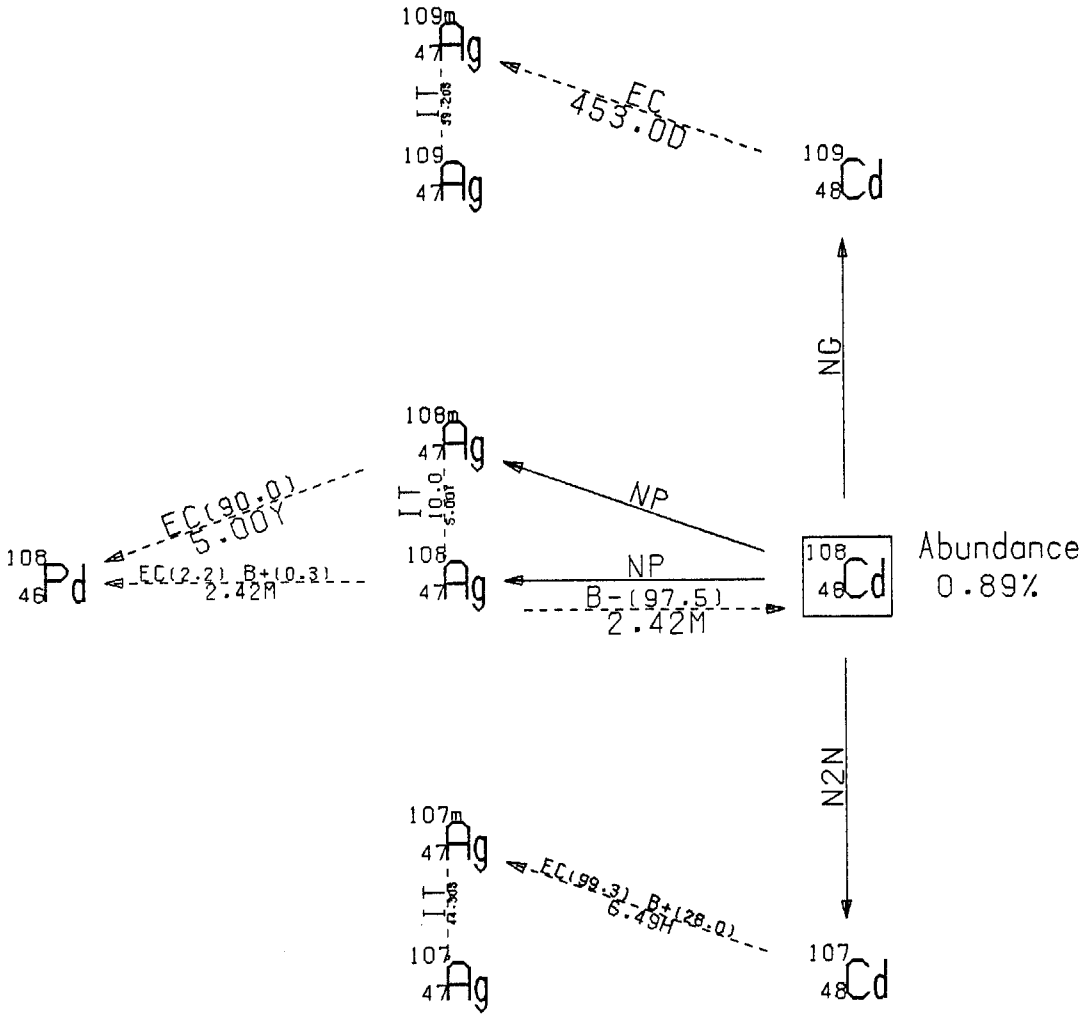
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{101}_{42}Mo$	14.61 M	5.11E+05	1.92E+05	5.91E+05	1.01E+06	5.05E+05	2.03E+06	1.53E+06	6.96E+05	5.90E+05	8.07E+04
		0.00	19.60	17.10	13.36	12.38	7.25	6.23	6.09	5.91	5.52
$^{101}_{43}Tc$	14.30 M	5.11E+05	3.07E+05	5.45E+05	1.27E+05	1.84E+05	6.95E+05	5.32E+05	7.16E+05	1.60E+05	6.27E+05
		0.00	88.00	6.04	2.87	1.70	1.18	1.03	0.69	0.65	0.39
$^{99}_{42}Mo$	66.02 H	5.11E+05	1.41E+05	7.39E+05	1.81E+05	7.78E+05	3.66E+05	4.06E+04	8.23E+05		
		0.00	89.32	12.60	6.33	4.43	1.36	0.89	0.14		
$^{99m}_{43}Tc$	6.02 H	5.11E+05	1.41E+05	1.43E+05							
		0.00	89.00	6.44							
$^{99}_{43}Tc$	2.14E+05Y										
$^{97}_{40}Zr$	16.90 H										
$^{97m}_{41}Nb$	60.00 S										
$^{100}_{41}Nb$	1.01 S										
$^{97}_{41}Nb$	72.10 M										

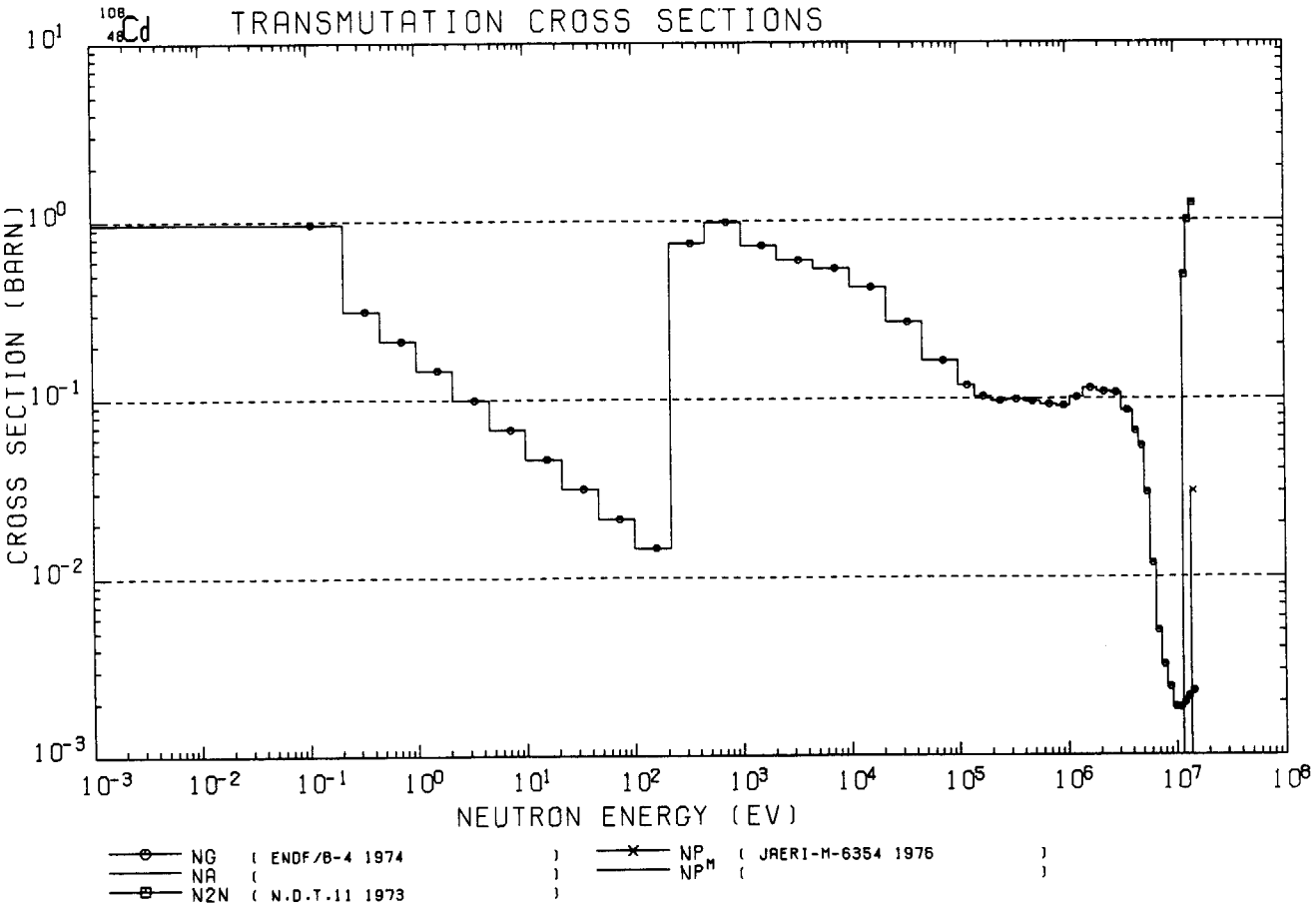

107m 47 Ag
IT 44.3S
107 47 Ag
EC(97.3) B+(2.7) 6.49H
107 48 Cd
NG
Abundance 1.25%
106m 47 Ag
NP
106 46 Pd
EC 8.50D
B+ 23.96M
106 47 Ag
NP
106 48 Cd
ND NNP
N2N
105 46 Pd
EC 40.00D
105 47 Ag
B+ 55.00M
105 48 Cd
N3N
104m 47 Ag
IT 40.0 29.80M
104 46 Pd
B+(60.0) 29.80M
B+ 66.00M
104 47 Ag
EC 57.00M
104 48 Cd
NA
103m 45 Rh
IT 57.00M
103 45 Rh
EC 17.00D
103 46 Pd



106 48Cd DECAY GAMMA-RAY TABLE

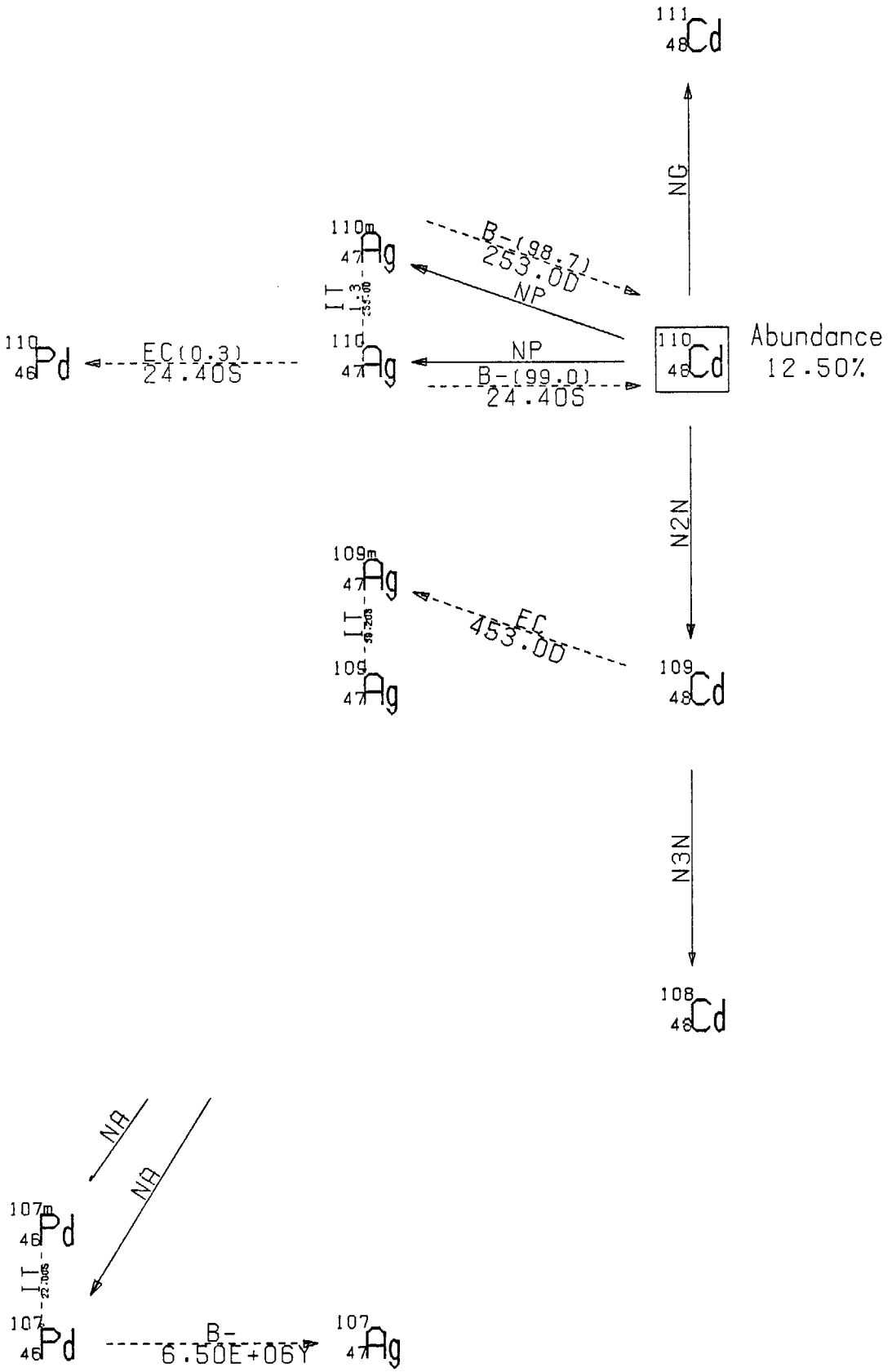
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
103 46Pd	17.00 D	5.11E+05	9.97E+04								
		0.00	0.68								
103m 45Rh	57.00 M	5.11E+05									
		0.00									
105 47Ag	40.00 D	5.11E+05	3.45E+05	2.80E+05	4.43E+05	6.45E+05	4.42E+05	3.19E+05	3.32E+05	1.09E+06	1.78E+05
		0.00	43.12	31.21	12.10	12.00	5.25	4.62	4.62	4.21	2.84
104 48Cd	57.00 M	5.11E+05	8.35E+04	7.09E+05	5.59E+05	6.66E+04	6.26E+05	1.24E+05	1.50E+05		
		0.00	47.10	15.56	6.36	2.42	2.18	0.36	0.11		
104m 47Ag	29.80 M	5.11E+05	5.56E+05	1.24E+06	2.28E+06	1.78E+06	7.86E+05	1.72E+06	1.34E+06	2.14E+06	3.21E+06
		200.00	60.60	2.67	1.65	1.39	1.29	1.16	1.10	1.06	0.97
104 47Ag	66.00 M	5.11E+05	6.66E+05	7.67E+05	9.41E+05	9.26E+05	8.68E+05	7.86E+05	7.69E+05	1.34E+06	9.23E+05
		200.00	92.10	64.86	23.02	12.43	10.82	9.35	7.72	7.17	6.92
105 48Cd	55.00 M	5.11E+05	9.62E+05	3.47E+05	1.30E+06	6.07E+05	1.69E+06	4.39E+05	1.39E+06	1.56E+06	2.33E+06
		200.00	4.73	4.24	4.11	3.78	3.57	2.84	2.72	2.07	2.00
106 47Ag	23.96 M	5.11E+05	6.12E+05	6.23E+05	6.17E+05	8.73E+05	1.05E+06	1.22E+06			
		200.00	17.00	0.27	0.19	0.17	0.17	0.10			
106m 47Ag	8.50 D	5.11E+05	5.12E+05	1.05E+06	7.17E+05	4.51E+05	6.16E+05	7.48E+05	1.53E+06	8.25E+05	4.06E+05
		0.00	88.25	29.75	29.20	28.49	21.77	20.80	16.43	15.49	13.54
107 48Cd	6.49 H	5.11E+05	9.31E+04	8.29E+05							
		0.46	4.62	0.16							
107m 47Ag	44.30 S	5.11E+05	9.31E+04								
		0.00	4.60								

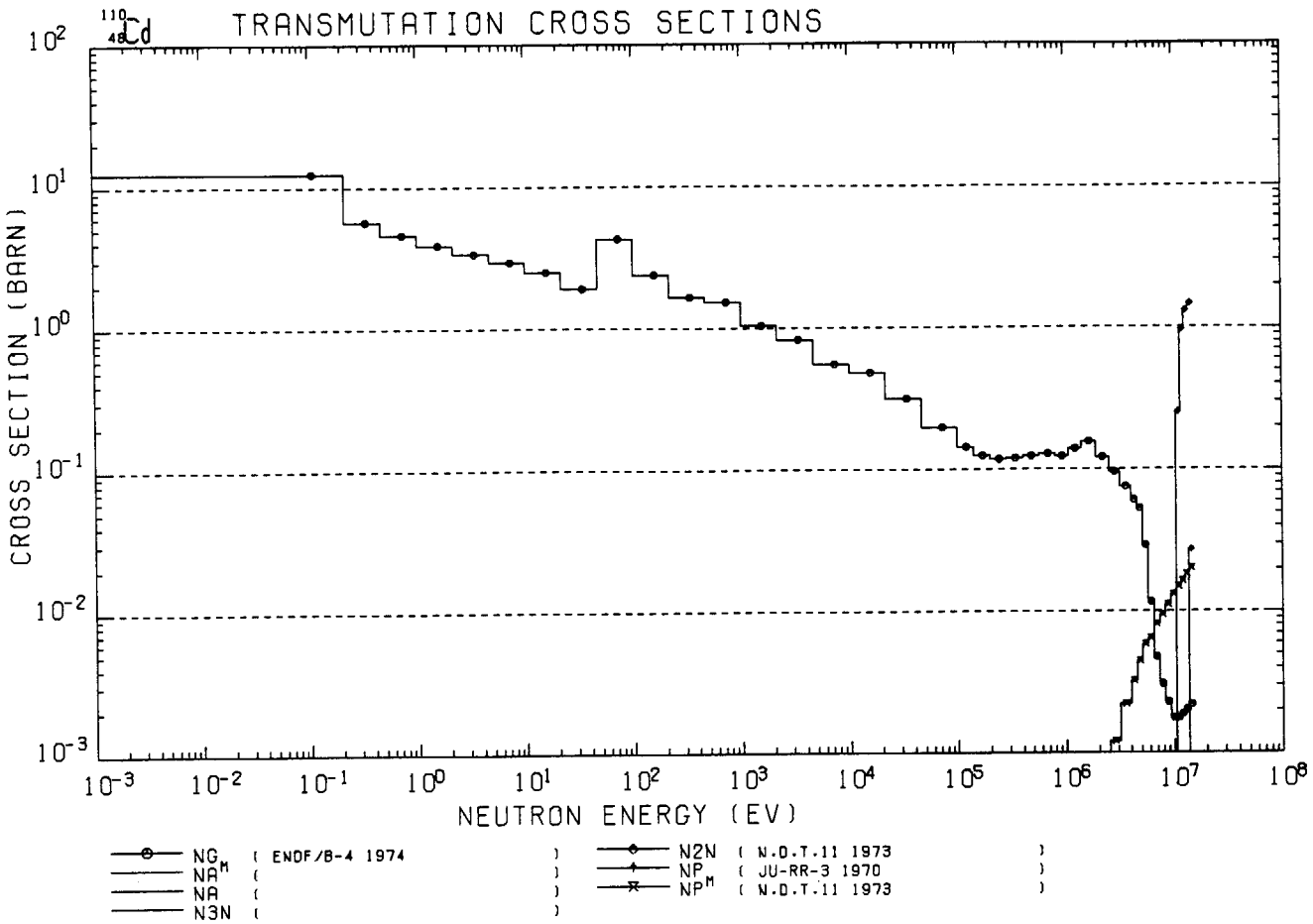

109m 47 Ag
IT 39.2d
109 47 Ag
EC 453.0D
109 48 Cd
NG
108m 47 Ag
IT 10.0 5.00Y
NP
EC(90.0) 5.00Y
108 46 Pd
EC(2.2) B+(0.3) 2.42M
108 47 Ag
NP
B-(97.5) 2.42M
108 48 Cd
Abundance 0.89%
N2N
107m 47 Ag
IT 44.3S
EC(99.3) B+(28.0) 6.49H
107 47 Ag
107 48 Cd
NA
105 46 Pd



$^{108}_{48}$Cd DECAY GAMMA-RAY TABLE

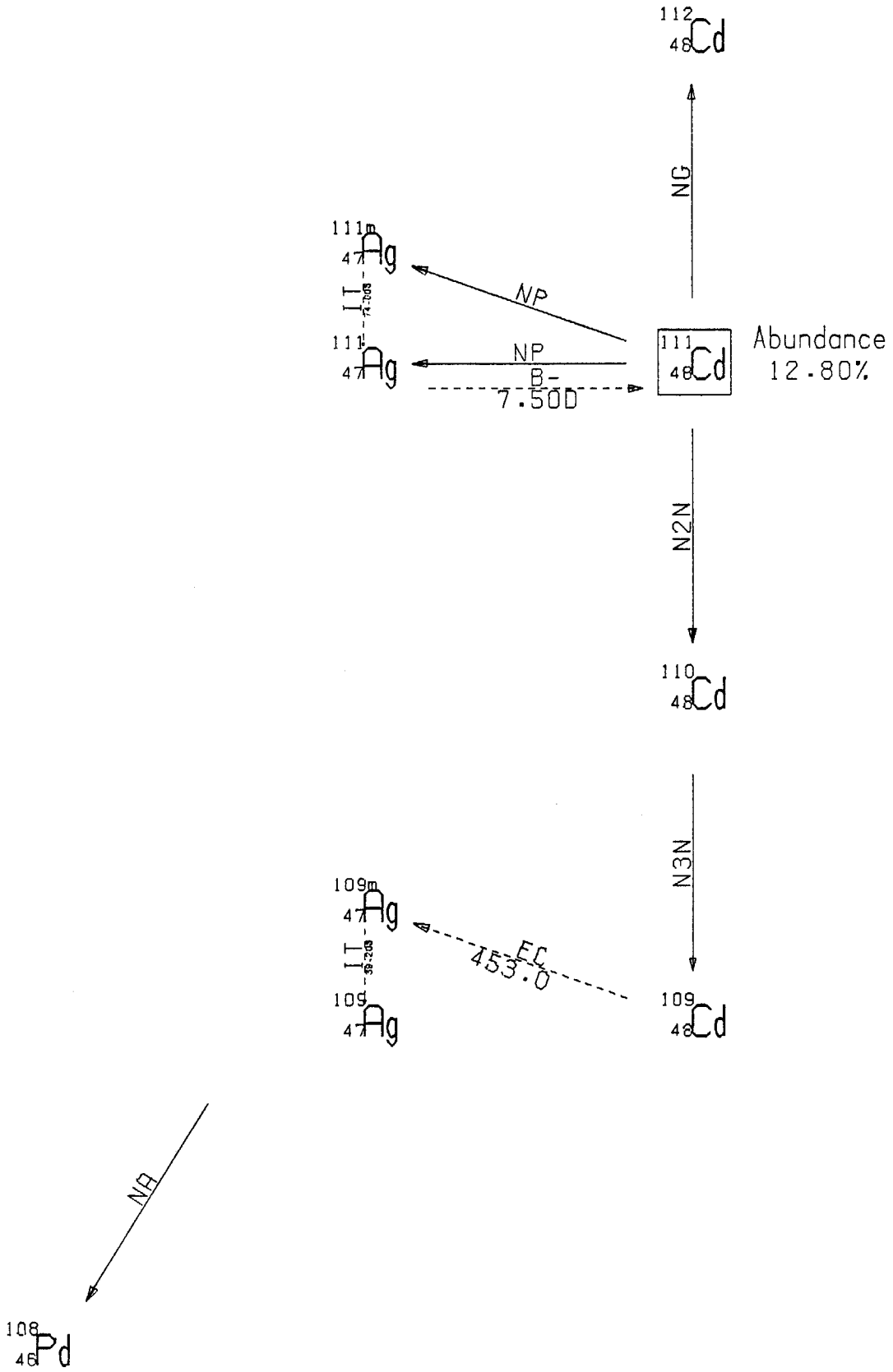
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-				
$^{109}_{48}$Cd	453.0 D	5.11E+05	8.80E+04			
		0.00	3.79			
$^{109m}_{47}$Ag	39.20 S	5.11E+05	8.80E+04			
		0.00	3.60			
$^{107}_{48}$Cd	6.49 H	5.11E+05	9.31E+04	8.29E+05		
		0.46	4.62	0.16		
$^{107m}_{47}$Ag	44.30 S	5.11E+05	9.31E+04			
		0.00	4.60			
$^{108}_{47}$Ag	2.42 M	5.11E+05	6.33E+05	4.34E+05	6.19E+05	
		0.56	1.75	0.60	0.26	
$^{108m}_{47}$Ag	5.00 Y	5.11E+05	4.34E+05	6.14E+05	7.23E+05	7.94E+04
		0.00	90.59	89.80	89.80	6.69

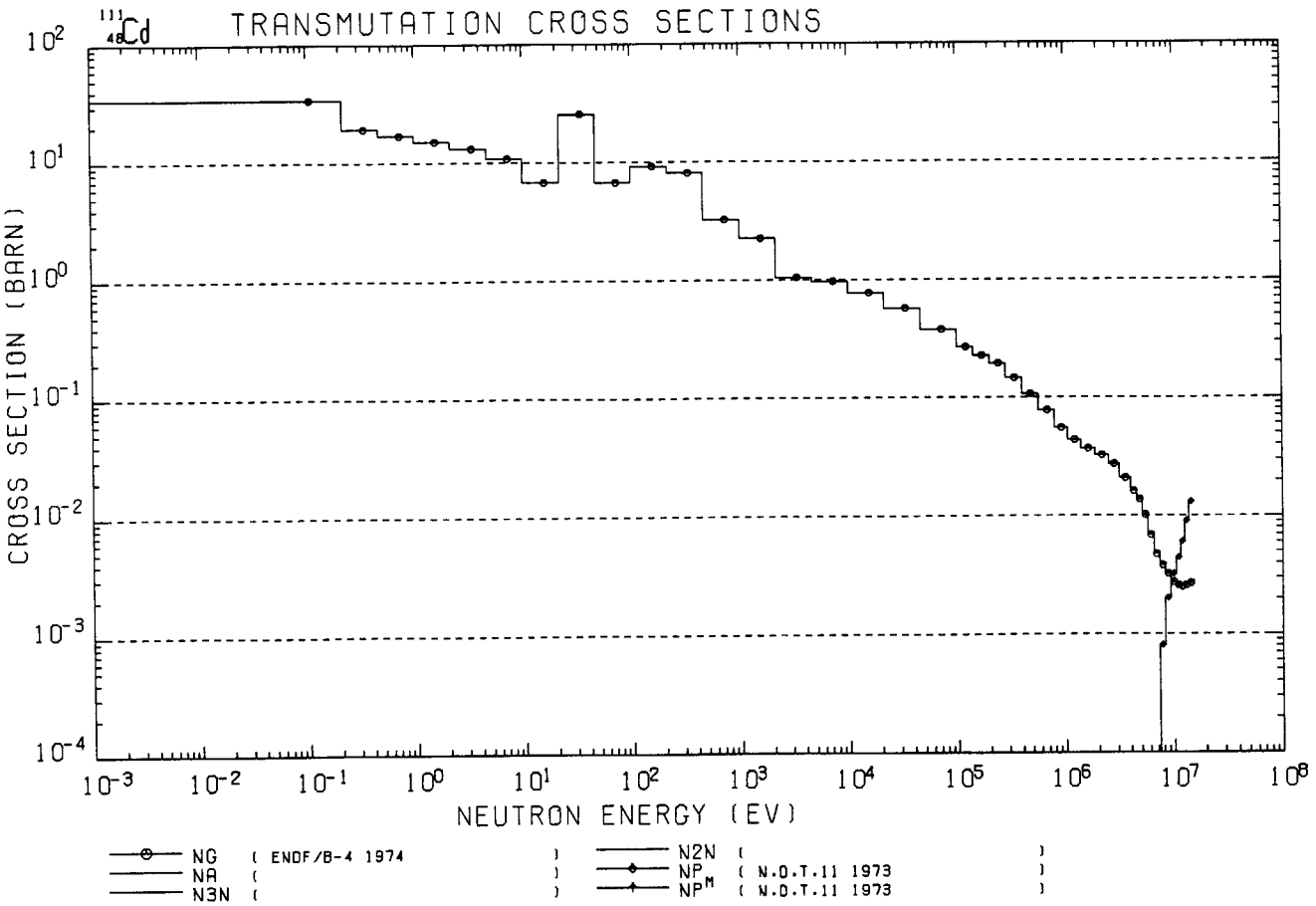

111 48 Cd
NG
110m 47 Ag
IT 1.3 MIN
B-(98.7) 253.0D
NP
110 46 Pd
EC(0.3) 24.4OS
110 47 Ag
NP
B-(99.0) 24.4OS
110 48 Cd
Abundance 12.50%
N2N
109m 47 Ag
IT 39.2OS
EC 453.0D
109 47 Ag
109 48 Cd
N3N
108 48 Cd
NA
NA
107m 46 Pd
IT 21.3OS
107 46 Pd
B- 6.50E+06Y
107 47 Ag



$^{110}_{48}Cd$ DECAY GAMMA-RAY TABLE

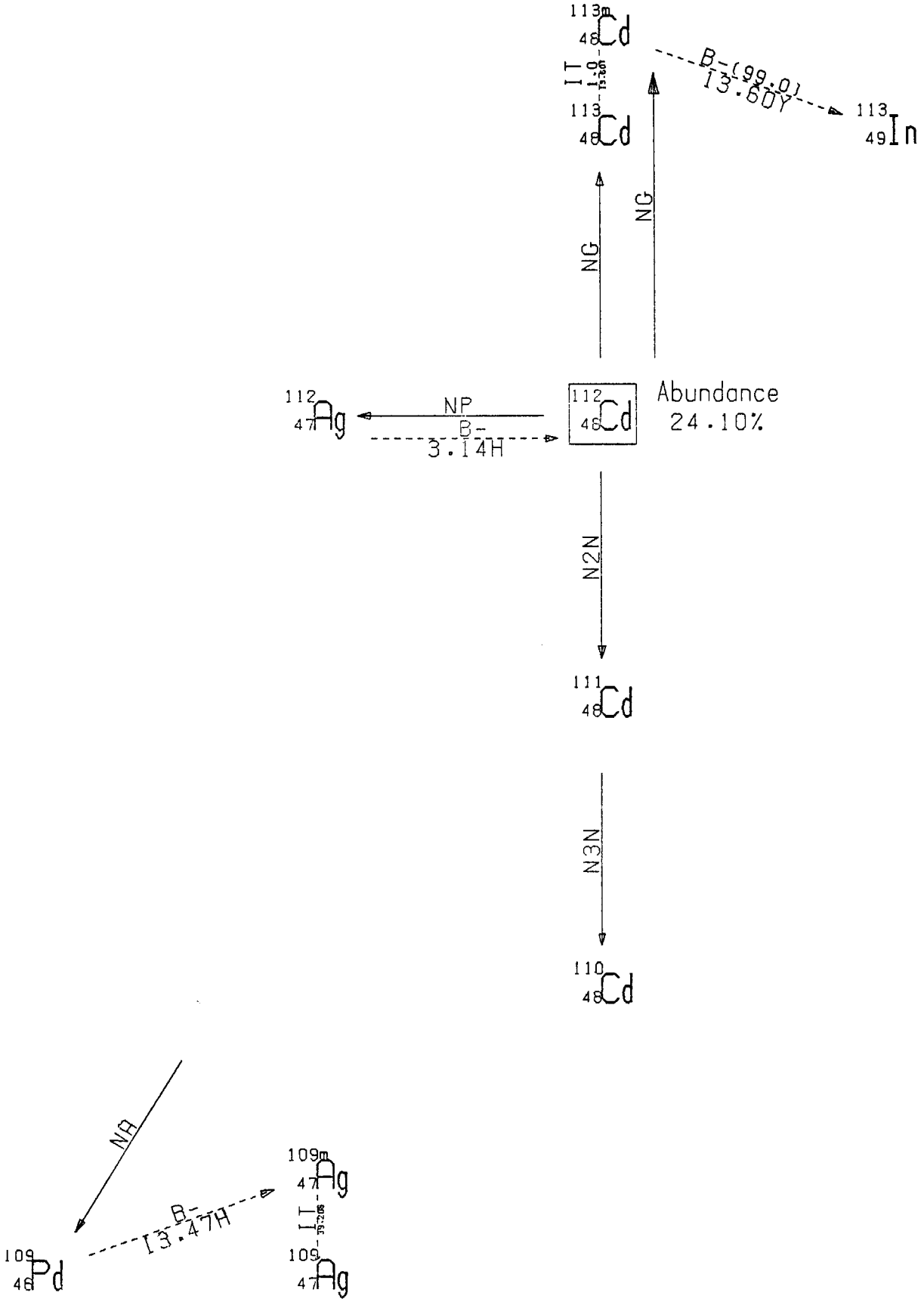
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{107m}_{46}Pd$	22.00 S	5.11E+05	2.14E+05								
		0.00	68.00								
$^{109}_{48}Cd$	453.0 D	5.11E+05	8.80E+04								
		0.00	3.79								
$^{109m}_{47}Ag$	39.20 S	5.11E+05	8.80E+04								
		0.00	3.60								
$^{110m}_{47}Ag$	253.0 D	5.11E+05	6.58E+05	6.65E+05	9.57E+05	1.38E+06	7.64E+05	7.07E+05	1.50E+06	8.78E+05	8.18E+05
		0.00	94.41	72.81	34.29	24.65	22.27	16.32	13.23	10.58	7.28
$^{110}_{47}Ag$	24.40 S	5.11E+05	6.58E+05								
		0.00	4.52								
$^{107}_{46}Pd$	6.50E+06Y										

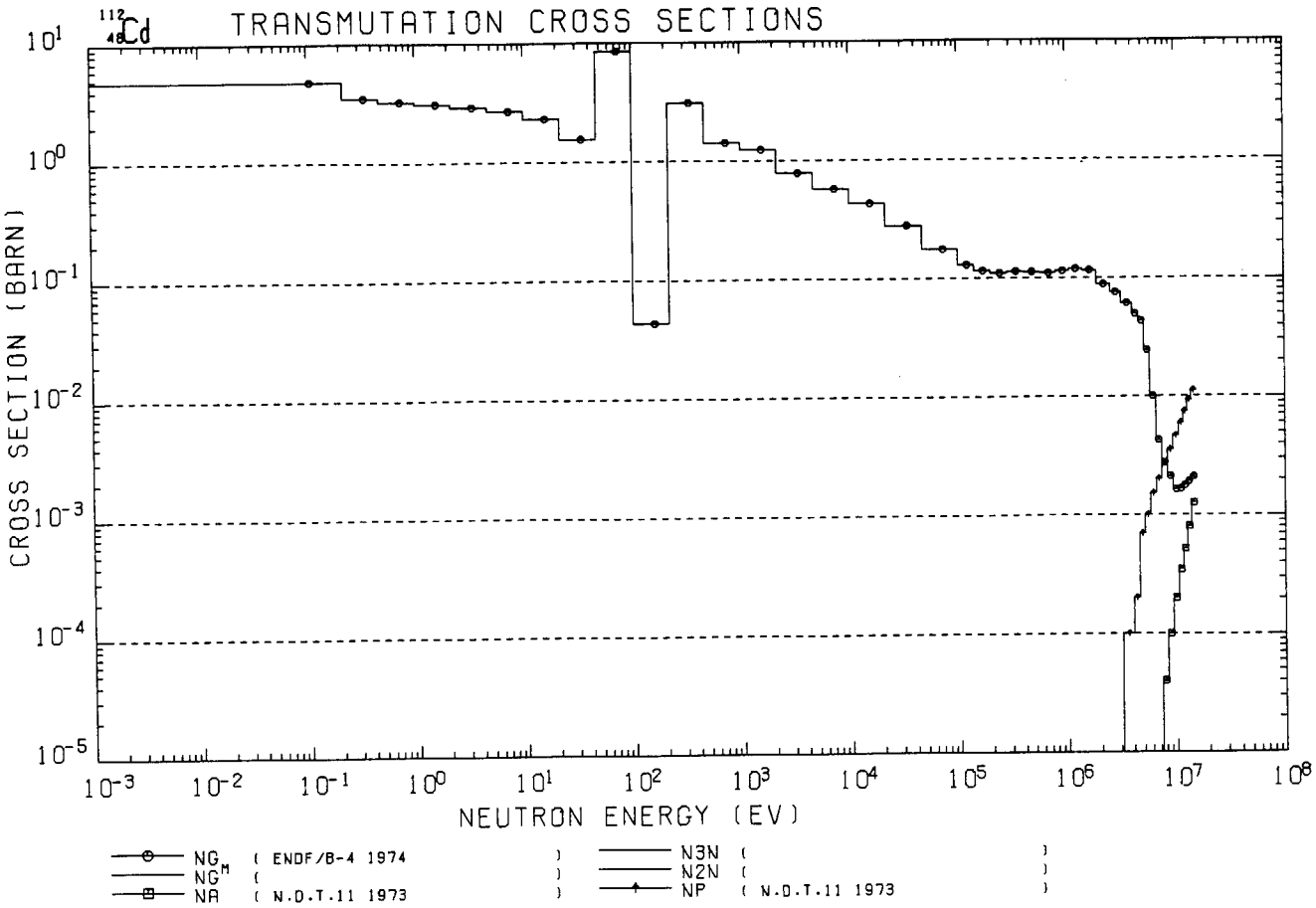

112 48 Cd
NG
111m 47 Ag
IT
111 47 Ag
NP
NP
B-
7.50D
111 48 Cd
Abundance
12.80%
N2N
110 48 Cd
N3N
109m 47 Ag
IT
109 47 Ag
EC
453.0
109 48 Cd
NA
108 46 Pd



$^{111}_{48}Cd$ DECAY GAMMA-RAY TABLE

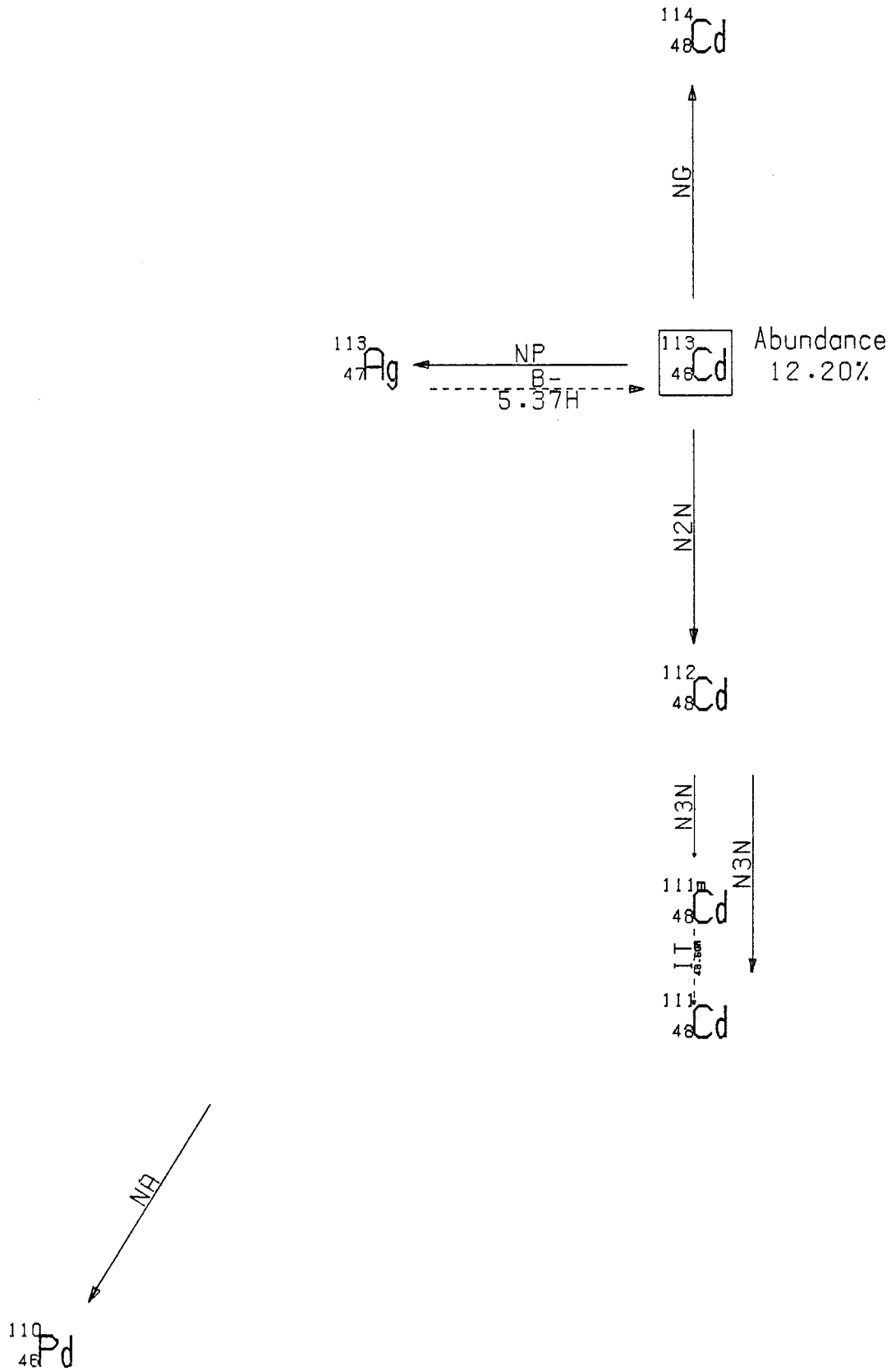
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-		
$^{109}_{48}Cd$	453.0	5.11E+05	8.80E+04	
		0.00	3.79	
$^{109m}_{47}Ag$	39.20 S	5.11E+05	8.80E+04	
		0.00	3.60	
$^{111m}_{47}Ag$	74.00 S	5.11E+05	5.99E+04	
		0.00	0.53	
$^{111}_{47}Ag$	7.50 D	5.11E+05	3.42E+05	2.46E+05
		0.00	0.50	0.10

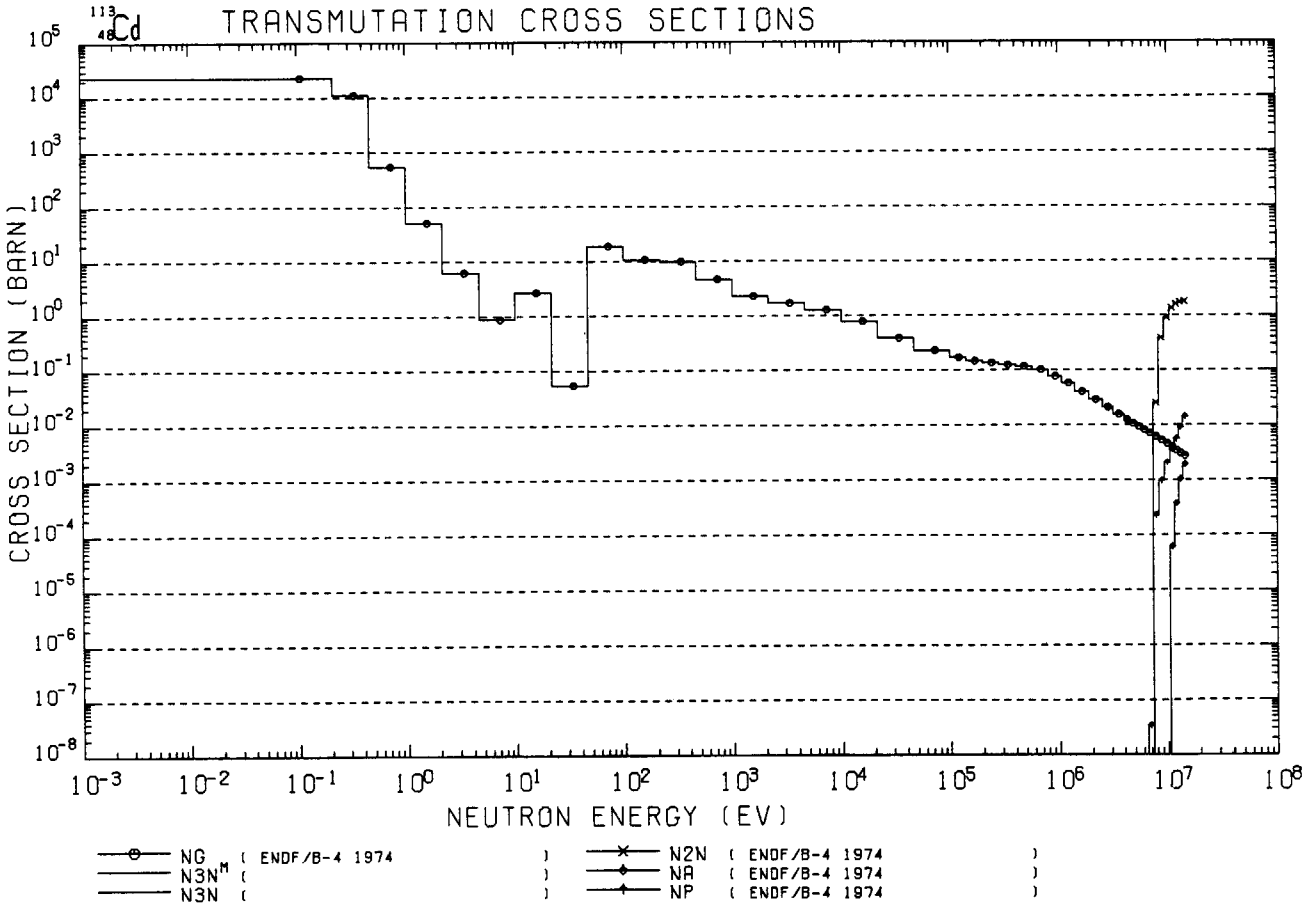

113m 48 Cd
IT
1.0
15.86
113 48 Cd
B- (99.0)
13.60Y
113 49 In
NG
NG
112 47 Ag
NP
B-
3.14H
112 48 Cd
Abundance
24.10%
N2N
111 48 Cd
N3N
110 48 Cd
NA
B-
13.47H
109 46 Pd
109m 47 Ag
IT
39.2H
109 47 Ag



112 48Cd DECAY GAMMA-RAY TABLE

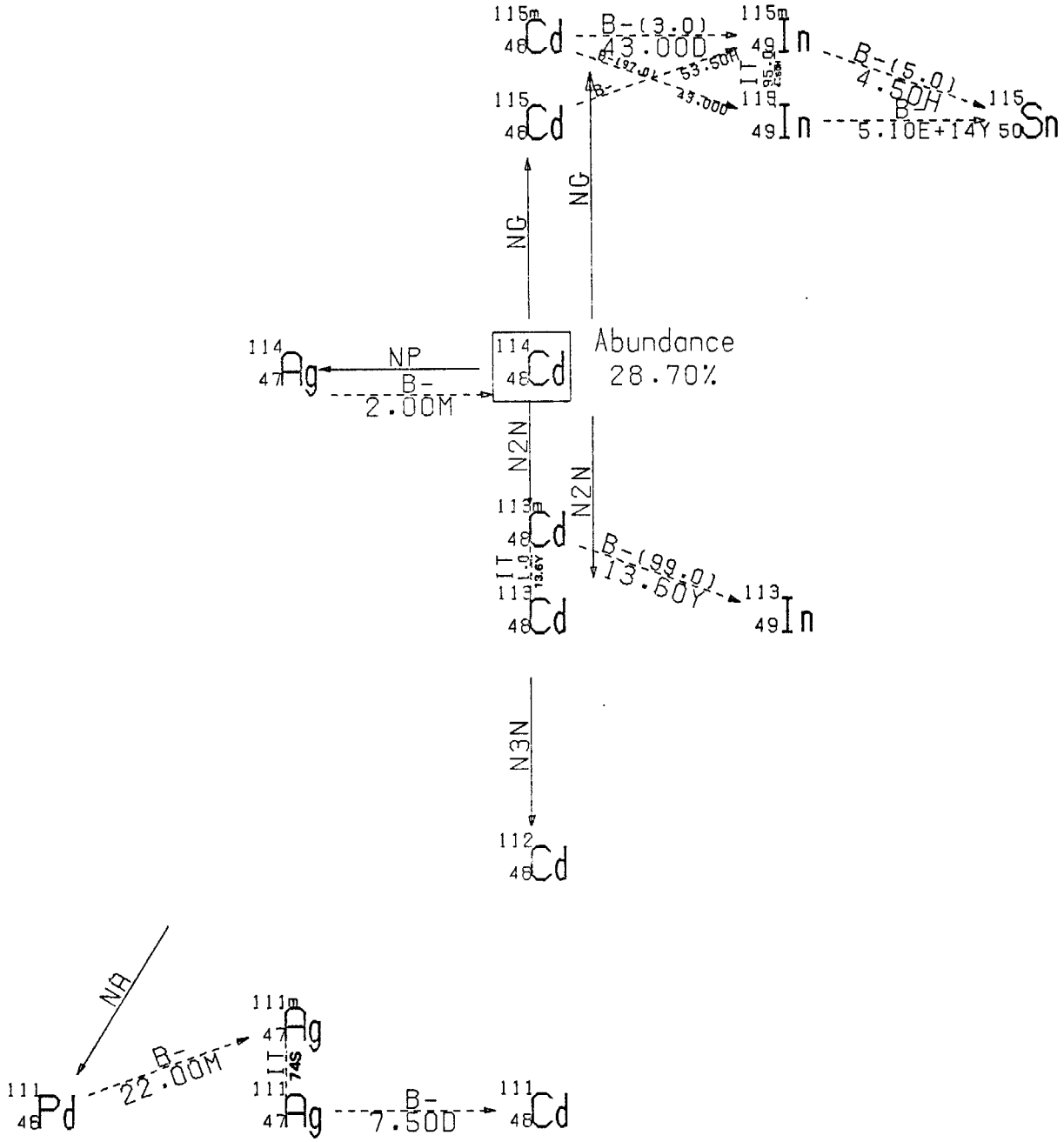
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
113m 48Cd	13.60 Y	5.11E+05									
		0.00									
109 46Pd	13.47 H	5.11E+05	6.47E+05	8.80E+04	3.11E+05	7.82E+05	4.15E+05	6.36E+05	6.02E+05	4.13E+05	7.02E+05
		0.00	3.62	3.60	3.32	1.82	1.63	1.48	1.24	0.84	0.53
109m 47Ag	39.20 S	5.11E+05	8.80E+04								
		0.00	3.60								
112 47Ag	3.14 H	5.11E+05	6.17E+05	1.39E+06	6.07E+05	6.95E+05	1.61E+06	2.11E+06	1.31E+06	6.93E+05	2.51E+06
		0.00	42.50	5.31	3.06	2.93	2.80	2.38	1.19	1.06	1.06

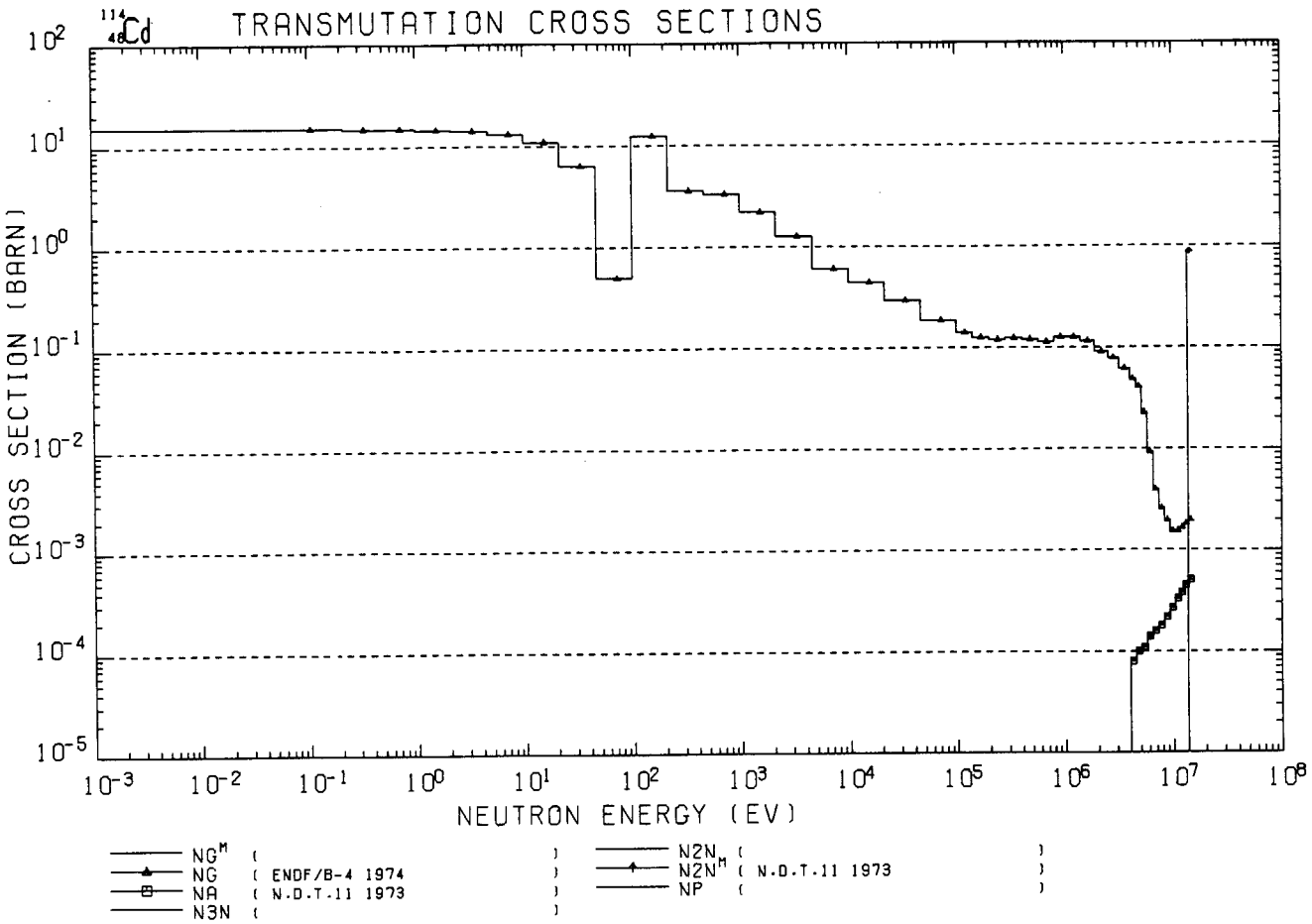

114 48 Cd
NG
113 47 Ag
NP
B-
5.37H
113 48 Cd
Abundance
12.20%
N2N
112 48 Cd
N3N
111m 48 Cd
IT
111 48 Cd
N3N
NA
110 46 Pd



$^{113}_{48}Cd$ DECAY GAMMA-RAY TABLE

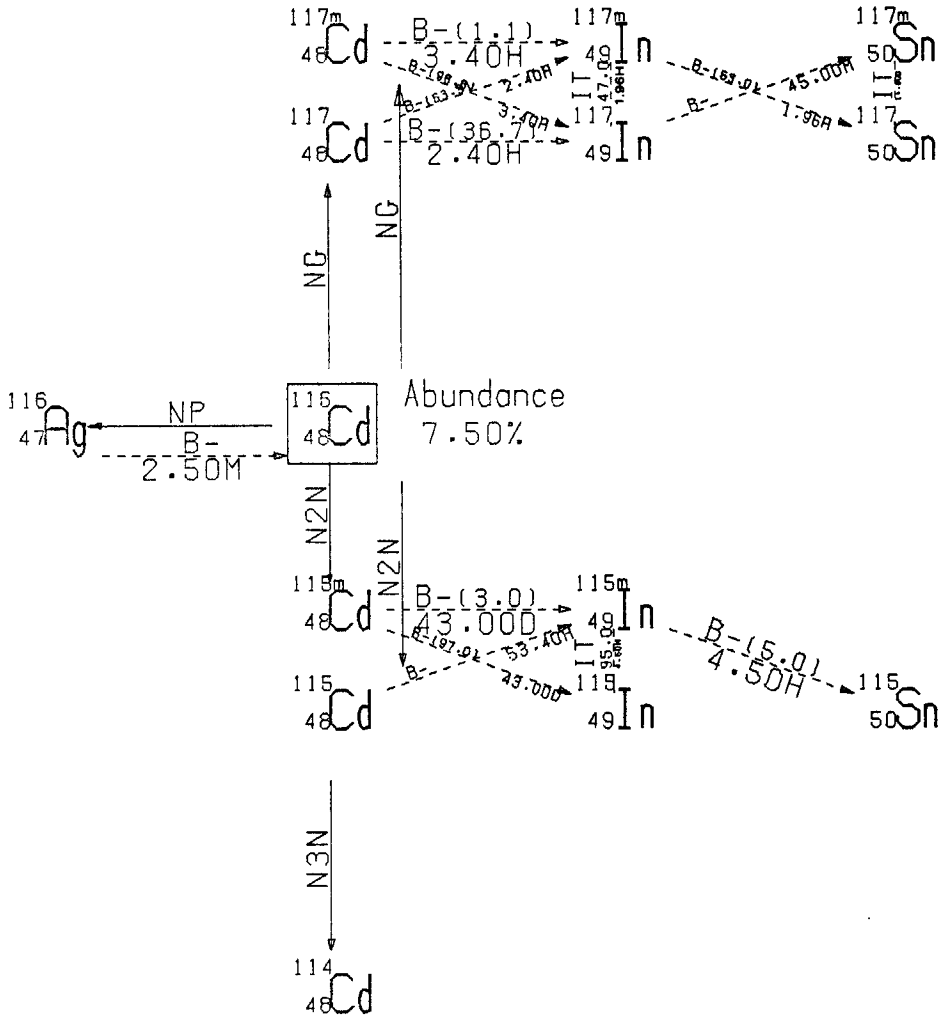
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{113m}_{48}Cd$	48.60 M	5.11E+05	2.45E+05	1.51E+05							
		0.00	94.20	31.09							
$^{113}_{47}Ag$	5.37 H	5.11E+05	2.98E+05	2.59E+05	3.16E+05	6.73E+05	6.81E+05	3.33E+05	3.39E+05	9.89E+05	1.19E+06
		0.00	9.00	1.52	1.23	1.11	0.72	0.58	0.58	0.43	0.40

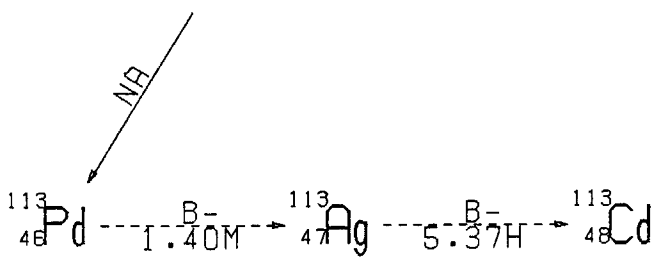

115m 48 Cd
B-(3.0)
43.000
115m 49 In
IT 4.50H
B-(5.0)
4.50H
115 50 Sn
115 48 Cd
B-
5.10E+14Y
115 49 In
NG
NG
114 47 Ag
NP
B-
2.00M
114 48 Cd
Abundance
28.70%
N2N
N2N
113m 48 Cd
IT 13.6Y
B-(99.0)
13.60Y
113 49 In
113 48 Cd
N3N
112 48 Cd
NA
111m 47 Ag
B-
22.00M
111 48 Pd
IT 74S
111 47 Ag
B-
7.50D
111 48 Cd

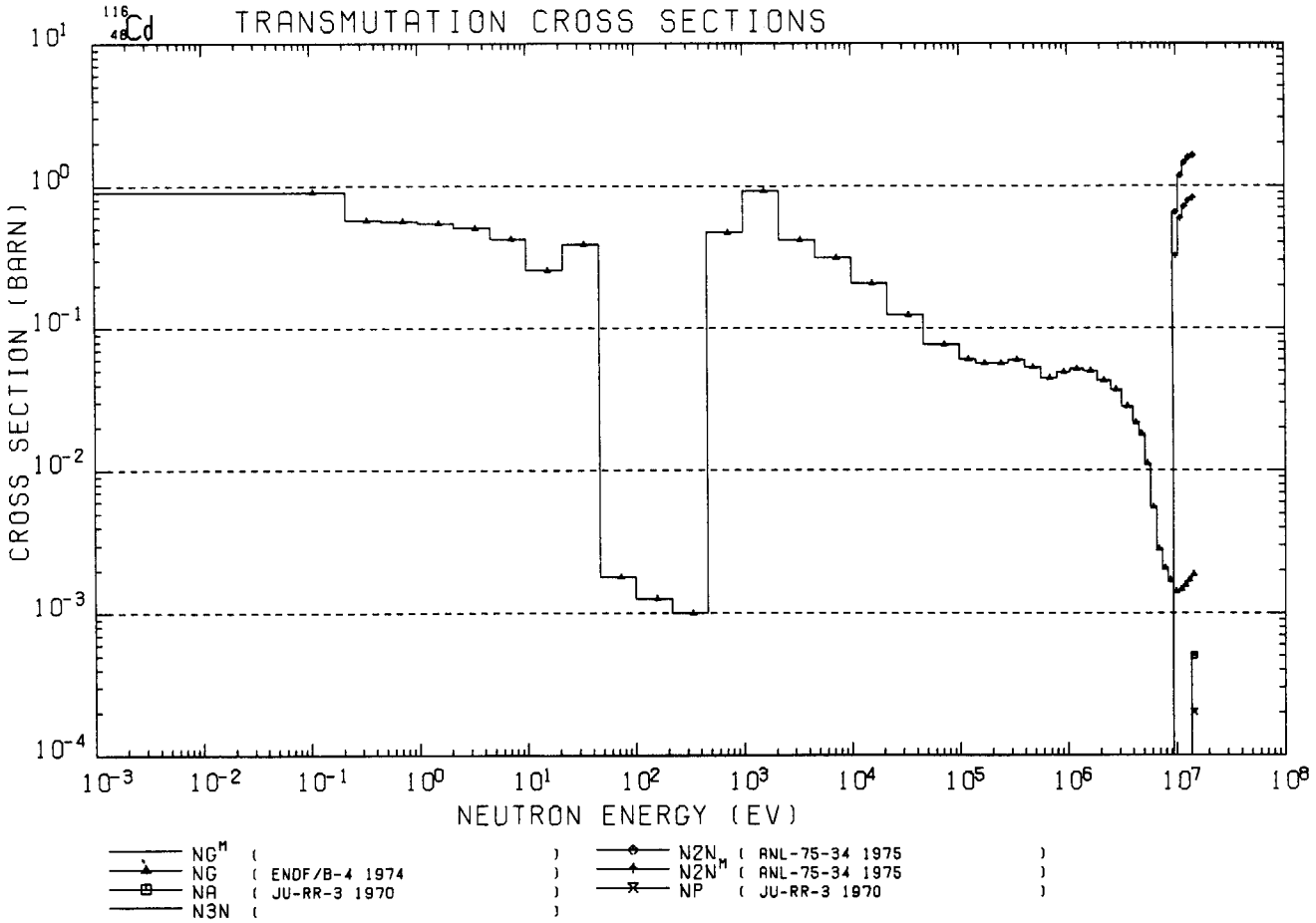


$^{114}_{48}Cd$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{115m}_{48}Cd$	43.00 D	5.11E+05	9.34E+05	1.29E+06	4.84E+05						
		0.00	1.70	0.77	0.26						
$^{115m}_{49}In$	4.50 H	5.11E+05	3.36E+05								
		0.00	45.91								
$^{115}_{49}In$	5.10E+14Y										
$^{115}_{48}Cd$	53.50 H	5.11E+05	3.57E+05	5.28E+05	4.93E+05	2.62E+05	2.32E+05				
		0.00	50.11	30.28	8.56	1.87	0.61				
$^{111}_{46}Pd$	22.00 M	5.11E+05	5.99E+04	5.80E+05	1.46E+06	1.39E+06	7.05E+04	6.51E+05	3.77E+05	5.47E+05	6.23E+05
		0.00	59.83	0.80	0.71	0.69	0.64	0.55	0.44	0.35	0.31
$^{111m}_{47}Ag$	74.00 S	5.11E+05	5.99E+04								
		0.00	0.63								
$^{111}_{47}Ag$	7.50 D	5.11E+05	3.42E+05	2.48E+05							
		0.00	0.50	0.10							
$^{113m}_{48}Cd$	13.60 Y	5.11E+05									
		0.00									
$^{114}_{47}Ag$	2.00 M	5.11E+05	1.66E+06	5.58E+05	5.76E+05	1.30E+06	6.61E+05	8.08E+05	1.36E+06	2.45E+06	1.21E+06
		0.00	3.05	1.00	0.81	0.55	0.33	0.30	0.18	0.17	0.15

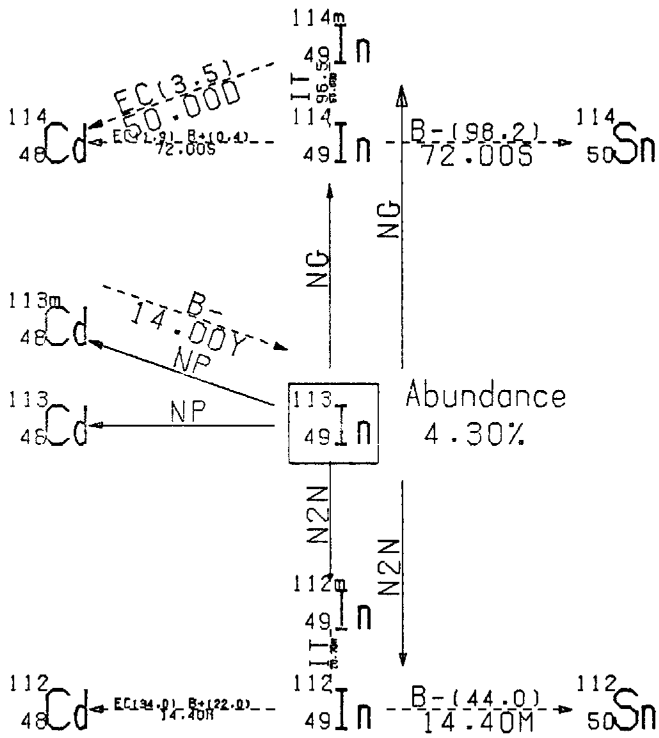

117m 48 Cd
B-(1.1)
3.40H
117m 49 In
117m 50 Sn
117 48 Cd
B-(36.7)
2.40H
117 49 In
117 50 Sn
IT
B-
NG
NG
116 47 Ag
NP
B-
2.50M
115 48 Cd
Abundance
7.50%
N2N
N2N
115m 48 Cd
B-(3.0)
43.00D
115m 49 In
B-(5.0)
4.50H
115 50 Sn
115 48 Cd
115 49 In
IT
N3N
114 48 Cd


NA
113 46 Pd
B-
1.40M
113 47 Ag
B-
5.37H
113 48 Cd

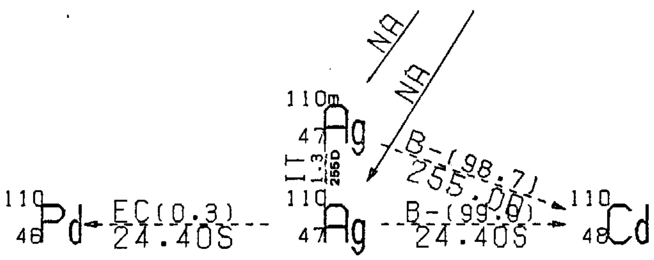


116 48Cd DECAY GAMMA-RAY TABLE

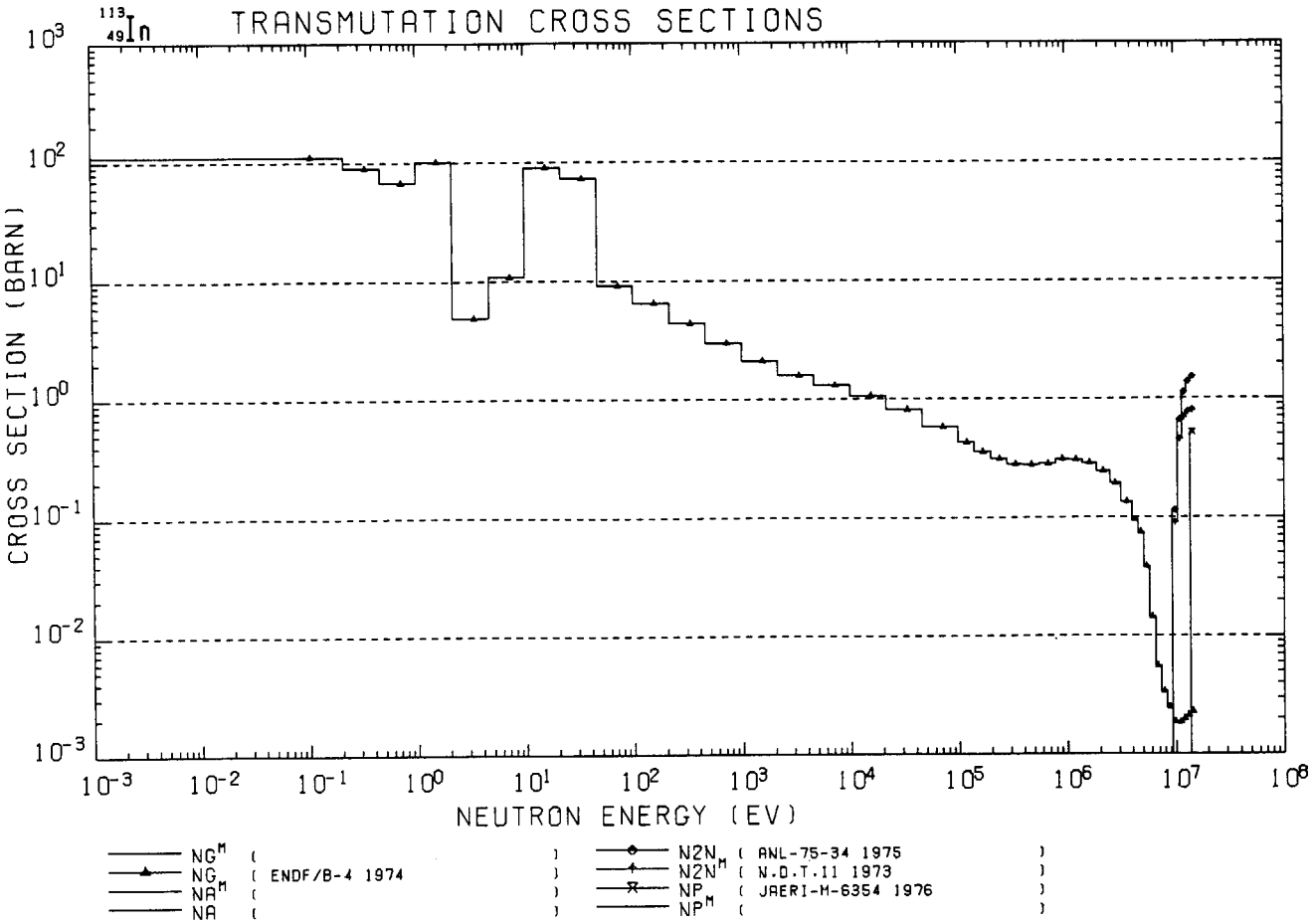
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
117m 48Cd	3.40	H	5.11E+05	2.00E+06	1.07E+06	5.64E+05	1.43E+06	1.03E+06	1.23E+06	8.60E+05	2.32E+06	2.10E+06
			0.00	25.52	23.20	15.31	14.38	12.06	11.44	8.42	7.54	7.31
117m 49In	1.96	H	5.11E+05	3.15E+05	1.59E+05							
			0.00	17.20	14.20							
117 49In	45.00	M	5.11E+05	5.53E+05	1.59E+05	3.97E+05						
			0.00	99.72	86.76	0.14						
117m 50Sn	14.00	D	5.11E+05	1.59E+05	1.56E+05							
			0.00	86.40	2.11							
117 48Cd	2.40	H	5.11E+05	2.73E+05	1.30E+06	3.44E+05	3.15E+05	1.58E+06	4.34E+05	1.05E+06	8.81E+05	8.97E+04
			0.00	29.30	18.46	17.87	17.20	11.31	10.58	4.39	3.46	3.37
113 46Pd	1.40	M										
113 47Ag	5.37	H	5.11E+05	2.98E+05	2.59E+05	3.16E+05	6.73E+05	6.81E+05	3.33E+05	3.39E+05	9.89E+05	1.19E+06
			0.00	9.00	1.52	1.23	1.11	0.72	0.58	0.58	0.43	0.40
115m 48Cd	43.00	D	5.11E+05	9.34E+05	1.29E+06	4.84E+05						
			0.00	1.70	0.77	0.26						
115m 49In	4.50	H	5.11E+05	3.36E+05								
			0.00	45.91								
116 47Ag	2.50	M	5.11E+05	5.14E+05	7.00E+05	1.30E+06	1.21E+06	2.48E+06	1.41E+06	7.09E+05	6.40E+05	1.17E+06
			0.00	64.00	13.00	9.06	8.45	5.64	5.07	3.38	3.30	2.81
116 48Cd	53.40	H	5.11E+05	3.37E+05	5.28E+05	4.93E+05	2.62E+05	2.32E+05				
			0.00	50.11	30.28	8.56	1.87	0.61				



114m 49 In
IT
EC(3.5)
50.00D
114 48 Cd
72.00S
114 49 In
B-(98.2)
72.00S
114 50 Sn
NG
NG
113m 48 Cd
B-
14.00Y
NP
113 48 Cd
NP
113 49 In
Abundance
4.30%
N2N
N2N
112m 49 In
IT
112 48 Cd
14.40M
112 49 In
B-(44.0)
14.40M
112 50 Sn

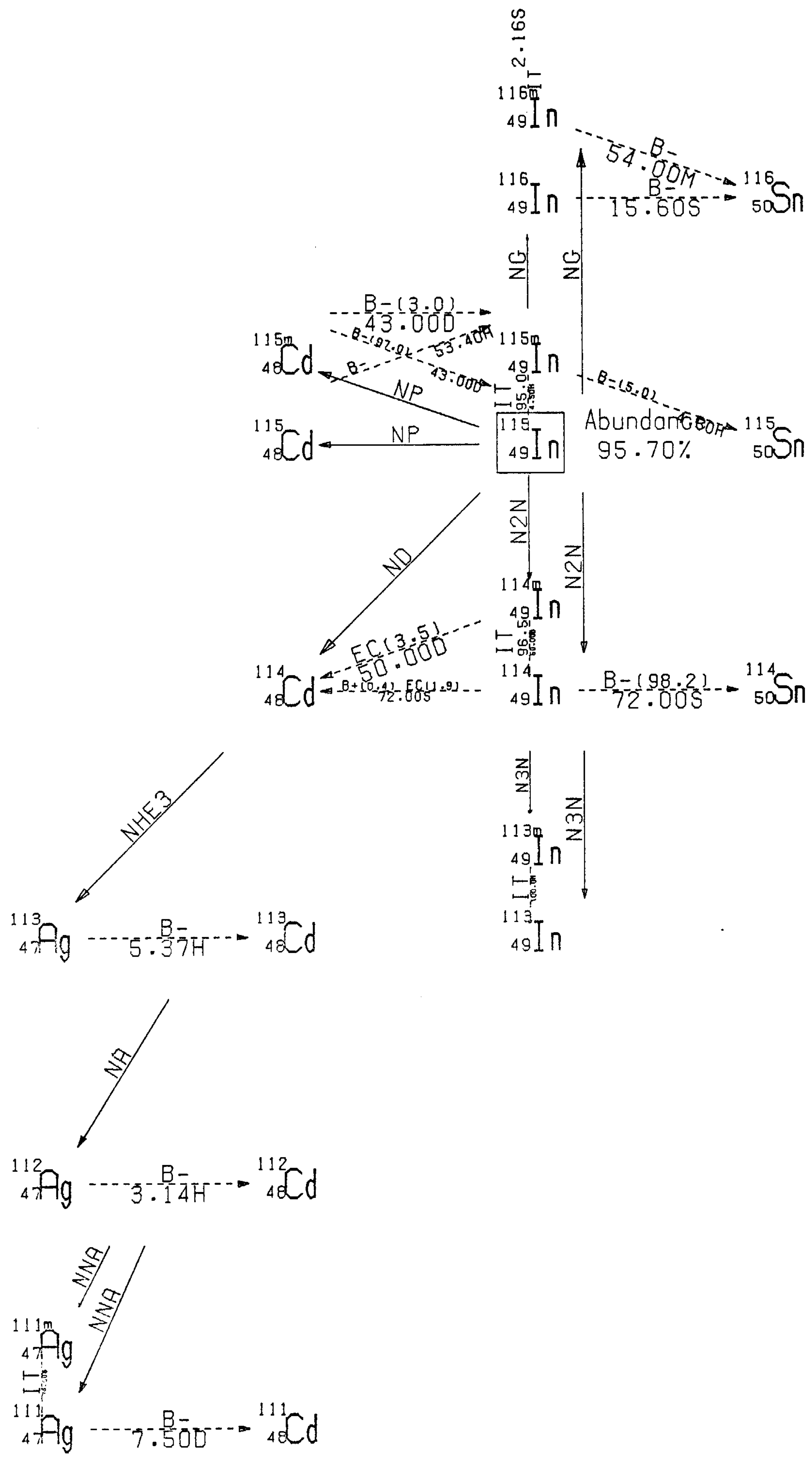


NA
NA
110m 47 Ag
IT
1.3
255D
B-(98.7)
255.0D
110 46 Pd
EC(0.3)
24.40S
110 47 Ag
B-(99.0)
24.40S
110 48 Cd

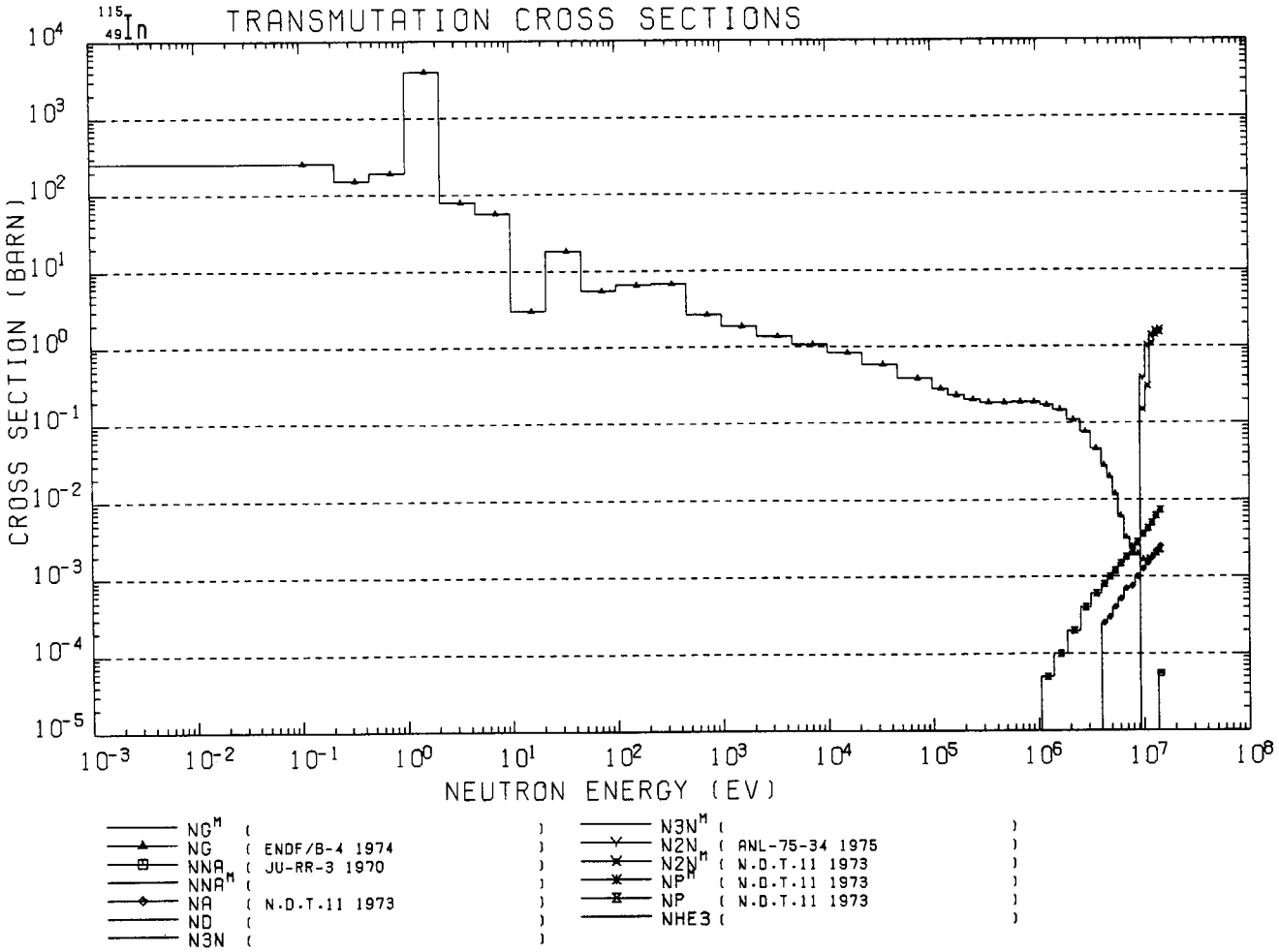


$^{113}_{49}In$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{114m}_{49}In$	50.00	D	5.11E+05	1.90E+05	5.58E+05	7.25E+05						
			0.00	96.70	3.40	3.32						
$^{114}_{49}In$	72.00	S	5.11E+05	1.30E+06								
			0.00	0.14								
$^{110m}_{47}Ag$	255.0	D	5.11E+05	6.58E+05	8.85E+05	9.37E+05	1.38E+06	7.64E+05	7.07E+05	1.50E+06	6.78E+05	8.18E+05
			0.00	94.41	72.81	34.29	24.65	22.27	16.32	13.23	10.58	7.28
$^{110}_{47}Ag$	24.40	S	5.11E+05	6.58E+05								
			0.00	4.52								
$^{112m}_{49}In$	20.70	M	5.11E+05	1.55E+06								
			0.00	13.00								
$^{112}_{49}In$	14.40	M	5.11E+05	6.17E+05	6.07E+05	1.25E+06	8.61E+05					
			65.47	6.00	1.54	0.28	0.20					
$^{113m}_{48}Cd$	14.00	Y	5.11E+05									
			0.00									

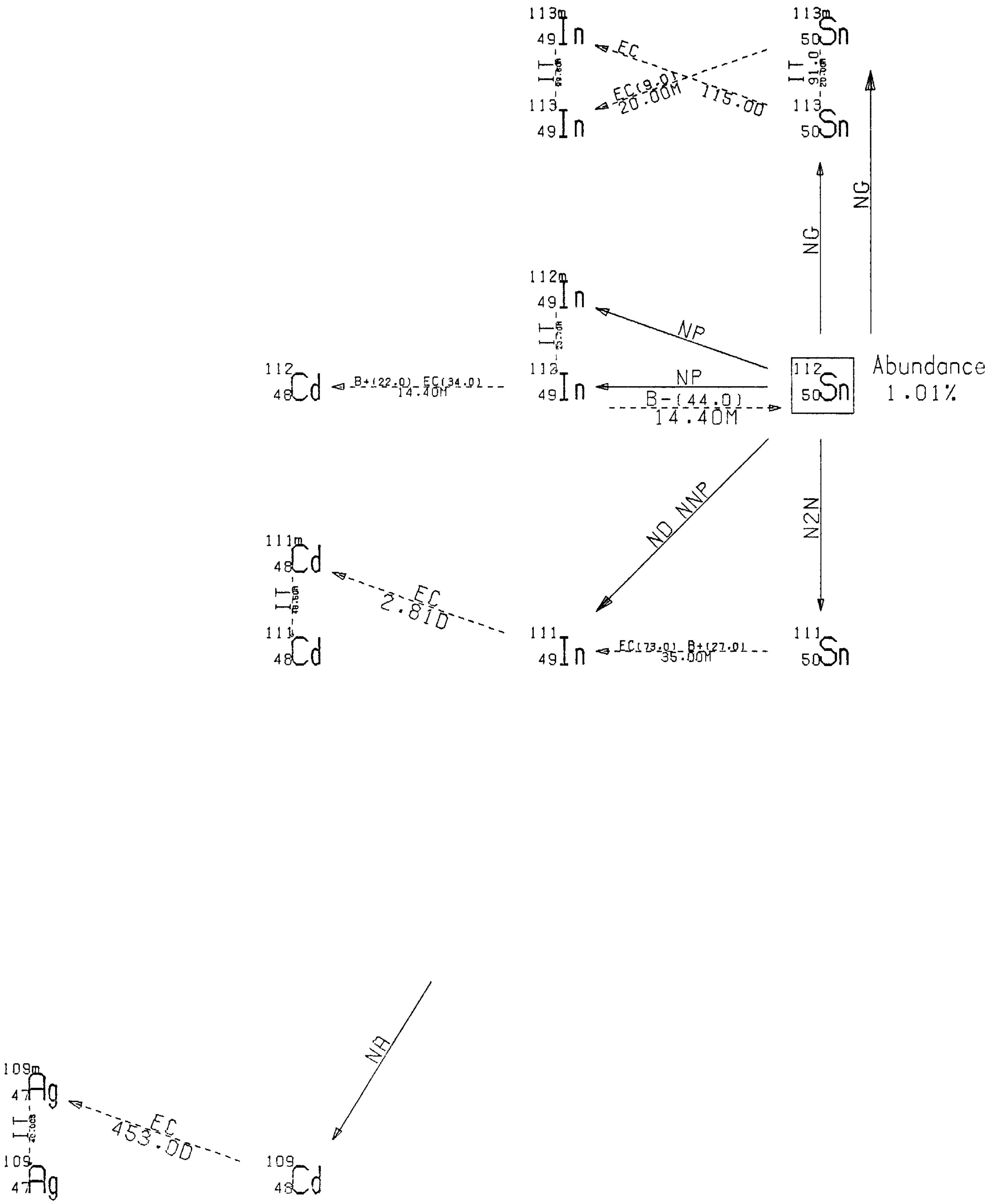


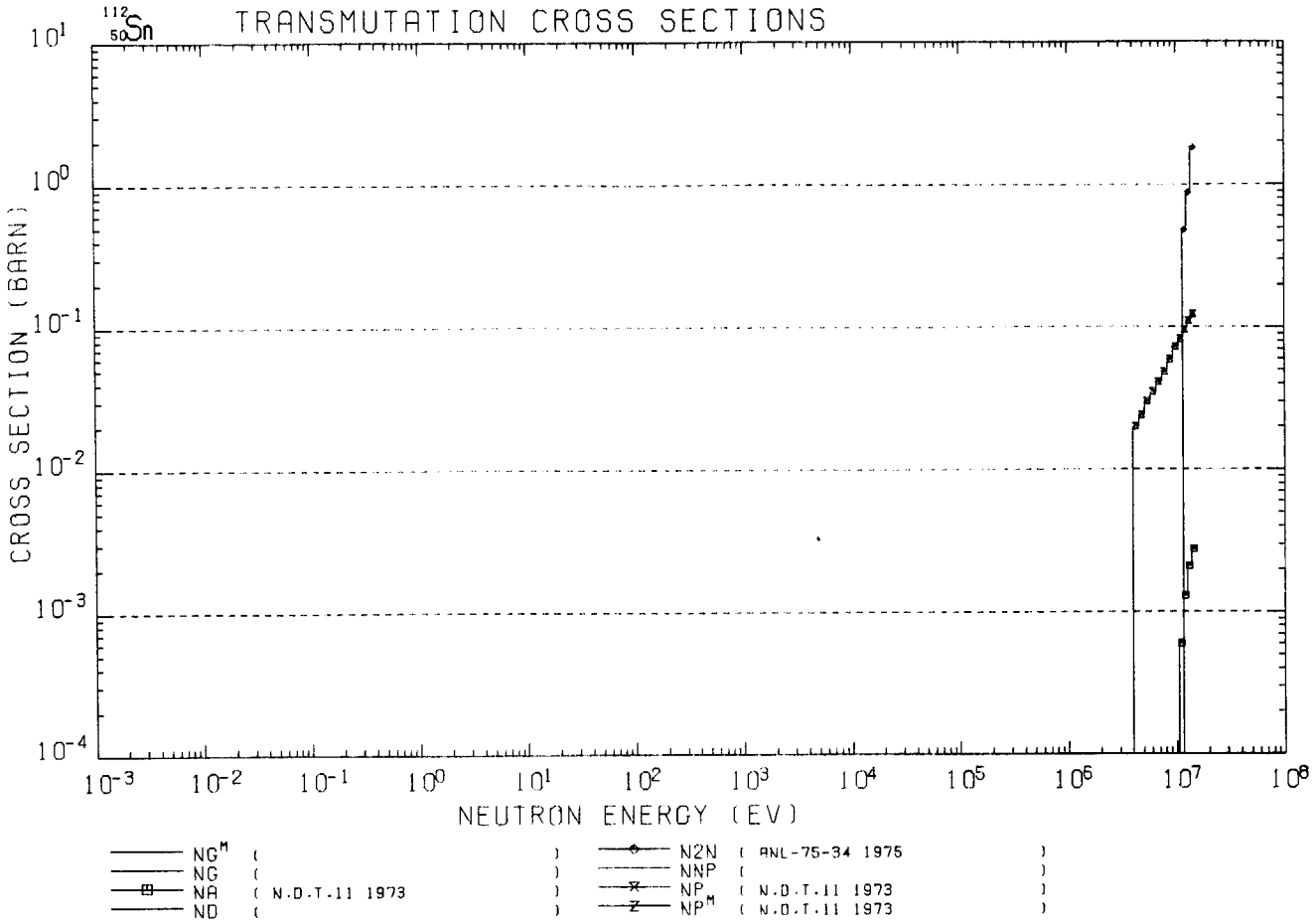
116m In 49
IT 2.16S
B- 54.00M
116 In 49
B- 15.60S
116 Sn 50
NG
NG
115m Cd 48
B-(3.0) 43.00D
53.40H
B- 43.00D
115m In 49
IT 95.0
B-(5.0)
115 Sn 50
115 Cd 48
NP
NP
115 In 49
Abundance 95.70%
N2N
N2N
ND
114m In 49
IT 96.5
EC(3.5) 50.00D
114 Cd 48
B+(0.4) EC(1.9) 72.00S
114 In 49
B-(98.2) 72.00S
114 Sn 50
N3N
N3N
113m In 49
IT
113 In 49
NHE3
113 Ag 47
B- 5.37H
113 Cd 48
NA
112 Ag 47
B- 3.14H
112 Cd 48
NNA
NNA
111m Ag 47
IT
111 Ag 47
B- 7.50D
111 Cd 48



$^{115}_{49}In$ DECAY GAMMA-RAY TABLE

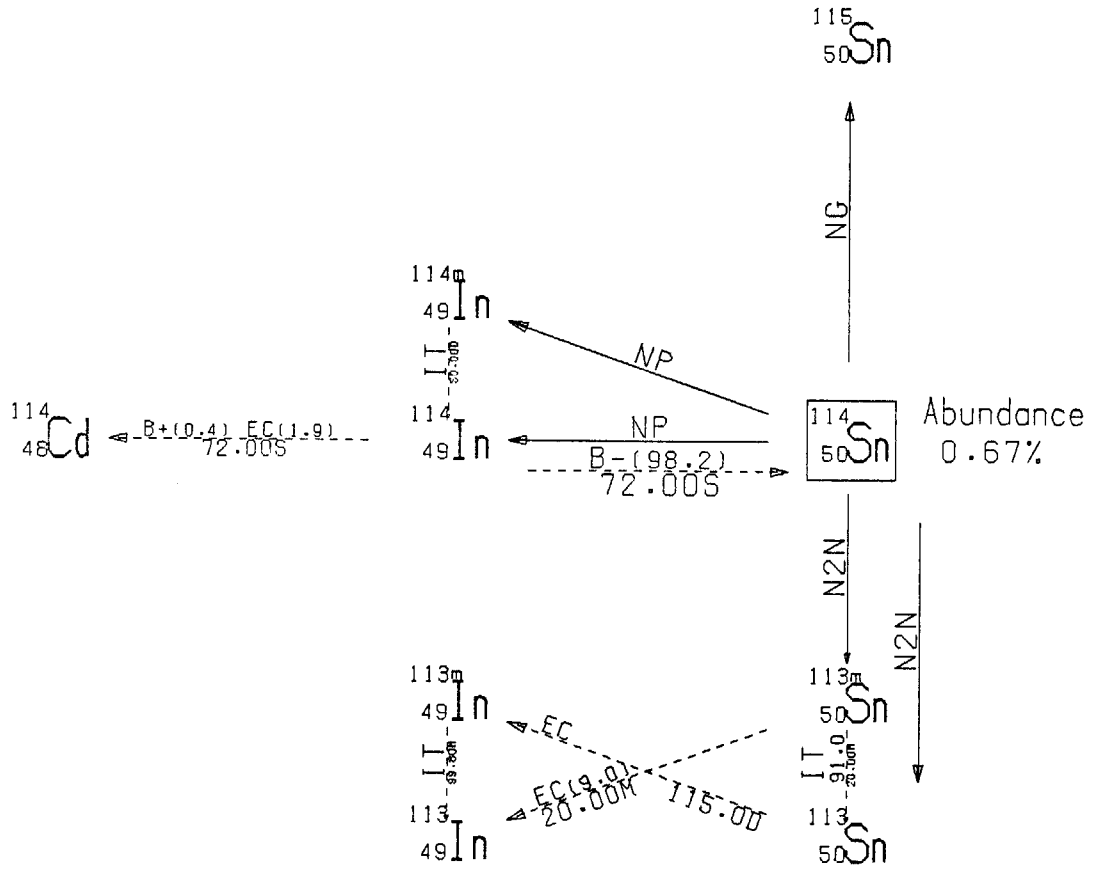
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{116m}_{49}In$	2.16	S	5.11E+05	1.29E+06	1.10E+06	4.17E+05	2.11E+06	8.19E+05	1.51E+06	1.38E+05	1.75E+06	3.55E+05
			0.00	85.02	55.71	32.41	15.01	11.66	10.25	3.33	2.44	0.86
$^{116}_{49}In$	15.60	S	5.11E+05	1.29E+06	4.63E+05							
			0.00	1.30	0.25							
$^{111}_{47}Ag$	7.50	D	5.11E+05	3.42E+05	2.46E+05							
			0.00	0.50	0.10							
$^{111m}_{47}Ag$	74.00	S	5.11E+05	5.99E+04								
			0.00	0.53								
$^{112}_{47}Ag$	3.14	H	5.11E+05	6.17E+05	1.39E+06	6.07E+05	6.95E+05	1.61E+06	2.11E+06	1.31E+06	6.93E+05	2.61E+06
			0.00	42.60	5.31	3.06	2.93	2.80	2.38	1.19	1.05	1.06
$^{113m}_{49}In$	100.0	M	5.11E+05	3.92E+05								
			0.00	64.00								
$^{114}_{49}In$	72.00	S	5.11E+05	1.30E+06								
			0.00	0.14								
$^{114m}_{49}In$	50.00	D	5.11E+05	1.80E+05	5.58E+05	7.25E+05						
			0.00	96.70	3.40	3.32						
$^{115m}_{48}Cd$	43.00	D	5.11E+05	9.34E+05	1.29E+06	4.84E+05						
			0.00	1.70	0.77	0.26						
$^{115m}_{49}In$	4.50	H	5.11E+05	3.36E+05								
			0.00	45.91								
$^{113}_{47}Ag$	5.37	H	5.11E+05	2.98E+05	2.59E+05	3.16E+05	6.73E+05	6.81E+05	3.33E+05	3.39E+05	9.89E+05	1.19E+06
			0.00	9.00	1.52	1.23	1.11	0.72	0.58	0.58	0.43	0.40
$^{115}_{48}Cd$	53.40	H	5.11E+05	3.37E+05	5.28E+05	4.93E+05	2.62E+05	2.32E+05				
			0.00	59.11	30.28	8.66	1.87	0.61				

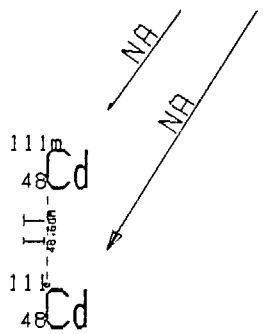

113m 49 In
113m 50 Sn
EC
IT
EC(9.0) 20.00M
115.0D
IT 91.0
113 49 In
113 50 Sn
NG
NG
112m 49 In
NP
IT
112 48 Cd
B+(22.0) EC(34.0) 14.40M
112 49 In
NP
B-(44.0) 14.40M
112 50 Sn
Abundance 1.01%
ND NNP
N2N
111m 48 Cd
EC 2.81D
IT
111 48 Cd
111 49 In
EC(73.0) B+(27.0) 35.00M
111 50 Sn
NA
109m 47 Ag
EC 453.0D
IT
109 47 Ag
109 48 Cd

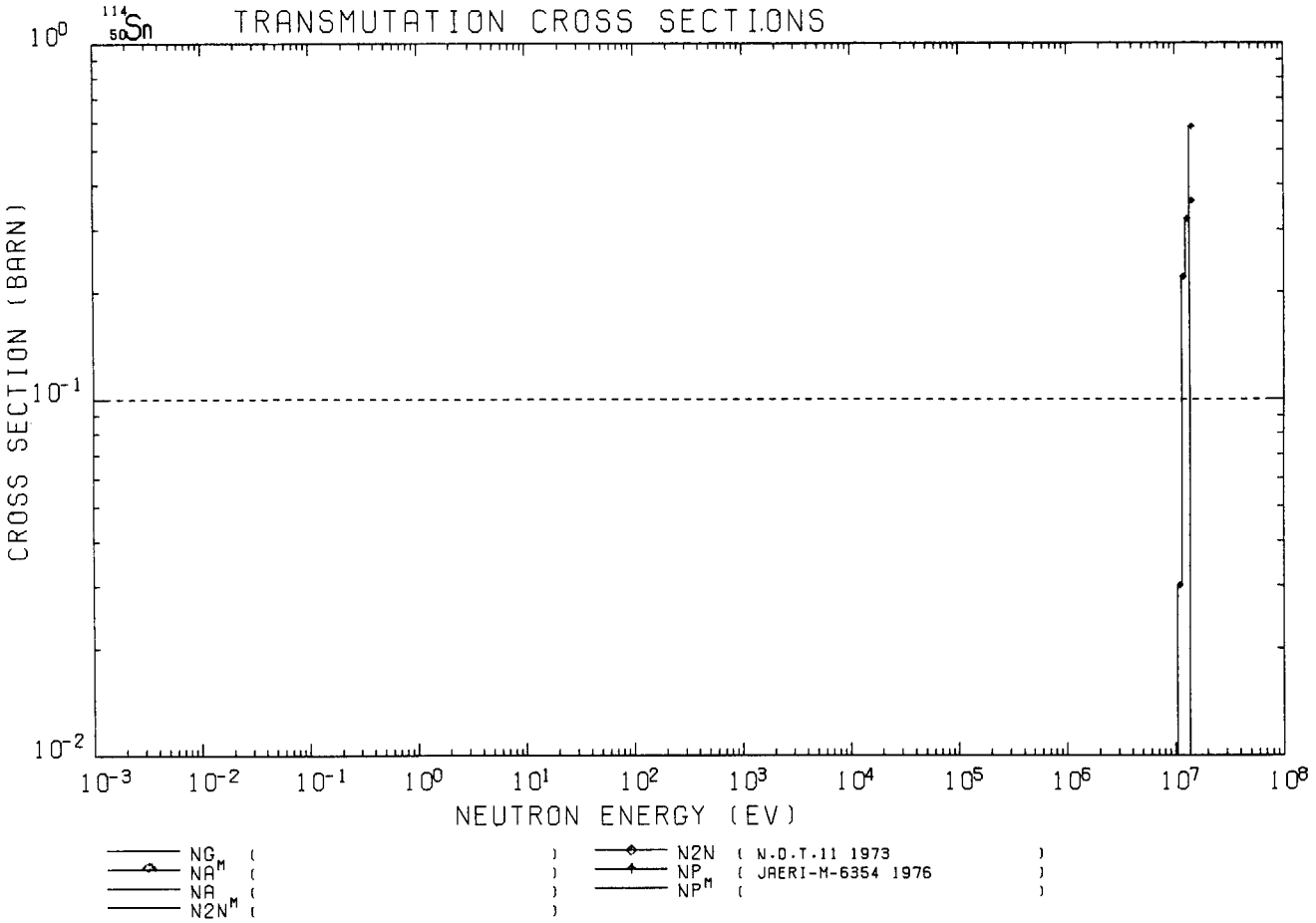


$^{112}_{50}Sn$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{113m}_{50}Sn$	20.00 M	5.11E+05	7.93E+04								
		0.00	0.61								
$^{113}_{50}Sn$	115.0 D	5.11E+05	3.92E+05	2.55E+05							
		0.00	64.10	1.83							
$^{113m}_{49}In$	99.80 M	5.11E+05	3.92E+05								
		0.00	64.00								
$^{109}_{48}Cd$	453.0 D	5.11E+05	8.80E+04								
		0.00	3.78								
$^{109m}_{47}Ag$	40.00 S	5.11E+05	8.80E+04								
		0.00	3.60								
$^{111}_{49}In$	2.81 D	5.11E+05	1.71E+05	2.45E+05							
		0.00	94.22	94.22							
$^{111m}_{48}Cd$	48.60 M	5.11E+05	2.45E+05	1.51E+05							
		0.00	94.20	31.09							
$^{111}_{50}Sn$	35.00 M	5.11E+05	5.37E+05	1.15E+06	1.91E+06	1.61E+06	7.61E+05	1.54E+06	1.10E+06	9.54E+05	3.72E+05
		0.00	7.51	1.32	0.98	0.67	0.67	0.38	0.33	0.23	0.19
$^{112}_{49}In$	14.40 M	5.11E+05	5.17E+05	6.07E+05	1.25E+06	8.51E+05					
		65.47	6.00	1.54	0.28	0.20					
$^{112m}_{49}In$	20.70 M	5.11E+05	1.55E+05								
		0.00	13.00								

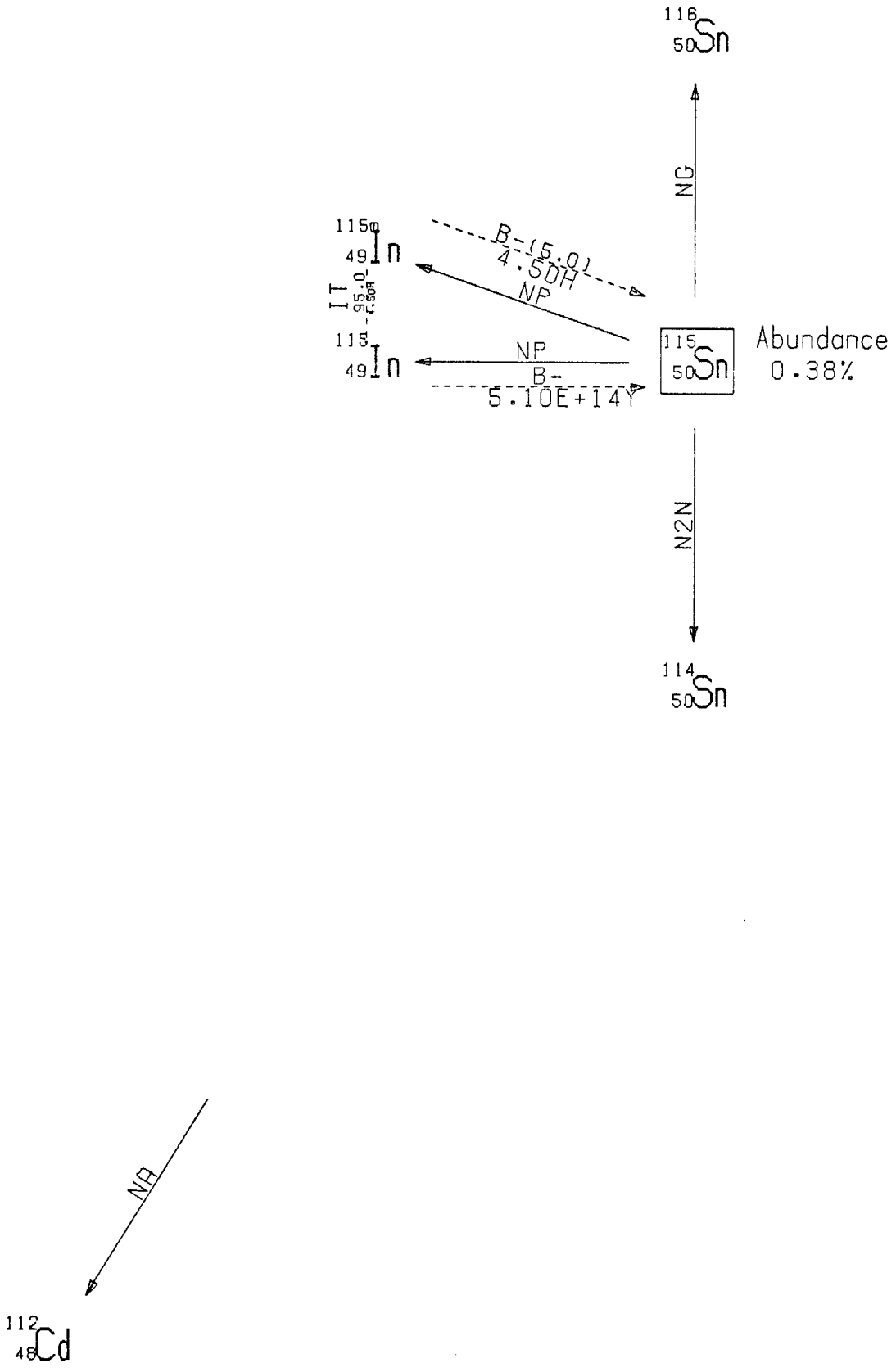

115 50 Sn
NG
114m 49 In
IT 50.0d
NP
114 48 Cd
B+(0.4) EC(1.9)
72.00S
114 49 In
NP
B-(98.2)
72.00S
114 50 Sn
Abundance
0.67%
N2N
N2N
113m 49 In
IT 99.5m
EC
EC(9.0)
20.00M
115.00
113m 50 Sn
IT 91.0
20.0d
113 49 In
113 50 Sn

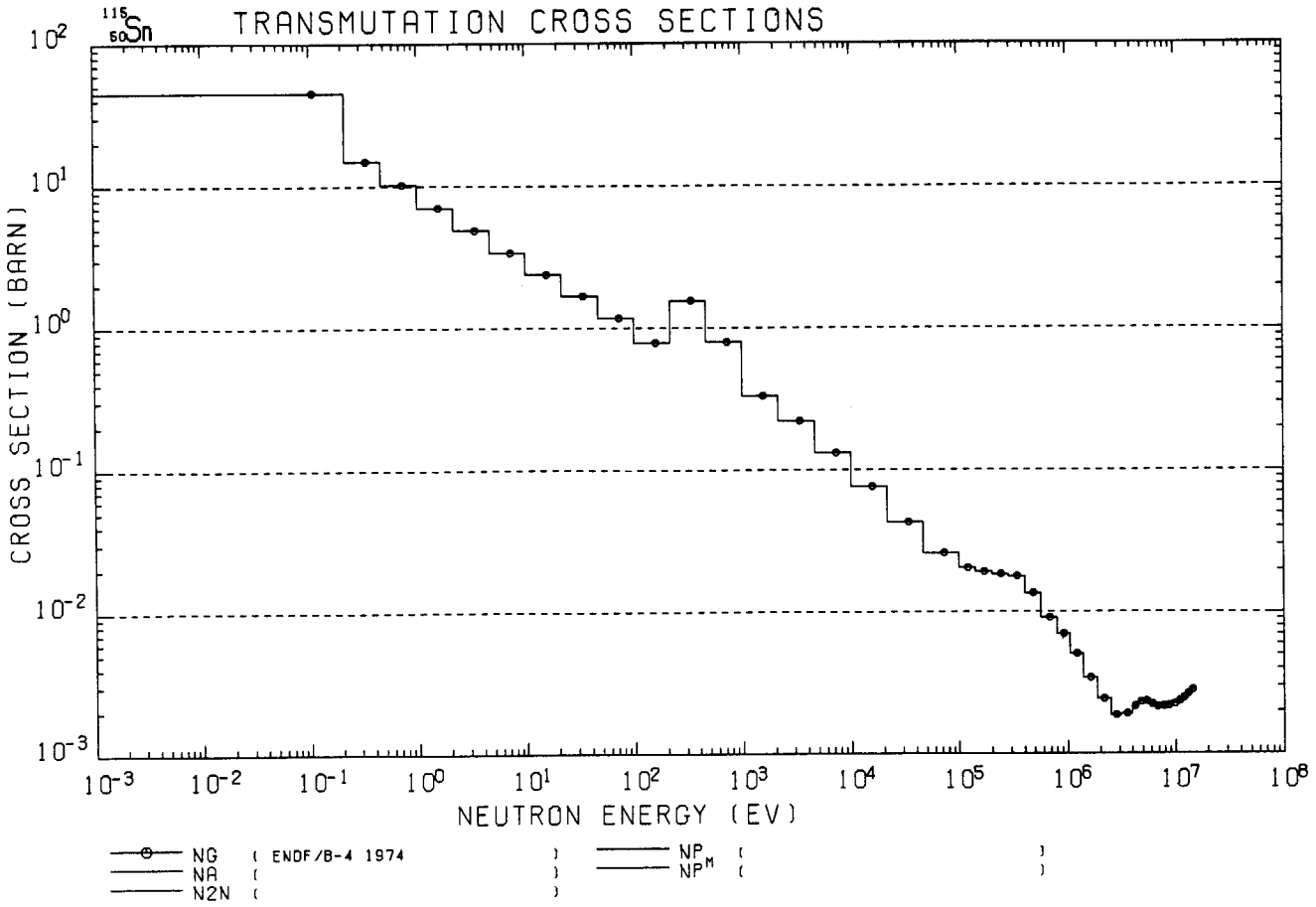

NA
NA
111m 48 Cd
IT 48.6m
111 48 Cd



114 50Sn DECAY GAMMA-RAY TABLE

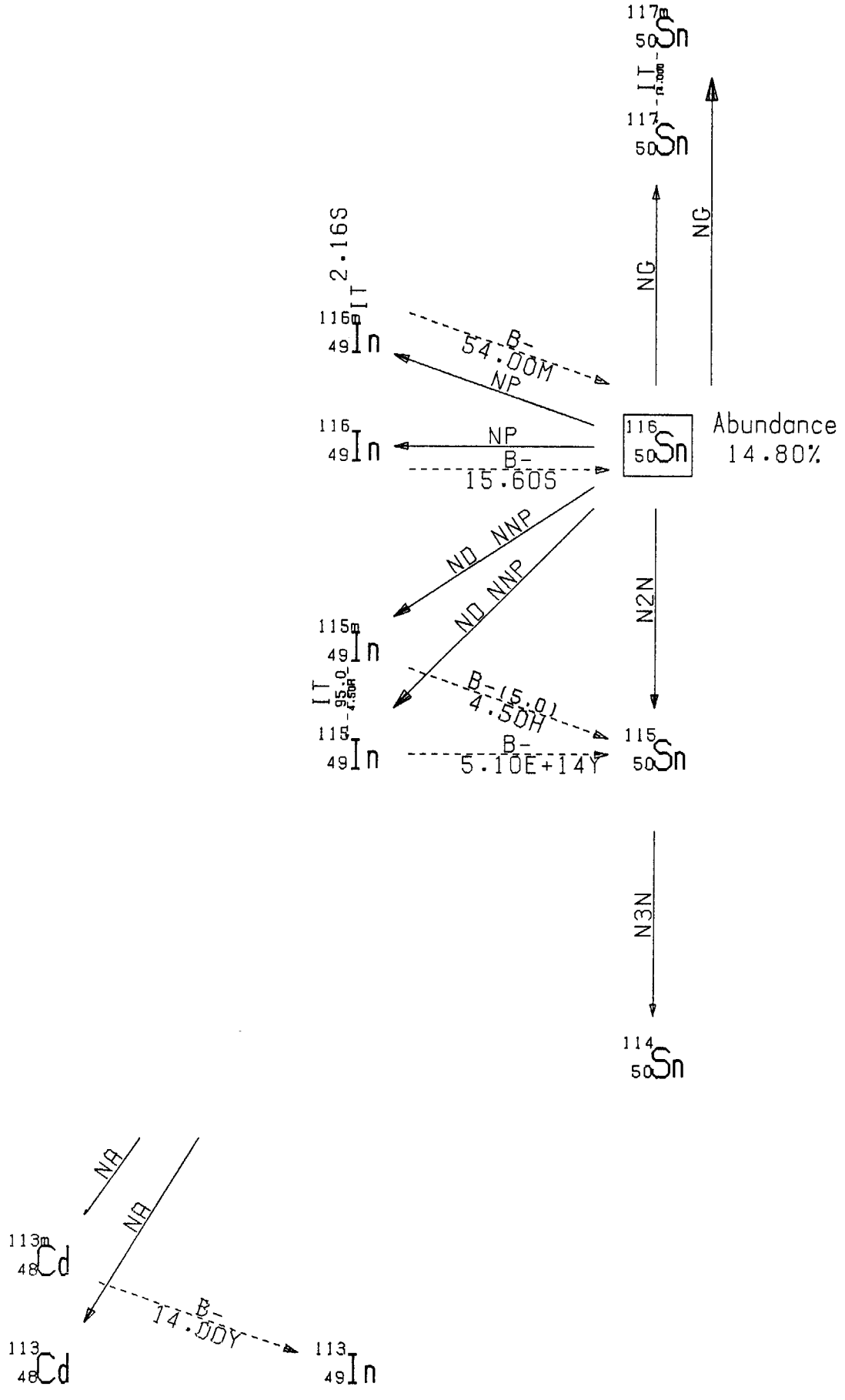
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-			
111m 48Cd	48.60	M	5.11E+05	2.45E+05	1.51E+05	
			0.00	94.20	31.09	
113m 50Sn	20.00	M	5.11E+05	7.93E+04		
			0.00	0.61		
113 50Sn	115.0	D	5.11E+05	3.92E+05	2.55E+05	
			0.00	64.10	1.83	
113m 49In	99.80	M	5.11E+05	3.92E+05		
			0.00	64.00		
114m 49In	50.00	D	5.11E+05	1.90E+05	5.58E+05	7.25E+05
			0.00	96.70	3.40	3.32
114 49In	72.00	S	5.11E+05	1.30E+06		
			0.00	0.14		

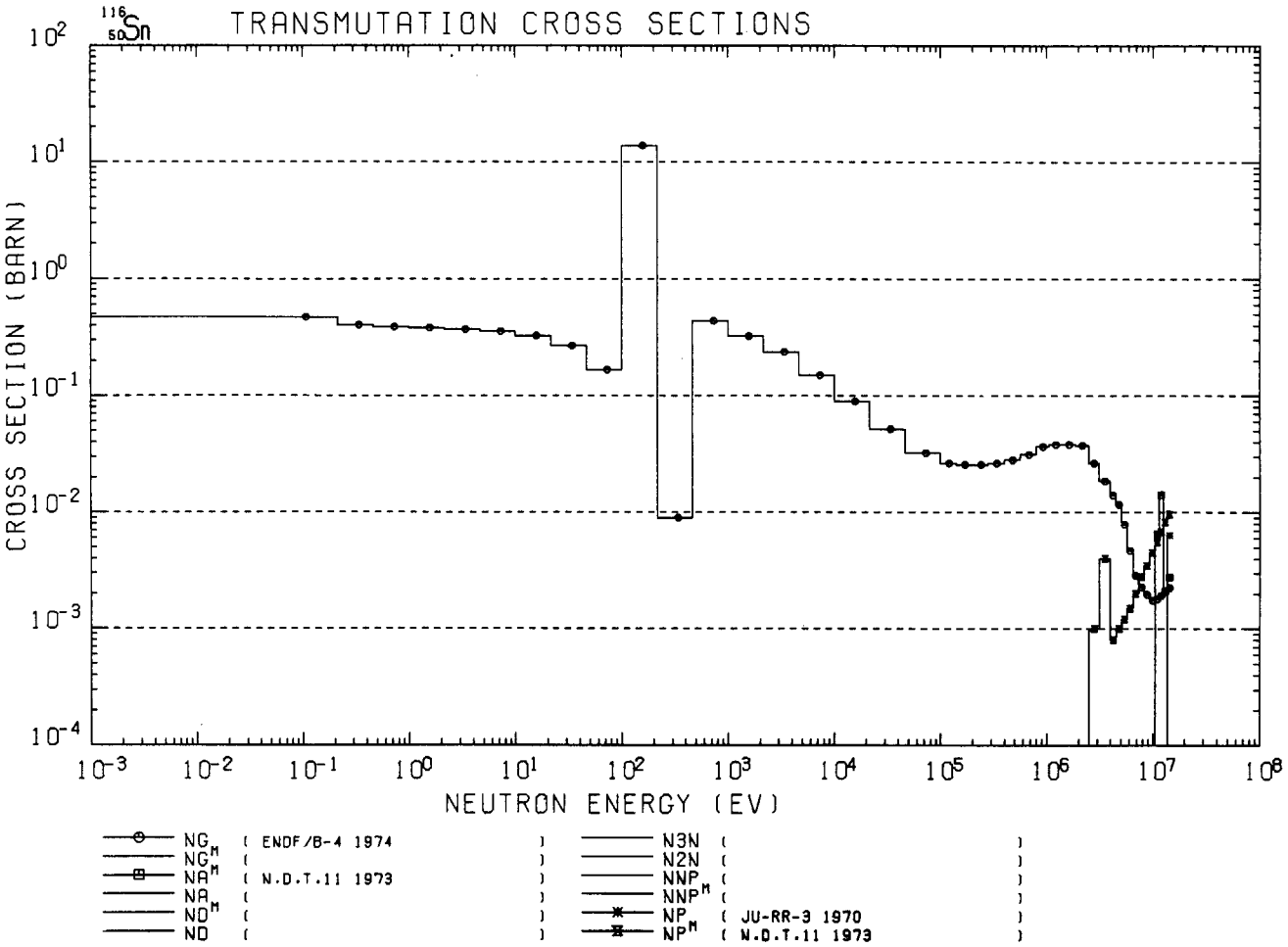

116 50Sn
NG
115m 49In
IT 95.0 4.50H
B- 15.01 4.50H
NP
115 49In
NP
B- 5.10E+14Y
115 50Sn
Abundance 0.38%
N2N
114 50Sn
NA
112 48Cd



$^{115}_{50}Sn$ DECAY GAMMA-RAY TABLE

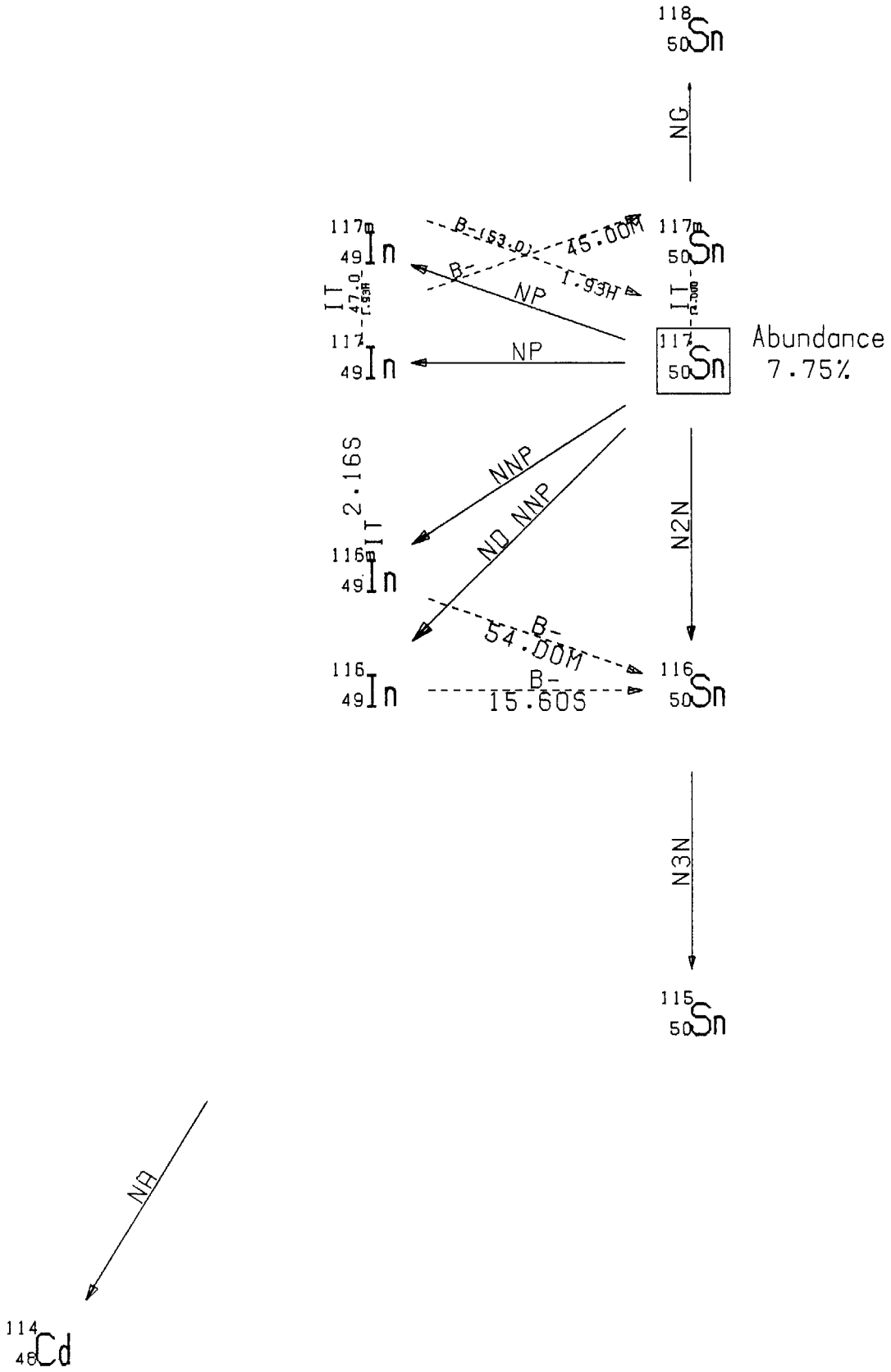
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-	
$^{115}_{49}In$	5.10E+14Y		
$^{115m}_{49}In$	4.50 H	5.11E+05	9.36E+05
		0.00	45.91

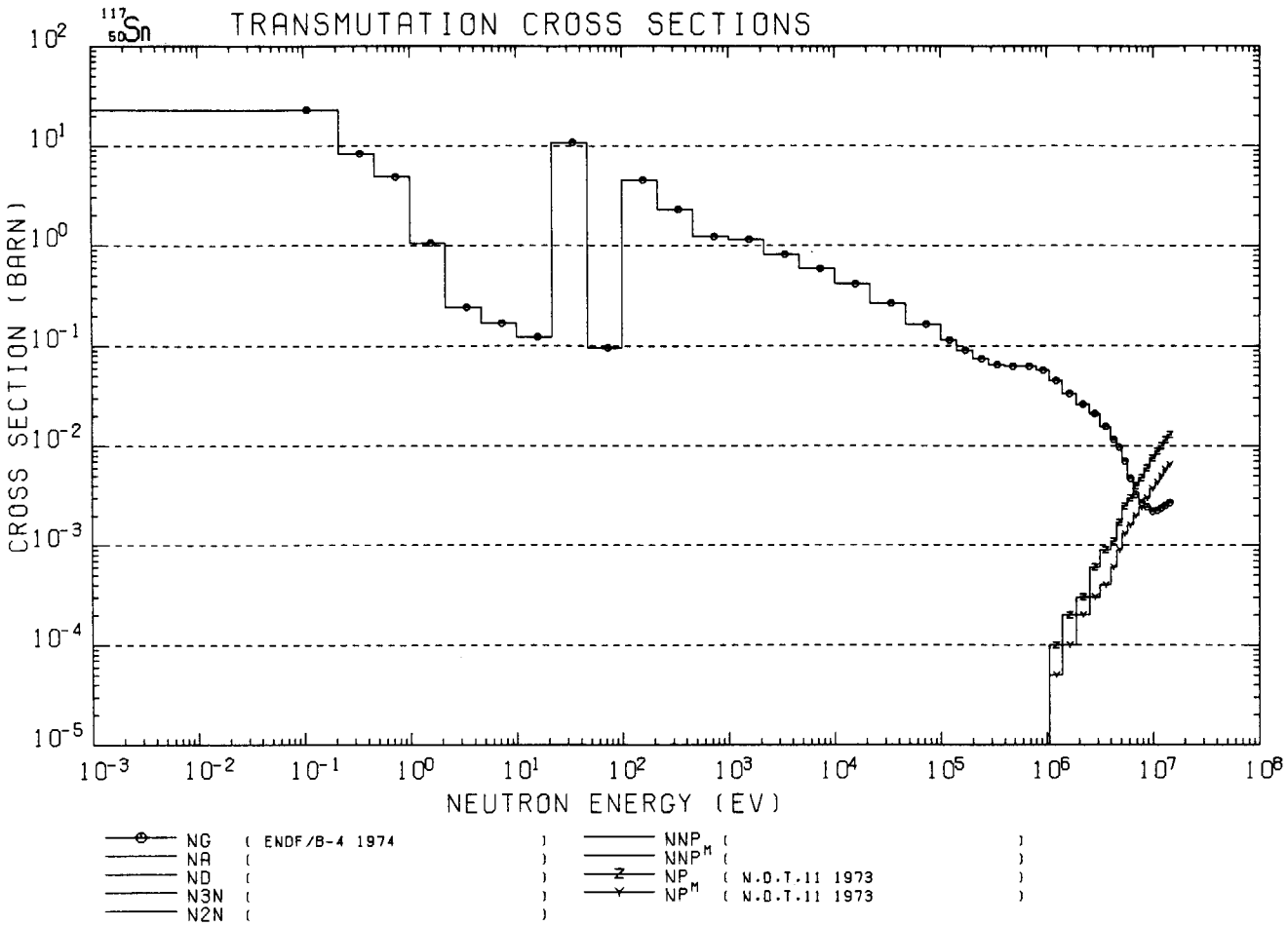

117m 50 Sn
IT 13.60D
117 50 Sn
NG
NG
2.16S IT
116m 49 In
B- 54.00M
NP
116 49 In
NP
B- 15.60S
116 50 Sn
Abundance 14.80%
ND NNP
ND NNP
N2N
115m 49 In
IT 95.0 4.50H
B- 15.0I 4.50H
115 49 In
B- 5.10E+14Y
115 50 Sn
N3N
114 50 Sn
NA
NA
113m 48 Cd
B- 14.00Y
113 48 Cd
113 49 In



116 50Sn DECAY GAMMA-RAY TABLE

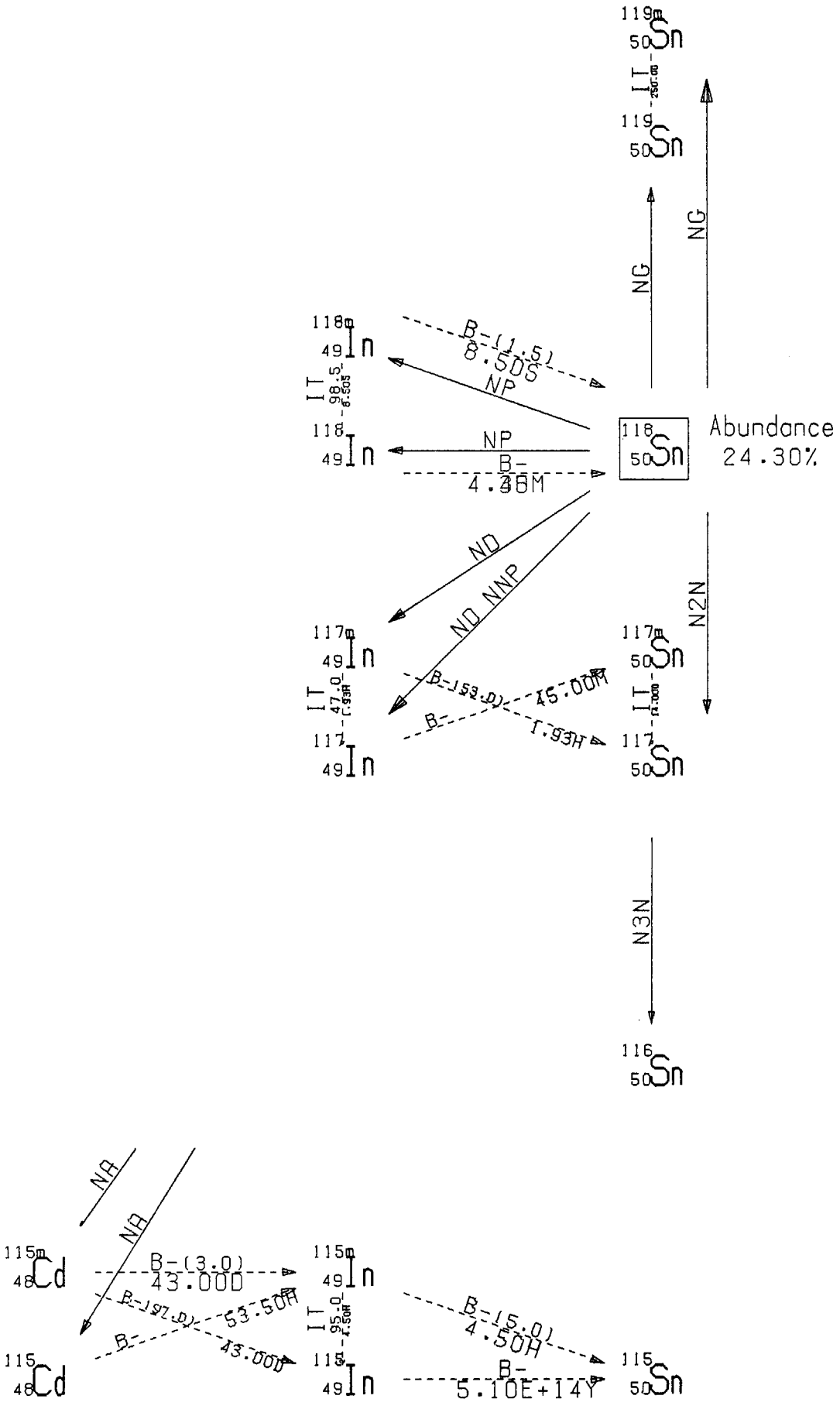
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
117m 50Sn	14.00 D	
113m 48Cd	14.00 Y	
116g 49In	4.50 H	
115 49In	5.10E+14Y	
116 49In	15.60 S	
116g 49In	2.16 S	

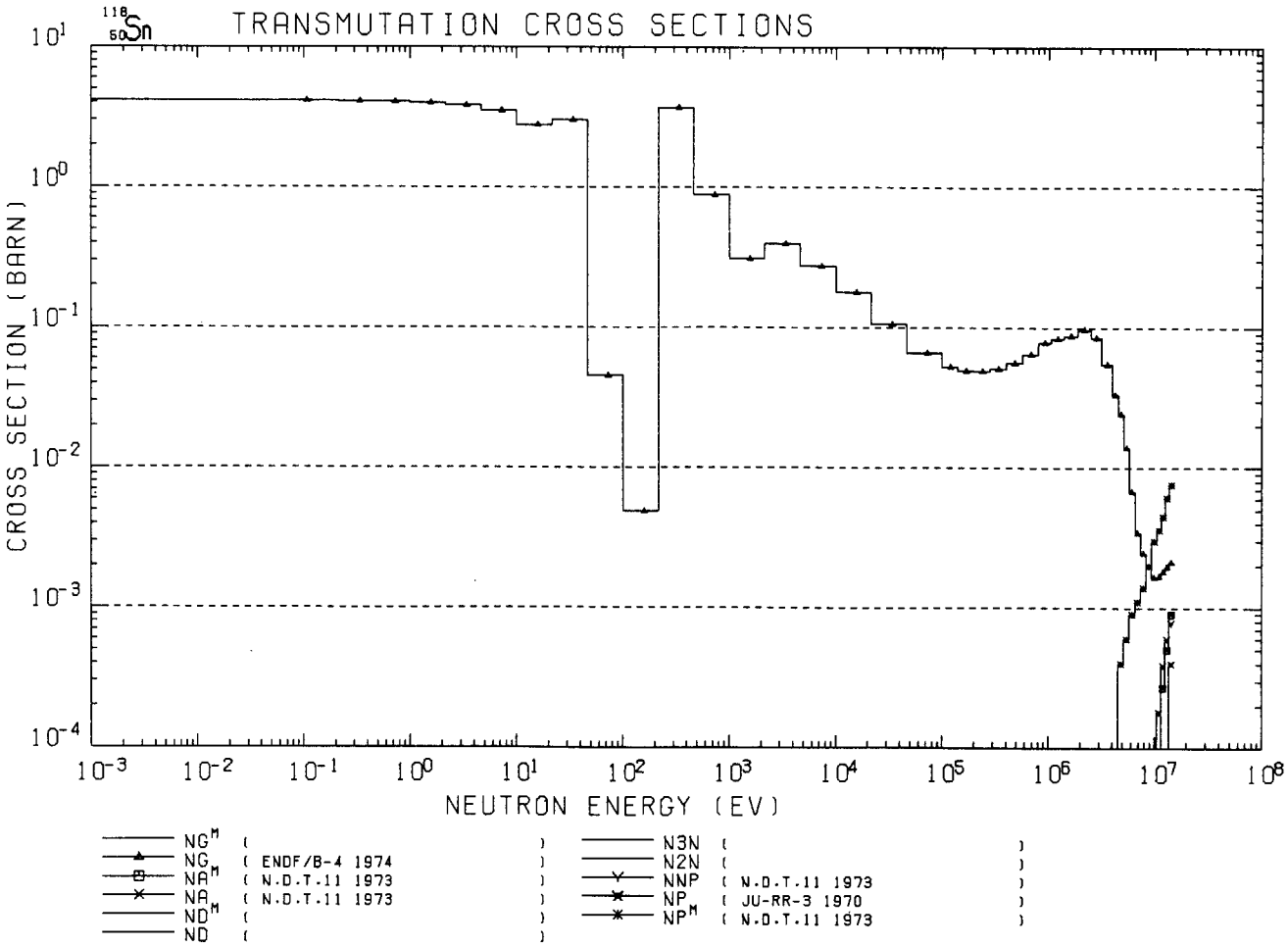

118 50 Sn
NG
117m 49 In
IT 47.0 1.95H
B- 153.0
45.00M
B-
1.93H
NP
117m 50 Sn
IT 14.00D
117 49 In
NP
117 50 Sn
Abundance
7.75%
NNP
ND NNP
2.16S
IT
116m 49 In
N2N
B-
54.00M
116 49 In
B-
15.60S
116 50 Sn
N3N
115 50 Sn
NA
114 48 Cd



117 50Sn DECAY GAMMA-RAY TABLE

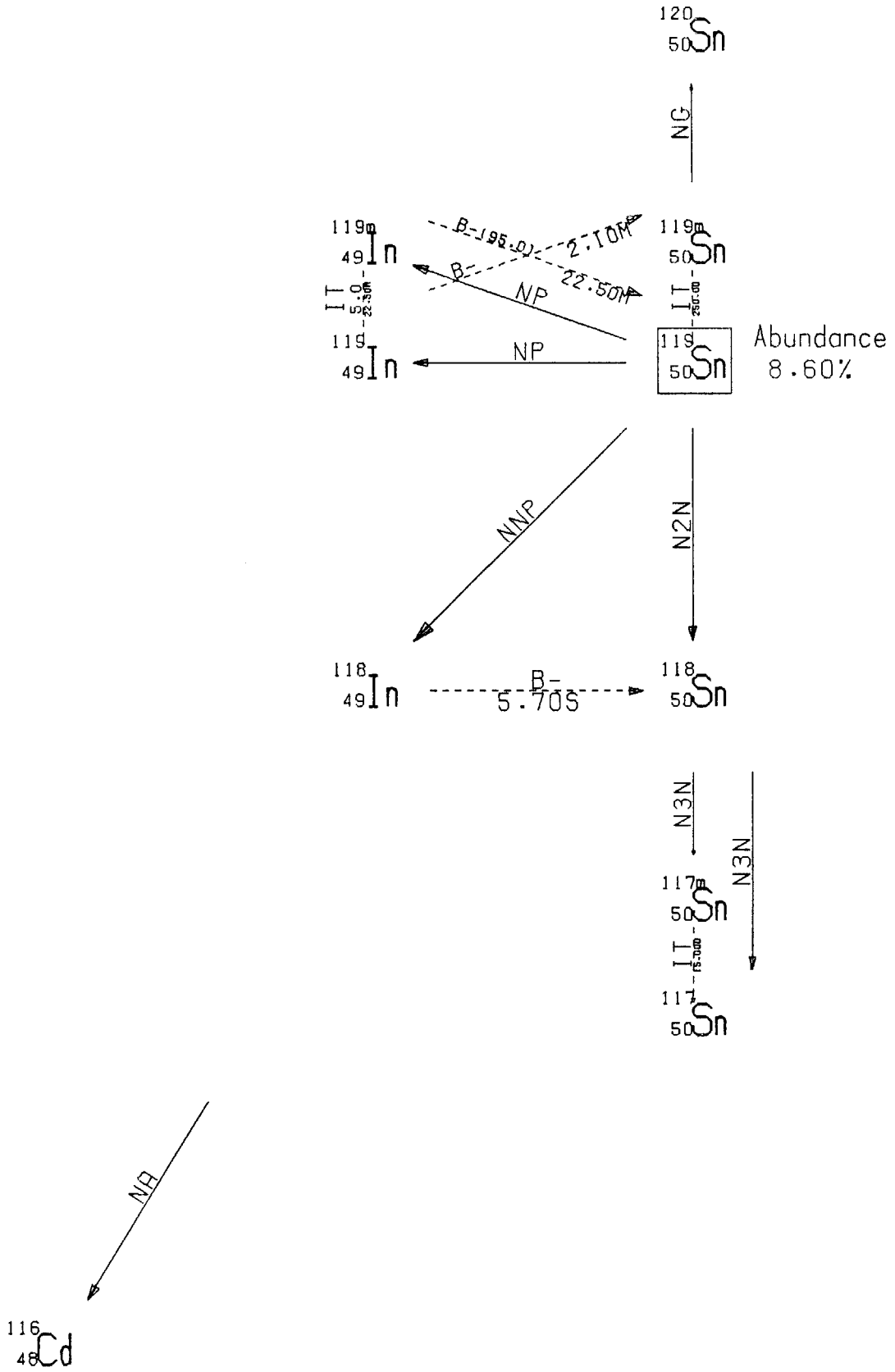
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-
116 49In	15.60 S	
116m 49In	2.16 S	
117 49In	45.00 M	
117m 50Sn	14.00 D	
117g 49In	1.93 H	

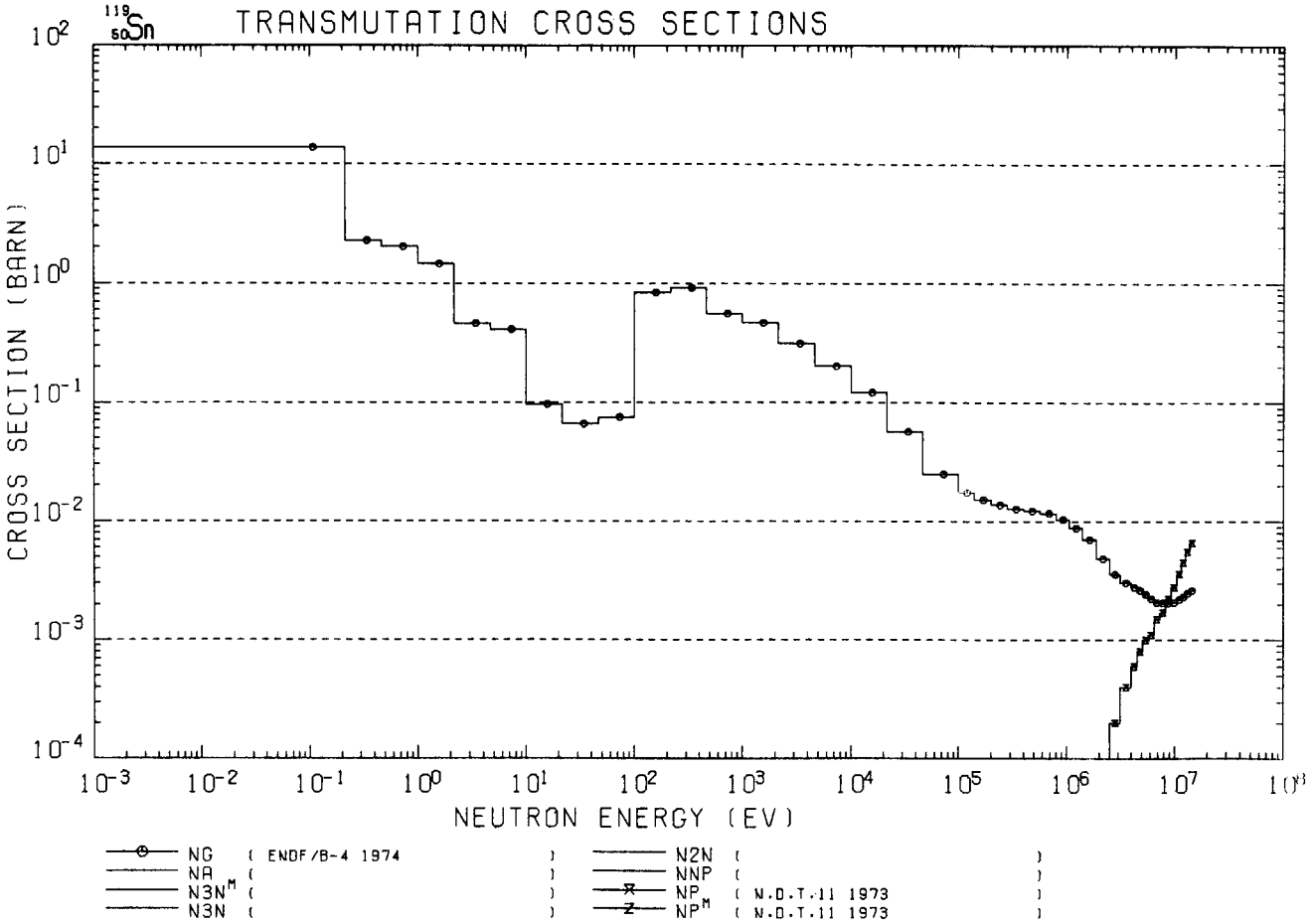

119m 50 Sn
IT 250.00
119 50 Sn
NG
NG
118m 49 In
IT 98.5 8.50S
118 49 In
B-(1.5) 8.50S
NP
NP
B- 4.38M
118 50 Sn
Abundance 24.30%
ND
ND NNP
N2N
117m 49 In
IT 47.0 1.93H
117 49 In
B-(3.2) 45.00M
B- 1.93H
117m 50 Sn
IT 11.000
117 50 Sn
N3N
116 50 Sn
NA
NA
115m 48 Cd
B-(3.0) 43.000
B-(1.97.0) 53.50M
B- 43.000
115 48 Cd
115m 49 In
IT 95.0 4.50H
115 49 In
B-(1.5.0) 4.50H
B- 5.10E+14Y
115 50 Sn



$^{118}_{50}Sn$ DECAY GAMMA-RAY TABLE

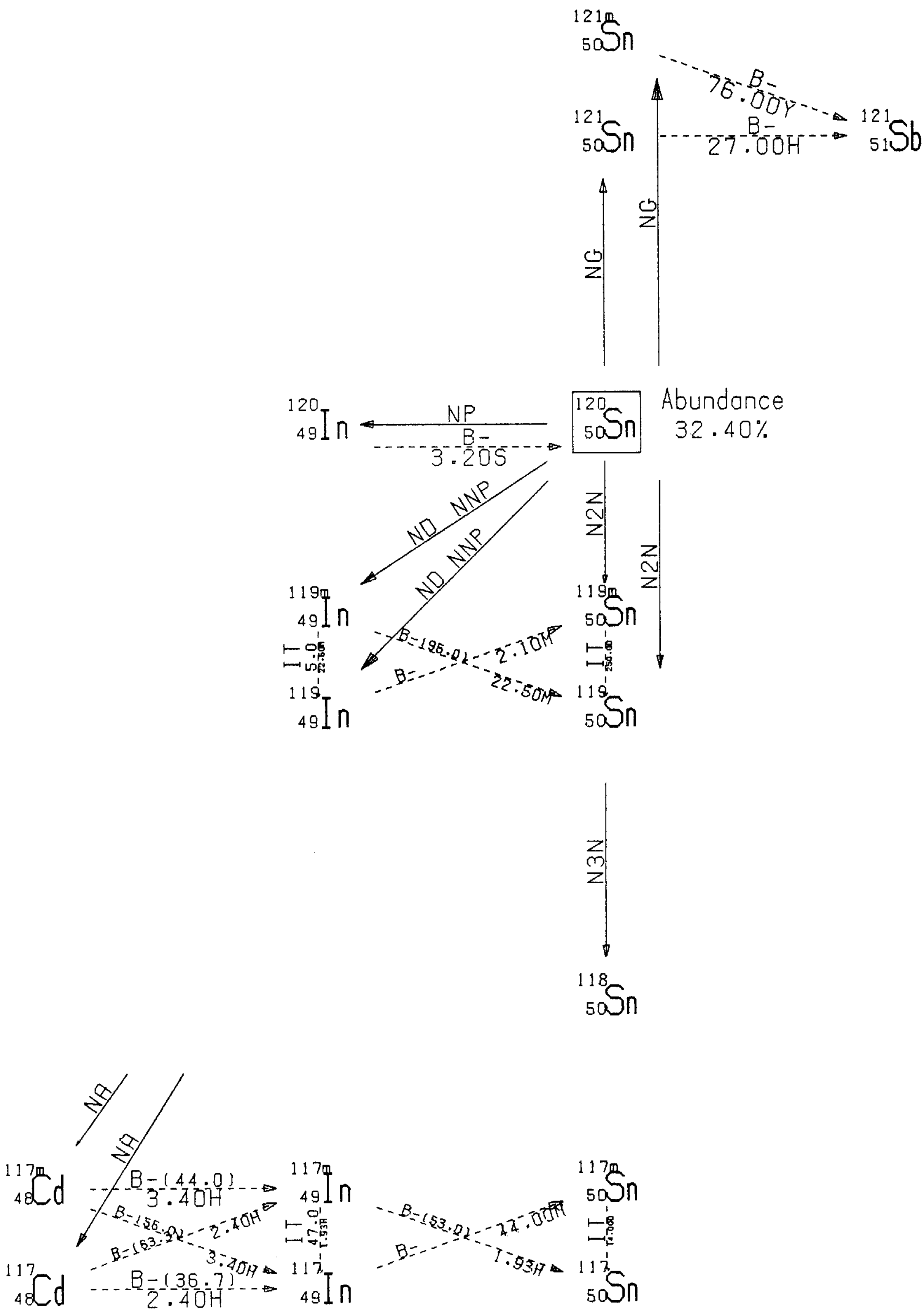
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{119m}_{50}Sn$	250.0	D	6.11E+05	2.39E+04								
			0.00	16.20								
$^{115m}_{48}Cd$	43.00	D										
$^{115m}_{49}In$	4.50	H										
$^{115}_{49}In$	5.10E+14Y											
$^{115}_{48}Cd$	53.50	H										
$^{117m}_{49}In$	1.93	H										
$^{117}_{49}In$	45.00	M										
$^{117m}_{50}Sn$	14.00	D										
$^{116}_{49}In$	4.35	M	6.11E+05	1.23E+06	1.06E+06	6.83E+05	4.46E+05	1.26E+06	6.37E+06	2.04E+06	1.10E+06	8.14E+05
			0.00	96.30	82.36	55.49	5.90	3.89	3.52	3.40	3.38	3.31
$^{116m}_{49}In$	8.50	S										

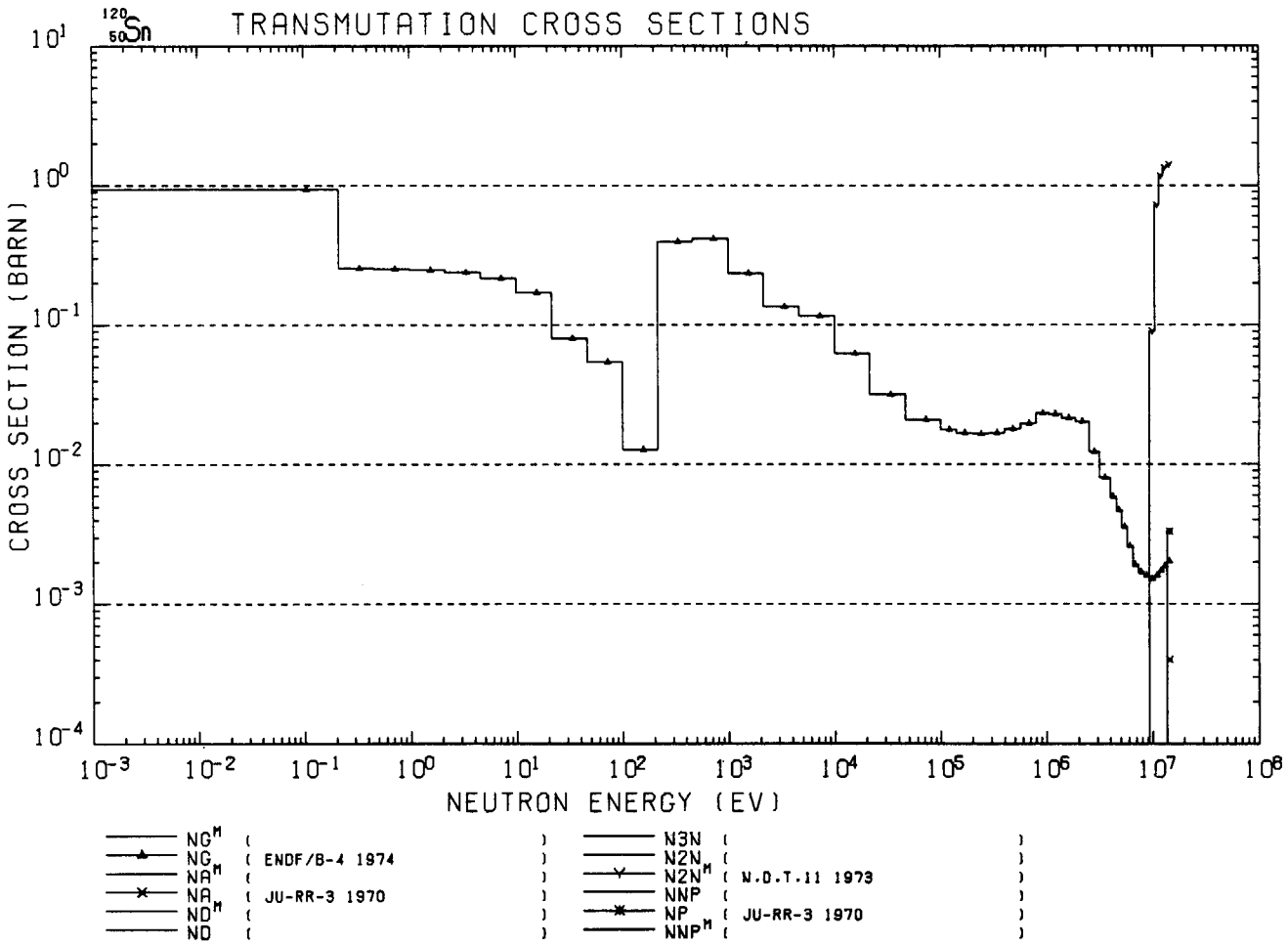

120 50 Sn
NG
119m 49 In
B- 195.0% 2.10M
B- 22.50M
IT 5.0 22.3M
NP
119 49 In
119m 50 Sn
IT 250.0M
119 50 Sn
Abundance 8.60%
NNP
N2N
118 49 In
B- 5.70S
118 50 Sn
N3N
N3N
117m 50 Sn
IT 75.0M
117 50 Sn
NA
116 48 Cd



119 50Sn DECAY GAMMA-RAY TABLE

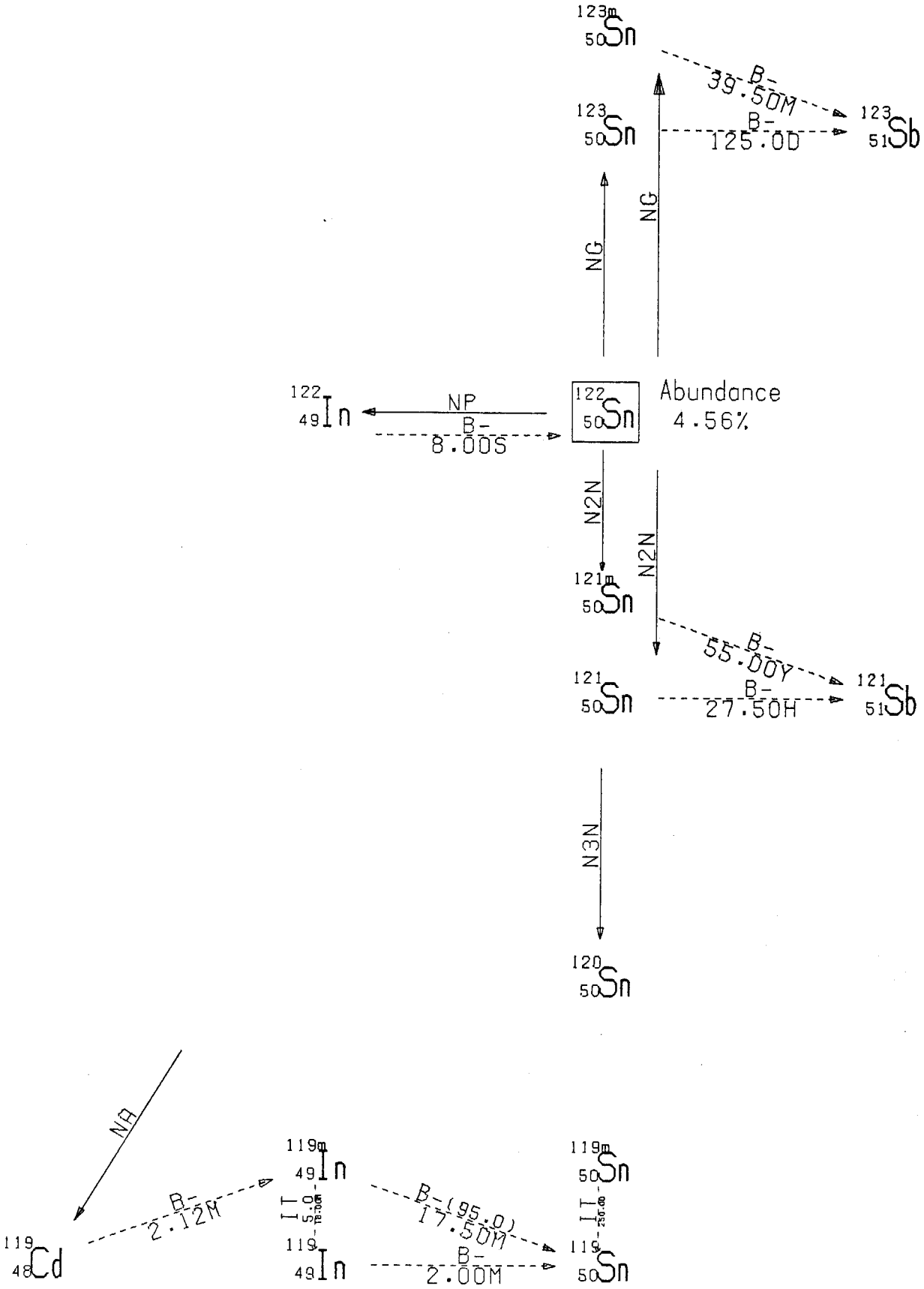
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
117m 50Sn	15.00 D										
		5.11E+05	1.23E+06	1.05E+06	6.83E+05	4.46E+05	1.26E+06	6.37E+05	2.04E+06	1.10E+06	6.14E+05
118 49In	5.70 S	0.00	96.30	82.36	55.49	5.90	3.89	3.52	3.40	3.38	3.31
		5.11E+05	7.63E+05	6.97E+05	1.21E+06						
119 49In	2.10 M	0.00	99.11	0.49	0.44						
		5.11E+05	2.39E+04								
119m 50Sn	250.0 D	0.00	16.20								
		5.11E+05	3.11E+05	1.07E+06	1.26E+06	1.16E+06					
119m 49In	22.50 M	0.00	2.34	0.30	0.17	0.13					

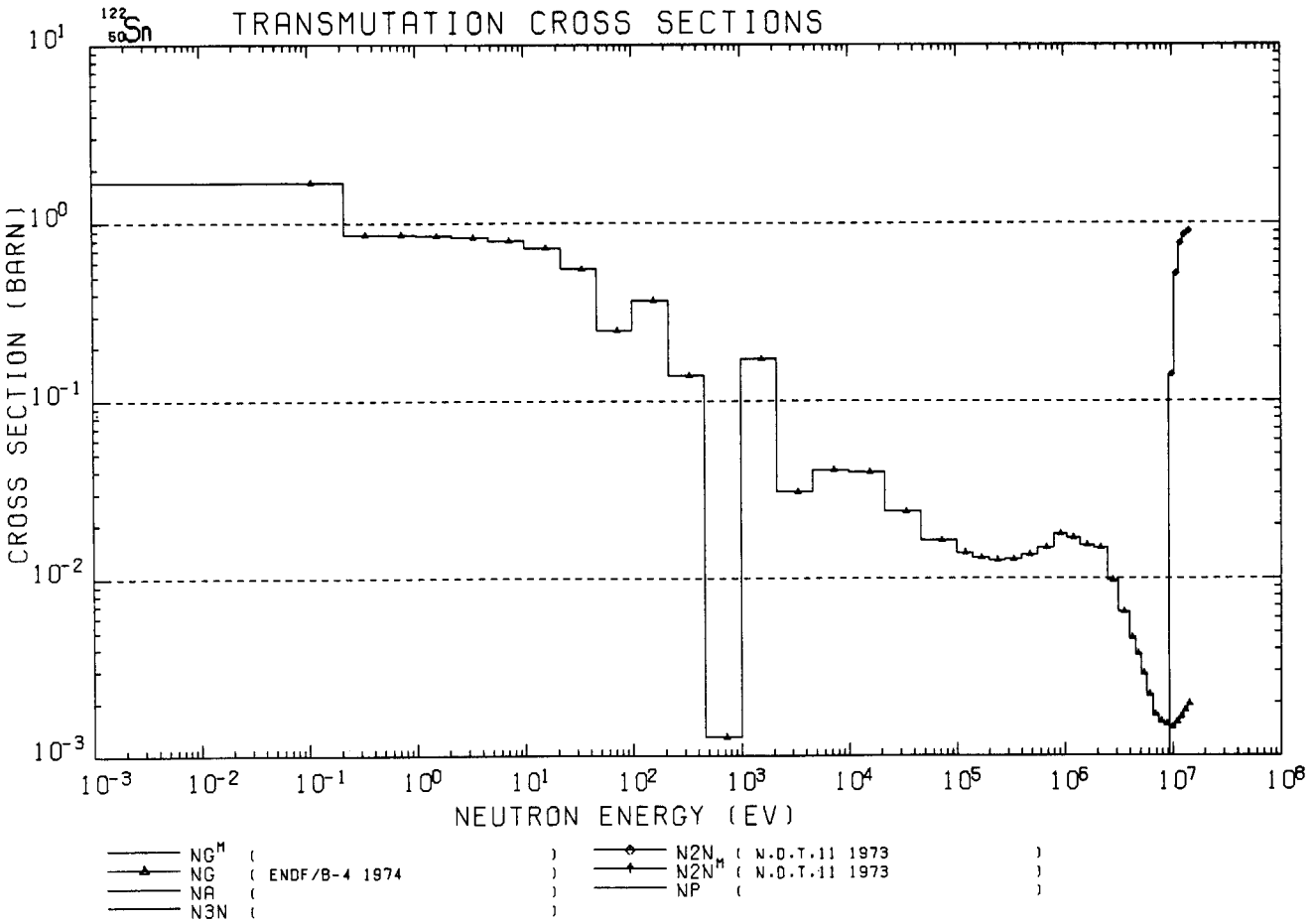

121m 50 Sn
B-
76.00Y
121 50 Sn
B-
27.00H
121 51 Sb
NG
NG
120 49 In
NP
B-
3.20S
120 50 Sn
Abundance
32.40%
ND NNP
ND NNP
N2N
N2N
119m 49 In
IT 5.0
119m 50 Sn
IT
2.10M
22.50M
119 49 In
119 50 Sn
N3N
118 50 Sn
NA
NA
117m 48 Cd
B-(44.0)
3.40H
117m 49 In
IT 47.0
1.93H
117m 50 Sn
IT
2.40H
3.40H
117 48 Cd
B-(36.7)
2.40H
117 49 In
B-
1.93H
117 50 Sn



$^{120}_{50}Sn$ DECAY GAMMA-RAY TABLE

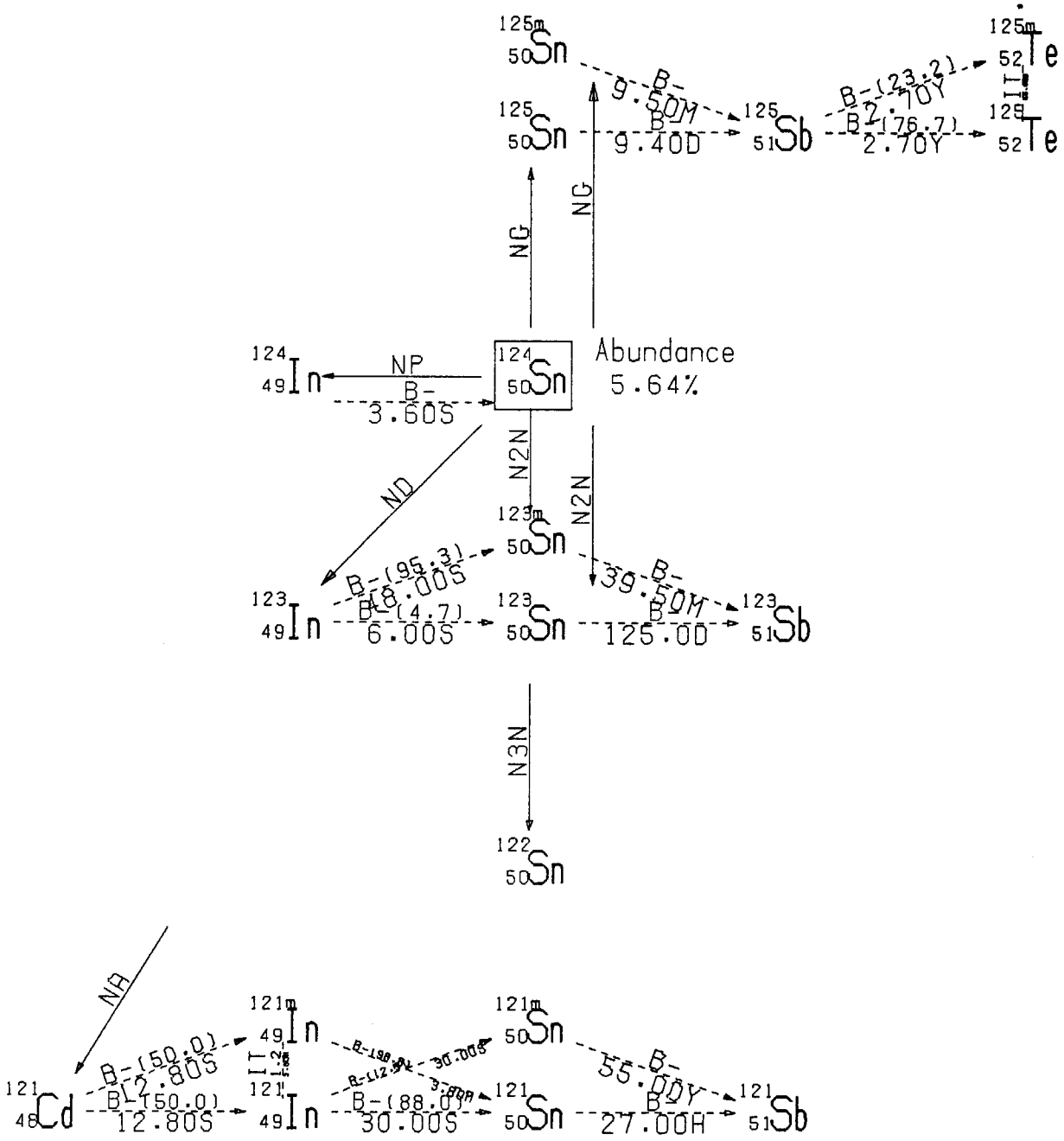
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{121m}_{50}Sn$	76.00 Y	5.11E+05	3.71E+04								
		0.00	8.30								
$^{121}_{50}Sn$	27.00 H										
$^{117m}_{48}Cd$	3.40 H										
$^{117m}_{49}In$	1.93 H										
$^{117}_{49}In$	44.00 M										
$^{117m}_{50}Sn$	14.00 D										
$^{119m}_{49}In$	22.50 M	5.11E+05	3.11E+05	1.07E+06	1.25E+06	1.16E+06					
		0.00	2.34	0.30	0.17	0.19					
$^{119}_{49}In$	2.10 M	5.11E+05	7.63E+05	6.97E+05	1.21E+06						
		0.00	99.11	0.49	0.44						
$^{119m}_{50}Sn$	250.0 D	5.11E+05	2.39E+04								
		0.00	16.20								
$^{120}_{49}In$	3.20 S	5.11E+05	1.17E+06	1.02E+06	8.64E+05	1.29E+06	1.97E+05	9.65E+05	7.14E+05	2.01E+06	8.99E+04
		0.00	97.11	60.40	30.30	10.83	7.92	7.91	6.93	6.37	6.33
$^{117}_{48}Cd$	2.40 H										

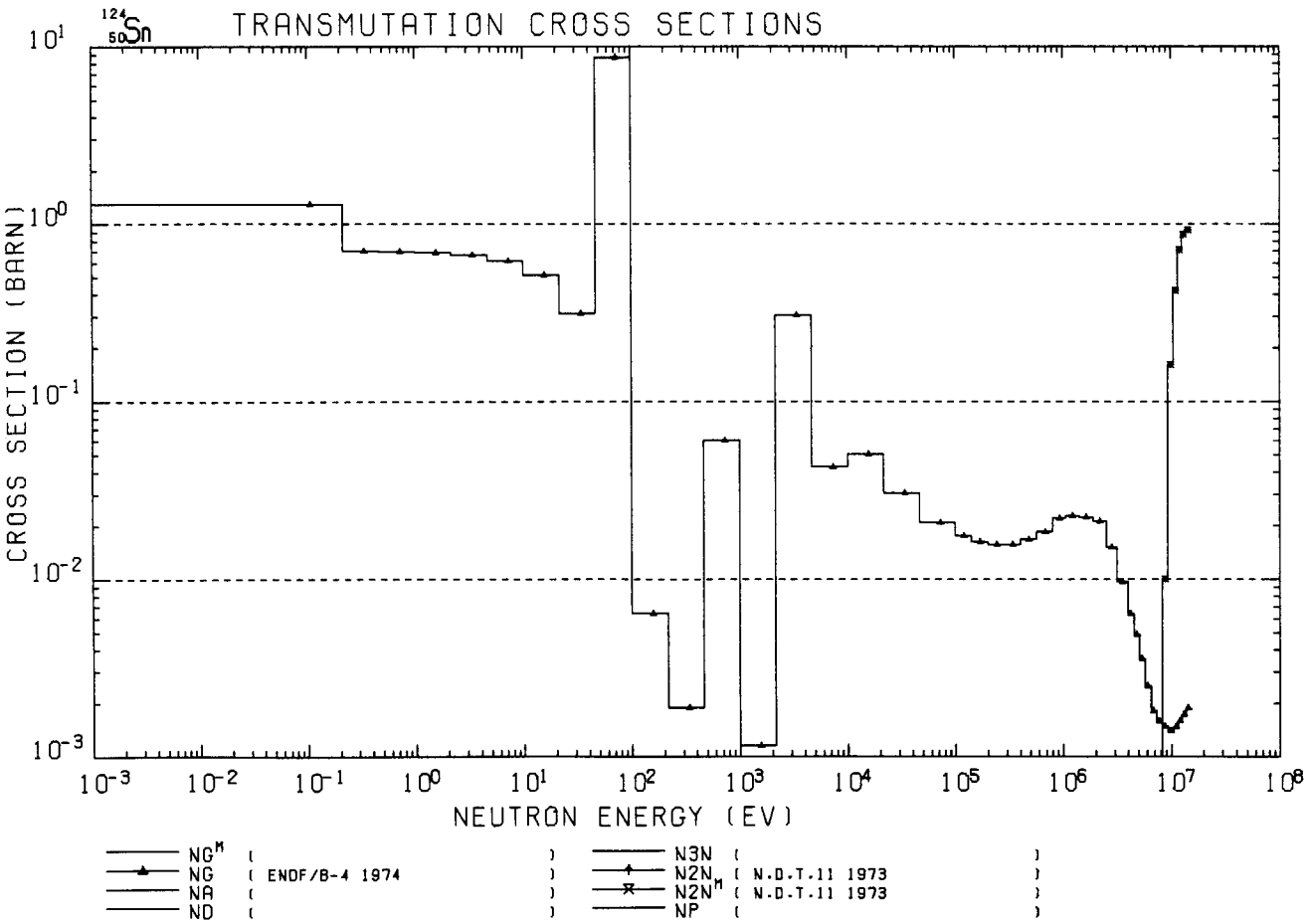

123m 50 Sn
39.50M
B-
123 50 Sn
B-
125.0D
123 51 Sb
NG
NG
122 49 In
NP
B-
8.00S
122 50 Sn
Abundance
4.56%
N2N
N2N
121m 50 Sn
B-
55.00Y
121 50 Sn
B-
27.50H
121 51 Sb
N3N
120 50 Sn
NA
119 48 Cd
B-
2.12M
119m 49 In
IT
5.0
119 49 In
B-(95.0)
17.50M
B-
2.00M
119m 50 Sn
IT
250.0
119 50 Sn



$^{122}_{50}Sn$ DECAY GAMMA-RAY TABLE

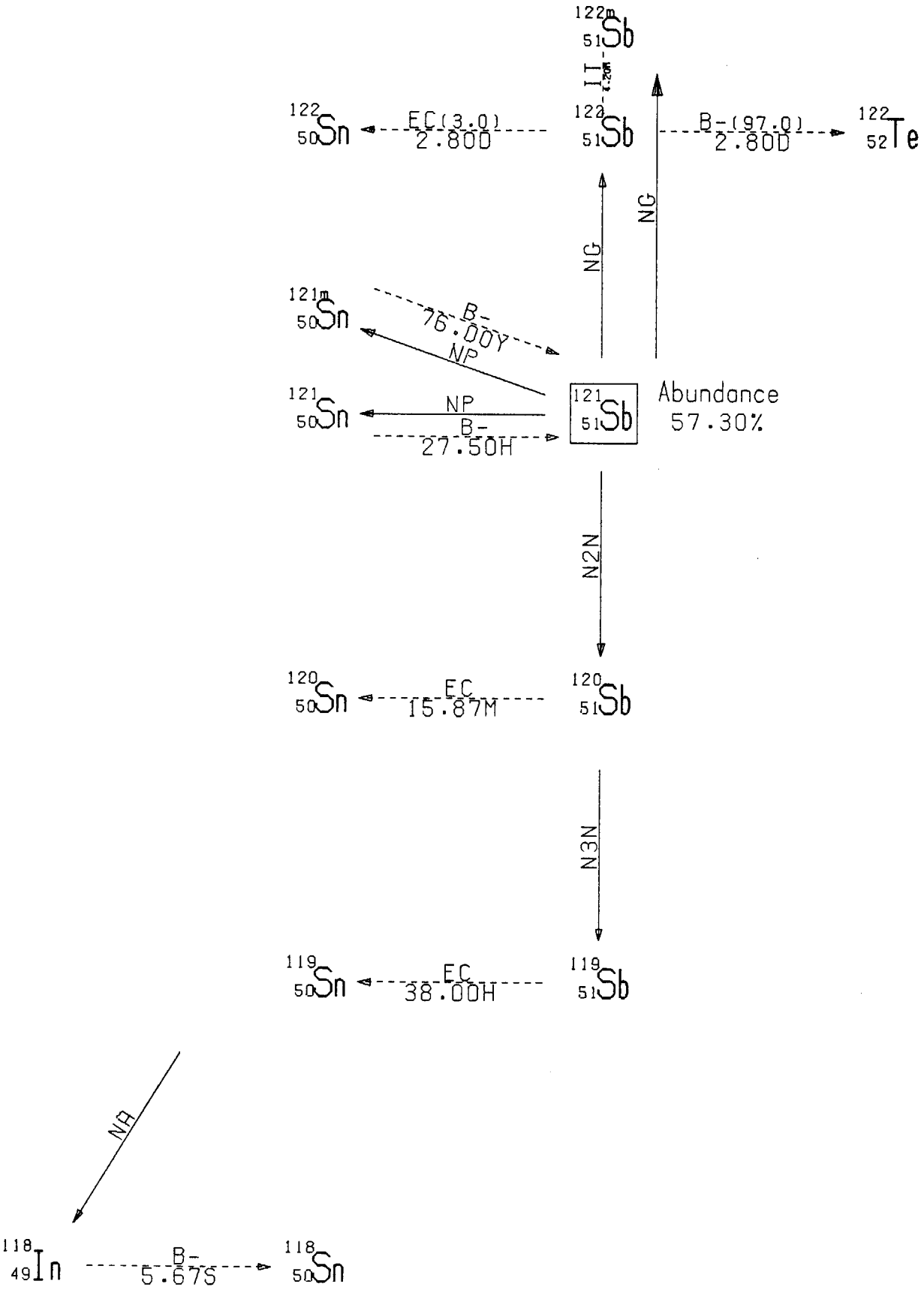
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-									
$^{123m}_{50}Sn$	39.50	M	5.11E+05	1.60E+06								
			0.00	86.62								
$^{123}_{50}Sn$	125.0	D	5.11E+05	1.09E+06								
			0.00	0.60								
$^{119}_{48}Cd$	2.12	M	5.11E+05	2.93E+05	3.43E+05	1.61E+06	1.76E+06	1.73E+06	1.32E+05	1.34E+05	1.05E+06	2.36E+06
			0.00	25.50	13.15	8.06	7.85	7.24	7.04	5.25	5.10	2.99
$^{119m}_{49}In$	18.00	M										
$^{119m}_{50}Sn$	250.0	D										
$^{119}_{49}In$	2.00	M										
$^{121m}_{50}Sn$	55.00	Y										
$^{121}_{50}Sn$	27.50	H										
$^{122}_{49}In$	8.00	S	5.11E+05	1.14E+06	1.00E+06	1.19E+06	1.04E+05					
			0.00	100.00	56.11	18.22	6.81					

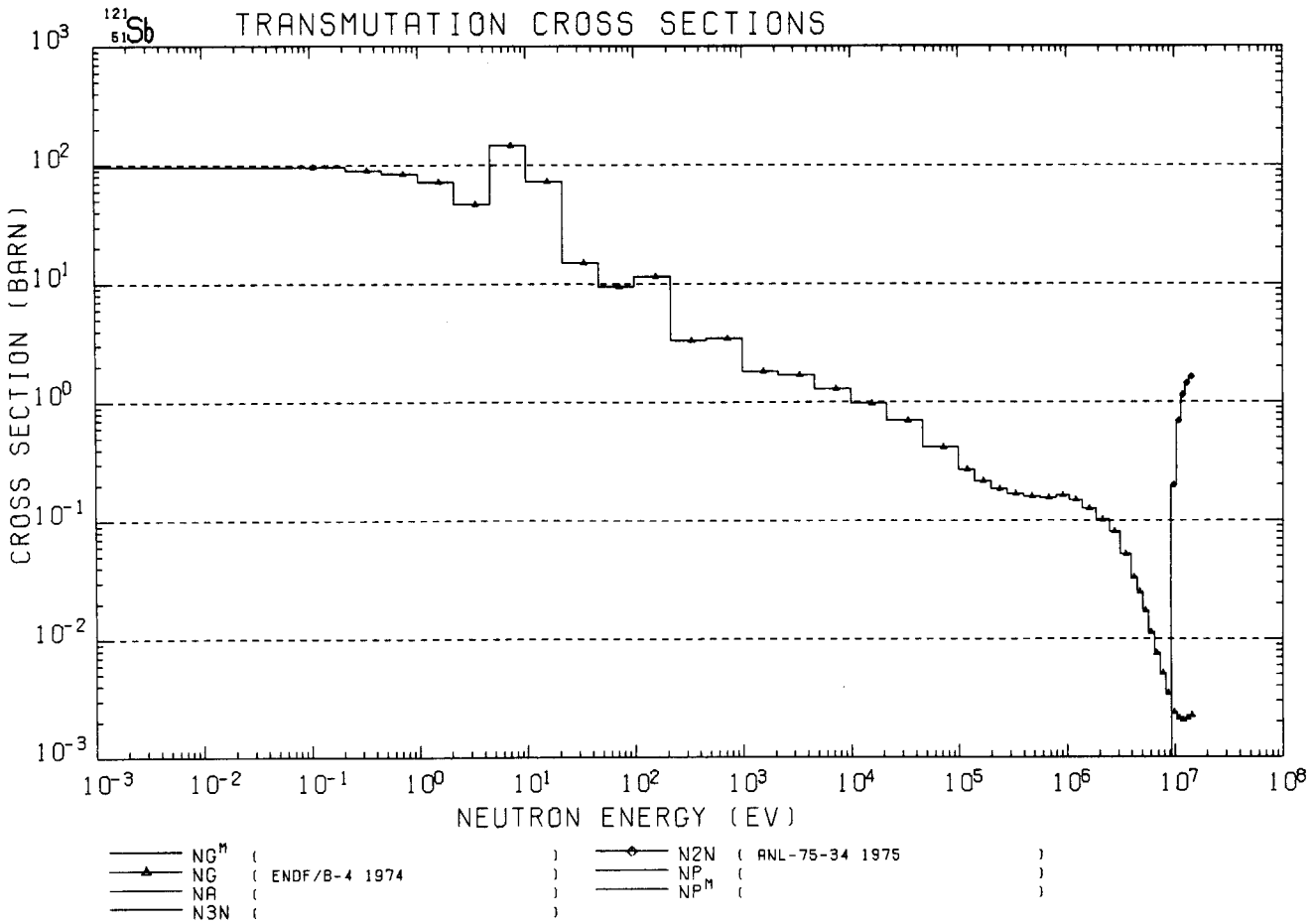

125m 50 Sn
9.50M
B-
125 50 Sn
9.40D
125 51 Sb
B-(23.2)
2.70Y
B-(176.7)
125m 52 Te
125 52 Te
NG
NG
124 49 In
NP
B-
3.60S
124 50 Sn
Abundance
5.64%
N2N
N2N
ND
123m 50 Sn
39.50M
B-(95.3)
B-(8.0)
123 49 In
B-(4.7)
6.00S
123 50 Sn
125.00
123 51 Sb
N3N
122 50 Sn
NA
121m 49 In
B-(50.0)
B-(2.8)
121 48 Cd
B-(50.0)
12.8S
121 49 In
B-(88.0)
30.0S
121m 50 Sn
55.0Y
121 50 Sn
27.00H
121 51 Sb



$^{124}_{50}Sn$ DECAY GAMMA-RAY TABLE

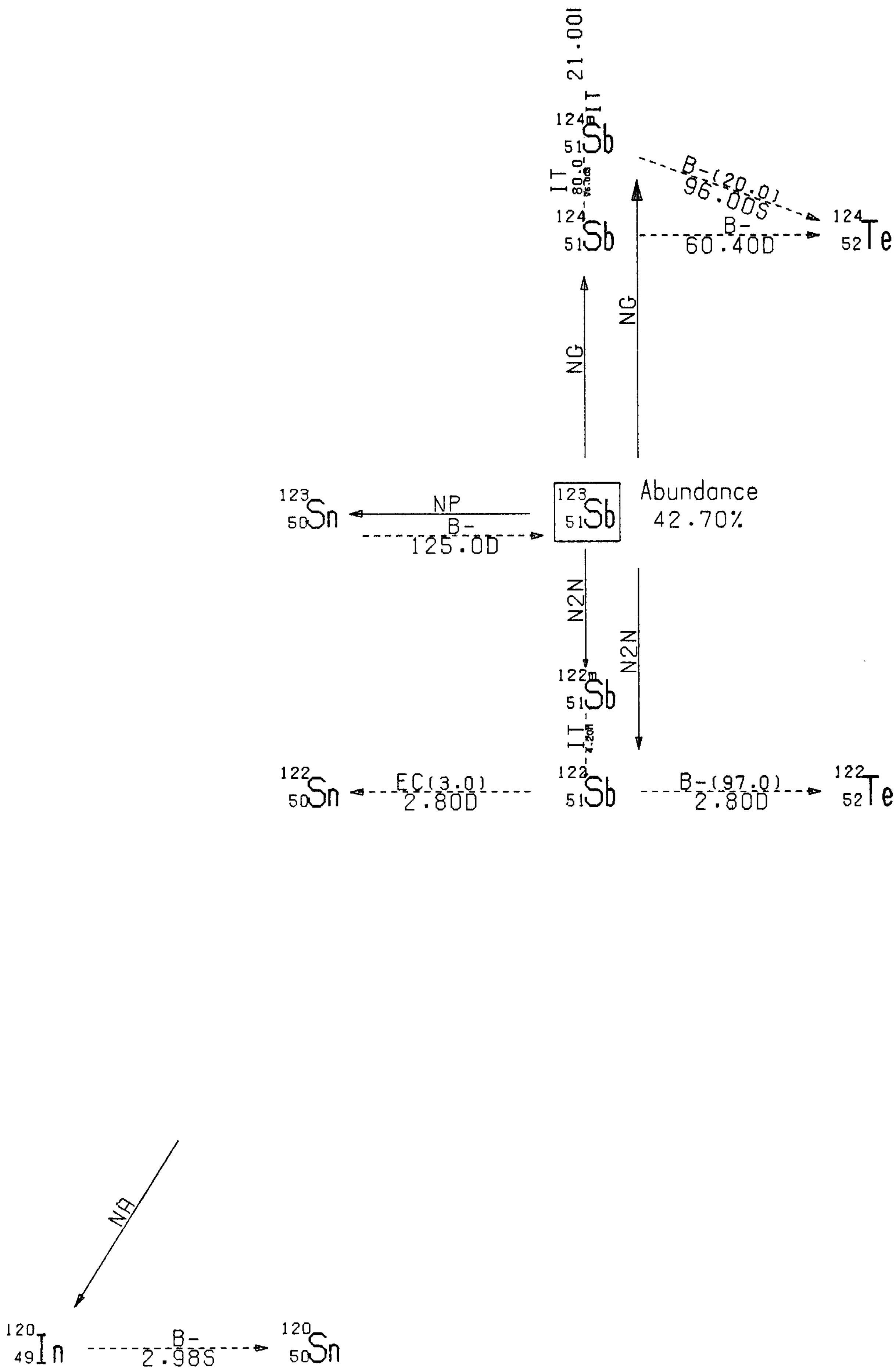
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{125m}_{50}Sn$	9.50 M	5.11E+05	3.32E+05	1.40E+05	5.90E+05	1.48E+05	6.43E+05	1.37E+06	1.61E+06		
		0.00	97.04	0.73	0.18	0.18	0.13	0.12	0.11		
$^{125}_{50}Sn$	9.40 D	5.11E+05	1.07E+06	1.09E+06	8.23E+05	9.15E+05	2.00E+06	4.70E+05	3.32E+05	8.00E+05	1.09E+06
		0.00	9.30	4.49	4.05	3.94	2.21	1.44	1.28	1.01	0.98
$^{121}_{48}Cd$	12.80 S	5.11E+05	3.25E+05	6.40E+04	1.46E+06	1.02E+06	1.04E+06	2.06E+06	7.67E+05	3.49E+05	1.18E+06
		0.00	100.00	38.20	33.80	33.00	32.80	28.90	26.00	25.10	24.20
$^{121m}_{49}In$	3.80 M	5.11E+05	6.01E+04	1.04E+06	1.10E+06	1.12E+06	3.21E+05	9.09E+05	2.60E+06	2.66E+06	
		0.00	21.00	1.15	0.95	0.62	0.62	0.34	0.12	0.11	
$^{121}_{49}In$	30.00 S	5.11E+05	9.26E+05	6.03E+04	2.62E+05	6.67E+05	9.19E+05	8.69E+05	1.09E+06	8.09E+05	5.64E+04
		0.00	87.60	21.00	7.95	7.16	4.23	1.11	0.34	0.22	0.19
$^{121m}_{50}Sn$	55.00 Y										
$^{121}_{50}Sn$	27.00 H										
$^{123}_{49}In$	48.00 S	5.11E+05	1.13E+06	1.02E+06	6.19E+05	8.46E+05	1.38E+06	5.36E+05	9.67E+05	9.31E+05	2.00E+06
		0.00	63.40	32.40	2.64	1.33	1.13	0.91	0.41	0.31	0.28
$^{123m}_{50}Sn$	39.50 M	5.11E+05	1.60E+05								
		0.00	85.52								
$^{123}_{50}Sn$	125.0 D	5.11E+05	1.09E+06								
		0.00	0.60								
$^{124}_{49}In$	3.60 S										
$^{125}_{51}Sb$	2.70 Y	5.11E+05	4.28E+05	6.01E+05	6.36E+05	4.64E+05	1.76E+05	6.07E+05	6.72E+05	3.81E+05	1.22E+05
		0.00	30.10	18.01	11.56	10.64	6.86	4.96	1.76	1.64	1.06
$^{125m}_{52}Te$	58.00 D	5.11E+05	1.09E+05								
		0.00	0.27								


122m 51Sb
IT
122 50Sn
EC(3.0)
2.80D
122 51Sb
B-(97.0)
2.80D
122 52Te
NG
NG
121m 50Sn
B-
76.00Y
NP
121 50Sn
NP
B-
27.50H
121 51Sb
Abundance
57.30%
N2N
120 50Sn
EC
15.87M
120 51Sb
N3N
119 50Sn
EC
38.00H
119 51Sb
NA
118 49In
B-
5.67S
118 50Sn

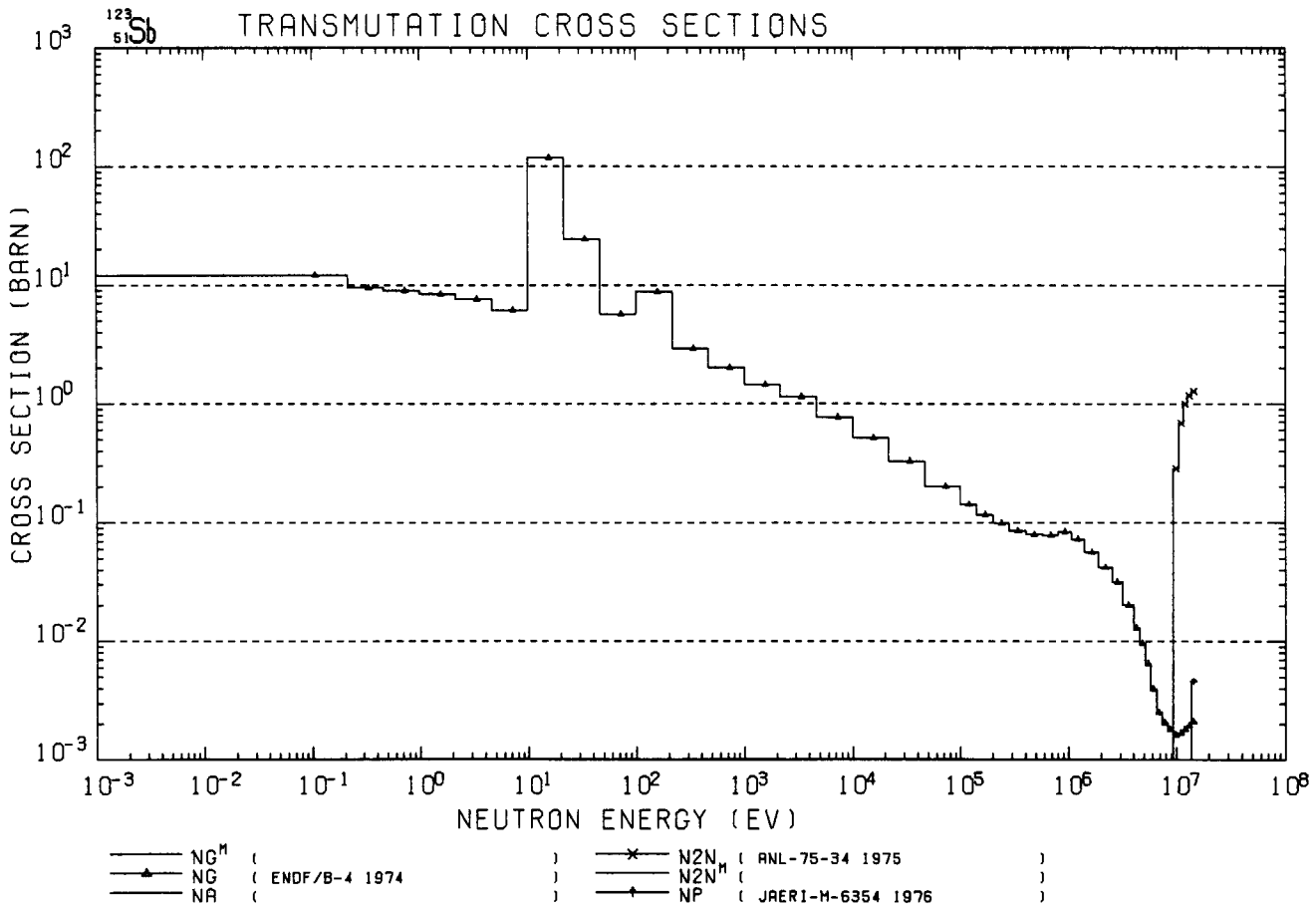


$^{121}_{51}Sb$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-				
$^{122m}_{51}Sb$	4.20	M	5.11E+05	6.15E+04	7.61E+04	2.52E+04	
			0.00	44.42	18.43	9.95	
$^{122}_{51}Sb$	2.80	D	5.11E+05	5.64E+05	6.93E+05	1.14E+06	1.26E+06
			0.00	70.40	3.92	0.82	0.77
$^{118}_{49}In$	5.67	S					
$^{119}_{51}Sb$	38.00	H	5.11E+05	2.36E+04			
			0.00	16.23			
$^{120}_{51}Sb$	15.87	M	5.11E+05	1.17E+06	7.03E+05	9.88E+05	
			87.00	2.16	0.27	0.11	
$^{121}_{50}Sn$	27.50	H					
$^{121m}_{50}Sn$	76.00	Y					

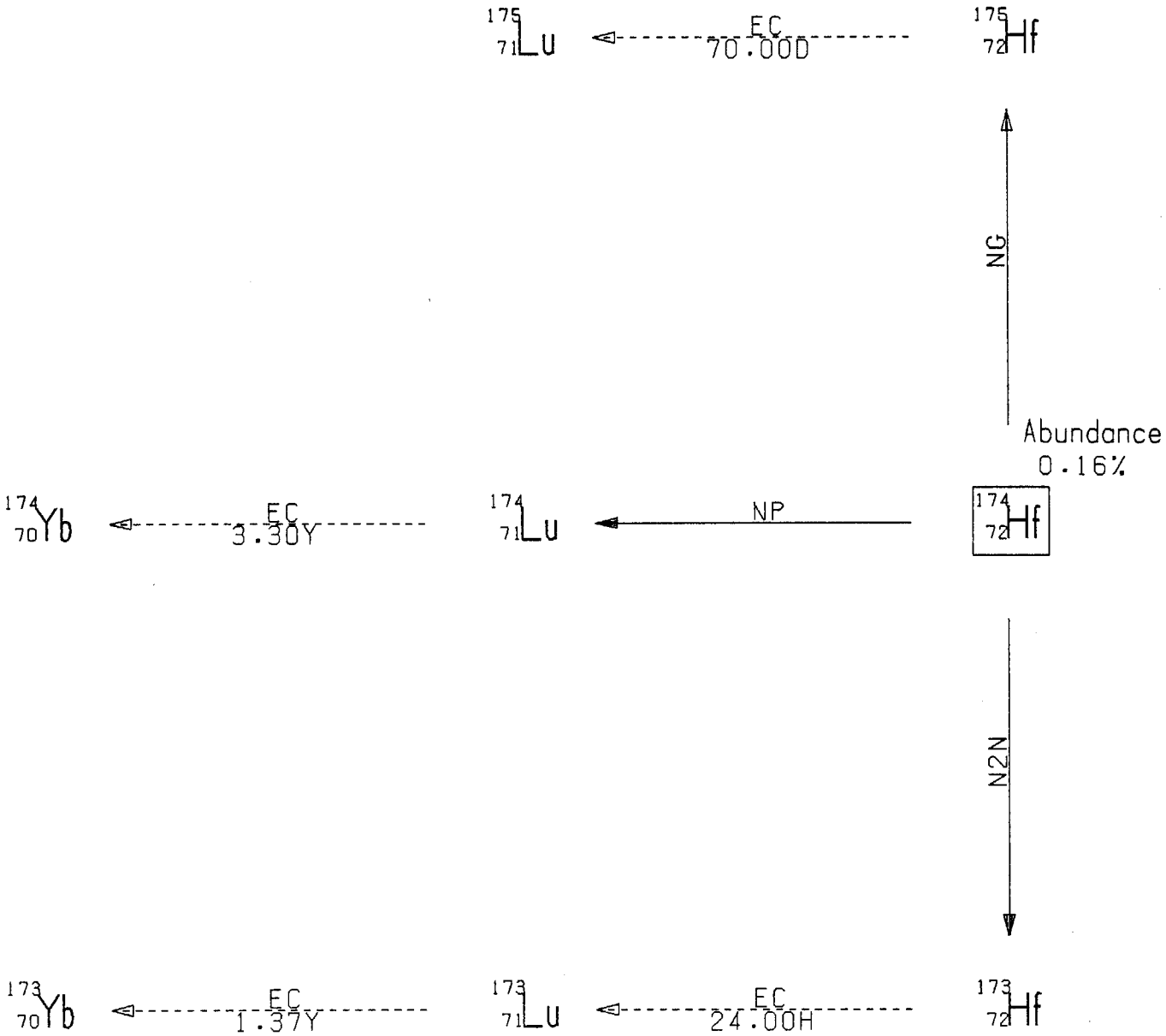


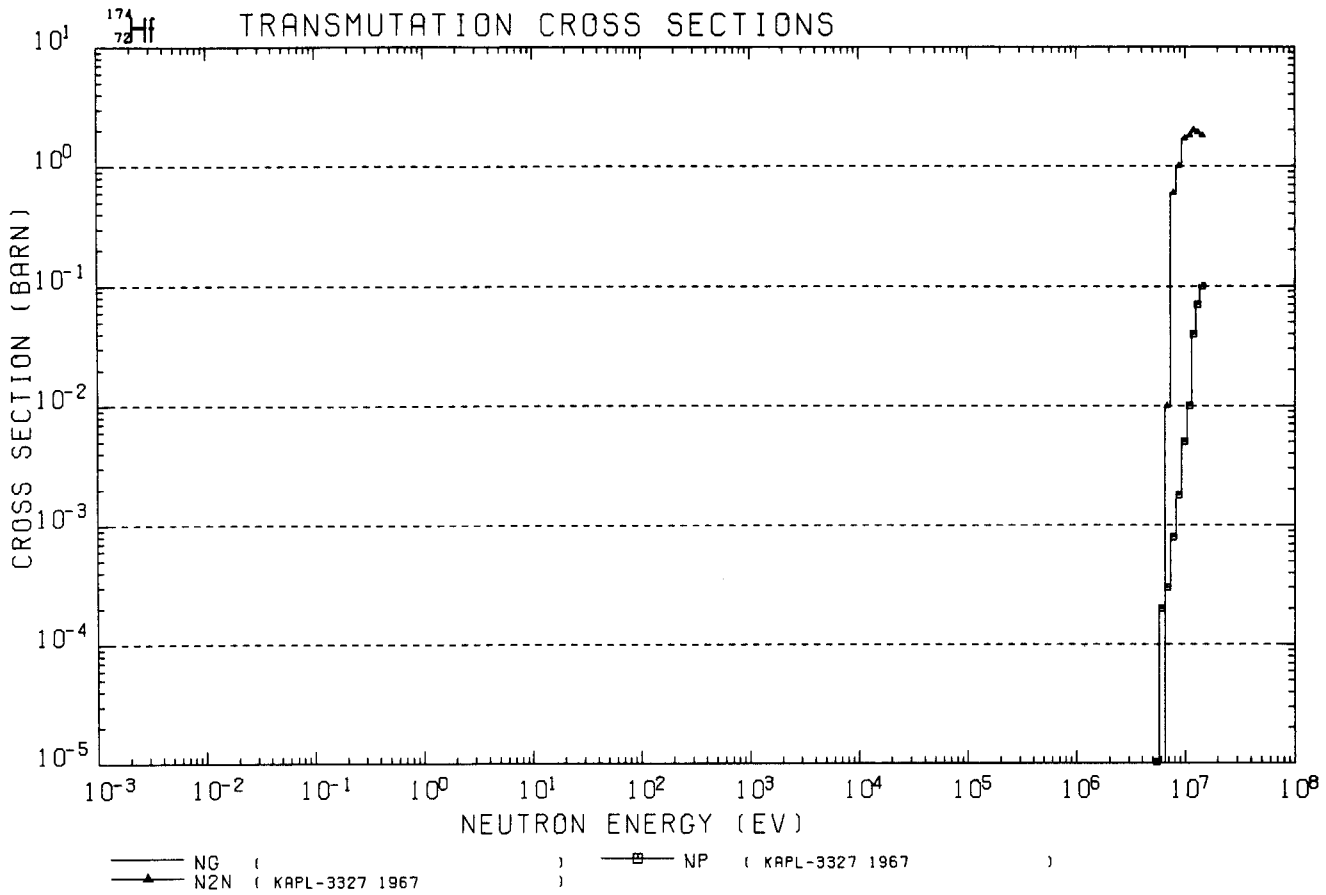
IT 21.00I
124m Sb 51
IT 80.0 93.00S
B-(20.0) 96.00S
124 Sb 51
B- 60.40D
124 Te 52
NG
NG
123 Sn 50
NP
B- 125.0D
123 Sb 51
Abundance 42.70%
N2N
N2N
122m Sb 51
IT 4.20M
122 Sn 50
EC(3.0) 2.80D
122 Sb 51
B-(97.0) 2.80D
122 Te 52
NA
120 In 49
B- 2.98S
120 Sn 50



$^{123}_{51}Sb$ DECAY GAMMA-RAY TABLE

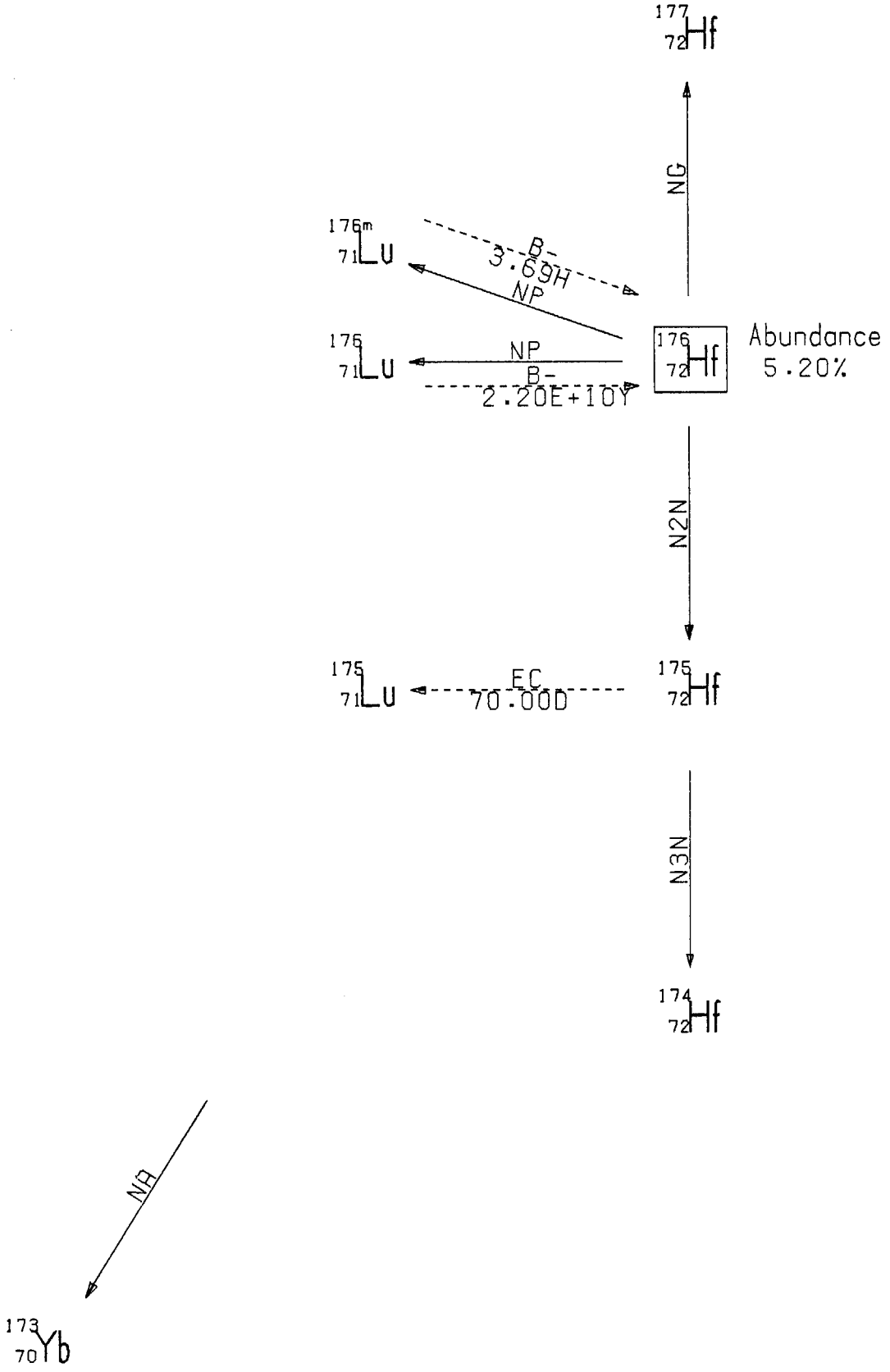
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{124m}_{51}Sb$	21.00	M	5.11E+05	6.03E+05	6.46E+05	4.98E+05	1.10E+06					
			0.00	20.50	20.50	20.17	0.33					
$^{124}_{51}Sb$	60.40	D	5.11E+05	6.03E+05	1.69E+06	7.23E+05	6.46E+05	2.09E+06	1.37E+06	7.14E+05	9.68E+05	1.05E+06
			0.00	98.30	50.41	10.97	7.40	5.76	2.72	2.39	2.00	1.89
$^{120}_{49}In$	2.98	S										
$^{122m}_{51}Sb$	4.20	M	5.11E+05	6.15E+04	7.61E+04	2.52E+04						
			0.00	44.42	18.43	9.95						
$^{122}_{51}Sb$	2.80	D	5.11E+05	6.64E+05	6.93E+05	1.14E+06	1.26E+06					
			0.00	70.40	3.92	0.82	0.77					
$^{123}_{50}Sn$	125.0	D	5.11E+05	1.09E+06								
			0.00	0.60								

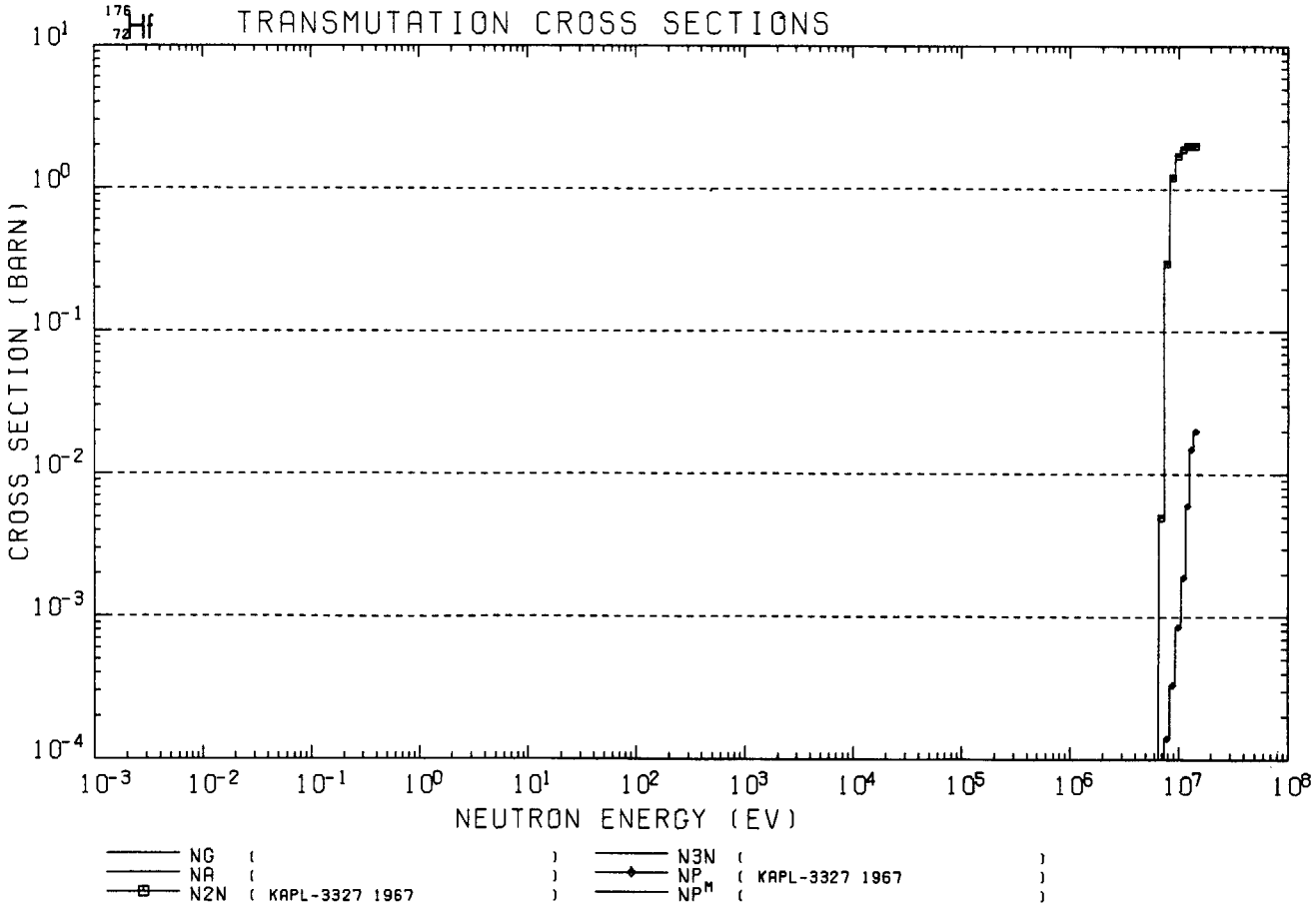

175 71 Lu
EC
70.00D
175 72 Hf
NG
Abundance
0.16%
174 70 Yb
EC
3.30Y
174 71 Lu
NP
174 72 Hf
N2N
173 70 Yb
EC
1.37Y
173 71 Lu
EC
24.00H
173 72 Hf



$^{174}_{72}Hf$ DECAY GAMMA-RAY TABLE

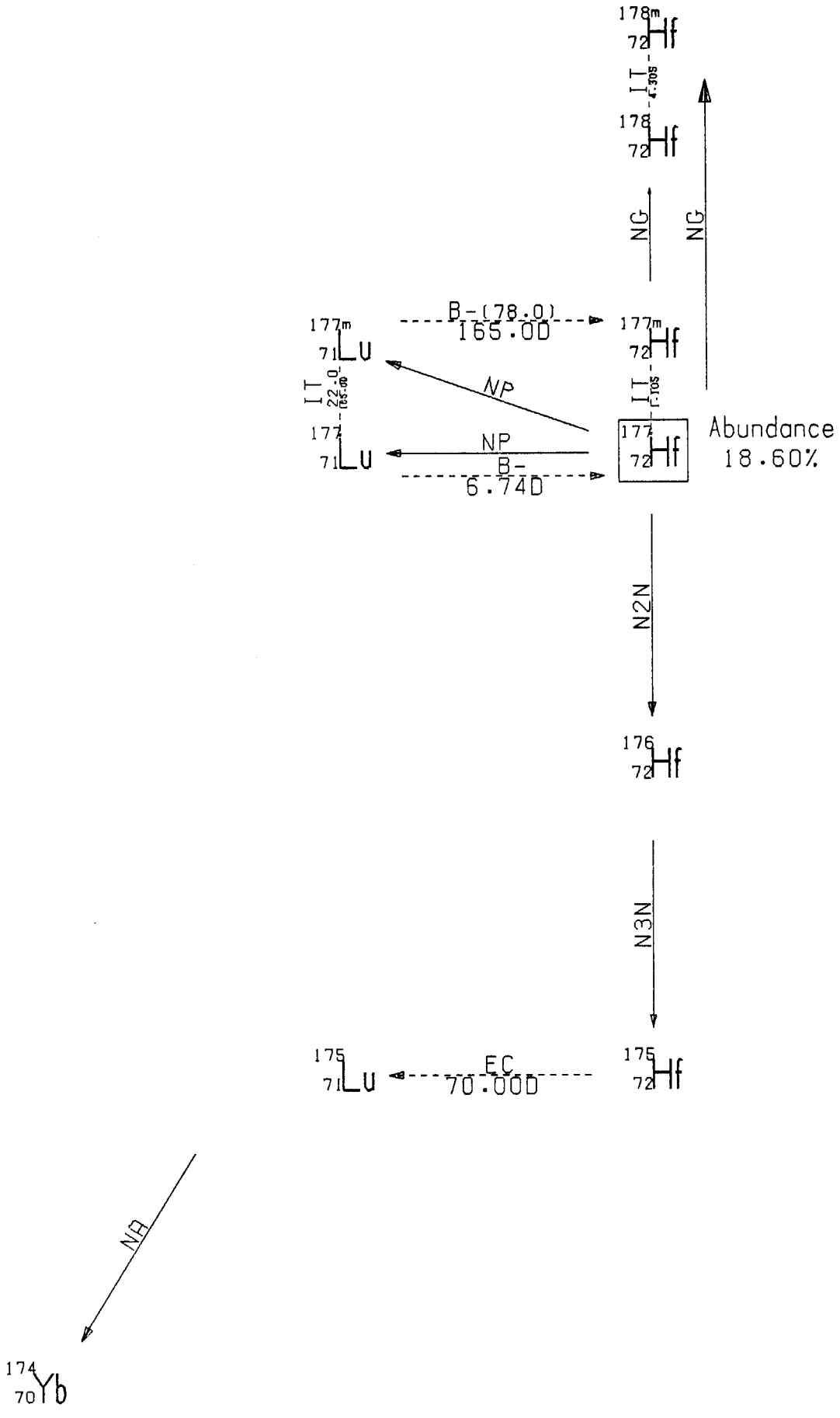
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{175}_{72}Hf$	70.00 D	5.11E+05	3.43E+05	8.94E+04	4.33E+05	2.30E+05	1.14E+05	3.54E+05	3.19E+05		
		0.00	87.05	2.29	1.50	0.78	0.32	0.24	0.18		
$^{173}_{72}Hf$	24.00 H	5.11E+05	1.24E+05	2.97E+05	1.40E+05	3.11E+05	1.62E+05	3.07E+05	1.35E+05	8.99E+05	3.57E+05
		0.00	83.10	33.99	12.91	10.75	6.55	6.34	4.79	1.02	0.46
$^{173}_{71}Lu$	1.37 Y	5.11E+05	2.72E+05	7.86E+04	1.01E+05	1.71E+05	6.36E+05	1.79E+05	2.85E+05	2.33E+05	5.57E+05
		0.00	13.00	7.80	3.13	1.78	0.87	0.83	0.35	0.35	0.30
$^{174}_{71}Lu$	3.30 Y	5.11E+05	1.24E+06	7.65E+04							
		0.00	6.00	5.40							

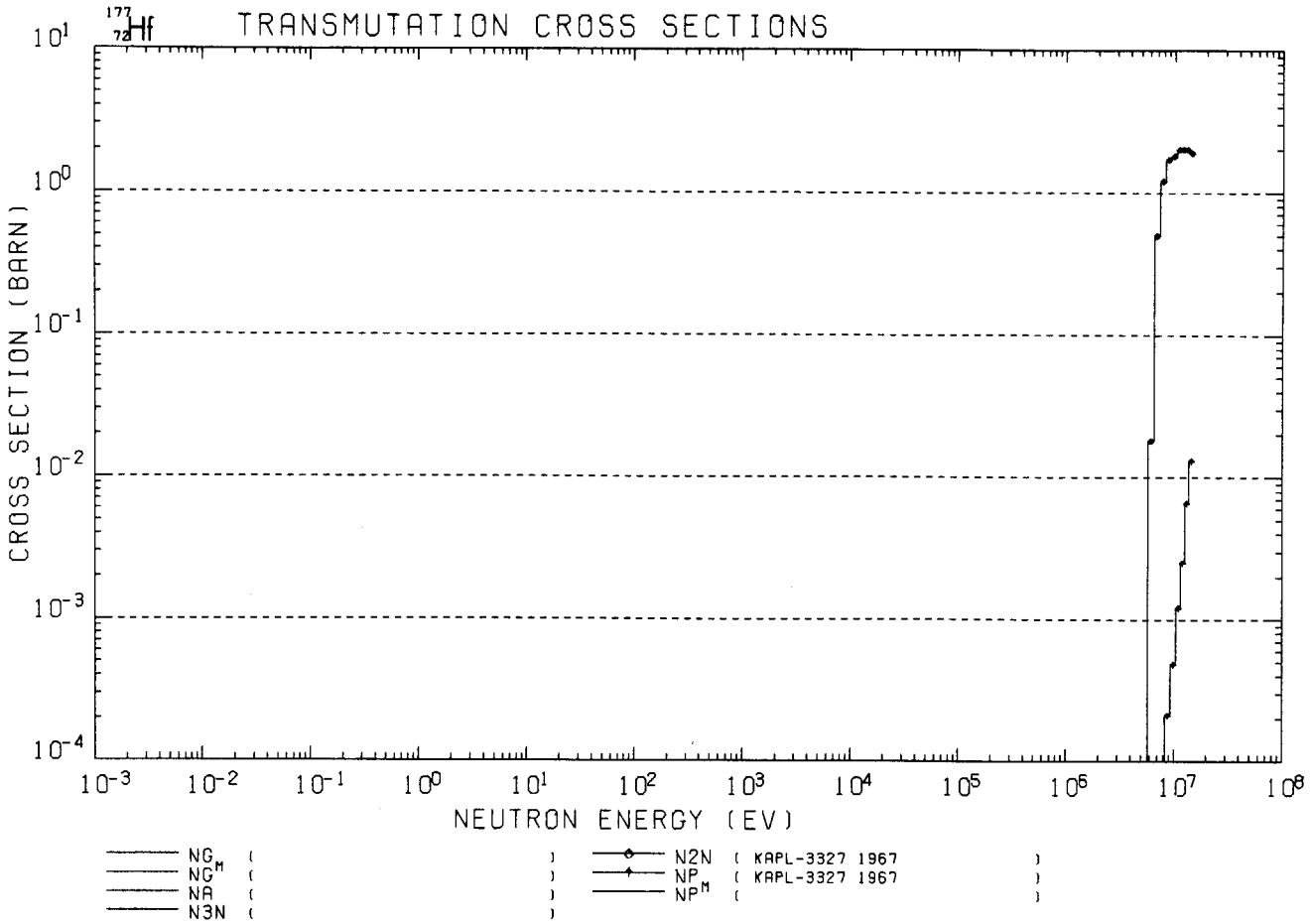

177 72 Hf
NG
176m 71 Lu
B-
3.69H
NP
176 71 Lu
NP
B-
2.20E+10Y
176 72 Hf
Abundance
5.20%
N2N
175 71 Lu
EC
70.00D
175 72 Hf
N3N
174 72 Hf
NP
173 70 Yb



176 72Hf DECAY GAMMA-RAY TABLE

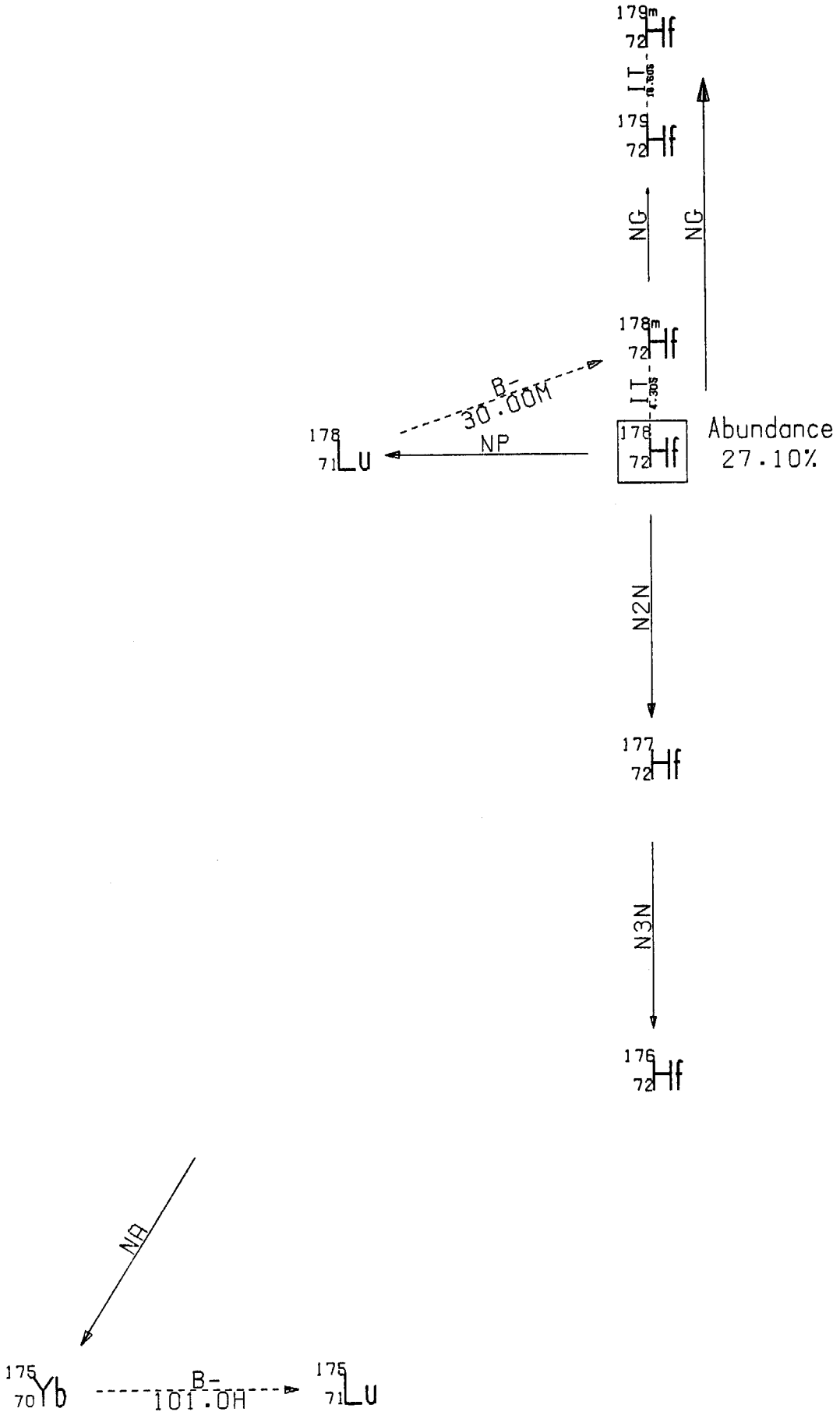
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-							
176 71Lu	2.20E+10Y	5.11E+05	3.07E+05	2.02E+05	8.84E+04	4.01E+05			
		0.00	93.02	84.61	13.13	0.86			
176m 71Lu	3.69 H	5.11E+05	8.83E+04						
		0.00	8.79						
176 72Hf	70.00 D	5.11E+05	3.43E+05	8.94E+04	4.33E+05	2.30E+05	1.14E+05	3.54E+05	3.19E+05
		0.00	87.05	2.28	1.50	0.78	0.32	0.24	0.18

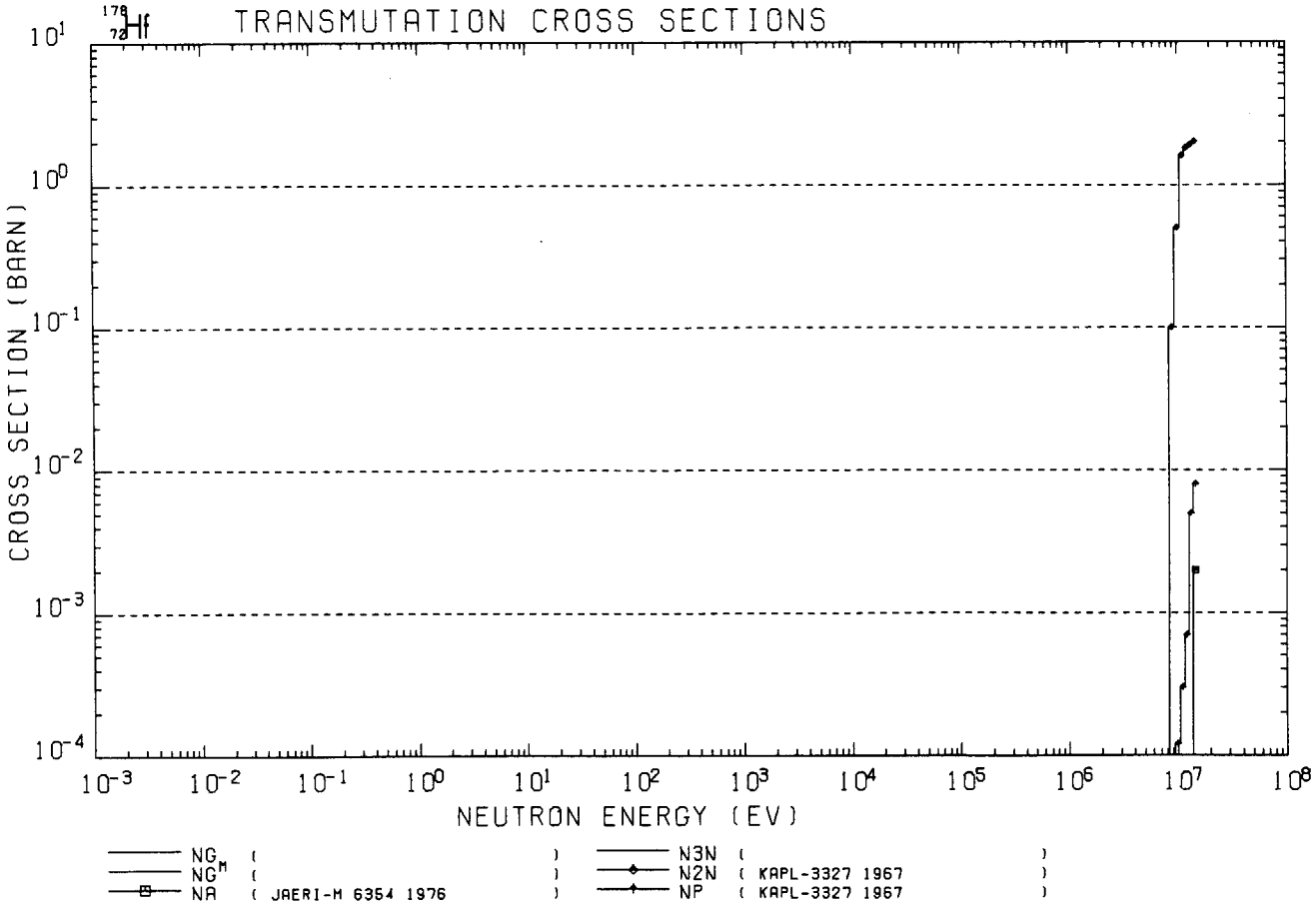

178m 72 Hf
IT
178 72 Hf
NG
NG
B-(78.0)
165.0D
177m 71 Lu
177m 72 Hf
IT
IT
NP
177 71 Lu
NP
B-
6.74D
177 72 Hf
Abundance
18.60%
N2N
176 72 Hf
N3N
175 71 Lu
EC
70.00D
175 72 Hf
NP
174 70 Yb



$^{177}_{72}Hf$ DECAY GAMMA-RAY TABLE

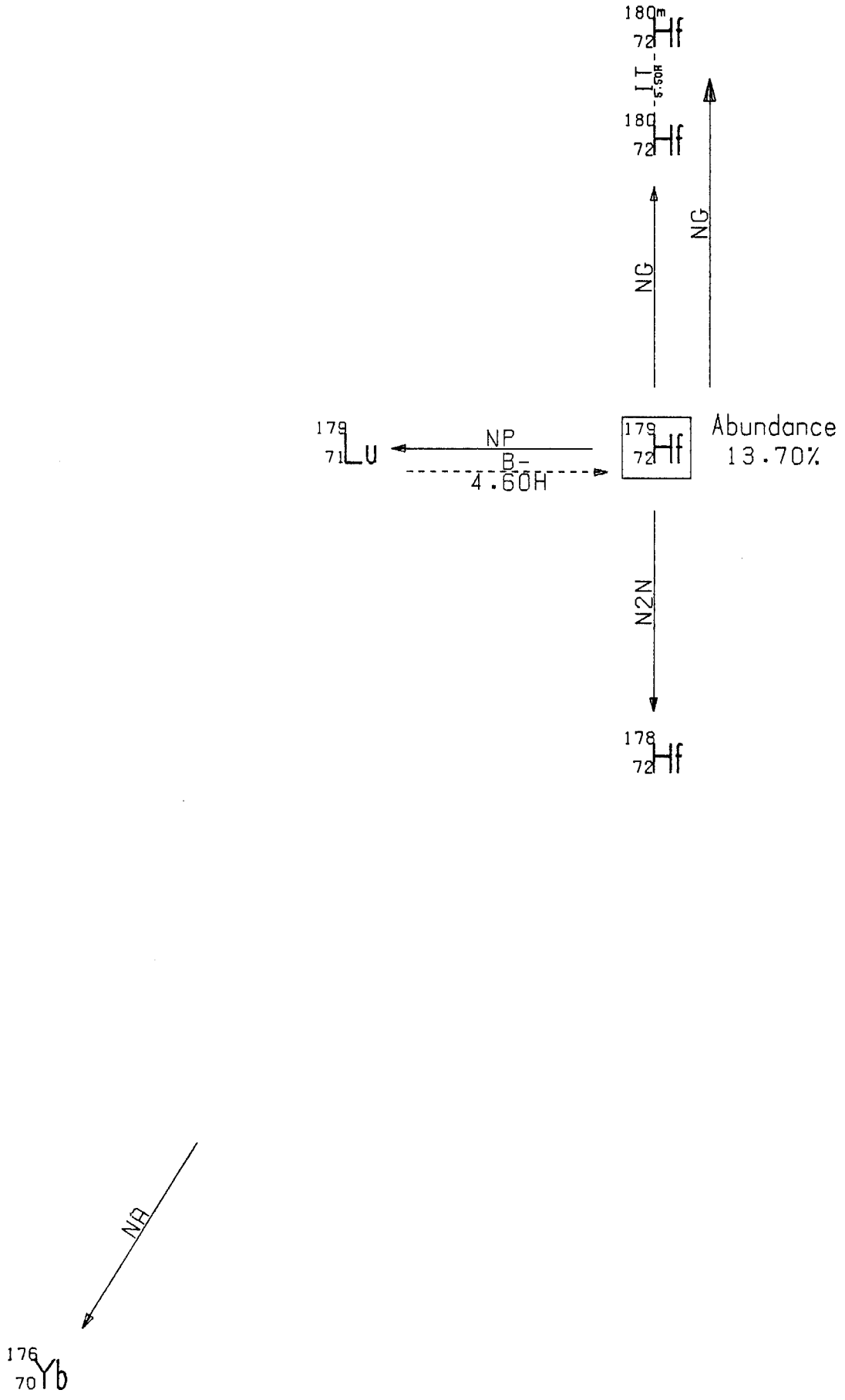
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY									
		YIELD (%) --GREATER THAN 0.1-									
$^{178m}_{72}Hf$	4.30 S	5.11E+05	4.26E+05	3.26E+05	5.74E+05	2.13E+05	4.95E+05	2.17E+05	8.89E+04	9.32E+04	2.68E+05
		0.00	97.17	94.13	83.80	81.16	68.92	63.83	62.14	17.32	16.62
$^{175}_{72}Hf$	70.00 D	5.11E+05	3.43E+05	8.94E+04	4.33E+05	2.30E+05	1.14E+05	3.54E+05	3.19E+05		
		0.00	87.05	2.28	1.50	0.78	0.32	0.24	0.18		
$^{177}_{71}Lu$	6.74 D	5.11E+05	2.08E+05	1.13E+05	7.20E+04	3.21E+05	2.50E+05				
		0.00	11.10	6.70	1.67	0.22	0.21				
$^{177m}_{71}Lu$	165.0 D	5.11E+05	2.08E+05	2.28E+05	3.78E+05	1.13E+05	4.18E+05	1.53E+05	3.28E+05	4.14E+05	1.28E+05
		0.00	61.71	37.61	28.10	21.68	20.22	18.16	17.66	16.65	15.36
$^{177m}_{72}Hf$	1.10 S	5.11E+05	2.08E+05	2.28E+05	3.78E+05	1.13E+05	4.18E+05	3.28E+05	1.53E+05	1.28E+05	2.04E+05
		0.00	83.81	60.67	38.24	28.20	26.77	23.24	23.10	20.71	20.65

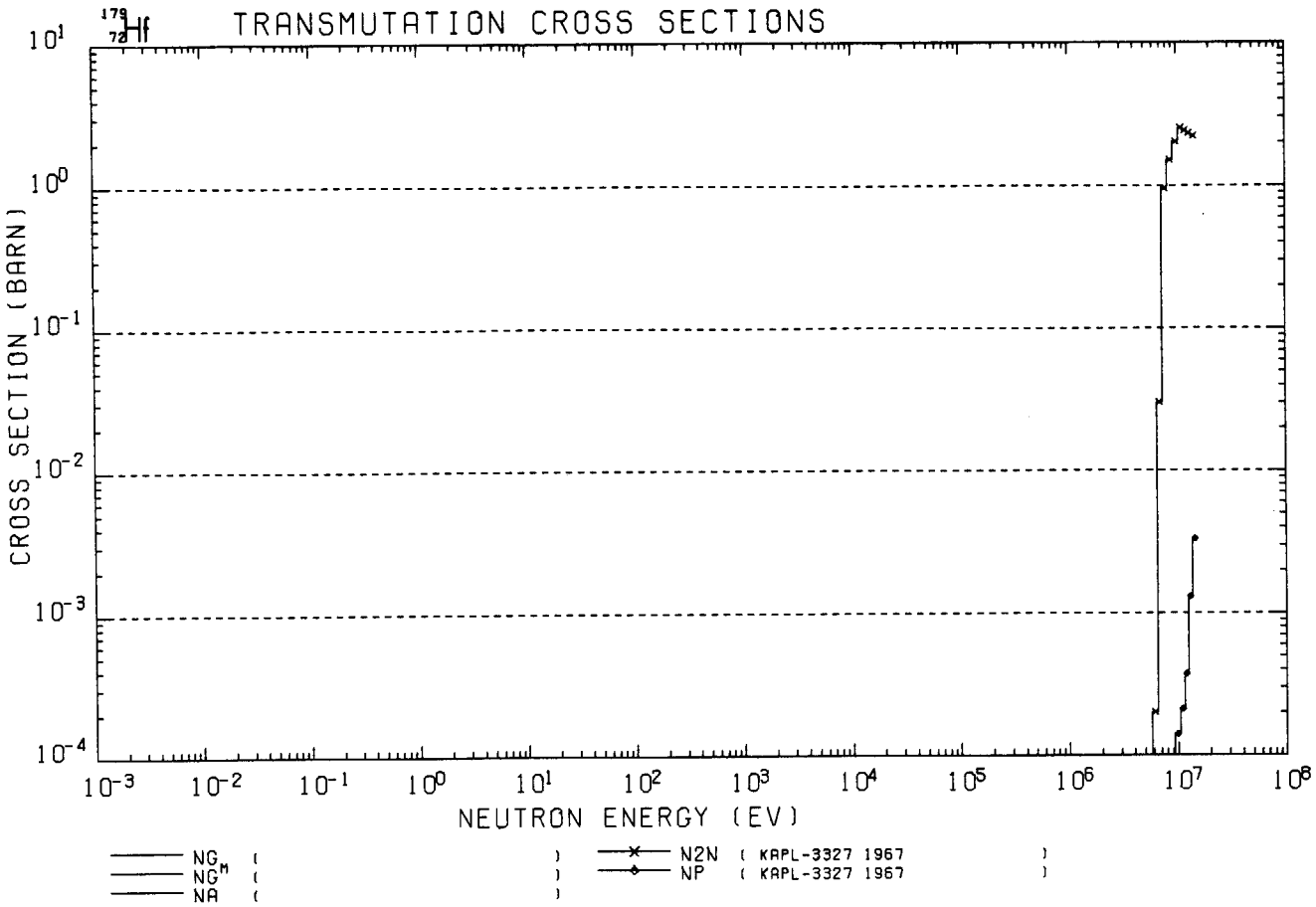

179m 72 Hf
IT
179 72 Hf
NG
NG
178m 72 Hf
IT
B-
30.00M
178 71 Lu
NP
178 72 Hf
Abundance
27.10%
N2N
177 72 Hf
N3N
176 72 Hf
NA
175 70 Yb
B-
101.0H
175 71 Lu



$^{178}_{72}Hf$ DECAY GAMMA-RAY TABLE

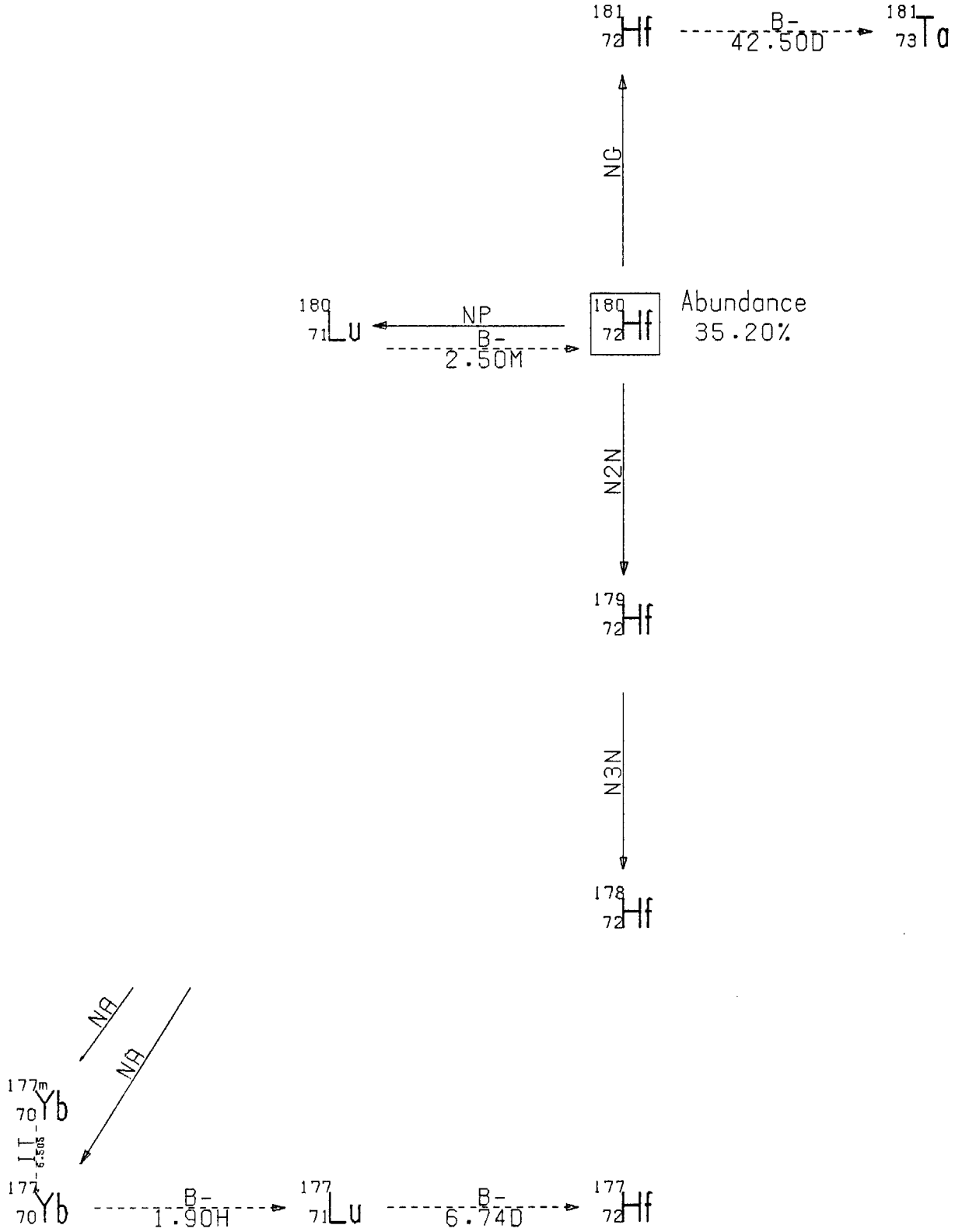
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY									
		YIELD (%) --GREATER THAN 0.1-									
$^{179m}_{72}Hf$	18.60 S	5.11E+05	4.53E+05	3.62E+05	1.23E+05	1.46E+05	4.10E+05	1.93E+05	3.16E+05	1.70E+05	2.36E+05
		0.00	66.40	38.20	26.69	26.11	20.78	20.75	19.69	18.71	18.17
$^{175}_{70}Yb$	101.0 H	5.11E+05	3.96E+05	2.83E+05	1.14E+05	1.45E+05					
		0.00	6.11	2.84	1.77	0.32					
$^{178}_{71}Lu$	30.00 M	5.11E+05	9.30E+04	1.34E+06	1.31E+06	1.27E+06	1.40E+06	1.50E+06	2.04E+05	1.68E+06	1.25E+06
		0.00	6.77	5.00	1.60	1.06	0.65	0.36	0.35	0.31	0.25
$^{178m}_{72}Hf$	4.30 S	5.11E+05	4.26E+05	3.26E+05	5.74E+05	2.13E+05	4.95E+05	2.17E+05	8.89E+04	9.32E+04	2.56E+05
		0.00	97.17	84.13	83.80	81.16	68.92	63.83	62.14	17.32	16.62

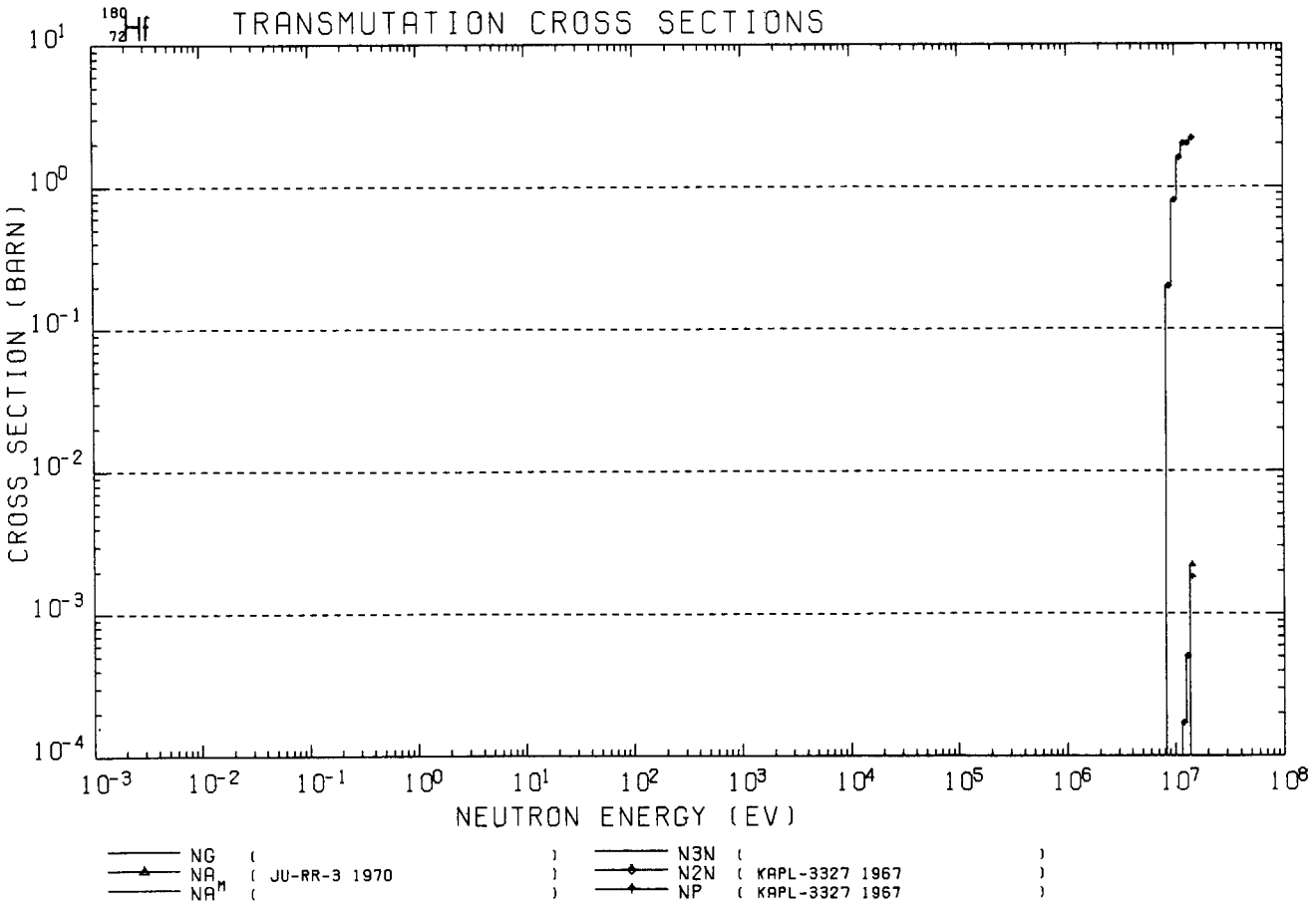

180m 72 Hf
IT
5.50H
180 72 Hf
NG
NG
179 71 Lu
NP
B-
4.60H
179 72 Hf
Abundance
13.70%
N2N
178 72 Hf
NA
176 70 Yb



$^{179}_{72}Hf$ DECAY GAMMA-RAY TABLE

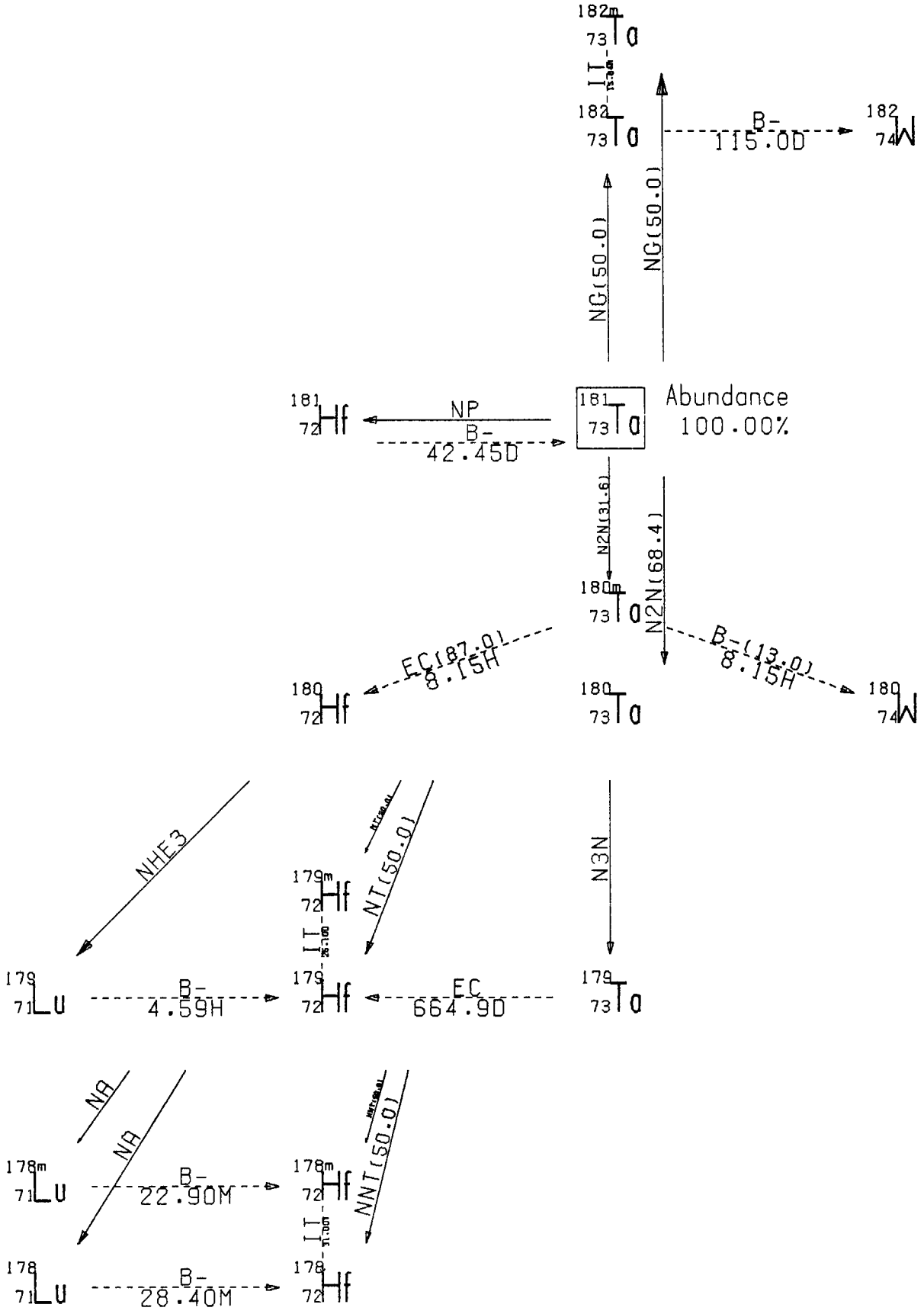
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY						
		YIELD (%) --GREATER THAN 0.1-						
$^{180m}_{72}Hf$	5.50 H	5.11E+05	3.32E+05	4.43E+05	2.15E+05	5.75E+04	9.33E+04	5.01E+05
		0.00	94.40	86.38	81.69	48.46	17.04	12.85
$^{179}_{71}Lu$	4.60 H	5.11E+05	2.14E+05	2.15E+05	1.23E+05	3.38E+05	1.23E+05	8.59E+05
		0.00	11.63	0.46	0.46	0.19	0.15	0.10

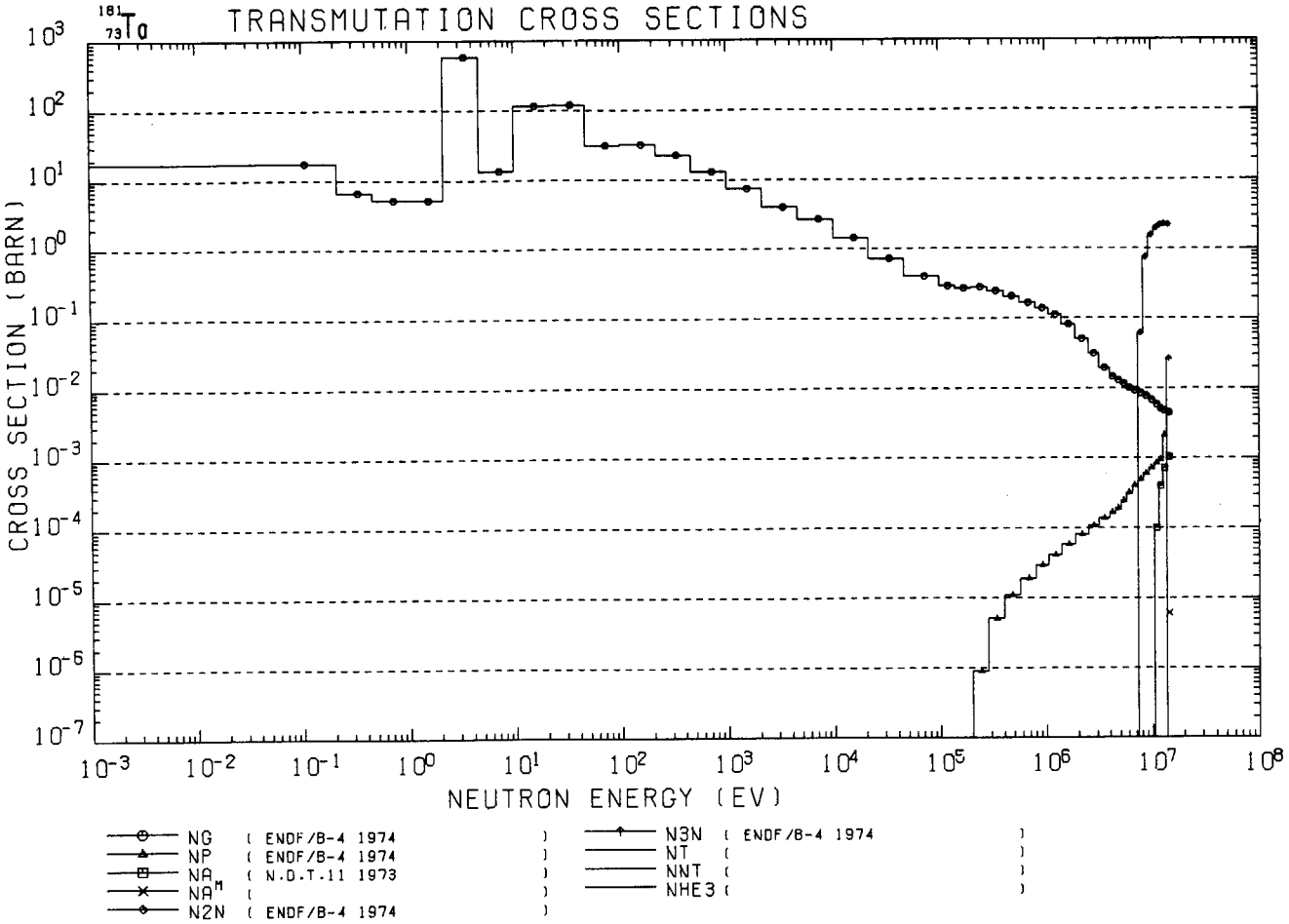

181 72 Hf
B-
42.50D
181 73 Ta
NG
180 71 Lu
NP
B-
2.50M
180 72 Hf
Abundance
35.20%
N2N
179 72 Hf
N3N
178 72 Hf
NA
NA
177m 70 Yb
IT
6.50S
177 70 Yb
B-
1.90H
177 71 Lu
B-
6.74D
177 72 Hf



180 72Hf DECAY GAMMA-RAY TABLE

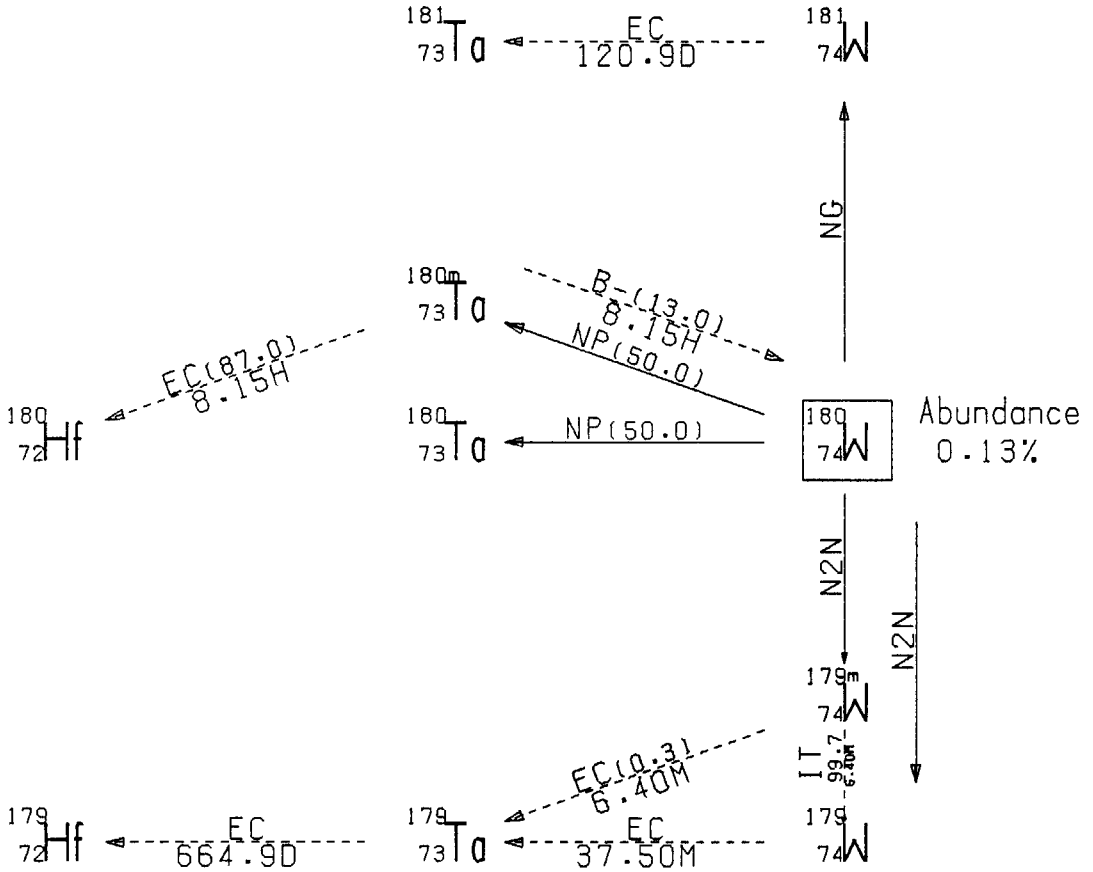
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY									
			YIELD (%) --GREATER THAN 0.1-									
181 72Hf	42.50	D	5.11E+05	4.82E+05	1.33E+05	3.46E+05	1.38E+05	1.37E+05	4.76E+06	6.16E+05		
			0.00	81.20	40.00	13.00	6.00	1.70	1.70	0.20		
177m 70Yb	6.50	S	5.11E+05	1.04E+06								
			0.00	76.50								
177 70Yb	1.90	H	5.11E+05	1.50E+05	1.08E+06	1.22E+05	1.24E+06	1.39E+05	9.42E+05	8.99E+05	1.15E+06	1.03E+06
			0.00	20.07	5.54	3.45	3.38	1.33	1.01	0.65	0.65	0.64
177 71Lu	6.74	D	5.11E+05	2.08E+05	1.13E+05	7.20E+04	3.21E+05	2.50E+05				
			0.00	11.10	6.70	1.67	0.22	0.21				
180 71Lu	2.50	M	5.11E+05	4.08E+05	1.20E+06	1.11E+06	2.15E+05	1.20E+06	3.17E+05	1.30E+06	9.33E+04	1.51E+06
			0.00	50.20	25.78	23.62	21.01	16.23	15.03	14.27	13.32	7.94

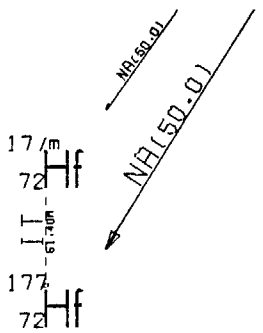

182m 73 Ta
IT 15.8M
182 73 Ta
B- 115.0D
182 74 W
NG(50.0)
NG(50.0)
181 72 Hf
NP
B- 42.45D
181 73 Ta
Abundance 100.00%
N2N(31.6)
180m 73 Ta
N2N(68.4)
EC(87.0) 8.15H
B-(13.0) 8.15H
180 72 Hf
180 73 Ta
180 74 W
NHE3
NT(50.0)
179m 72 Hf
IT 25.05D
N3N
179 71 Lu
B- 4.59H
179 72 Hf
EC 664.9D
179 73 Ta
NA
NA
NNT(50.0)
178m 71 Lu
B- 22.90M
178m 72 Hf
IT 31.0Y
178 71 Lu
B- 28.40M
178 72 Hf

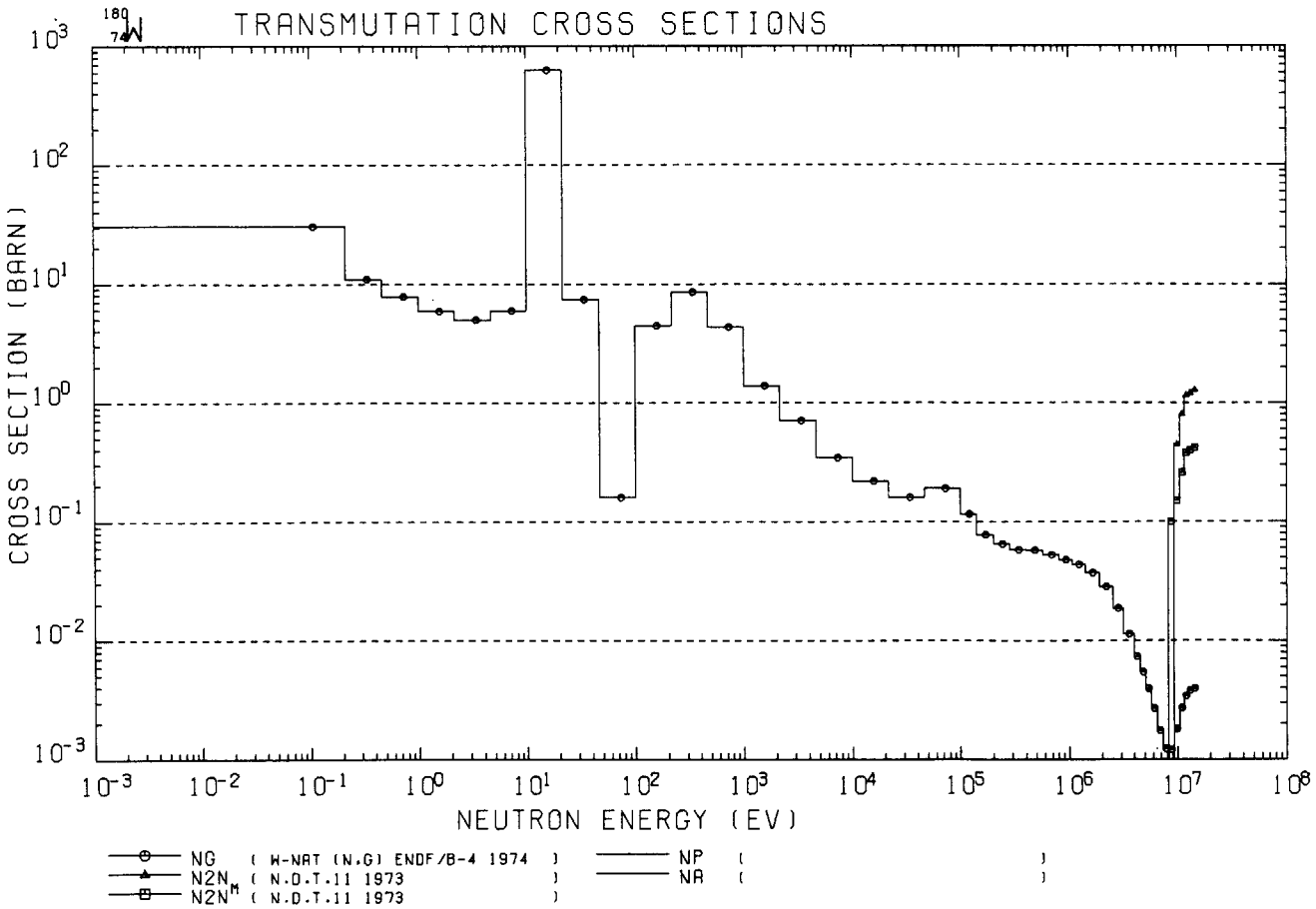


$^{181}_{73}Ta$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{182}_{73}Ta$	115.0 D	5.11E+05	1.12E+06	1.22E+06	1.19E+06	1.23E+06	1.00E+06	1.26E+06	1.29E+06	1.16E+06	1.27E+06
		0.00	35.15	27.17	16.40	11.68	2.08	1.50	1.36	1.00	0.65
$^{182m}_{73}Ta$	15.84 M	5.11E+05	1.72E+05	1.47E+06	1.85E+06	3.18E+05	3.66E+05				
		0.00	47.20	36.06	23.74	6.66	0.29				
$^{181}_{72}Hf$	42.45 D	5.11E+05	4.82E+05	1.33E+05	3.46E+05	1.36E+05	1.37E+05	4.76E+05	6.16E+05		
		0.00	81.20	40.00	13.00	6.00	1.70	1.70	0.20		
$^{178}_{71}Lu$	28.40 M	5.11E+05	9.30E+04	1.34E+06	1.31E+06	1.27E+06	1.40E+06	1.50E+06	2.04E+05	1.66E+06	1.25E+06
		0.00	6.77	5.00	1.60	1.06	0.65	0.36	0.35	0.31	0.25
$^{178m}_{71}Lu$	22.90 M	5.11E+05	4.26E+05	3.26E+05	2.13E+05	8.90E+04	9.30E+04	3.32E+06	2.17E+05		
		0.00	97.05	94.43	79.87	63.86	17.96	11.74	2.62		
$^{178m}_{72}Hf$	31.00 Y	5.11E+05	4.26E+05	3.26E+05	5.74E+05	2.13E+05	4.95E+05	2.17E+05	8.89E+04	9.32E+04	2.58E+05
		0.00	97.17	94.13	83.80	81.16	68.92	63.83	62.14	17.32	16.62
$^{180m}_{73}Ta$	8.15 H	5.11E+05	9.30E+04	1.04E+05							
		0.00	0.50	0.30							
$^{179}_{73}Ta$	664.9 D										
$^{179}_{71}Lu$	4.59 H	5.11E+05	2.14E+05	2.15E+05	1.23E+05	3.38E+05	1.23E+05	8.59E+05			
		0.00	11.63	0.45	0.46	0.19	0.15	0.10			
$^{179m}_{72}Hf$	25.10 D	5.11E+05	4.53E+05	3.62E+05	1.23E+05	1.46E+05	4.10E+05	1.93E+05	3.16E+05	1.70E+05	2.36E+05
		0.00	65.40	38.20	26.69	25.11	20.78	20.75	19.59	18.71	18.17

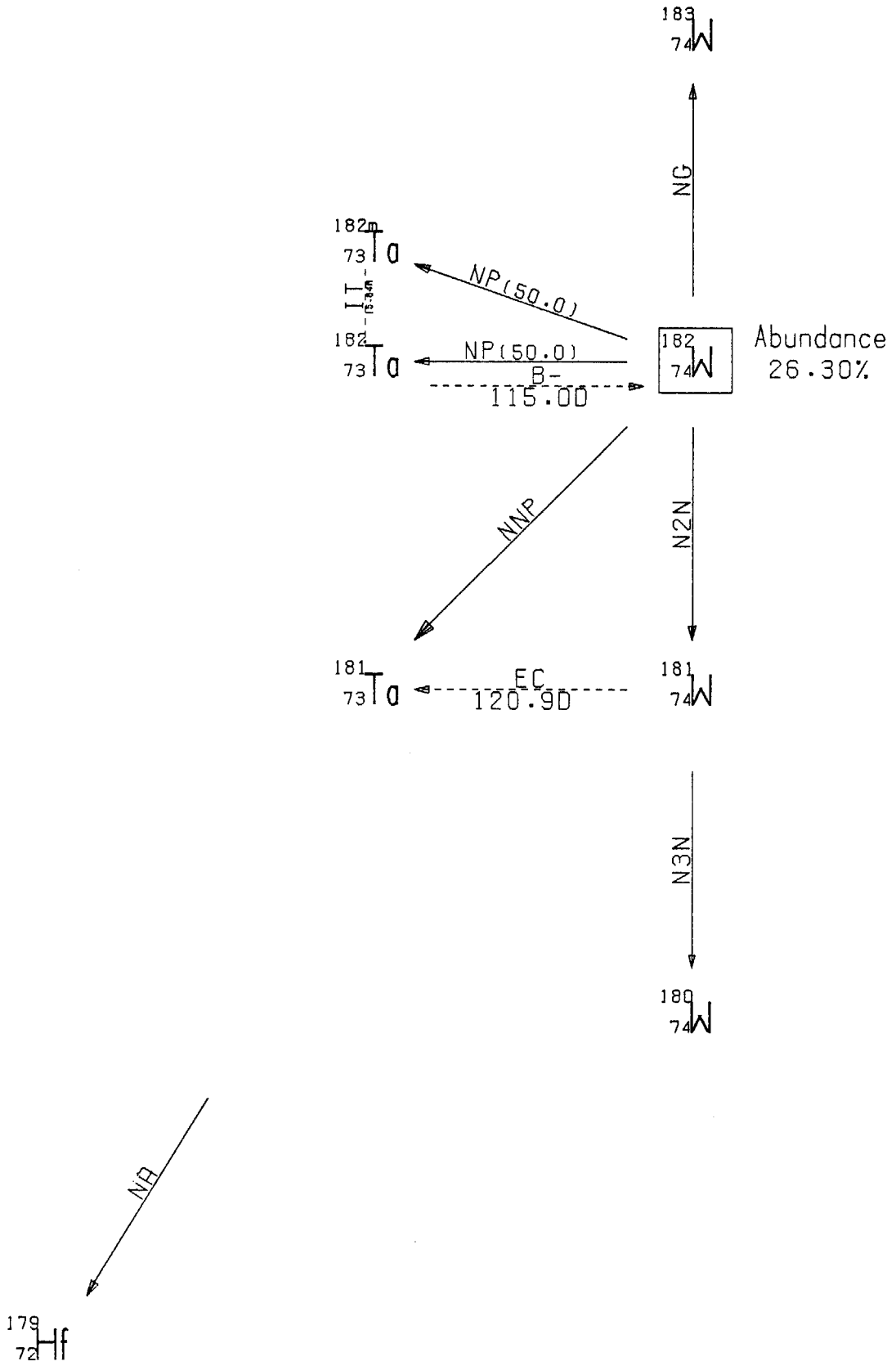

181 73 Ta
EC
120.9D
181 74 W
NG
180m 73 Ta
B-(13.0)
8.15H
NP(50.0)
EC(87.0)
8.15H
180 72 Hf
180 73 Ta
NP(50.0)
180 74 W
Abundance
0.13%
N2N
N2N
179m 74 W
IT
99.7
6.40M
EC(0.3)
6.40M
179 72 Hf
EC
664.9D
179 73 Ta
EC
37.50M
179 74 W

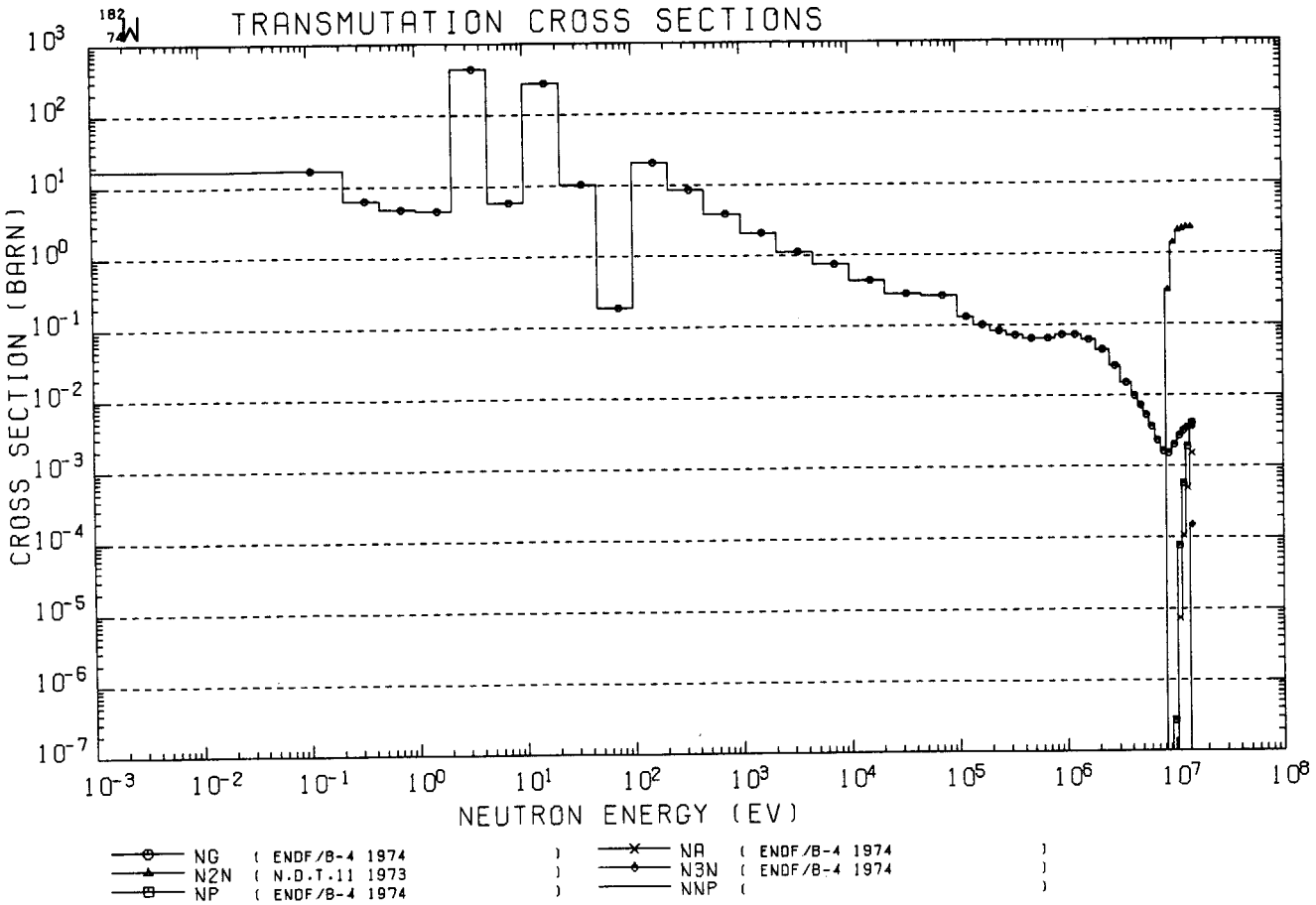

NP(50.0)
NA(50.0)
177m 72 Hf
IT
6.40M
177 72 Hf



180 74W DECAY GAMMA-RAY TABLE

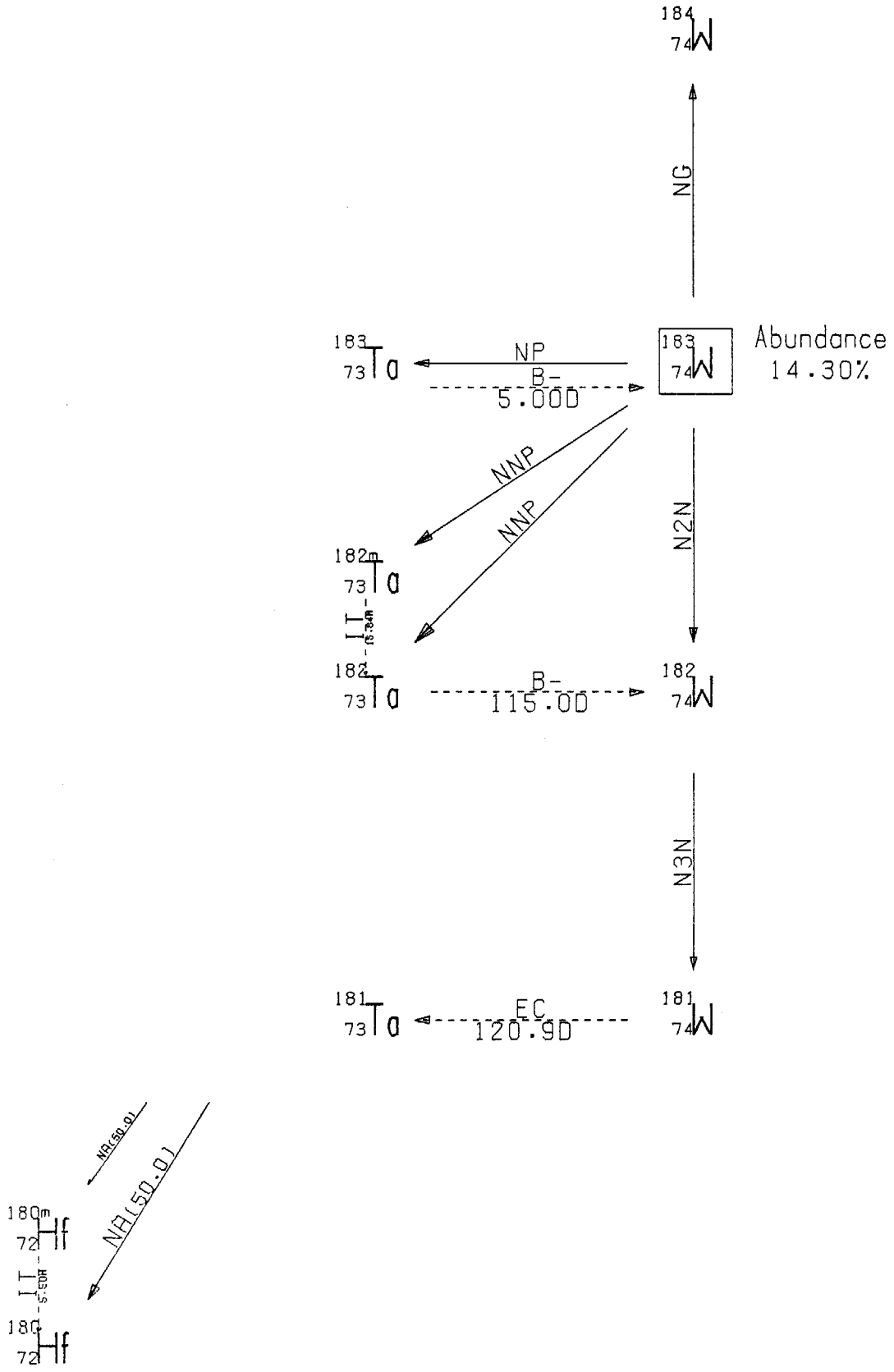
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
181 74W	120.9	D										
179 74W	37.50	M	5.11E+05	3.07E+04	1.34E+05							
			0.00	18.00	0.11							
179m 74W	6.40	M	5.11E+05	2.22E+05	1.02E+05	1.20E+05	2.38E+05	2.62E+05				
			0.00	8.63	0.62	0.32	0.22	0.19				
179 73Ta	664.9	D										
180m 73Ta	8.15	H	5.11E+05	9.30E+04	1.04E+06							
			0.00	0.50	0.30							
177m 72Hf	51.40	M	5.11E+05	2.08E+05	2.28E+05	3.78E+05	1.13E+05	4.18E+05	3.28E+05	1.53E+05	1.28E+05	2.04E+05
			0.00	83.81	50.67	38.24	28.20	26.77	23.24	23.10	20.71	20.55

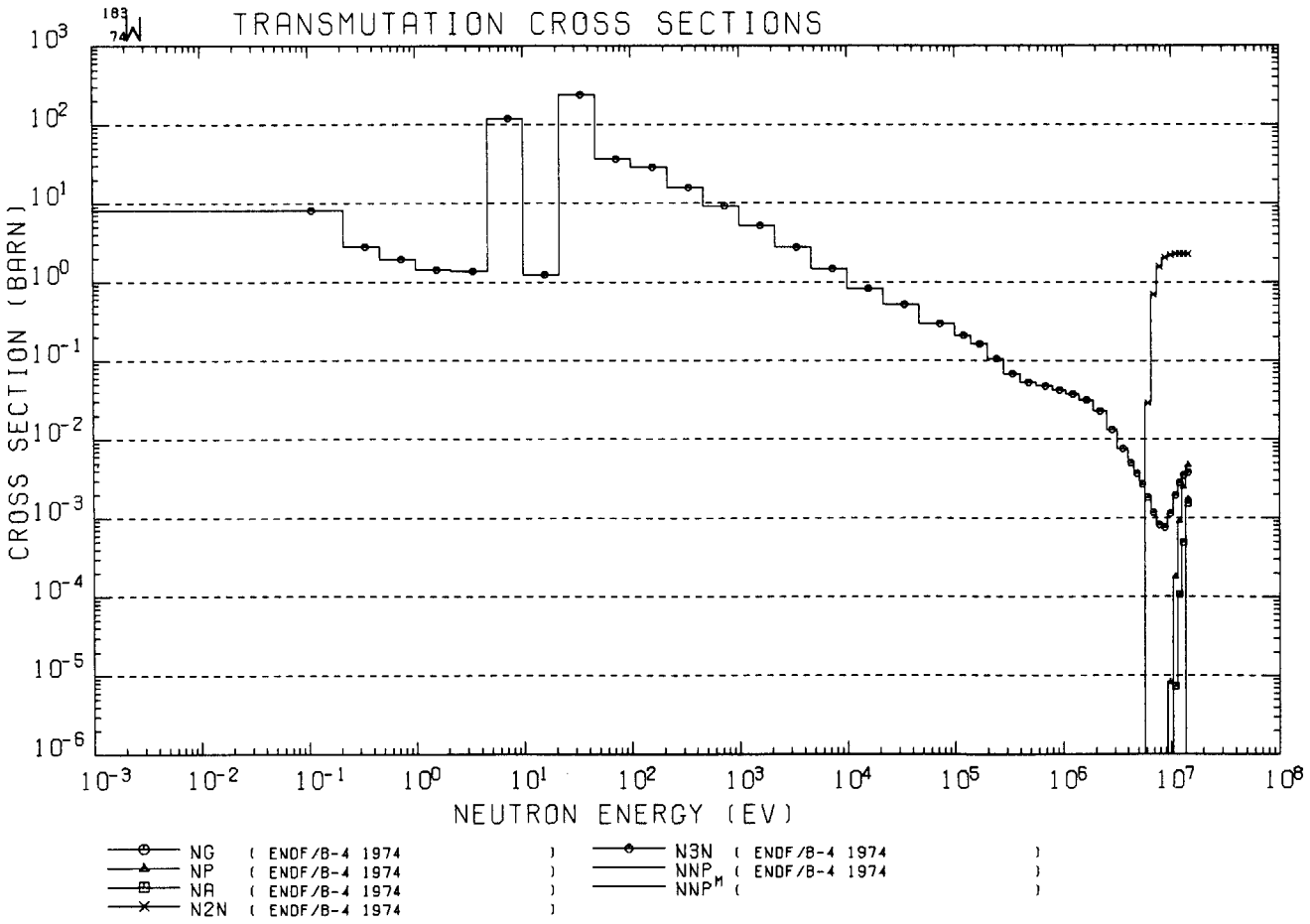

183
74W
NG
182m
73Ta
IT
6.34m
NP(50.0)
182
73Ta
NP(50.0)
B-
115.00
182
74W
Abundance
26.30%
NNP
N2N
181
73Ta
EC
120.9D
181
74W
N3N
180
74W
NA
179
72Hf



$^{182}_{74}W$ DECAY GAMMA-RAY TABLE

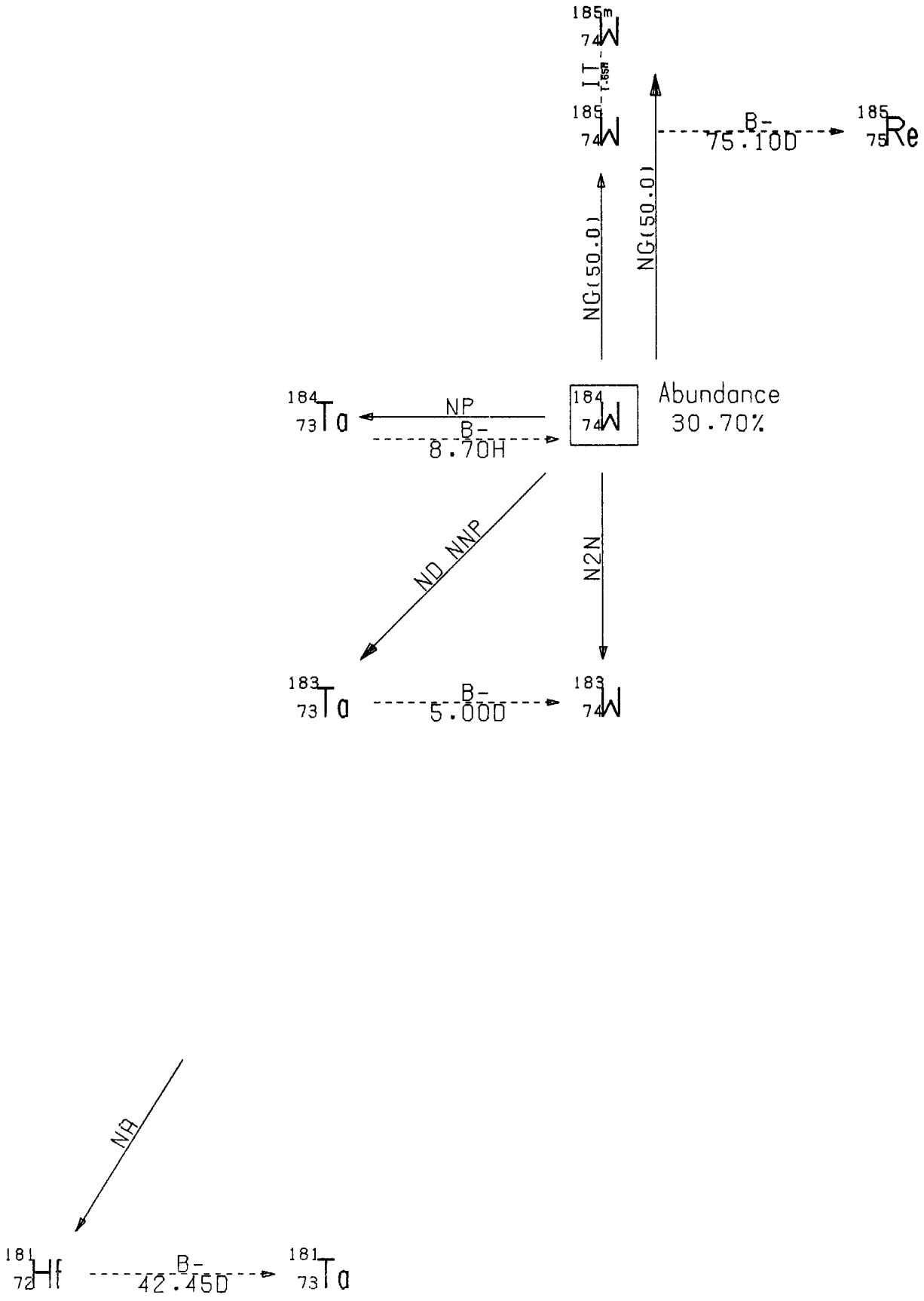
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{181}_{74}W$	120.9 D										
$^{182}_{73}Ta$	115.0 D	5.11E+05	1.12E+06	1.22E+06	1.19E+06	1.23E+06	1.00E+06	1.26E+06	1.29E+06	1.16E+06	1.27E+06
		0.00	35.15	27.17	16.40	11.58	2.08	1.50	1.36	1.00	0.65
$^{182m}_{73}Ta$	15.84 M	5.11E+05	1.72E+05	1.47E+05	1.85E+05	3.18E+05	3.56E+05				
		0.00	47.20	36.06	23.74	6.66	0.29				

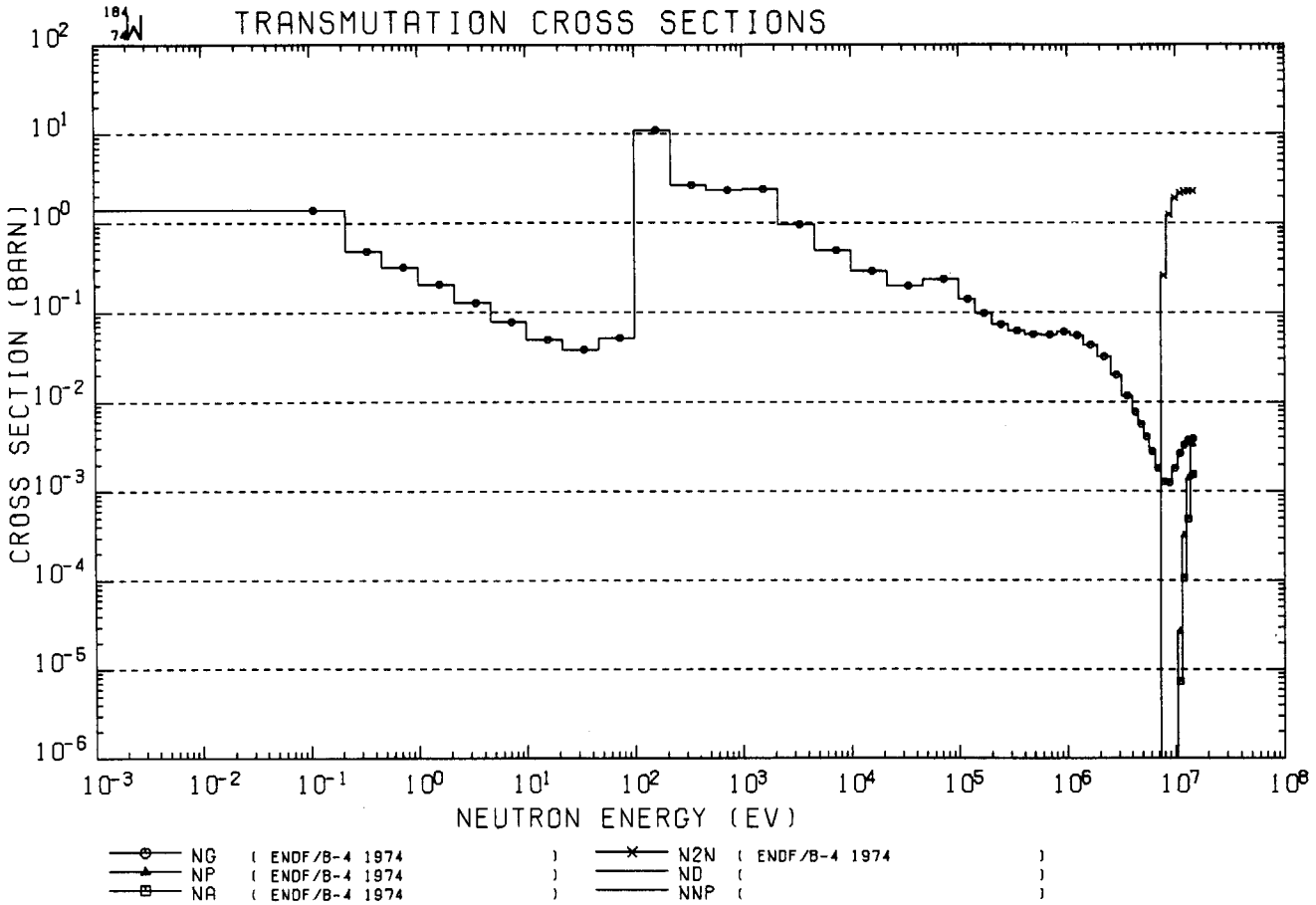

184 74 W
NG
183 73 Ta
NP
B-
5.00D
183 74 W
Abundance
14.30%
NNP
NNP
N2N
182m 73 Ta
182 73 Ta
B-
115.00
182 74 W
N3N
181 73 Ta
EC
120.9D
181 74 W
NA(50.0)
NA(50.0)
180m 72 Hf
180 72 Hf



183 74W DECAY GAMMA-RAY TABLE

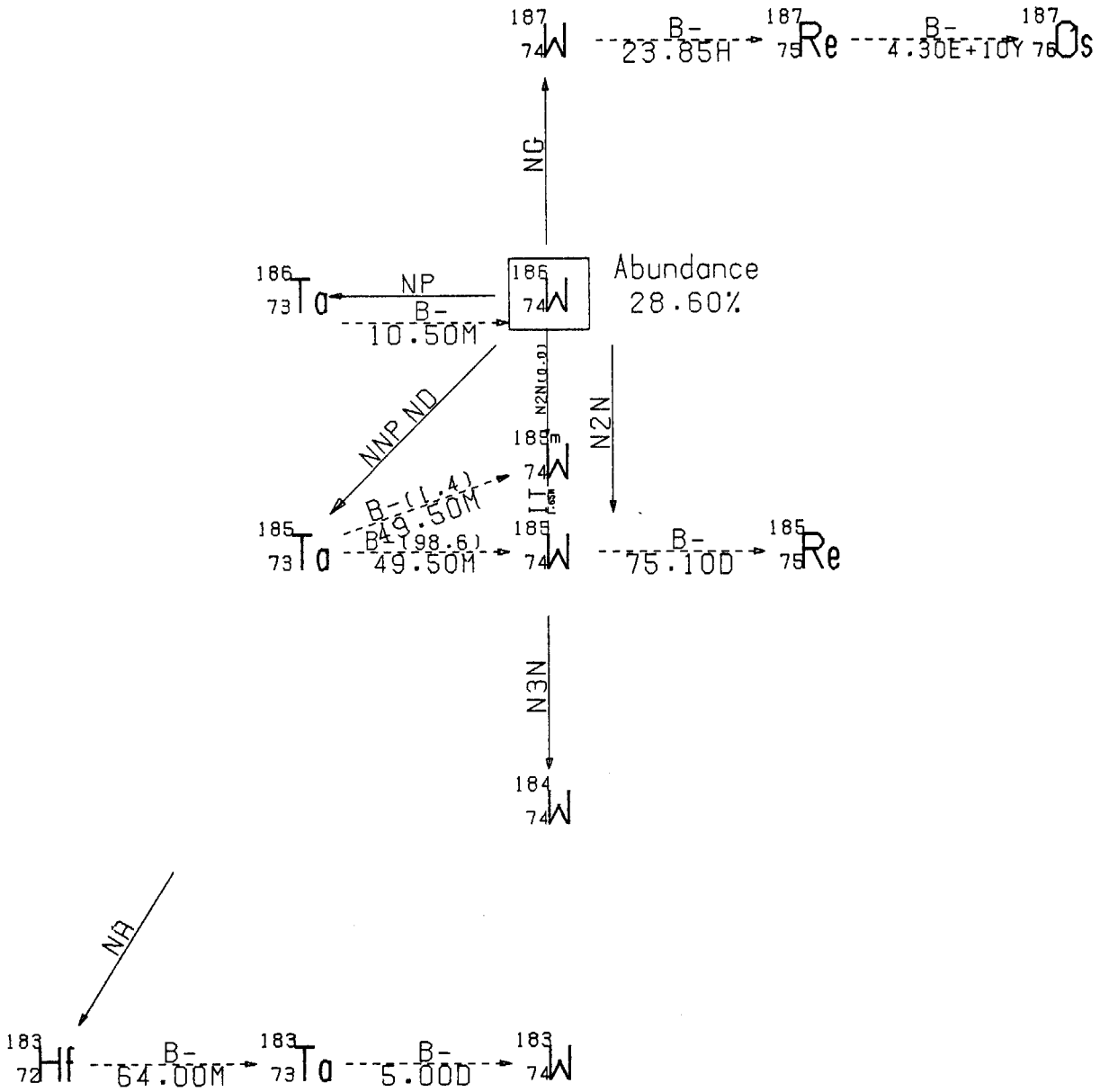
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY									
			YIELD (%) --GREATER THAN 0.1-									
183 73Ta	5.00	D	5.11E+05	2.46E+05	1.08E+05	3.54E+05	1.61E+05	2.44E+05	3.13E+05	9.91E+04	4.65E+04	5.26E+04
			0.00	27.30	12.06	11.80	9.45	8.74	7.42	7.27	5.87	5.87
180m 72Hf	5.50	H	5.11E+05	3.32E+05	4.43E+05	2.15E+05	5.75E+04	9.33E+04	5.01E+05			
			0.00	94.40	85.38	81.69	48.46	17.04	12.85			
181 74W	120.9	D										
182 73Ta	115.0	D	5.11E+05	1.12E+06	1.22E+06	1.19E+06	1.23E+06	1.00E+06	1.26E+06	1.29E+06	1.16E+06	1.27E+06
			0.00	35.15	27.17	15.40	11.58	2.08	1.50	1.36	1.00	0.65
182m 73Ta	15.84	M	5.11E+05	1.72E+05	1.47E+05	1.85E+05	3.18E+05	3.66E+05				
			0.00	47.20	36.06	23.74	6.66	0.29				

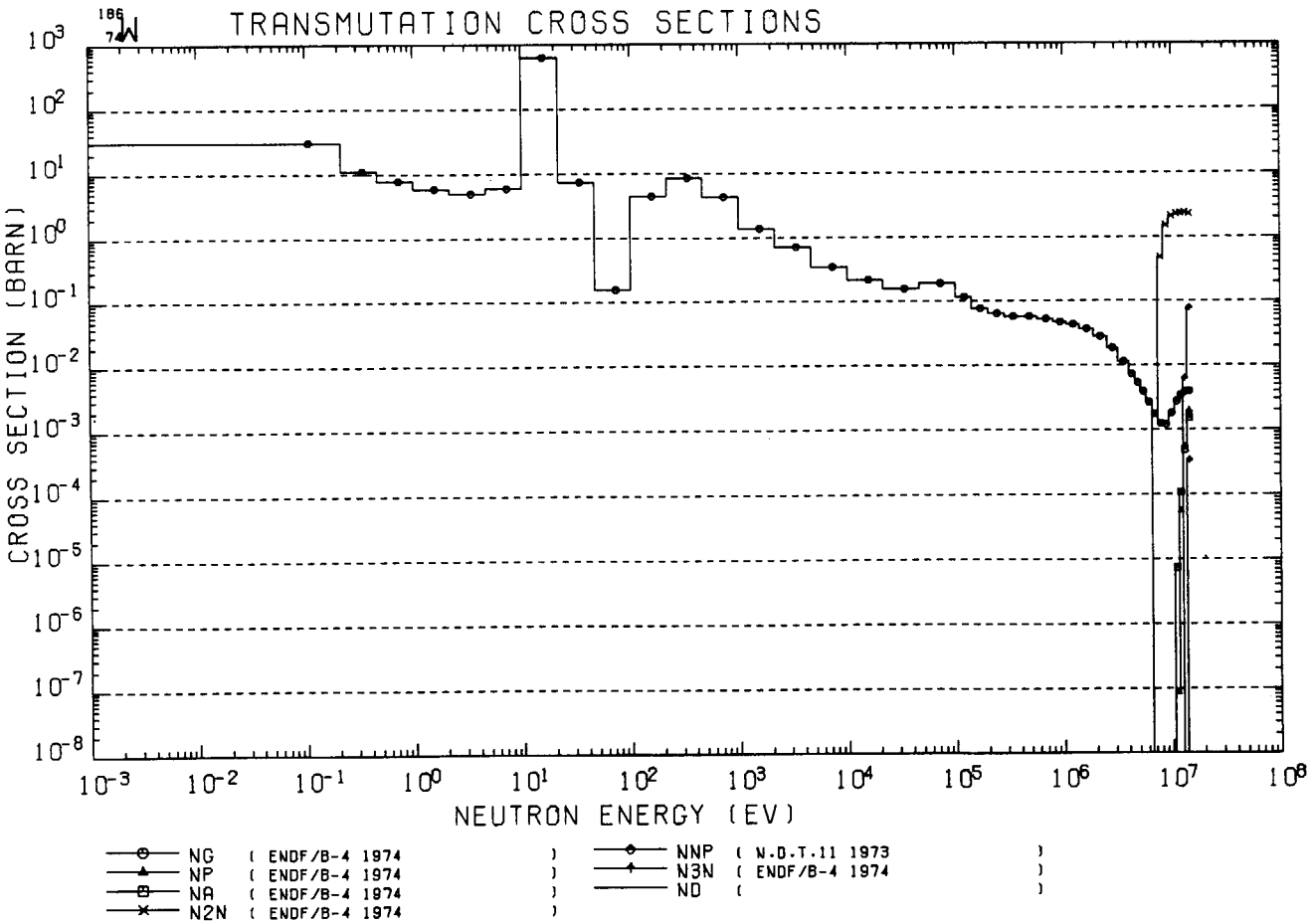

185m 74W
IT 1.65M
185 74W
B-
75.10D
185 75Re
NG(50.0)
NG(50.0)
184 73Ta
NP
B-
8.70H
184 74W
Abundance
30.70%
ND NNP
N2N
183 73Ta
B-
5.00D
183 74W
NA
181 72Hf
B-
42.45D
181 73Ta



$^{184}_{74}W$ DECAY GAMMA-RAY TABLE

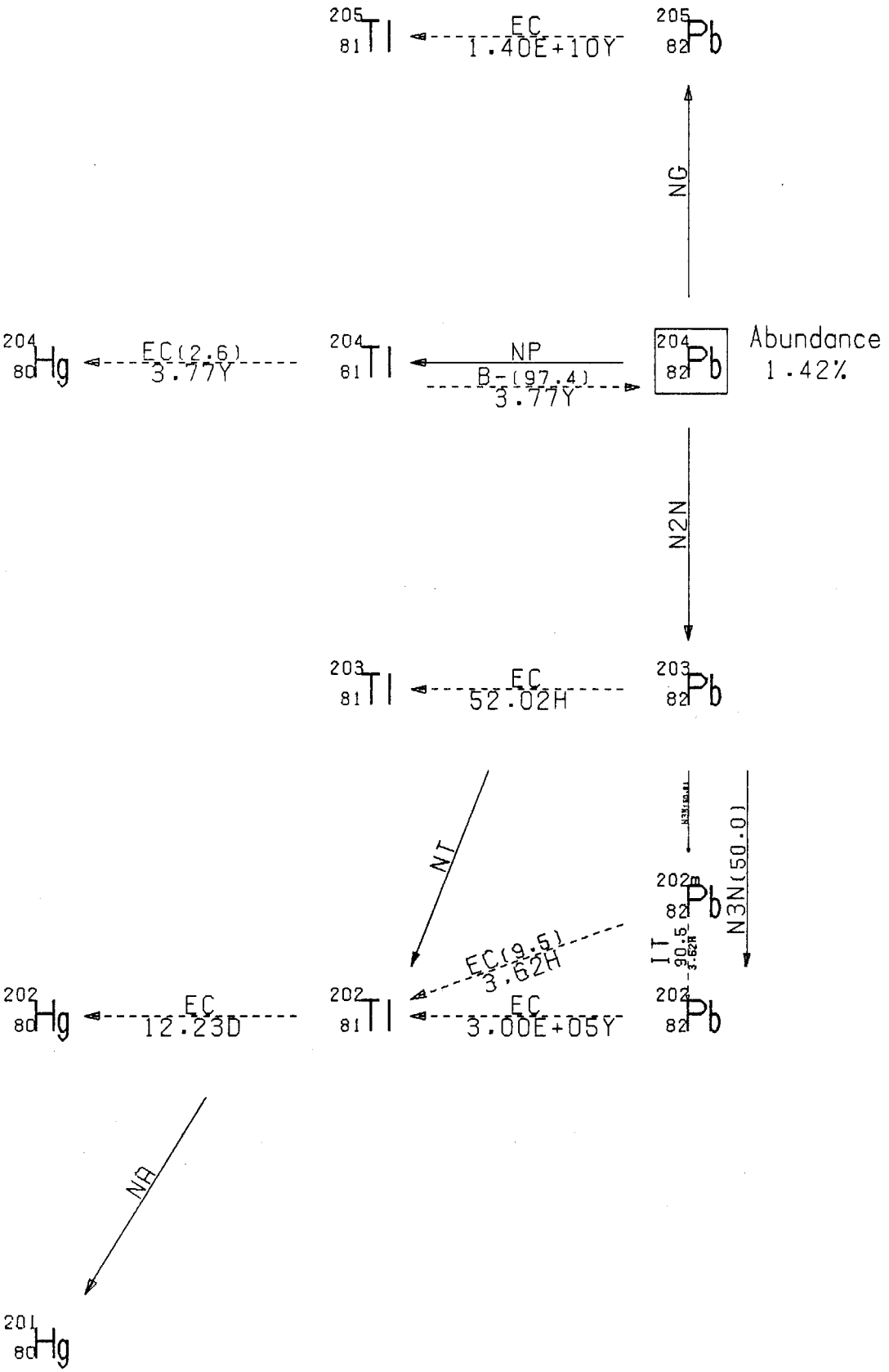
NUCLIDE	HALF LIFE		DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{185}_{74}W$	75.10	D	5.11E+05									
			0.00									
$^{185m}_{74}W$	1.65	M	5.11E+05	8.69E+04	1.32E+05	1.74E+05	1.88E+05	1.64E+05	1.08E+05	2.35E+04	9.46E+04	
			0.00	5.14	4.30	3.18	0.78	0.57	0.35	0.17	0.11	
$^{184}_{73}Ta$	8.70	H	5.11E+05	4.14E+05	2.59E+05	9.21E+05	1.11E+05	3.18E+05	9.03E+05	7.92E+05	5.37E+05	3.84E+05
			0.00	74.10	44.86	32.91	24.39	23.55	15.45	15.00	13.15	12.86
$^{181}_{72}Hf$	42.45	D	5.11E+05	4.82E+05	1.33E+05	3.46E+05	1.36E+05	1.37E+05	4.76E+05	6.16E+05		
			0.00	81.20	40.00	13.00	6.00	1.70	1.70	0.20		
$^{183}_{73}Ta$	5.00	D	5.11E+05	2.46E+05	1.08E+05	3.54E+05	1.61E+05	2.44E+05	3.13E+05	9.91E+04	4.66E+04	5.26E+04
			0.00	27.30	12.05	11.80	9.46	8.74	7.42	7.27	6.87	6.87

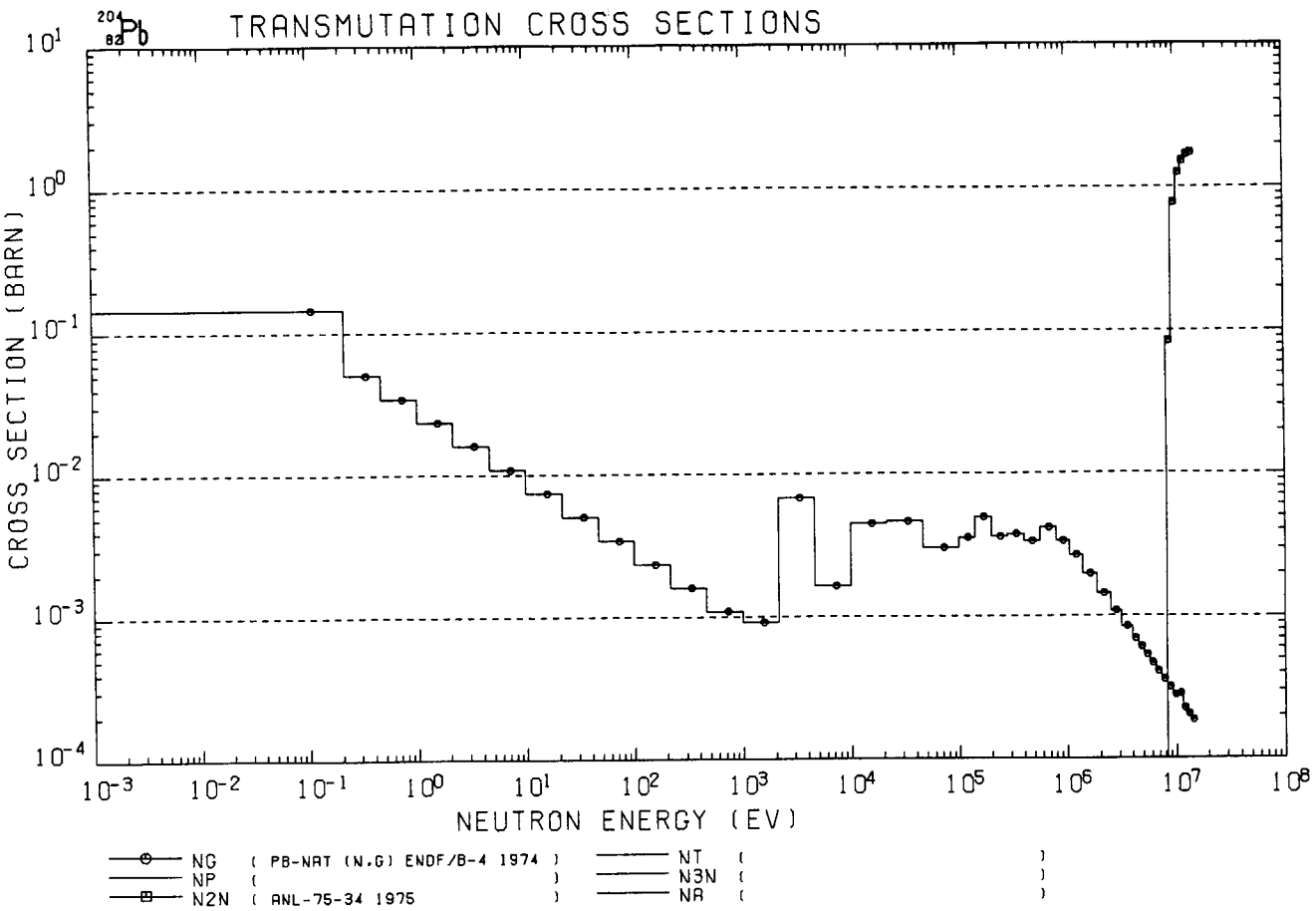

187 74 W
B-
23.85H
187 75 Re
B-
4.30E+10Y
187 76 Os
NG
186 73 Ta
NP
B-
10.50M
186 74 W
Abundance
28.60%
N2N(0.0)
N2N
NNP ND
185m 74 W
1.4M
B-(1.4)
B-(98.6)
49.50M
185 73 Ta
185 74 W
B-
75.10D
185 75 Re
N3N
184 74 W
NA
183 72 Hf
B-
64.00M
183 73 Ta
B-
5.00D
183 74 W



$^{186}_{74}W$ DECAY GAMMA-RAY TABLE

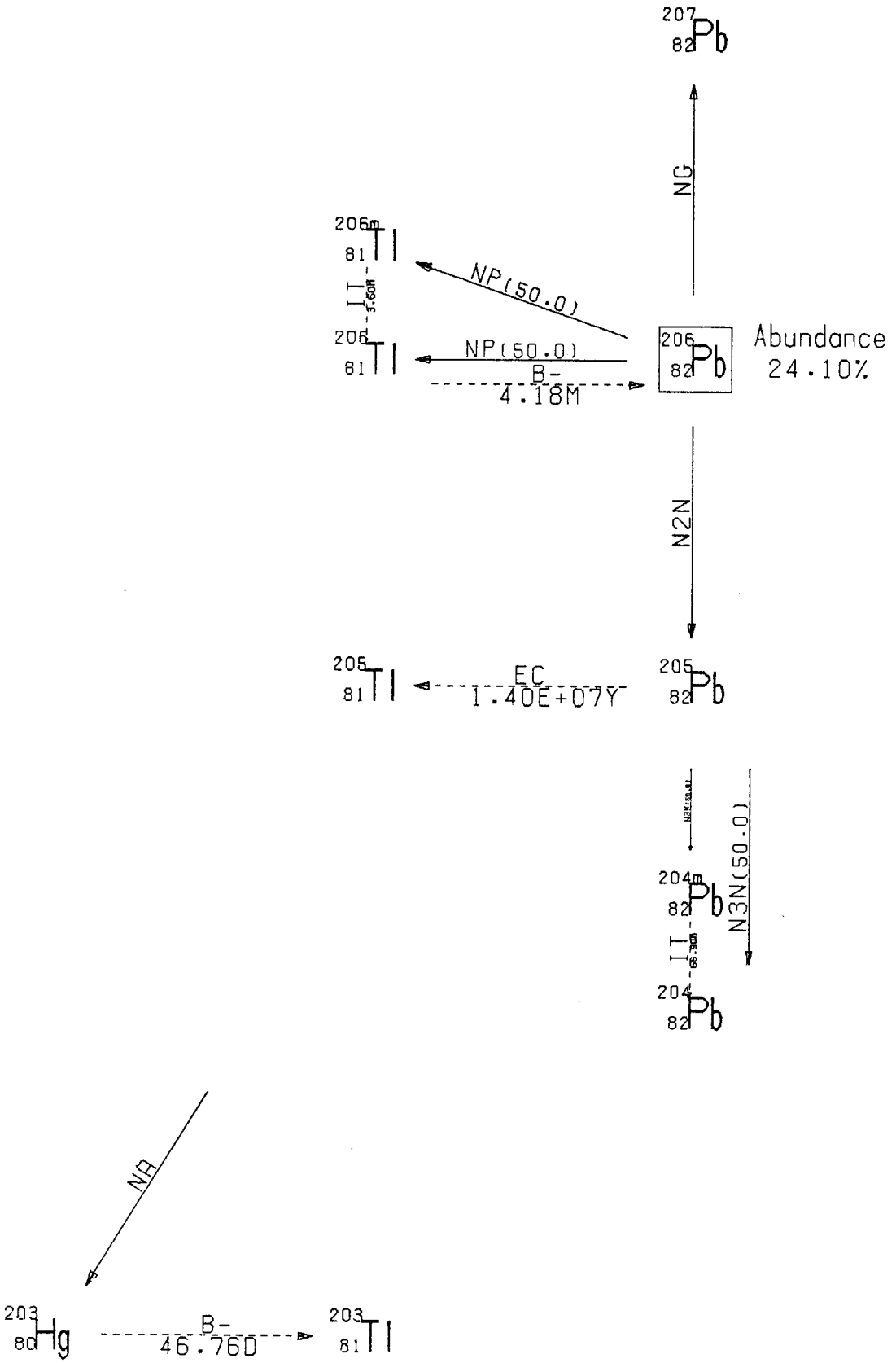
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{187}_{74}W$	23.85 H	5.11E+05	2.39E+05	1.14E+05	6.86E+05	4.80E+05	7.25E+04	1.34E+05	6.18E+05	5.52E+05	7.73E+05
		0.00	82.98	74.09	26.27	21.01	10.71	8.51	6.04	4.89	3.96
$^{187}_{75}Re$	4.30E+10Y										
$^{186}_{73}Ta$	10.50 M	5.11E+05	1.98E+05	2.15E+05	5.11E+05	7.38E+05	6.15E+05	1.22E+05	4.18E+05	7.39E+05	3.08E+05
		0.00	58.30	49.28	44.02	34.05	32.76	29.56	14.69	11.78	11.26
$^{183}_{72}Hf$	64.00 M	5.11E+05	7.84E+05	7.32E+04	4.59E+05	3.98E+05	1.47E+06	3.16E+05	7.35E+05	4.77E+05	4.81E+05
		0.00	65.10	38.40	27.33	2.93	2.73	1.22	0.89	0.73	0.70
$^{183}_{73}Ta$	5.00 D	5.11E+05	2.46E+05	1.08E+05	3.64E+05	1.61E+05	2.44E+05	3.13E+05	9.91E+04	4.65E+04	5.26E+04
		0.00	27.30	12.05	11.80	9.45	8.74	7.42	7.27	6.87	6.87
$^{185}_{74}W$	75.10 D	5.11E+05									
		0.00									
$^{185m}_{74}W$	1.65 M	5.11E+05	6.59E+04	1.32E+05	1.74E+05	1.88E+05	1.64E+05	1.08E+05	2.36E+04	9.45E+04	
		0.00	5.14	4.30	3.18	0.79	0.67	0.36	0.17	0.11	
$^{185}_{73}Ta$	49.50 M	5.11E+05	1.78E+05	1.74E+05	2.44E+05	1.08E+05	5.42E+05	1.47E+06	3.95E+05	5.88E+05	5.80E+05
		0.00	26.30	23.09	4.26	2.50	1.99	1.58	1.38	1.38	1.01

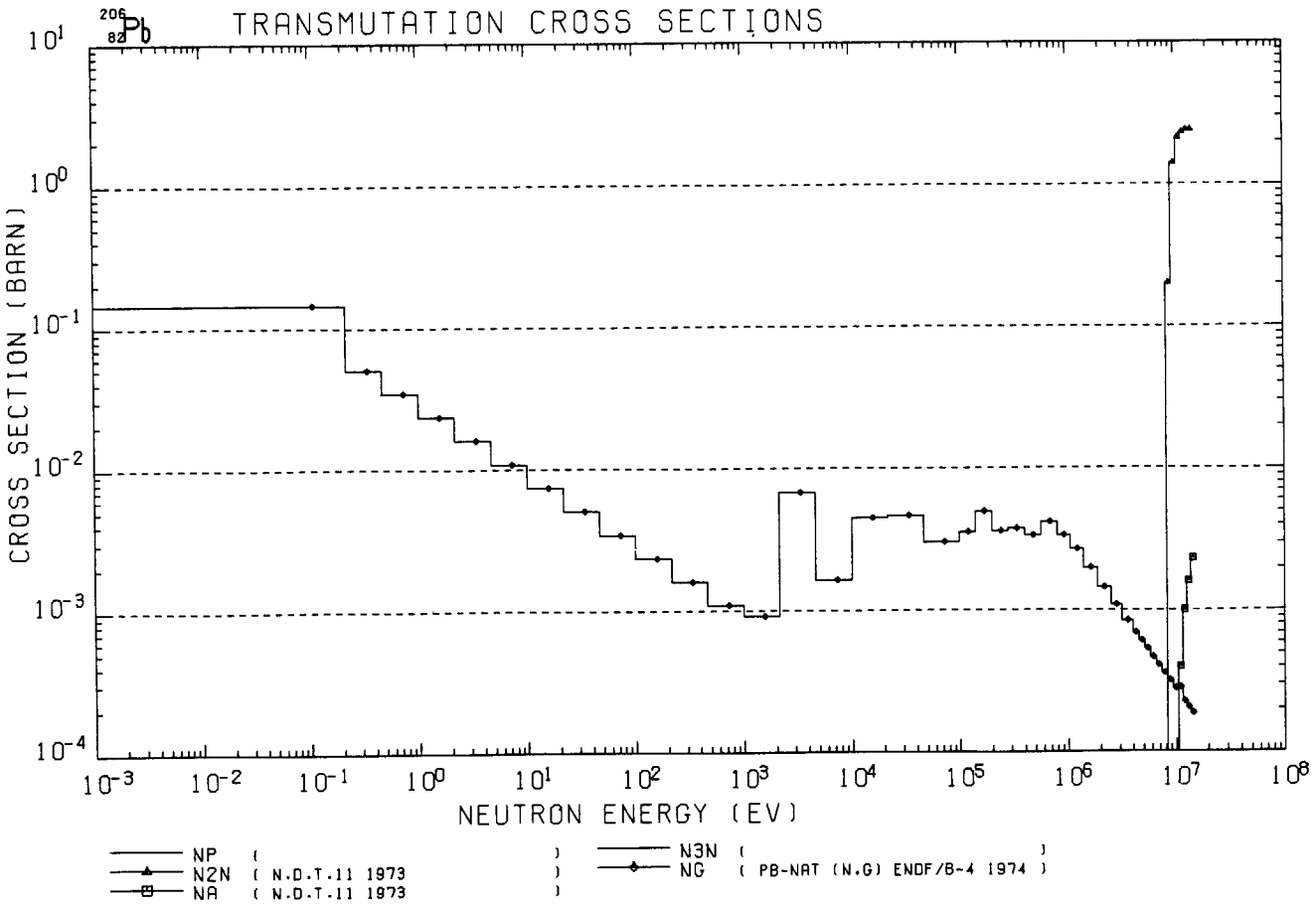

205 81 Tl
EC
1.40E+10Y
205 82 Pb
NG
204 80 Hg
EC(2.6)
3.77Y
204 81 Tl
NP
B-(97.4)
3.77Y
204 82 Pb
Abundance
1.42%
N2N
203 81 Tl
EC
52.02H
203 82 Pb
NT
202m 82 Pb
IT
90.5
3.62H
N3N(50.0)
EC(9.5)
3.62H
202 80 Hg
EC
12.23D
202 81 Tl
EC
3.00E+05Y
202 82 Pb
NA
201 80 Hg



$^{204}_{82}$Pb DECAY GAMMA-RAY TABLE

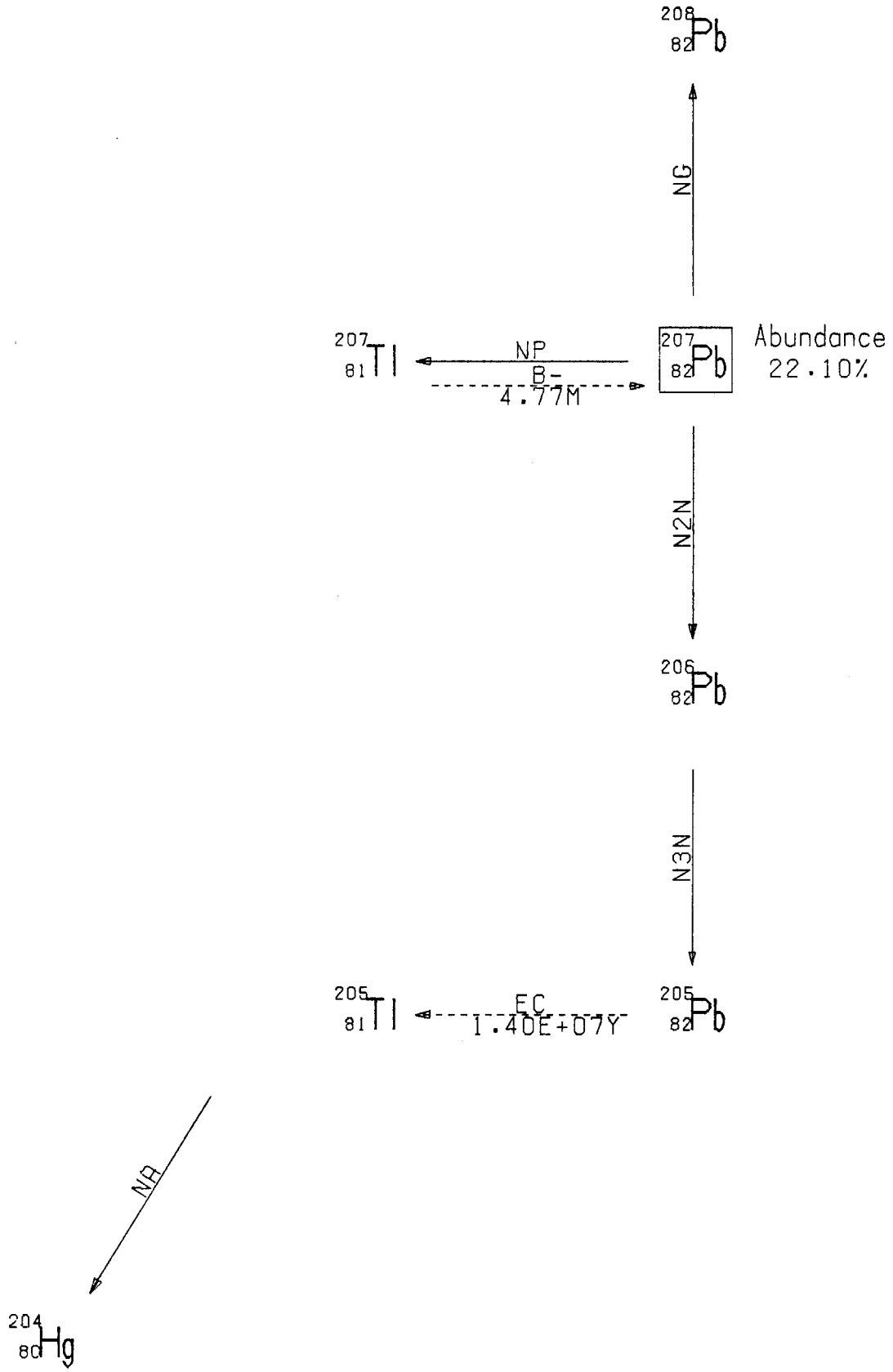
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{205}_{82}$Pb	1.40E+10Y										
$^{204}_{81}$Tl	3.77 Y										
$^{203}_{82}$Pb	52.02 H	5.11E+05	2.79E+05	4.01E+05	6.80E+05						
		0.00	81.00	4.17	0.69						
$^{202}_{81}$Tl	12.23 D	5.11E+05	4.40E+05	5.20E+05	9.60E+05						
		0.00	91.00	0.94	0.12						
$^{202}_{82}$Pb	3.00E+05Y										
$^{202m}_{82}$Pb	3.62 H	5.11E+05	9.61E+05	4.22E+05	7.87E+05	6.57E+05	4.90E+05	4.60E+05	3.90E+05	2.40E+05	9.65E+05
		0.00	91.70	86.00	49.80	32.52	9.17	8.62	6.18	1.11	1.02

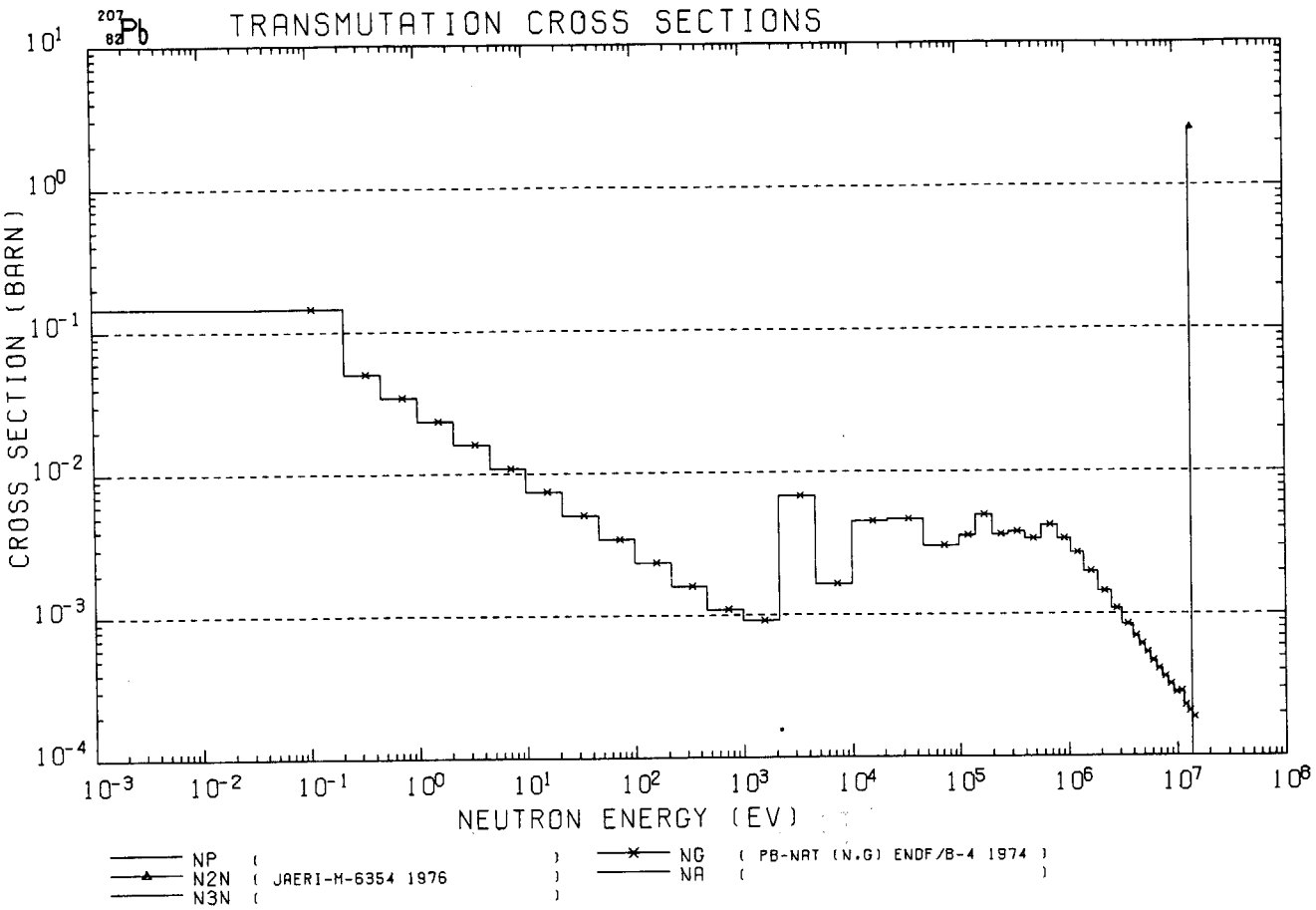

207 82 Pb
NG
206m 81 Tl
IT - 3.60M
NP(50.0)
206 81 Tl
NP(50.0)
B-
4.18M
206 82 Pb
Abundance
24.10%
N2N
205 81 Tl
EC
1.40E+07Y
205 82 Pb
N3N(50.0)
204m 82 Pb
IT - 66.90M
204 82 Pb
NA
203 80 Hg
B-
46.760
203 81 Tl



206 82 Pb DECAY GAMMA-RAY TABLE

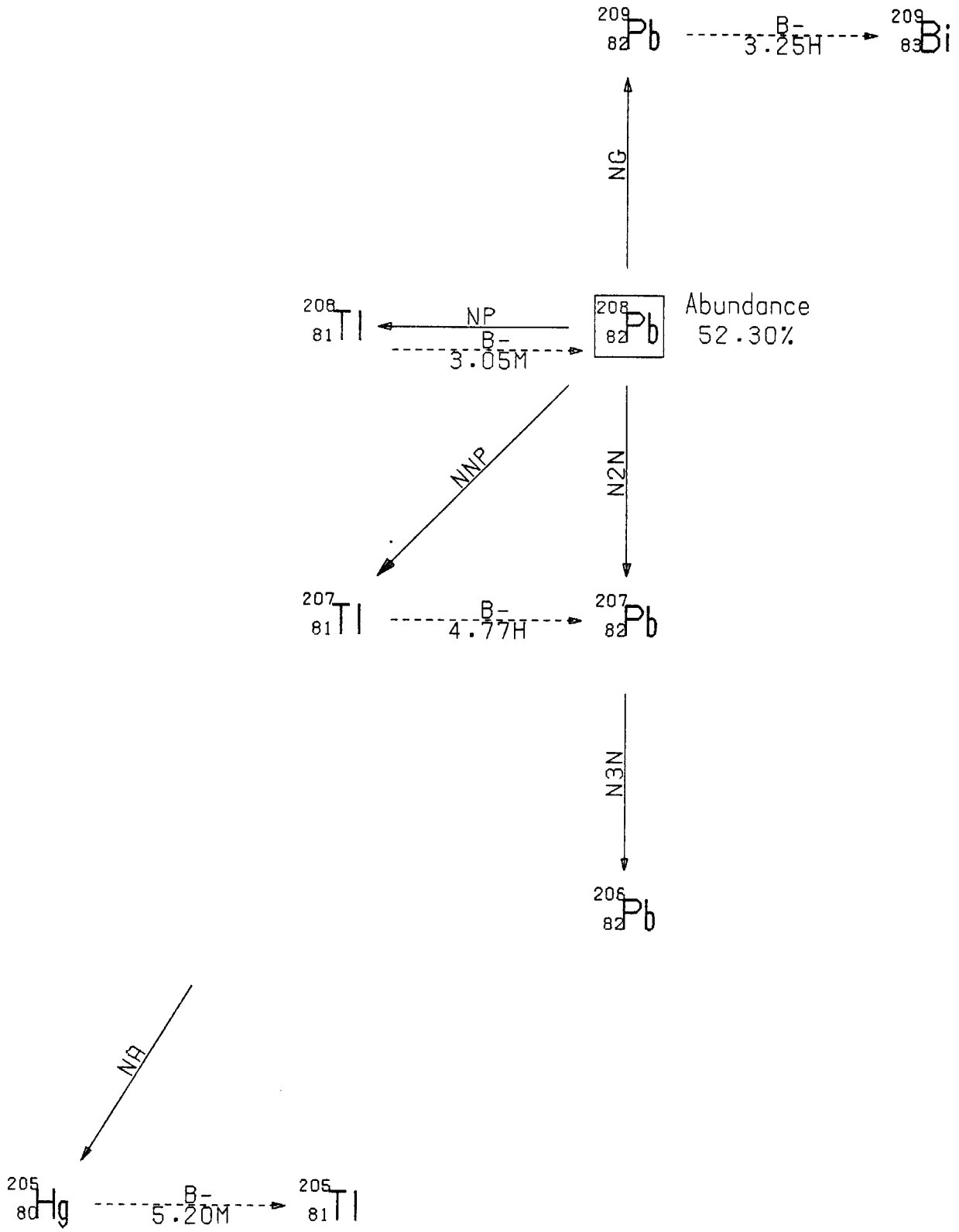
NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY YIELD (%) --GREATER THAN 0.1-							
206 81 Tl	4.18 M								
206m 81 Tl	3.60 M	5.11E+05	6.86E+05	4.53E+05	2.16E+05	2.66E+05	1.02E+06	4.67E+05	5.65E+05
		0.00	100.00	94.00	89.00	86.00	76.00	22.00	13.00
205 82 Pb	1.40E+07Y								
203 80 Hg	46.76 D	5.11E+05	2.79E+05						
		0.00	81.50						
204m 82 Pb	66.90 M	5.11E+05	8.99E+05	9.12E+05	3.74E+05	6.22E+05	2.89E+05		
		0.00	99.18	96.36	89.42	0.74	0.65		

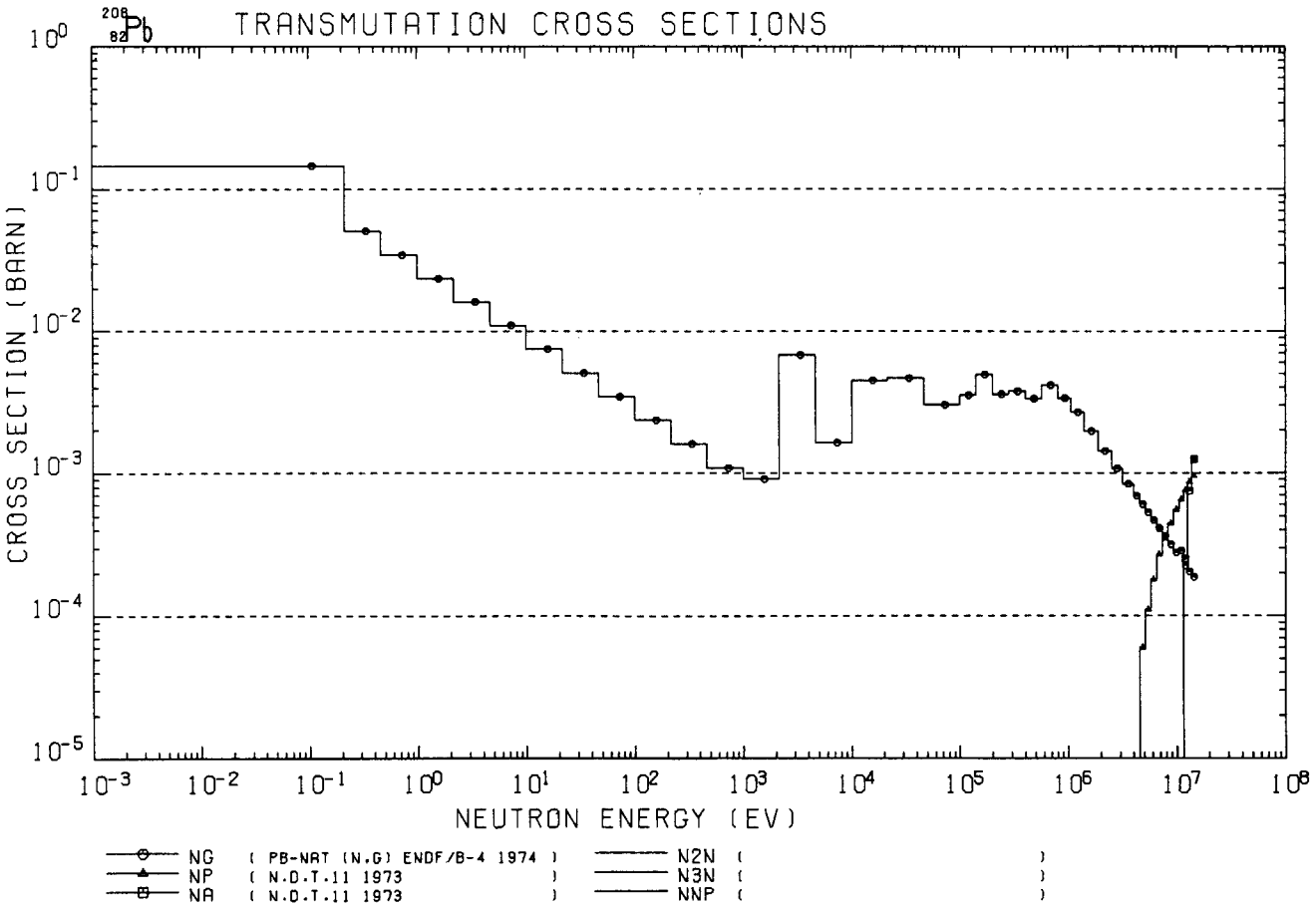

208 82 Pb
NG
207 81 Tl
NP
B-
4.77M
207 82 Pb
Abundance
22.10%
N2N
206 82 Pb
N3N
205 81 Tl
EC
1.40E+07Y
205 82 Pb
NR
204 80 Hg



$^{207}_{82}Pb$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY	
		YIELD (%) --GREATER THAN 0.1-	
		5.11E+05	8.98E+05
$^{207}_{81}Tl$	4.77 M	0.00	0.27
$^{205}_{82}Pb$	1.40E+07Y		


209 82 Pb
B-
3.25H
209 83 Bi
NG
208 81 Tl
NP
B-
3.05M
208 82 Pb
Abundance
52.30%
NNP
N2N
207 81 Tl
B-
4.77H
207 82 Pb
N3N
206 82 Pb
NA
205 80 Hg
B-
5.20M
205 81 Tl



$^{208}_{82}Pb$ DECAY GAMMA-RAY TABLE

NUCLIDE	HALF LIFE	DECAY GAMMA-RAY ENERGY / YIELD (%) --GREATER THAN 0.1-									
$^{209}_{82}Pb$	3.25 H										
$^{208}_{81}Tl$	3.05 M	5.11E+05	2.61E+06	5.83E+05	5.11E+05	8.60E+05	2.77E+05	7.63E+05	2.63E+05	1.09E+06	2.33E+05
		0.00	99.79	86.12	21.64	12.05	6.82	1.65	0.80	0.37	0.31
$^{205}_{80}Hg$	5.20 M	5.11E+05	2.04E+05								
		0.00	2.30								
$^{207}_{81}Tl$	4.77 H	5.11E+05	8.98E+05								
		0.00	0.27								

4. Concluding Remarks

Activation data for 116 stable nuclides of interest in terms of fusion reactor design are graphically represented using the AMOEBA code. The graphical representation and the checking of the activation data proved to be very effective in correcting inappropriate data. The compilation of the graphs is a useful reference in the examination of activation problems in fusion reactors.

As the result of the present work, the following areas appeared to require further improvement in the future.

(1) Activation reaction cross sections need considerable addition and re-evaluation.
(2) Inelastic reactions resulting in metastable states should be considered.
(3) More nuclides should be added as it becomes necessary.

Acknowledgements

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Appendix Activation Data Checking and Plotting Code, AMOEBA

The number of stable nuclides stored in the CHAINLIB library is 116 at present. The number of transmutation cross sections in the CROSSLIB library is about 800 and there are about 300 gamma ray data in the GAMMALIB library. The consistencies of large amount of data should be guaranteed to obtain a reliable estimate of induced activation in fusion reactors.

The AMOEBA code has been developed to check the consistencies of data in the activation data libraries and to display their contents in graphs for further examination. Its function, program structure and input/output descriptions are introduced in this appendix.

A.1 Function

The functions of the AMOEBA code are as follows:

Checking functions

(1) It checks the consistency of the CHAINLIB library data.
   i) The number of the data for transmutation and decay chain is checked.
   ii) The symbol of the decay type is checked.
   iii) The consistencies of the changes in atomic number, metastable state indicator and mass number involved in transmutation reaction or decay are checked.
   iv) The existence of the activation chain table for an unstable nuclide is checked according to **Table 1**.

(2) It checks the duplicity, nonexistence and redundancy of the cross section data in the CROSSLIB library.

(3) It checks the GAMMALIB library data.
   i) It lists gamma ray intensity greater than 1.0 for close examination. Annihilation gamma ray intensities greater than 1.0 are not listed.
   ii) It prints out the symbol of unstable nuclides without decay gamma data.

Plotting functions

(4) Transmutation and decay chain scheme is plotted using the data in the CHAINLIB library for each of the stable nuclides.

(5) Transmutation reaction cross sections are plotted in the multigroup (42-group) format.

(6) Delayed gamma ray emission data are shown in tabular form.

The checking of the libraries (1) ~ (3) is conducted for all nuclides while the plotting (4) ~ (6) are conducted only for the nuclides specified by the input data.

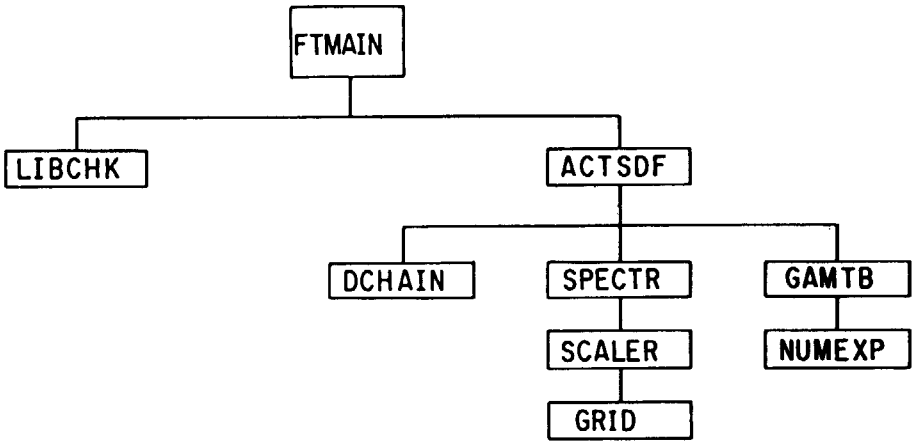
A.2 Program Structure and Subroutines

The program structure and processing flow of the AMOEBA code are shown in **Fig. A1**.

The functions of the subroutines of the AMOEBA code are described below:

1. FTMAIN ····· Set variable common address and initialize
2. LIBCHK ····· Check library data consistency
3. ACTSDF ····· Control plotting routines
4. DCHAIN ····· Draw transmutation and decay chain scheme
5. SPECTRA ···· Draw multi-group transmutation cross sections.

Program Structure



Processing Flow

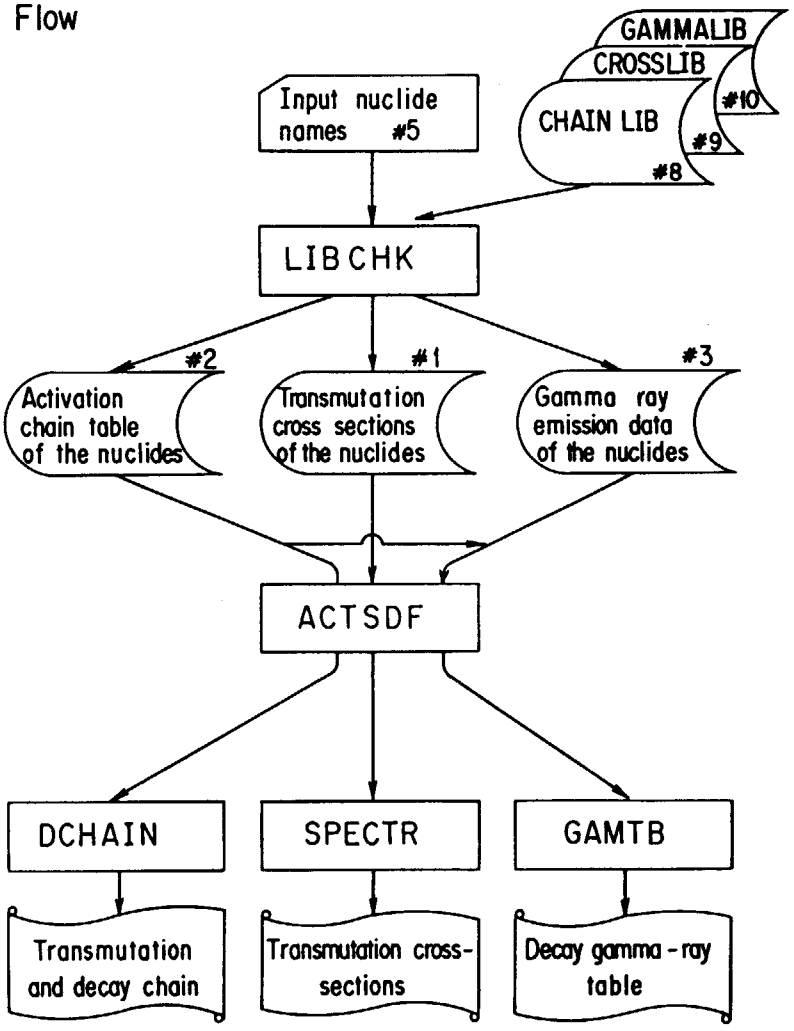


Fig. A1 Program structure and processing flow of the AMOEBA code.

6. SCALER ····· Calculate a factor for normalization
7. GRID ····· Draw grid lines and frame
8. ZNORM ····· Normalize cross section values to fit the scaling
9. GAMTB ····· Draw gamma ray emission data table
10. NUMEXP ····· Change numbers to the exponential format
11. TYPECV ····· Check the symbols need for transmutation reactions and decay type
12. ZBUN ····· Separate the name of the nuclide into atomic number Z, metastable indicator M and mass number A.
13. ZPLOT ····· Plot nuclide symbols
14. CLEAR ····· Clear the storage area
15. LOCAT ····· Check the unused locations
16. PENSET ····· Choose the pen for plotting
17. ERRCHN ····· Error message printout for CHAINLIB
18. ERRCRS ····· Error message printout for CROSSLIB
19. ERRGAM ····· Error message printout for GAMMALIB

A.3 Input Instruction and Output Description

Input format of the AMOEBA code

#Card 1 (2I6)

ICMAX ; the number of nuclides for plotting

IEMAX ; the number of energy groups, usually 42. (The 42-group structure is built in.)

#Card 2 (6E12.0)

ZAIC ; the names of the nuclides for plotting

[ICMAX]

The logical numbers required for input/output files and their uses are:

logical 1 ~ 3 work file
logical 8 activation data file J2504. CHAINLIB. DATA (CH82)
logical 9 cross section file J2504. CROSSLIB. DATA (CR82)
logical 10 gamma data file J2504. GAMMALIB. DATA (GAM81)
logical 5 card input (#1 and #2 cards).
logical 6 output file
* plotter output file

Job control cards required for the AMOEBA execution in FACOM M-200 machine are shown in **Fig. A2**.

```
//F2504174 JOB ('72622504G017.100MORSEI          ',
//              'T.00W.0CC.COP.CCI.00','GRPOPN                        '),
//              'IIDA.HIROMAS',CLASS=B,PRTY=09,TIME=(0000,05),
//              MSGCLASS=G,MSGLEVEL=(2,0,1),
//              USER=J2504,GROUP=G0017,PASSWORD=
***JOBPARM       S=ANY,R=2504,L=0002,C=0000000
**********************************************************************
***                       LIST OF PRIVATE PROC                       *
**********************************************************************
**********************************************************************
***                       LIST OF USER JCL                           *
**********************************************************************
*********************************************************************/
***   AMOEBA IS GRAPHIC DISPLAY CODE FOR CHECKING THE LIBRARY FILE USED/
***  IN INDUCED ACTIVITY CALCULATION CODE (ACT4).                    /
***   GRAPHIC DISPLAY ITEMS ARE DECAY CHAIN, TRANSMUTATION CROSS SECTI-/
***  ONS AND DECAY GAMMA-RAY TABLES.                                  /
***   JOB START.                                                      /
*********************************************************************/
// EXEC FORTHE,
// SO='J2504.AMOEBA',
// A='ELM(*)',
// B=NOPRINT
//LINK EXEC LKED,
// GRLIB=PNL
//RUN EXEC GO
//FT06F001  DD  DCB=(BLKSIZE=137)
// EXPAND DISK,
// DDN=FT01F001
// EXPAND DISK,
// DDN=FT02F001
// EXPAND DISK,
// DDN=FT03F001
// EXPAND DISKTO,
// DDN=FT08F001,
// DSN='J2504.CHAINLIB',
// Q='.DATA(CH82)'
// EXPAND DISKTO,
// DDN=FT09F001,
// DSN='J2504.CROSSLIB',
// Q='.DATA(CR82)'
// EXPAND DISKTO,
// DDN=FT10F001,
// DSN='J2504.GAMMALIB',
// Q='.DATA(GAM82)'
// EXPAND GRNLP,
// SYSOUT=H
//SYSIN DD  *
//
```

Fig. A2 Job control cards required for the AMOEBA code execution in FACOM M-200 machine.