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INFORMAL REPORT

EXFOR Basics
A Short Guide to the
Neutron Reaction Data Exchange Format

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INTRODUCTION

This manual is intended as a guide to users of nuclear reaction data compiled in the EXFOR format, and is not intended as a complete guide to the EXFOR System.[1]

EXFOR is the exchange format designed to allow transmission of nuclear reaction data between the Nuclear Reaction Data Centers.[2] In addition to storing the data and its' bibliographic information, experimental information is also compiled. The status (*e.g.*, the source of the data) and history (*e.g.*, date of last update) of the data set is also included.

EXFOR is designed for flexibility in order to meet the diverse needs of the nuclear reaction data centers. It was originally conceived for the exchange of neutron data and was developed through discussions among personnel from centers situated in Saclay, Vienna, Livermore and Brookhaven. It was accepted as the official exchange format of the neutron data centers at Saclay, Vienna, Brookhaven and Obninsk, at a meeting held in November 1969.[3] As a result of two meetings held in 1975 and 1976[4] and attended by several charged-particle data centers, the format was further developed and adapted to cover all nuclear reaction data.

The exchange format should not be confused with a center-to-user format. Although users may obtain data from the centers in the EXFOR format, other center-to-user formats have been developed to meet the needs of the users within each center's own sphere of responsibility.

The EXFOR format, as outlined, allows a large variety of numerical data tables with explanatory and bibliographic information to be transmitted in a format:
- that is machine-readable (for checking and indicating possible errors);
- that can be read by personnel (for passing judgement on and correcting errors).

The data presently included in the EXFOR exchange file include:
- a "complete" compilation of experimental neutron-induced reaction data,
- a selected compilation of charged-particle-induced reaction data,
- a selected compilation of photon-induced reaction data.

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1 For a complete guide to the EXFOR System, see EXFOR Systems Manual, Brookhaven National Laboratory report BNL-NCS-63330 (1999).

2 See Appendix A for a list of the Nuclear Reaction Data Centers and their areas of responsibilities.

3 See IAEA report INDC(NDS)-16/N (December 1969).

4 See IAEA report INDC(NDS)-69 (December 1975) and INDC(NDS)-77 (October 1976).

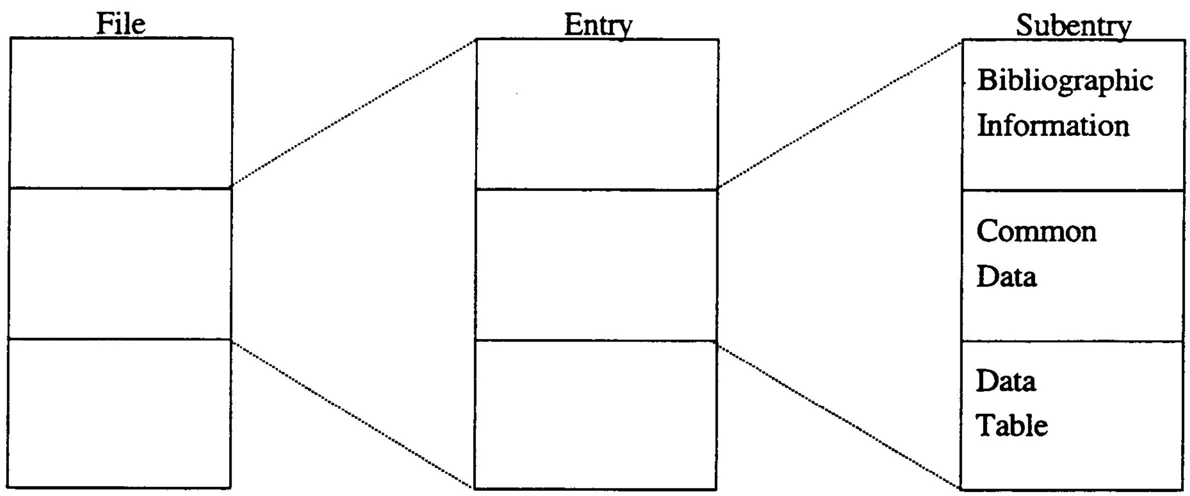
EXCHANGE FILE FORMAT

An exchange file contains a number of entries (works). Each entry is divided into a number of subentries (data sets). Each entry is assigned an accession number; each subentry is assigned a subaccession number (the accession number plus a subentry number). The subaccession numbers are associated with a data table throughout the life of the EXFOR system.

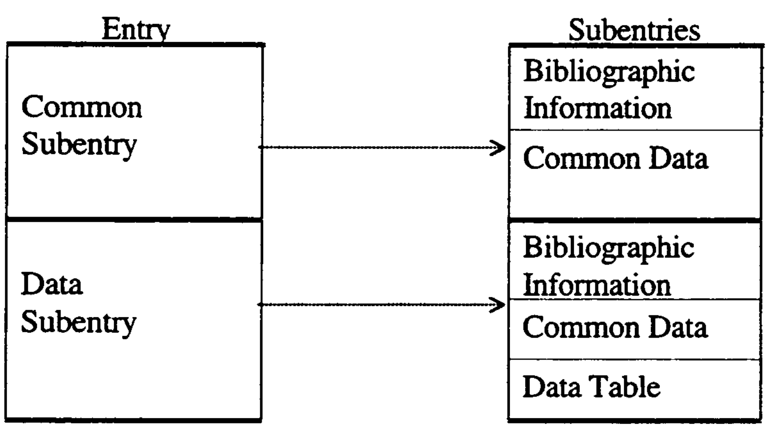
The subentries are further divided into:

- bibliographic, descriptive and bookkeeping information (hereafter called BIB information),
- common data that applies to all data throughout the subentry , and
- a data table.

The file may, therefore, be considered to be of the following form:



In order to avoid repetition of information that is common to all subentries within an entry or to all lines within a subentry, information may be associated with an entire entry or with an entire subentry. To accomplish this, the first subentry of each work contains only information that applies to all other subentries. Within each subentry, the information common to all lines of the table precedes the table. Two levels of hierarchy are thereby established:



Permitted Character Set. The following characters are permitted for use in the exchange format:

All Roman characters, A to Z and a to z
All numbers, 0 to 9
The special characters:

+	(plus)	>	(greater than)
-	(minus)	:	(colon)
.	(decimal point/full stop)	;	(semi-colon)
)	(right parenthesis)	!	(exclamation mark)
(	(left parenthesis)	?	(question mark)
*	(asterisk)	&	(ampersand)
/	(slash)	#	(number symbol)
=	(equals)	[	(opening bracket)
'	(apostrophe)	]	(closing bracket)
,	(comma)	"	(quotation mark)
%	(percent)	~	(varies as sign)
<	(less than)	@	(at symbol)

EXFOR Records

EXFOR Exchange files consist of 80 character ASCII records. The format of columns 1-66 varies according to the record type as outlined in the following chapters. Columns 67-79 is used to uniquely identify a record within the file. The records on the file are in ascending order according to the record identification. Column 80 is reserved for an alteration flag.

Record identification. The record identification is divided into three fields: the accession number (entry), subaccession number (subentry), and record number within the subentry. The format of these fields is as follows.

Columns	67-71	Center-assigned accession number
	72-74	Subaccession number
	75-79	Sequence number

Alteration flag (column 80). The last column of each record contains the alteration flag which is used to indicate that a record and/or following records has been altered (*i.e.*, added, deleted or modified) since the work was last transmitted. The flag field will normally contain a blank to indicate an unaltered record.

System Identifiers

Each of the sections of an EXFOR file begins and ends with a system identifier. Each of the following system identifiers indicates the beginning of one of these sections.

TRANS	- A file is the unit
ENTRY	- An entry is the unit
SUBENT	- A subentry is the unit
BIB	- A BIB Information section is the unit
COMMON	- A common data section is the unit
DATA	- A data table section is the unit

- The end of unit is signaled by modifier END preceding the basic system identifier, *e.g.*, NODATA.
- A positive indication that a unit is intentionally omitted is signaled by the modifier NO preceding the basic system identifier, *e.g.*, NOSUBENT.

The following system identifiers are defined.

1. A file is:

Headed by: **TRANS** *cxxx* *yyyymmdd*

CXXX = the center-identification character,[5]

yyyymmdd = date (year, month, and day) on which the file was generated.

Ended by: **ENDTRANS** N1

N1 = number of entries (accession numbers) on the file.

2. An entry is:

Headed by: **ENTRY** N1 N2

N1 = 5-character accession number

N2 = Date of last update (or date of entry if never updated) (*yyyymmdd*)

Ended by: **ENDENTRY** N1

N1 - The number of subentries in the work.[6]

N2 - Presently unused (may be blank or zero).

3. A subentry is:

Headed by: **SUBENT** N1 N2

N1 = 8-character subaccession number (accession number and subentry number).

N2 = Date of last update (or date of entry if never updated) (yyyymmdd).

Ended by: **ENDSUBENT** N1

N1 - The number of records within the subentry.

If a subentry has been deleted, the following record is included in the file

NOSUBENT N1 N2

N1 = 8-character subaccession number.

N2 = Date of last alter.

[5] On files that contain entries with different file-identification characters, column 67 is assigned such that the record sorts at the beginning of the file.

[6] NOSUBENT records are counted as subentries when computing the number of subentries in an entry.

4. **A BIB** section is:
   Headed by BIB N1 N2
   N1 =Number of information-identifier keywords in the BIB section.
   N2 = Number of records in the BIB section.
   Ended by : **ENDBIB** N1
   N1 - Number of records in BIB section.
   If no BIB section is given the following record is included:
   NOBIB
5. A COMMON section is:
   Headed by: **COMMON** N1 N2
   N1 = Number of common data fields.
   N2 = Number of records within the common section.
   Ended by: **ENDCOMMON** N1
   N1 = Number of records within the common section.
   If no COMMON section is given, the following record is included:
   NOCOMMON
6. A DATA section is:
   Headed by: **DATA** N1 N2
   N1 = Number of fields (variables) associated with each line of a data table.
   N2 = Number of data lines within the table (excluding headings and units).
   Ended by: **ENDDATA** N1
   N1 - Number of records within the data section.
   If no DATA section is given, the following record is included:
   NODATA

POINTERS

Different pieces of EXFOR information may be linked together by pointers. A pointer is a numeric or alphabetic character (1,2...9,A,B,...Z) placed in the eleventh column of the information-identifier keyword field in the BIB section and in the field headings in the COMMON or DATA section.

Pointers may link, for example,
- one of several reactions with its data field;
- one of several reactions with a specific piece of information in the BIB section (*e.g.*, ANALYSIS), and/or with a value in the COMMON section, and/or with a field in the DATA section;
- a value in the COMMON section with any field in the DATA section.

In general, a pointer is valid for only one subentry. A pointer used in the first subentry applies to all subentries and has a unique meaning throughout the entire entry.

BIB SECTION

The BIB section contains the bibliographic information (*e.g.*, reference, authors), descriptive information (*e.g.*, neutron source, method, facility), and administrative information (*e.g.*, history) associated with the data presented. It is identified on an exchange file as that information between the system identifiers BIB and ENDBIB.

A BIB record consists of three parts:

columns 1-11: information-identifier keyword field,
columns 12-66: information field, which may contain coded information and/or free text,
columns 67-80: record identification and alteration flag fields.

BIB information for a given data set consists of the information contained in the BIB section of its subentry together with the BIB information in subentry 001. That is, information coded in subentry 001 applies to all other subentries in the same entry. A specific information-identifier keyword may be included in either subentry or both.

Information-identifier keywords

The information-identifier keyword is used to define the significance of the information given in columns 12-66. The keyword is left adjusted to begin in column 1, and does not exceed a length of 10 characters (column 11 is either blank, or contains a pointer, see Chapter 5).

These keywords may, in general, appear in any order within the BIB section, however, an information-identifier keyword is not repeated within any one BIB section. If pointers are present, they appear on the first record of the information to which they are attached and are not repeated on continuation records. A pointer is assumed to refer to all BIB information until either another pointer or a new keyword is encountered. As this implies, pointer-independent information for each keyword appears first.

Coded (machine-retrievable) information

Coded information may be used:
- to define the actual BIB information,
- as a link to the COMMON and DATA section,
- to enter associated numerical data.

Coded information is enclosed in parentheses and left adjusted so that the opening parenthesis appears in column 12. Several pieces of coded information may be associated with a given information-identifier keyword.

Codes for use with a specific keyword are found in the relevant dictionary. However, for some keywords, the code string may include retrievable information other than a code from one of the dictionaries.

In general, codes given in the dictionaries may be used singly or in conjunction with one or more codes from the same dictionary. Two options exist if more than one code is used:

a) two or more codes within the same set of parenthesis, separated by a comma;
   Example: (SOLST,NAICR)
b) each code on a separate record, enclosed in it's own set of parenthesis starting in column 12, followed by free text.
   Example: (SOLST) *free text*
   (NAICR) *free text*

For some cases, the information may be continued onto successive records. Information on continuation records does not begin before column 12 (columns 1-10 are blank and column 11 is blank or contains a pointer).

Note that some information-identifier keywords have no coded information associated with them and that, for many keywords which may have coded information associated with them, it need not always be present.

Free text

Free text may be entered in columns 12-66 under each of the information-identifier keywords in the BIB section. The text follows any coded information on the record or may begin on a separate record; it may be continued onto any number of records.

The language of the free text is English.

Coding of nuclides and compounds.

Nuclides appear in the coding of many keywords. The general code format is *Z-S-A-X*, where:

- *Z* is the charge number; up to 3 digits, no leading zeros
- *S* is the element symbol; 1 or 2 characters (Dictionary 8)
- *A* is the mass number; up to 3 digits, no leading zeroes. A single zero denotes natural isotopic composition.
- *X* is an isomer code denoting the isomeric state; this subfield is not used if there are no known isomeric states.
  X may have the following values:
  - G for ground state (of a nucleus which has a metastable state)
  - M if only one metastable state is regarded
  - M1 for the first metastable state
  - M2 for the second, *etc.*
  - T for sum of all isomers (limited to use within an isomeric ratio in SF4 of the reaction string)

Examples: `92-U-235`
`49-IN-115-M/T`

Compounds may in some cases replace the nuclide code. The general format for coding compounds is either the specific compound code, taken from Dictionary 9, or the general code for a compound of the form *Z-S*-CMP.

Example: `26-FE-CMP`

COMMON AND DATA SECTIONS

A data table is, generally, a function of one or more independent variables, *e.g.*,

- *X* vs. *Y*, *e.g.*, energy, cross section
- *X*, *X′* and *Y*, *e.g.*, energy and angle; differential cross section
- *X*, *X′* and *X″* vs. *Y*, e.g., energy, secondary energy, angle, partial angular distribution.

When more than one representation of *Y* is present, the table may be *X* vs. *Y* and *Y′*, with associated errors for *X*, *Y* and *Y′* (*e.g.*, *X* = energy, *Y* = absolute cross section, *Y′* = relative cross section), and possible associated information. The criteria for grouping *Y* with *Y′* are that they both be derived from the same experimental information by the author of the data.

For some data, the data table does not have an independent variable *X* but only a function *Y*. (*Examples*: Spontaneous $\bar{\nu}$; resonance energies without resonance parameters)

Additional variables may be associated with the data, *e.g.*, errors, standards.

The format of the common data (COMMON) and data table (DATA) sections is identical. Each section is a table of data containing the data headings and units associated with each field. The difference between the common data and data table is:

- The common data contains constant parameters that apply to each line of a point data table;
- The data table contains fields of information; each field, generally, contains values as a function of one or more independent variables (*e.g.*, angle, angular error, cross section, cross section error), *i.e.*, one or more lines of data.

Each physical record may contain up to six information fields, each 11 columns wide. If more than six fields are used, the remaining information is contained on the following records. Therefore, a data line consists of up to three physical records. The number of fields in a data line is restricted to 18.

Records are not packed; rather, individual point information is kept on individual records; *i.e.*, if only four fields are associated with a data line, the remaining two fields are left blank, and, in the case of the data table, the information for the next line begins on the following record. These rules also apply to the headings and units associated with each field.

The content of the COMMON and DATA sections are as follows:

- Field headings: a data heading left adjusted to the beginning of each field (columns 1, 12, 23, 34, 45, 56), plus, perhaps, a pointer placed in the last (11^{th}) column of a field.
- Data units: left adjusted to the beginning of each field (columns 1, 12, 23, 34, 45, 56).
- Numerical data: FORTRAN-readable using a floating-point format, as follows.
  - A decimal point is always present, even for integers.
  - A decimal number without an exponent can have any position within the 11-character field.
  - No blank is allowed following a sign (+ or -).
  - A plus sign may be omitted, except that of an exponent when there is no E.

- In an exponential notation, the exponent is right adjusted within the 11-character field. The mantissa may have any position.

The values are either zero or have absolute values between 1.0000E-38 and 9.999E+38.

COMMON Section

The COMMON section is identified as that information between the system identifiers COMMON and ENDCOMMON. In the common data table, only one value is entered for a given field, and successive fields are not integrally associated with one another.

An example of a common data table with more than 6 fields:

1	12	23	34	45	56 66
COMMON					
EN	EN-ERR	EN-RSL	E-LVL	E-LVL	MONIT
MONIT-ERR					
MEV	MEV	MEV	MEV	MEV	MB
MB					
2.73	0.02	0.05	2.73	2.78	3.456
0.123					
ENDCOMMON					

DATA Section

The DATA section is identified as that information between the system identifiers DATA and ENDDATA. In the DATA table, all entries on a record are integrally associated with an individual point. Independent variables precede dependent variables, and are monotonic until the value of the preceding independent variable, if any exist, changes.

Every line in a data table gives data information. This means, for example, that a blank in a field headed DATA is permitted only when another field contains the data information on the same line, e.g., under DATA-MAX. In the same way, each independent variable occurs at least once in each line (*e.g.*, either under data headings E-LVL or E-LVL-MIN, E-LVL-MAX, see example following). Supplementary information, such as resolution or standard values, is not given on a line of a data table unless the line includes data information. Blanks are permitted in all fields.

An example of a point data table is shown below with its associated DATA and ENDDATA records.

1	12	23	34	45	56 66
DATA					
ANG	ANG-ERR	DATA	DATA-ERR	DATA-MAX	
ADEG	ADEG	MB/SR	MB/SR	MB/SR	
10.7	1.8	138.	8.5		
22.9	1.2	127.	4.2		
39.1	0.9			83.2	
46.7	0.7	14.8	2.9		
ENDDATA					

Appendix A

Nuclear Reaction Data Centers

This appendix contains a list of the members of the Nuclear Data Center Network, along with information on how to contact them. Also list are the entry series for which each of the data centers is responsible.

Principal Centers and their services areas.[1]

United States and Canada	
National Nuclear Data Center, Bldg. 197D Brookhaven National Laboratory Upton, NY, 11973-5000 U.S.A.	Center codes: 1, C, L, P, T Telephone: +1 631-344-2902 Fax: +1 631-344-2806 Email: nndc@bnl.gov or nndc*nn*@bnl.gov[2] www.nndc.bnl.gov
O. E. C. D. Nuclear Energy Agency Member Countries	
NEA Data Bank 12, boulevard des Iles 92130 Issy-les-Moulineaux, FRANCE	Center codes: 2, O Telephone: +33 (1) 4524 1071 Fax: +33 (1) 4524 1110 Email:nea@nea.fr or *name*@nea.fr www.nea.fr
Countries of the former Soviet Union	
Federal Research Center IPPE Centr Yadernykh Dannykh Ploschad Bondarenko 249 020 Obninsk, Kaluga Region, RUSSIA	Center codes: 4, Q Telephone: +7 084-399-8982 Fax: +7 095-883-3112 Email: *name*@cjd.obninsk.ru rndc.ippe.obninsk.ru
Remaining countries	
IAEA Nuclear Data Section Wagramerstr. 5, P.O.Box 100 A-1400 Vienna, AUSTRIA	Center codes: 3, D, G, V. Telephone: +43 (1) 2360 1709 Fax: +43 (1) 234 564 Email: *name*@iaeand.iaea.or.at www-nds.iaea.or.at

Other participating centers.

National Scientific Research Center Kurchatov Institute Russia Nuclear Center 46 Ulitsa Kurchatova 123 182 Moscow, RUSSIA	Center codes: A, B Email: feliks@polyn.kiae.su
Institute of Nuclear Physics Moskovskiy Gos. Universitet Vorob'evy Gory 119 899 Moscow, RUSSIA	Center code: M Email: varlamov@cdfe.npi.msu.ru

[1] The four principal centers are responsible for maintaining customer services for the area given.
[2] *nn* = first and last initial of person to be contacted, *e.g.*, NNDCCD@BNL.GOV.

China Nuclear Data Center China Institute of Atomic Energy P.O. BOX 275 (41) Beijing 102413, CHINA	Center code: S Email: cndc@mipsa.ciae.ac.cn
Japan Charged Particle Reaction Group Dept. of Physics Hokkaido University Kita-10 Nisha-8, Kita-ku Sapporo 060, JAPAN	Center code: E, R Email: kato@nucl.phys.hokaido.ac.jp
Dr. F. T. Tárkányi Cyclotron Application Department ATOMKI, Institute of Nuclear Research Bem Tér 18/c, P. O. Box 51 H-4001 Debrecen, HUNGARY	Contributes data under center code D Email: tarkanyi@atomki.hu
Russian Federal Center - VNIIEF Sarov, Nizhni Novgorod Region 607 190 pr. Mira 37, RUSSIA	Center code: F Email: dunaeva@expd.vniief.ru

Appendix B

Information Identifier Keywords

This appendix provides a listing of all information-identifier keywords, along with details about their use. The keywords appear in alphabetical order.

ADD-RES. Gives information about any additional results obtained in the experiment, but which are not compiled in the data tables. Codes are given in Dictionary 20.

Example: `ADD-RES        (RANGE) Range of recoils measured.`

ANALYSIS. Gives information as to how the experimental results have been analyzed to obtain the values given under the heading DATA which actually represent the results of the analysis. Codes are found in Dictionary 23.

Example: `ANLAYSIS     (MLA) Breit-Wigner multilevel analysis`

ASSUMED Gives information about values assumed in the analysis of the data, and about COMMON or DATA fields headed by ASSUM or its derivatives. The format of the code is:

(heading,reaction,quantity)

Heading field: data heading to be defined.

Reaction field and quantity field: coded as under the keyword REACTION.

Example:

```
ASSUMED    (ASSUM,6-C-12(N,TOT),,SIG)
```

AUTHOR. Gives the authors of the work reported.

Example:

```
AUTHOR    (R.W.McNally Jr,A.B.JONES)
```

COMMENT. Gives pertinent information which cannot logically be entered under any other of the keywords available.

CORRECTION. Gives information about corrections applied to the data in order to obtain the values given under DATA. See also **LEXFOR, Correction**.

COVARIANCE. Gives covariance information provided by the experimentalist, or to flag the existence of a covariance data file. See Appendix C for covariance file format.

Example:
```
COVARIANCE  (COVAR) COVARIANCE FILE EXISTS AND MAY BE OBTAINED ON
            REQUEST.
```

CRITIQUE. Gives comments on the quality of the data presented in the data table.

DECAY-DATA. Gives the decay data for any nuclide occurring in the reaction measured as assumed or measured by the author for obtaining the data given[1]. The general format of the coding string consists of three major fields which may be preceded by a decay flag:

((decay flag)nuclide,half-life,radiation).

Flag. A fixed-point number that also appears in the data section under the data heading DECAY-FLAG. If the flag may be omitted, its parentheses are also omitted.

Nuclide field. A nuclide code.

Half-life field. The half-life of the nuclide specified, coded as a floating-point number, followed by a unit code with the dimensions of TIME.

Radiation field. Consists of three subfields: (type of radiation, energy, abundance) This field may be omitted, or repeated (each radiation field being separated by a comma). The absence of any subfield is indicated by a comma; trailing commas are not included.

SF1. Type-of-radiation. A code from Dictionary 13. Where two or more different decay modes are possible and are not distinguished in the measurement, two or more codes are given; each separated by a slash. (See Example b, following).

SF2. Energy. The energy of the radiation in keV, coded as a floating-point number. In the case of two or more unresolved decays, two or more energies, or a lower and upper energy limit, are given, each separated by a slash. (See Example e).

SF3. Abundance. The abundance of the observed per decay, coded as a floating-point number.

Examples

a) `DECAY-DATA (60-ND-140,3.3D)` (radiation field omitted)

b) `DECAY-DATA (59-PR-140,,B+/EC,,0.500)` (half-life and decay energy omitted)

c) `DECAY-DATA (25-MN-50-G,0.286SEC,B+,6610.)` (abundance omitted)

d) `DECAY-DATA ((1.)60-ND-138,5.04HR,DG,328.,0.065)` (decay flag, all fields present)

e) `DECAY-DATA (60-ND-139-M,5.5HR,DG,708./738.,0.64)` (the abundance given is the total abundance of both γ rays)

f)
```
DECAY-DATA  (60-ND-139-G,30.0MIN,B+,,0.257,
                                 DG,405.,0.055)
            (60-ND-139-M,5.5HR,  DG,738.,0.37,
                                 DG,982.,0.29,
                                 DG,708.,0.27,
                                 DG,403.,0.03,
                                 B+,,0.006)
```

[1] Decay data relevant to the monitor reaction are coded under the keyword DECAY-MON and not under DECAY-DATA.

DECAY-MON. Gives the decay data assumed by the author for any nuclide occurring in the monitor reaction used. The coding rules are the same as those for DECAY-DATA, except that there is no flag field.

DETECTOR. Gives information about the detector(s) used in the experiment. Codes are found in Dictionary 22. If the code COIN is used, then the codes for the detectors used in coincidence follow within the same parenthesis;

Example: `DETECTOR (COIN,NAICR,NAICR)`

EMS-SEC. Gives information about secondary squared effective mass of a particle or particle system, and to define secondary-mass fields given in the data table. The format of the coded information is: (heading, particle).

Heading Field contains the data heading or the root[2] of the data heading to be defined. Particle Field contains the particle or nuclide to which the data heading refers. The code is:
either a particle code from Dictionary 13.
or a nuclide code.

Example:

```
EMS-SEC     (EMS1,N)
            (EMS2,P+D)
```

EN-SEC. Gives information about secondary energies, and to define secondary-energy fields given in the data table. The format of the coded information is: (heading,particle).

Heading Field. Contains the data heading or the root of the data heading to be defined.

Particle Field. Contains the particle or nuclide to which the data heading refers. The code is:
either a particle code from Dictionary 13.
or a nuclide code.

Example:

```
EN-SEC      (E1,G)
            (E2,N)
            (E-EXC,3-LI-7
```

ERR-ANALYS. Explains the sources of uncertainties and the values given in the COMMON or DATA sections under data headings of the type ERR- or -ERR. The general code format is (heading,correlation factor) free text

Heading Field. Contains the data heading or the root[3] of the data heading to be defined.

Correlation Factor Field contains the correlation factor, coded as a floating point number.

Example:

```
BIB
...
ERR-ANALYS   (EN-ERR) followed by explanation of energy error
             (ERR-T)  followed by explanation of total uncertainty
             (ERR-S)  followed by explanation of statistical uncertainty
```

[2] Root means that the data heading given will also define the same heading followed by -MIN, -MAX or -APRX.

[3] Root means that the data heading given also defines the heading preceded by + or -.

EXP-YEAR. Defines the year in which the experiment was performed when it differs significantly from the data of the references given (*e.g.*, classified data published years later).

Example:
```
EXP-YEAR    (1965)
```

FACILITY. Defines the main apparatus used in the experiment. The facility code from Dictionary 18 may be followed by an institute code from Dictionary 3, which specifies the location of the facility.

Example:
```
FACILITY    (CHOPF,1USACOL)
            (SPECC,1USABNL)
```

FLAG. Provides information to specific lines in a data table. See also **LEXFOR, Flags**.

Example:
```
BIB
...
FLAG          (1.) Data averaged from 2 runs
              (2.) Modified detector used at this energy
ENDBIB
...
DATA
EN            DATA          FLAG
KEV           MB            NO-DIM
1.2           123.          1.
2.3           234.
3.4           456.          2.
ENDDATA
```

HALF-LIFE. Gives information about half-life values and defines half-life fields given in the data table. The general coding format is: (heading,nuclide)

Example:
```
HALF-LIFE   (HL1,41-NB-94-G)
            (HL2,41-NB-94-M)
```

HISTORY. Documents the handling of an entry or subentry. The general format of the code is: (*yyyymmddX*), where *yyyymmdd* is the date (year,month,day) and *X* is a code from Dictionary 15.

Example:
```
HISTORY     (19940312C)
            (19960711A) Data units corrected.
```

INC-SOURCE. Gives information on the source of the incident particle beam used in the experiment. Codes are found in Dictionary 19.

Example:
```
INC-SOURCE (POLNS,D-T)
INC-SOURCE (MPH=13-AL-27(N,A)11-NA-24)
```

INC-SPECT. Provides free text information on the characteristics and resolution of the incident-projectile beam.

INSTITUTE. Designates the laboratory, institute, or university at which the experiment was performed, or with which the authors are affiliated. Codes are given in Dictionary 3.

Examples:
```
INSTITUTE  (1USAGA, 1USALAS)
INSTITUTE  (2FR SAC)
```

LEVEL-PROP. Gives information on the spin and parity of excited states. The general format of the code is ((flag) nuclide, level identification, lever properties)

Flag. Coded as a fixed-point number that appears in the data section under the data heading LVL-FLAG. When the flag is omitted, its parentheses are also omitted.

Nuclide. Coded is a nuclide, except that the use of the extension G is optional.

Level identification. Identification of the level whose properties are specified, given as either a level energy or level number. If the field omitted, its separating comma is omitted.

Level Energy. The field identifier E-LVL= followed by the excited state energy in MeV, coded as a floating-point number which also appears in the data section under the data heading E-LVL.

Level Number. The field identifier LVL-NUMB= followed by the level number of the excited state, coded as a fixed-point number which also appears in the data section under the data heading LVL-NUMB.

Level properties. Properties for the excited state, each preceded by a subfield identification. At least one of the fields must be present. If the field is omitted, its separating comma is omitted.

Spin. The field identifier SPIN=, followed by the level spin coded as a floating point number. For an uncertain spin assignment, two or more spins may be given, each separated by a slash.

Parity. The field identifier PARITY=, followed by the level parity, coded as *e.g.*, +1. or -1.

Examples:
```
LEVEL-PROP (82-PB-206,E-LVL=0.,SPIN=0./1.,PARITY=+1.)
           (82-PB-206,E-LVL-1.34,SPIN+3.,PARITY=+1.)
LEVEL-PROP ((1.)82-PB-206,,SPIN=0./1.,PARITY=+1.)
           ((2.)82-PB-206,,SPIN=3.,PARITY=+1.)
LEVEL-PROP (82-PB-207,LVL-NUMB=2.,SPIN=1.5,PARITY=-1)
```

METHOD. Describes the experimental technique(s) employed in the experiment. Codes are found in Dictionary 21.

Example:
```
METHOD     (RCHEM) Radiochemical separation
```

MISC-COL. Defines fields in the COMMON or DATA sections headed by MISC and it derivatives.

Example:
```
MISC-COL   (MISC1)  Free text describing 1st miscellaneous field
           (MISC2)  Free text describing 2nd miscellaneous field
```

MOM-SEC. Gives information about secondary linear momentum, and defines secondary-momentum fields given in the data table. The general code format is: (heading,particle)

Heading Field: the data heading or root[4] of the data heading to be defined.

Particle Field: the particle or nuclide to which the data heading refers. The code is:
either a particle code from Dictionary 13.
or a nuclide code.

Example:
```
MOM-SEC    (MOM-SEC1,26-FE-56)
           (MOM-SEC2,26-FE-57)
```

MONITOR. Gives information about the standard reference data (standard, monitor) used in the experiment and defines information coded in the COMMON and DATA sections under the data heading MONIT, *etc*. The general coding format is ((heading) reaction)

Heading Field. Contains the data heading of the field in which the monitor value is given. If the heading is omitted, its parenthesis is omitted.

Reaction Field. The coding rules are identical to those for REACTION, except that subfields 5 to 9 may be omitted if the reaction is known.

Example:
```
REACTION    1 (AAAAA)
            2 (BBBBB)
MONITOR     1 (CCCCC)
            2 (DDDDD)
...
DATA
EN            DATA        1 DATA        2 MONIT       1 MONIT        2
...
```

MONIT-REF. Gives information about the source reference for the standard (or monitor) data used in the experiment.

The general code format is ((heading)subaccession#,author,reference)

Heading Field: Data heading of the field in which the standard value is given. If the heading is omitted, its parentheses are also omitted.

Subaccession Number Field: Subaccession number for the monitor data, if the data is given in an EXFOR entry. C*nnnn*001 refers to the entire entry; C*nnnn*000 refers to a yet unknown subentry.

Author Field. The first author, followed by "+" when more than one author exists.

Reference Field. May contain up to 6 subfields, coded as under REFERENCE.

Example:
```
MONIT-REF  ((MONIT1)B0017005,J.GOSHAL,J,PR,80,939,1950)
           ((MONIT2),A.G.PANONTIN+,J,JIN,30,2017,1968)
```

[4] Root means that the data heading given will also define the same heading followed by -MIN, -MAX or -APRX.

<u>**PART-DET**</u>. Gives information about the particles detected directly in the experiment. Particles detected in a standard/monitor reaction are not coded under this keyword. The code is either a code from Dictionary 13, or, for particles heavier than α particles, a nuclide code. Particles detected pertaining to different reaction units within a reaction combination are coded on separate records in the same order as the corresponding reaction units.

Example:
```
PART-DET    (A)
PART-DET    (3-LI-6)
```

<u>**RAD-DET**</u>. Gives information about the decay radiations (or particles) and nuclides observed in the reaction measured. The general format of the code is ((flag)nuclide, radiation).

<u>Flag</u> is a fixed-point number which appears in the data section under the data heading DECAY-FLAG. If the field is omitted, its parentheses are also omitted.

<u>Nuclide</u> contains a nuclide code.

<u>Radiation</u> contains one or more codes from Dictionary 33, each separated by a comma.

Examples:
```
RAD-DET     (25-MN-52-M,DG,B+)
RAD-DET     (48-CD-115-G,B-)
            (49-IN-115-M,DG)
RAD-DET     ((1.)48-CD-115-G,B-)
            ((2.)49-IN-115-M,DG)
```

<u>**REACTION**</u>. Specifies the data presented in the DATA section in fields headed by DATA.[5] The general format of the code is (reaction, quantity, data-type).

Reaction field. The reaction field consists of 4 subfields.

<u>SF1. Target nucleus</u>. Contains either:

a) a nuclide code.
   A = 0 denotes natural isotopic abundance.
b) a compound code.
c) a variable nucleus code ELEM and/or MASS
   Example: `(ELEM/MASS(0,B-),,PN)`

<u>SF2. Incident projectile</u>. Contains one of the following:

a) a particle code from Dictionary 28.
b) for particles heavier than an α, a nuclide code.

<u>SF3. Process</u>. Contains one of the following:

a) a process code from Dictionary 30, *e.g.*, TOT.
b) a article code from Dictionary 29 which may be preceded by a multiplicity factor, whose value may be 2→99.[6], *e.g.*, 4A.

---

[5] And similar headings such as DATA-MIN, DATA-MAX, *etc.*

[6] In the few cases where the multiplicity factor may exceed 99, the ***Variable Number of Emitted Nucleons Formalism*** may be used, see page 6.7.

c) for particles heavier than α, a nuclide code.
   Examples: `8-O-16`
   `8-O-16+8-O-16`
d) combinations of a), b) and c), with the codes connected by '+'.
   Examples: `HE3+8-0-16`
   `A+XN+YP`

If SF5 contains the branch code UND[7] (undefined), the particle codes given in SF3 represent only the sum of emitted nucleons, implying that the product nucleus coded in SF4 has been formed via different reaction channels. The code (DEF) in SF5 denotes that it is not evident from the publication whether the reaction channel is undefined or defined.

SF4. Reaction Product. In general, the heaviest of the products is defined as the reaction product (also called residual nucleus). In the case of two reaction products with equal mass, the one with the larger *Z* is considered as the *heavier* product. Exceptions or special cases are:

- If SF5 contains the code SEQ, indicating that the sequence of several outgoing particles and/or processes coded in SF3 is meaningful, the nuclide to be coded in SF4 is the heaviest of the final products.

  Example: `(5-B-10(N,A+T)2-HE-4,SEQ,SIG)`

- Where emission cross sections, production cross sections, product yields, *etc*., are given for specified nuclides, particles, or gammas, the product considered is defined as the reaction product (even if it is not the heaviest of several reaction products).

This subfield contains:
either a blank,
Example: `(26-FE-56(N,EL),,WID)`
or a nuclide code.
Example: `(51-SB-123(N,G)51-SB-124-M1+M2/T)`
or, a variable nucleus codes:
Example: `(92-U-235(N,F)ELEM/MASS,CUM,FY)`

Quantity consists of four subfields, each separated by a comma. All combinations of codes allowed in the quantity field are given in Dictionary 36.

SF5 Branch. Indicates a partial reaction, *e.g*., to one of several energy levels.

SF6 Parameter. Indicates the reaction parameter given, *e.g*., differential cross section.

[7] The code UND is presently used only for charged particle reaction data.

SF7 Particle Considered. Indicates to which of several outgoing particles the quantity refers.[8] Multiple codes, *e.g.*, for the correlation between outgoing particles, all particles are separated by a slash.

SF8 Modifier. Contains information on the representation of the data, *e.g.*, relative data.

Data Type Field. Indicates whether the data are experimental, theoretical, evaluated, *etc.* Codes are found in Dictionary 35.

Variable Nucleus. For certain processes, the data table may contain yield or production cross sections for several nuclei which are entered as variables in the data table. In this case, either SF1 or SF4 of the REACTION keyword contain one of the following codes:

ELEM - if the Z (charge number) of the nuclide is given in the data table.
MASS - if the A (mass number) of the nuclide is given in the data table.
ELEM/MASS - if the Z and A of the nuclide are given in the data table.

The nuclei are entered in the common data or data table as variables under the data headings ELEMENT and/or MASS with the units NO-DIM.

If the data headings ELEMENT and MASS are used, a third field with the data heading ISOMER is used when isomer states are specified:

0. = ground state (used only if nuclide has also an isomeric state),
1. = first metastable state (or the metastable state when only one is known),
2. = second metastable state, *etc.*

Decay data for each entry under ELEMENT/MASS(ISOMER) and their related parent or daughter nuclides may be given in the usual way under the information-identifier keyword DECAY-DATA. Entries under the data headings ELEMENT/MASS(ISOMER) are linked to entries under DECAY-DATA (and RAD-DET, if present) by means of a decay flag.[9]

Example:

```
BIB
REACTION    (...(...,F)ELEM/MASS,...)
ENDBIB
NOCOMMON
DATA
EN          ELEM        MASS        ISOMER      DATA
MEV         NO-DIM      NO-DIM      NO-DIM      B
 ...         61.         148.        0.          ...
 ...         61.         148.        1.          ...
 ...         61.         149.                    ...
 ...         62.         149.                    ...
```

[8] Note that the particle considered is not necessarily identical to the particle detected, *e.g.*, the angular distribution of an outgoing particle which has been deduced from a recoil particle detected.

[9] If the half-life is the only decay data given, this may be entered in the data table under the data heading HL, although this is not recommended.

Variable Number of Emitted Nucleons. Where mass and element distributions of product nuclei have been measured, the sum of outgoing neutrons and protons may be entered as variables in the data table. In this case SF3 of the REACTION keyword contains at least one of the following codes:

XN - variable number of neutrons given in the data table.
YP - variable number of protons given in the data table.

The numerical values of the multiplicity factors *X* and *Y* are entered in the data table under the data headings N-OUT and P-OUT, respectively.

Example:

```
BIB
REACTION     (...(...,XN+YP)...)
...
ENDBIB
NOCOMMON
DATA
EN           N-OUT         P-OUT        DATA
MEV          NO-DIM        NO-DIM       B
...
...
...
ENDDATA
```

Reaction Combinations. For experimental data sets referring to complex combinations of materials and reactions, the code units defined in this section can be connected into a single machine-retrievable field, with appropriate separators and properly balanced parentheses. The complete reaction combination is enclosed in parentheses.

The following reaction combinations are defined:

((------)+(-----))	Sum of 2 or more quantities (see **LEXFOR, Sums**).
((------)-(-----))	Difference between 2 or more quantities.
((------)*(-----))	Product of 2 or more quantities (see **LEXFOR, Products**).
((------)/(-----))	Ratio of 2 or more quantities (see **LEXFOR, Ratios**).
((------)//(-----))	Ratio of 2 quantities, where the numerator and denominator refer to different values for one or more independent variables (see **LEXFOR, Ratios**).
((------)=(-----))	Tautologies (see **LEXFOR, Tautologies** for usage).

When a reaction combination contains the separator "//", the data table will contain at least one independent variable pair with the data heading extensions -NM and -DN.

Example:

```
BIB
REACTION     (((92-U-238(N,F)ELEM/MASS,CUM,FY,,FIS)/
             (92-U-238(N,F)42-MO-99,CUM,FY,,FIS))//
             ((92-U-235(N,F)ELEM/MASS,CUM,FY,,MXW)/
             (92-U-235(N,F)42-MO-99,CUM,FY,,MXW)))
RESULT       (RVAL)
...
ENDBIB
COMMON
EN-DUM-NM    EN-DUM-DN
MEV          EV
 1.0          0.0253
ENDCOMMON
DATA
ELEMENT      MASS          DATA
...
ENDDATA
```

REFERENCE. Gives information on references that contain information about the data coded. Other related references are not coded under this keyword (see REL-REF, MONIT-REF). The general coding format is (reference type, reference, date).

The format of the reference field is dependent on the reference type. The general format for each reference type follows.

Type of Reference = B or C; Books and Conferences.
General code format: (B or C,code,volume,(part),page(paper #),date). Codes from Dictionary 7.
Examples:

`(C,67KHARKOV,,(56),196702)`	Kharkov Conference Proceedings, paper #56, February 1967.
`(C,66WASH,1,456,196603)`	Washington Conference Proceedings, Volume 1, page 456, March 1966
`(B,ABAGJAN,,123,1964)`	Book by Abagjan, page 123, published in 1964.

Type of Reference = J: Journals.
General code format is (J,code,volume,(issue #),page,date). Codes are from Dictionary 5.
Examples:

`(J,PR,104,1319,195612)`	Phys. Rev. Volume 104, page 1319, December 1956
`(J,XYZ,5,(2),89,196602)`	Journals XYZ, Volume 5, issue #2, page 89, February 1966

Type of Reference = P or R or S; Reports.
General code format: (P or R or S,code-number,date). Codes from Dictionary 6.
Examples:

`(R,JINR-P-2713,196605)`	Dubna report, series P, number 2713, May 1966.
`(P,WASH-1068,185,196603)`	WASH progress report number 1068, page 185, March 1966.

Type of Reference = T, or W; Thesis or Private Communication.
General code format: (W or T,author,page,date)
Examples:

`(W,BENZI,19661104)`	private communication from Benzi, November 4, 1966.
`(T,ANONYMOUS,58,196802)`	thesis by Anonymous, page 58, February 1968.

REL-REF. Gives information on references related to, but not directly pertaining to, the work coded. The general code format is: (code,subaccession#,author,reference).

Code: code from Dictionary 17.

Subaccession #: EXFOR subaccession number for the reference given, if it exists. C*nnnn*001 refers to the entire entry C*nnnn*. C*nnnn*000 refers to a yet unassigned subentry within the entry C*nnnn*.

Author: first author, coded as under AUTHOR, followed by + when more than one author exists.

Reference: coded as for REFERENCE.

Example:

`(C,B9999001,A.B.NAME+,J,XYZ,5,(2),90,197701)` Critical remarks by A.B.Name, *et al.*, in journal XYZ, volume 5, issue #2, p. 90, January 1977.

RESULT. Describes commonly used quantities that are coded as REACTION combinations.

Example:

```
REACTION    ((Z-S-A(N,F)ELEM/MASS,CUM,FY)/
            (Z-S-A(N,F)MASS,CHN,FY))
RESULT      (FRCUM)
```

SAMPLE. Used to give information on the structure, composition, shape, *etc.*, of the measurement sample.

STATUS. Givews information on the status of the data presented. Entered in one of the general code formats, or for cross reference to another data set, the general code format is: (code,subaccession#)

Code: code from Dictionary 16.

- Subaccession# Field: cross-reference to an EXFOR subaccession number, see REL-REF.

Example:

`STATUS (SPSDD,10048009)` - this subentry is superseded by subentry 10048009.

TITLE. Gives the title for the work referenced.

Appendix C

COVARIANCE DATA FILE FORMAT

Where covariance files are large, the covariance data may be stored in a separate covariance file. The existance of the file will be indicated in the corresponding EXFOR data set under the information-identifier keyword COVARIANCE, see Appendix B, COVARIANCE.

There are three record types in the covariance file:

- comment records,
- data records,
- end records.

Comment record format

Column	1	C
	2 – 9	Data set number (subaccession number)
	10	(blank)
	11 - 80	Comment which includes covariance type and format

Data record format

Column	1	D
	2 - 9	Data set number (subaccession number)
	10	(blank)
	11 - 80	Data in format given on comment record

End record format

Column	1	E
	2 - 9	Data set number (subaccession number)
	10 - 80	(blank)

EXFOR Basics

Appendix D

Table of Dictionaries

The EXFOR System Dictionaries list all keywords and codes used in the EXFOR entries. Listings are included for the following dictionaries. Where the dictionary is large, the most used codes are given. A complete listing of all dictionaries and codes is available from any of the Nuclear Reaction Data Centers.

Dictionary 3. Institutes: used with the keywords INSTITUTE and FACILITY. The first character of the codes designates the area of responsibility (see Appendix A), the next three characters designate the country, and the last three characters specify the institute. A subset containing some of the most frequently used codes is given here.

Area 1: United States and Canada

Canada

1CANCRC	A.E.C.L., Chalk River, Ontario
1CANMCM	McMaster University, Hamilton, Ontario
1CANTMF	Tri University Meson Facility, Vancouver, B.C.

United States

1USAANL	Argonne National Laboratory, Argonne, IL
1USAARK	Univ. of Arkansas, Fayetteville, AR
1USABNL	Brookhaven National Laboratory, Upton, NY
1USABNW	Pacific Northwest Laboratories, Richland, WA
1USABRK	Univ. of Calif. Lawrence Berkeley Lab., Berkeley, CA
1USACOL	Columbia University, New York, NY
1USADAV	University of California, Davis, CA
1USADKE	Duke University, Durham, NC
1USAFSU	Florida State University, Tallahasse, FL
1USAGEO	University of Georgia, Athens, GA
1USAGGA	Gulf General Atomic, San Diego, CA
1USAGIT	Georgia Instiitute of Technology, Atlanta, GA
1USAHAN	Hanford Atomic Products, Richland, WA
1USAINL	Idaho Nuclear Engineering Lab., Idaho Falls, ID
1USAINU	Indiana University, Bloomington, IN
1USAKAP	Knolls Atomic Power Laboratory, Schenectady, NY
1USAKTY	University of Kentucky, Lexington, KY
1USALAS	Los Alamos National Laboratory, NM
1USALRL	Lawrence Livermore National Laboratory, Livermore, CA
1USALTI	University of Lowell, Lowell, MA
1USAMHG	University of Michigan, Ann Arbor, MI
1USAMIT	Massachusetts Institute of Technology, Cambridge, MA
1USAMRY	University of Maryland, College Park, MD
1USANBS	National Bureau of Standards, Washington, DC
1USANIS	National Inst.of Standards & Techn., Gaithersburg, MD
1USANOT	Univ. of Notre Dame, Notre Dame, IN
1USAOHO	Ohio University, Athens, OH
1USAORL	Oak Ridge National Laboratory, Oak Ridge, TN
1USARPI	Rensselaer Polytechnic Institute, Troy, NY
1USATEX	Univ. of Texas, Austin, TX
1USATNL	Triangle Universities Nuclear Lab., Durham, NC
1USAWIS	University of Wisconsin, Madison, WI

Area 2: OECD Countries

Austria
2AUSIRK Inst. fuer Radiumforschung und Kernphysik, Vienna
Belgium
2BLGMOL C.E.N., Mol
Denmark
2DENRIS Riso, Roskilde
Finland
2SF JYV Jyvaeskylae Univ., Jyvaeskylae
France
2FR BRC CEN Bruyere-le-Chatel
2FR CAD C.E.N. Cadarache
2FR FAR CEA Fontenay-aux-Roses, Seine
2FR GRE Grenoble, Isere, (CEA and Univ.)
2FR PAR Univ. of Paris, (incl.Orsay), Paris
2FR SAC C.E.N. Saclay
Germany
2GERFRK J.W.Goethe Univ.,Frankfurt
2GERGSI Gesellschaft fuer Schwerionenforschung, Darmstadt
2GERHAM Hamburg, Universitaet
2GERJUL Kernforschungsanlage Juelich
2GERKFK Kernforschungszentrum, Karlsruhe
2GERKIL Univ. of Kiel, Kiel
2GERMUN Technische Universitaet Muenchen
2GERPTB Phys.Techn.Bundesanst., Braunschweig
2GERZFK Zentralinst.f.Kernforschung, Rossendorf
Greece
2GRCATH CNRC Demokritos, Athens
Italy
2ITYBOL ENEA Centro Ricerche Energia di Bologna
2ITYCAT Univ. of Catania
2ITYPAD Padua, University and Lab. Nat. Legnaro
Japan
2JPNJAE JAERI, Tokai
2JPNKTO Kyoto Univ., Kyoto
2JPNKYU Kyushu Univ., Dept.of Nucl.Eng., Fukuoka
2JPNOSA Osaka Univ., Osaka
2JPNTIT Tokyo Inst.of Technology, Tokyo
2JPNTOH Tohoku Univ., Sendai
2JPNTOK Tokyo Univ., Tokyo
The Netherlands
2NEDGRN Groningen
2NEDRCN Netherland's Energy Research Foundation, Petten
Norway
2NORKJL Inst. foer Atomenergi, Kjeller

Sweden
2SWDAE Studsvik Energiteknik AB
2SWDFOA Research Inst. for National Defence, Stockholm
Switzerland
2SWTETH Eidgenossische Technische Hochschule, Zuerich
2SWTPSI Paul Scherrer Inst., Villigen
United Kingdom
2UK ALD Awre, Aldermaston, England
2UK DOU Dounreay Experimental Reactor Establishment, England
2UK HAR AERE, Harwell, Berks, England
2UK NPL National Phys.Lab., Teddington, England
2UK OXF Univ. of Oxford, Oxford, England

Area 3: Remaining countries outside other 3 areas
Australia
3AULAML Univ. of Melbourne, Melbourne
3AULAUA Australian Nucl. Sci. and Techn.Org., Lucas Heights, SW
3AULCBR Australian National Univ., Canberra
China
3CPRAEP Inst. of Atomic Energy, Beijing
3CPRBJG Beijing Univ., Beijing
3CPRLNZ Lanzhou Univ., Lanzhou
3CPRNIX Northwest Inst.of Nucl.Technology, Xian
3CPRNRS Inst.of Nucl.Research, Acad.Sinica, Shanghai
3CPRSST Shanghai Univ. of Science and Technology
3CPRTSI Tsinghua Univ., Beijing
Croatia
3CRORBZ Inst.Rudjer Boskovic, Zagreb
3CROZAG Univ. of Zagreb, Zagreb
Czechoslovakia
3CZRUJV Inst. of Nuclear Research, Rez i Prahy
Hungary
3HUNDEB Inst.of Nuclear Research, ATOMKI, Debrecen
3HUNKFI Central Research Inst. for Physics, KFKI, Budapest
3HUNKOS Inst. for Experimental Physics, Kossuth U., Debrecen
India
3INDBOS Bose Institute, Calcutta
3INDMUA Muslim Univ., Aligarh
3INDSAH Saha Institute, Calcutta
3INDTAT Tata Institute, Bombay
3INDTRM Bhabha Atom.Res.Centre, Trombay
Israel
3ISLNEG Ben Gurion Univ. of the Negev, Beer-Sheva
3ISLWEI Weizmann Inst., Rehovoth

Mexico	
3MEXUMX	Univ. Nacionale Autonoma de Mexico, Mexico City
New Zealand	
3NZLNZH	Inst.of Nuclear Sciences, Lower Hutt
Poland	
3POLIPJ	Soltan Inst.Probl.Jadr., Swierk+Warszawa
3POLWWA	Warszawa, University
Romania	
3RUMBUC	Inst. de Fizica si Inginerie Nucleara, Bucharest
South Africa	
3SAFPEL	Atomic Energy Corp.of South Africa, Pelindaba

Area 4: Russian Federation

Armenia	
4ARMJER	Inst. Fiziki Armenian A.N., Jerevan
Belorus	
4BLRIJE	Inst. Yad. Energetiki A.N.Byeloruss.SSR, Minsk
Kazakhstan	
4KASKAZ	Inst.Yadernoi Fiziki, Alma-Ata
Latvia	
4LATIFL	Inst. Fiziki Latviyskoi A.N., Riga
Russia	
4RUSEPA	Experimental Physics Inst., Arzamas
4RUSFEI	Fiziko-Energeticheskii Inst., Obninsk
4RUSFTI	Fiz.-Tekhnicheskiy Inst.Ioffe, St.Petersburg+Gatchina
4RUSICP	Inst.of Chemical Phys., Moscow
4RUSITE	Inst.Teoret.+ Experiment. Fiziki, Moscow
4RUSJIA	Inst.Yadernych Issledovaniy Russian Acad. Sci.
4RUSKUR	Inst.At.En. I.V.Kurchatova, Moscow
4RUSLEB	Fiz.Inst. Lebedev (FIAN), Moscow
4RUSLIN	Leningrad Inst.Nucl.Phys., Russian Acad.Sci., Gatchina
4RUSMOS	Moscow State Univ., Nuclear Physics Inst., Moscow
4RUSNIR	NIIAR Dimitrovgrad
4RUSRI	Khlopin Radiev.Inst., Leningrad
Ukraine	
4UKRIJI	Inst. Yadernykh Issledovaniy Acad. Sct. Ukraine, Kiev
4UKRKFT	Kharkovskii Fiziko-Tekhnicheskii Inst., Kharkov
4UKRKGU	Gosudarstvennyi Univ.(State Univ.), Kiev
International	
4ZZZDUB	Joint Inst.for Nucl.Res., Dubna

Dictionary 4: Reference type: used as the first subfield for the keyword REFERENCE, and, similarly, for MONIT-REF, and REL-REF.

B	Book
C	Conference
J	Journal
P	Progress report
R	Report other than progress report
S	Report containing conference proceedings
T	Thesis or dissertation
W	Private communication

Dictionary 5: Journal codes: used as the second subfield for the keyword REFERENCE, when the reference type is given as J; similarly, for MONIT-REF, and REL-REF. A subset containing some of the most frequently used codes is given here. The code may have an extension delimited by a slash; these extensions have the following meanings:

/A, /B,..., /G	section or series
/L	letters section
/S	supplement

ACR	Acta Crystallographica
ADP	Annalen der Physik
AE	Atomnaya Energiya
AEJ	Journal of the Atomic Energy Society of Japan
AF	Arkiv foer Fysik
AHP	Acta Physica Hungarica
AJ	Astrophysical Journal
AK	Atomki Kozlemenyek
AKE	Atomkernenergie
ANP	Annalen der Physik (Leipzig)
ANS	Transactions of the American Nuclear Society
AP	Annals of Physics (New York)
APA	Acta Physica Austriaca
APP	Acta Physica Polonica
ARI	Applied Radiation and Isotopes
AUJ	Australian Journal of Physics
BAP	Bulletin of the American Physical Society
BAS	Bull.Russian Academy of Sciences - Physics
CHP	Chinese Journal of Physics (Taiwan)
CJP	Canadian Journal of Physics
CR	Comptes Rendus
CZJ	Czechoslovak Journal of Physics
DOK	Doklady Akademii Nauk
EPJ	European Physics Journal
FIZ	Fizika

HPA	Helvetica Physica Acta
IJP	Indian Journal of Physics
INC	Inorganic and Nuclear Chemistry Letters
ISP	Israel J.of Physics
IZV	Izv.Rossiiskoi Akademii Nauk,Ser.Fiz.
JAE	Yadernaya Energetika
JEL	Soviet Physics - JETP Letters
JET	Soviet Physics - JETP
JIN	Journal of Inorganic and Nuclear Chemistry
JNE	Journal of Nuclear Energy
JP	Jour. of Physics
JPJ	Journal of the Physical Society of Japan
JPR	Journal de Physique (Paris)
JRC	J.of Radioanalytical Chemistry
JRN	J.of Radioanalytical and Nuclear Chemistry
KFI	KFKI Kozlemenyek
NC	Nuovo Cimento
NCL	Lettere al Nuovo Cimento
NCR	Rivista del Nuovo Cimento
NCS	Nuovo Cimento, Suppl.
NIM	Nuclear Instrum.and Methods in Physics Res.
NKA	Nukleonika
NP	Nuclear Physics
NSE	Nuclear Science and Engineering
NST	J.of Nuclear Science and Technology, Tokyo
NWS	Naturwissenschaften
PAN	Physics of Atomic Nuclei
PCJ	Journal of Physical Chemistry
PHE	High Energy Physics and Nucl.Physics,Chinese ed.
PHY	Physica (Utrecht)
PL	Physics Letters
PNE	Progress in Nuclear Energy
PPS	Proceedings of the Physical Society (London)
PR	Physical Review
PRL	Physical Review Letters
PRS	Proc. of the Royal Society (London)
PS	Physica Scripta
PTE	Pribory i Tekhnika Eksperimenta
RCA	Radiochimica Acta
RJP	Romanian Journal of Physics
RRL	Radiochem.and Radioanal.Letters
RRP	Revue Roumaine de Physique
SJA	Soviet Atomic Energy
SJPN	Soviet Journal of Particles and Nuclei
SPC	Soviet Physics-Cristallography

SPD	Soviet Physics-Doklady
UFZ	Ukrainskii Fizichnii Zhurnal
UPJ	Ukrainian Physics Journal
YF	Yadernaya Fizika
YK	Vop. At.Nauki i Tekhn.,Ser.Yadernye Konstanty
ZEP	Zhurnal Eksper. i Teoret. Fiz., Pisma v Redakt.
ZET	Zhurnal Eksperimental'noi i Teoret. Fiziki
ZP	Zeitschrift fuer Physik

Dictionary 7: Books and Conferences: used as the second subfield for the keyword REFERENCE, when the reference type is given as B or C, and similarly, for MONIT-REF, and REL-REF. A subset containing some of the most frequently used codes is given here.

Books

ACT.EL	Actinide Elements
EXP.NUC.P.	Experimental Nuclear Physics
FAST N.PH.	Fast Neutron Physics
NB.GS.COMP	Noble Gas Compounds, Chicago Press 1963
NEJTRONFIZ	Neitronnaya Fizika, Moskva 1961
PR.NUC.EN.	Progress in Nucl.Energy
RCS	Radiochemical Studies, Fission Products
SPN	Sov.Progr.in Neutr.Phys.,New York 1961
TRANSU.EL.	Transuranium Elements

Conferences

55GENEVA	1st Conf. on Peaceful Uses Atomic Energy, Geneva 1955
55MOSCOW	USSR Conf. Peaceful Uses of Atomic Energy, Moscow 1955
56KIEV	Kiev Conf., Kiev 1956
58GENEVA	2nd Conf. on Peaceful Uses Atomic Energy, Geneva 1958
58PARIS	Nuclear Physics Congress, Paris 1958
59CALCUTTA	Low Energy Nuclear Physics Symp., Calcutta 1959
59LONDON	Conf.Nuclear Forces and Few-Nucleon Problem, London 1959
60BASEL	Conf. on Polarization Phenom. in Nuclear Reactions, Basel 1960
60VIENNA	Pile Neutron Research Symp., Vienna 1960
60WIEN	Neutron Inelastic Scattering Symp., Vienna 1960
61BOMBAY	Nuclear Physics Symp., Bombay 1961
61BRUSSELS	Neutron Time-of-Flight Colloquium, Brussels 1961
61DUBNA	Slow Neutron Physics Conf., Dubna 1961
61MANCH	Rutherford Conf., Manchester 1961
61RPI	Neutron Physics Symp., Rensselaer Polytech 1961
61SACLAY	Time of Flight Methods Conf., Saclay 1961
62PADUA	Nucl. Reaction Mechanisms Conf., Padua 1962
63BOMBAY	Nuclear and Solid State Physics Symp., Bombay 1963
63KRLSRH	Neutron Physics Conf., Karlsruhe 1963
64BOMBAY	Neutron Inelastic Scattering Symp., Bombay 1964
64GENEVA	3rd Conf. on Peaceful Uses Atomic Energy, Geneva 1964
64PARIS	Nuclear Physics Congress, Paris 1964
65CALCUTTA	Nuclear and Solid State Phys.Symp., Calcutta 1965
65KRLSRH	Pulsed Neutron Symp., Karlsruhe 1965
65SALZBURG	Physics and Chemistry of Fission Conf., Salzburg 1965
66BOMBAY	Nuclear and Solid State Physics Symp., Bombay 1966
66GATLNBG	Int. Conf. on Nuclear Physics, Gatlinburg, 1966
66MOSCOW	Nuclear Spectroscopy Conf., Moscow 1966
66PARIS	Nuclear Data For Reactors Conf., Paris 1966

66WASH	Neutron Cross-Section Technology Conf., Washington 1966
67BRELA	Light Nuclei Symp., Brela 1967
67JUELICH	Neutron Physics at Reactors Conf., Juelich 1967
67KARLSR	Symp. on Fast Reactor Physics,Karlsruhe 1967
68BOMBAY	Nuclear and Solid State Physics Symp., Bombay 1968
68COPENHGN	Neutron Inelastic Scattering Symp., Copenhagen 1968
68MADRAS	Nuclear and Solid State Physics Symp., Madras 1968
68WASH	Nuclear Cross-Sections & Technology Conf., Washington 1968
69ROORKEE	Nuclear and Solid State Physics Symp., Roorkee 1969
69VIENNA	Physics and Chemistry of Fission Symp., Vienna 1969
70ANL	Neutron Standards Symp., Argonne 1970
70HELSINKI	Nuclear Data for Reactors Conf., Helsinki 1970
70MADISON	Polarization Phenomena Conf., Madison 1970
70MADURAI	Nuclear and Solid State Physics Symp., Madurai 1970
71KIEV	Neutron Physics Conf., Kiev 1971
71KNOX	Conf. Neutron Cross Sections & Techology, Knoxville 1971
72BOMBAY	Nuclear and Solid State Physics Symp, Bombay 1972
72GRENOBLE	Neutron Inelastic Scattering Symp., Grenoble 1972
72KIEV	Nuclear Spectroscopy Conf, Kiev 1972
73BANGLO	Nuclear and Solid State Physics Symp.,Bangalore,1973
73KIEV	Conf.on Neutron Physics, Kiev 1973
73MUNICH	Conf. on Nuclear Physics,Munich 1973
73PACIFI	Conf. on Photonuclear Reactions, Pacific Grove 1973
73PARIS	Applications of Nuclear Data Symp., Paris 1973
74BOMBAY	Nuclear and Solid State Physics Symp., Bombay 1974
74PETTEN	Symp. on Neutron Capture Gamma Ray Spectroscopy, Petten 1974
75CALCUTTA	Nuclear and Solid State Physics Symp.,Calcutta,1975
75KIEV	Conf. on Neutron Phys., Kiev 1975
75WASH	Conf. on Nuclear Cross Sections and Technology, Washington 1975
75ZURICH	Symp. on Polarization Phenomena, Zuerich 1975
76AHMEDABA	Nuclear Physics & Solid State Physics Symp., Ahmedabad,1976
76LOWELL	Conf. on Interaction of Neutrons with Nuclei, Lowell 1976
77BNL	Symp. on Neutron Cross Sections at 10 - 40 Mev, Brookhaven 1977
77KIEV	Conf. on Neutron Physics, Kiev 1977
77NBS	Symp.on Neutron Standards, Gaithersburg 1977
77VIENNA	Symp. on Neutron Inelastic Scattering, Vienna 1977
78BNL	Symp. on Neutron Capture Gamma Ray Spectroscopy, Brookhaven 1978
78BOMBAY	Nuclear Physics and Solid State Physics Symp., Bombay 1978
78HARWELL	Conf. on Neutron Physics and Nuclear Data, Harwell 1978
79JUELICH	Symp. on Physics and Chemistry of Fission, Juelich 1979
79KNOX	Conf. on Nuclear Cross Sections fro Technology, Knoxville 1979
79MADRAS	Nuclear Physics and Solid State Physics Symp., Madras 1979
79SMOLENIC	Symp. on Neutron Induced Reactions, Smolenice 1979
80BERKELEY	Conf. on Nuclear Physics, Berkeley 1980
80BNL	Symp. on Neutron Cross Sections at 10-50 MeV, Brookhaven 1980

80KIEV	All-Union Conf. on Neutron Physics, Kiev 1980
80SANTA FE	Symp. on Polarization Phenomena in Nuclear Physics, Santa Fe 1980
81ANL	Neutron Scattering Conf., Argonne 1981
81BOMBAY	Nuclear Physics and Solid State Physics .Symp., Bombay 1981
81GRENOB	Symp. on Neutron Capture Gamma-Ray Spectroscopy, Grenoble 1981
82ANTWER	Conf. on Nuclear Data for Science and Technology, Antwerp 1982
82SMOLEN	Conf. on Neutron Induced Reactions, Smolenice 1982
83KIEV	All-Union Conf. on Neutron Physics, Kiev 1983
83MYSORE	Nuclear Physics and Solid State Physics Symp., Mysore 1983
84GAUSSIG	Symp. on Nuclear Physics, Gaussig 1984
84KNOX	Symp. on Capture Gamma Ray Spectroscopy, Knoxville 1984
85JUELIC	Conf. on Neutron Scattering in the Nineties, Juelich 1985
85SANTA	Conf.on Nuclesar Data for Basic and Applied Science, Santa Fe 1985
86DUBROV	Conf. on Fast Neutron Phys., Dubrovnik 1986
86HARROG	Nuclear Physics Conf., Harrogate 1986
87KIEV	Conf. on Neutron Physics, Kiev 1987
88BOMBAY	Nuclear Physics Symp., Bombay 1988
88MITO	Conf. on Nuclear Data for Science and Technology, Mito 1988
89LENING	50th Anniversary of Nuclear Fission, Leningrad 1989
89WASH	50 Years of Nuclear Fission, Washington D.C. 1989
91BEIJIN	Symp. on Fast Neutron Physics, Beijing 1991
91JUELIC	Conf. on Nuclear Data for Science and Technology, Juelich 1991
92BOMBAY	Nuclear Physics Symp., Bombay 1992
94GATLIN	Nuclear Data for Science & Technology, Gatlinburg 1994
96BUDA	Symp. on Capture Gamma Ray Spectroscopy, Budapest, 1996
96NOTRED	Nuclei in the Cosmos IV, Notre Dame, IN, 1996
97TRIEST	Nuclear Data for Science & Technology, Trieste, Italy, 1997
98VOLOS	Nuclei in the Cosmos V, Volos, Greece, 1998

Dictionary 15: History codes:: used with the keyword HISTORY.

A	Important alterations
C	Complied at the data center
D	Entry or subentry deleted
E	Transmitted to other data centers
L	Entered into data library
R	Data received at the data center
T	Converted from previous compilation
U	Unimportant alterations

Dictionary 16: Status codes: used with the keyword STATUS.

APRVD	Approved by author
COREL	Data correlated with another data set
CPX	Data taken from data file of McGowan, et al.
CURVE	Data read from a curve
DEP	Dependent data
NCHKD	Original reference not checked
NDD	Data converted from NEUDADA file
OUTDT	Normalization out-of-date
PRELM	Preliminary data
RIDER	Data converted from file of B.F. Rider
RNORM	Data renormalized by other than author
SCSRS	Data converted from SCISRS file
SPSDD	Data superseded
TABLE	Data received by center in tabular form
UNOBT	Data unobtainable from author

Dictionary 17: Related Reference codes: used with the keyword REL-REF.

A	Reference with which data agree
C	Critical remarks
D	Reference with which data disagree
E	Reference used in the evaluation
N	-
R	Reference from which data were used

Dictionary 18: Facility codes: used with the keyword FACILITY.

ACCEL	Accelerator
BETAT	Betatron
CCW	Cockcroft-Walton accelerator
CHOPF	Fast chopper
CHOPS	Slow chopper
CYCLO	Cyclotron
CYCTM	Tandem cyclotrons
CYGFF	Cyclograaff
DYNAM	Dynamitron
ESTRG	Electron storage ring
ICTR	Insulated core transformer accelerator
ISOCY	Isochronous cyclotron
LINAC	Linear accelerator
MESON	Meson facility
MICRT	Microtron
OLMS	On-line mass separator
OSCIP	Pile oscillator
REAC	Reactor
SELVE	Velocity selector
SPECC	Crystal spectrometer
SPECD	Double mass spectrometer
SPECM	Mass spectrometer
SYNCH	Synchrotron
SYNCY	Synchrocyclotron
VDG	Van de Graaff
VDGT	Tandem Van de Graaff

Dictionary 19: Incident Source codes: used with the keyword INC-SOURCE.

A-BE	Alpha-Beryllium
ARAD	Annihilation radiation
ATOMI	Atomic beam source
BRST	Bremsstrahlung
CF252	Spontaneous fission of 252Cf
CM244	Spontaneous fission of 244Cm
CM246	Spontaneous fission of 246Cm
CM248	Spontaneous fission of 248Cm
COMPT	Compton scattering
D-BE	Deuteron-Beryllium
D-C12	Deuteron-12C
D-C14	Deuteron-14C
D-D	Deuteron-Deuterium
D-LI	Deuteron-Lithium
D-LI7	Deuteron-7Li
D-N15	Deuteron-15N
D-T	Deuteron-Tritium
EVAP	Evaporation neutrons
EXPLO	Nuclear explosive device
HARD	Hardened
KINDT	Kinematically determined
LAMB	Lamb-shift source
LASER	Laser scattering
MPH	Monoenergetic photons
P-BE	Proton-Beryllium
P-D	Proton-Deuterium
P-LI7	Proton-7Li
P-T	Proton-Tritium
PHOTO	Photo-neutron
POLIS	Polarized ion source
POLNS	Polarized neutron source
POLTR	Polarized target
PU240	Spont.fission of 240Pu
QMPH	Quasi-monoenergetic photons
REAC	Reactor
SPALL	Spallation
TAGD	Electron tagged
THCOL	Thermal column
THRDT	Determined by threshold technique
VPH	Virtual photons

Dictionary 20: Additional Result Codes: used with the keyword ADD-RES.

A-DIS	Mass distribution
AMFF	Angular momentum of fission fragments
ANGD	Angular distribution
COMP	Comparison with calculated values
DECAY	Decay properties investigated
E-DIS	Energy distribution
G-SPC	Gamma spectra
LD	Level density
N-SPEC	Neutron spectra
P-SPEC	Proton spectra
POT	Parameters of nuclear potential
RANGE	Range of recoils measured
RECIP	Reciprocal data
STRUC	Nuclear structure data
THEO	Theory
TRCS	Total reaction cross section
TTY-C	Calculated thick target yield
Z-DIS	Charge distribution

Dictionary 21: Method Codes: used with the keyword METHOD.

ABSFY	Absolute fission yield measurement
ACTIV	Activation
AMS	Accelerator mass spectrometry
ASEP	Separation by mass separator
ASSOP	Associated particle
BCINT	Beam current integrated
BGCT	ß-? coincidence technique
BSPEC	ß-ray spectrometry
BURN	Burn-up
CADMB	Cadmium bath
CHRFL	Christiansen filter
CHSEP	Chemical separation
COINC	Coincidence
DIFFR	Diffraction
DSCAT	Double scattering
EDE	Particle identification by 'E/ΔE' measurement
EDEG	Energy degradation by foils
EXTB	Irradiation with external beam
FISCT	Absolute fission counting
FLUX	Neutron flux monitoring
FPGAM	Direct ?-ray spectrometry
GSPEC	γ- ray spectrometry
HADT	Heavy atom difference technique
HATOM	Hot atom method
HEJET	Collection by He jet
INTB	Irradiation with internal beam
JET	Collection by gas jet
LRASY	Left-right asymmetry
MAGFR	Magnetic field rotation
MANGB	Manganese bath
MASSP	Mass spectrometry
MOMIX	Mixed monitor
MOSEP	Separate monitor foil
OLMS	On-line mass separation
PHD	Pulse-height discrimination
PLSED	Pulse die-away
PSD	Pulse-shape discrimination
RCHEM	Radiochemical separation
REAC	Reactivity measurement
REC	Collection of recoils
REFL	Total reflection from mirrors
RELFY	Relative fission yield measurement
RVAL	R-value measurement
SFLIP	Spin flip

SHELT	Shell transmission
SITA	Single target irradiation
SLODT	Slowing-down time
STATD	Statistically determined
STTA	Stacked target irradiation
TOF	Time-of-flight

Dictionary 22: Detector Codes: used with the keyword DETECTOR.

BF3	BF3 neutron detector
BGO	Bismuth-germanate crystal detector
BPAIR	Electron-pair spectrometer
CEREN	Cerenkov detector
COIN	Coincidence counter arrangement
CSICR	Cesium-Iodide crystal
D4PI	4p detector
FISCH	Fission chamber
GE-IN	Germanium intrinsic detector
GELI	Ge(Li) detector
GEMUC	Geiger-Mueller counter
GLASD	Glass detector
HE3SP	3He spectrometer
HORBU	Hornyak button detector
HPGE	Hyperpure Germanium detector
IOCH	Ionization chamber
LONGC	Long counter
MAGSP	Magnetic spectrometer
MOXR	Moxon-Rae detector
MTANK	Moderating tank detector
MWPC	Position sensitive multi-wire proportional counter
NAICR	NaI(Tl) crystal
PLATE	Nuclear plates
PROPC	Proportional counter
PSSCN	Position sensitive scintillator
PSSSD	Position sensitive solid state detector
SCIN	Scintillation detector
SILI	Si(Li) detector
SOLST	Solid-state detector
STANK	Scintillator tank
SWPC	Position sensitive single-wire proportional counter
TELES	Counter telescope
THRES	Threshold detector
TRD	Track detector

Dictionary 23: Analysis Codes: used under the keyword ANALYSIS.

4PI1A	4p times differential cross section at one angle
AREA	Area analysis
CORAB	Correction for isotopic abundance
DECAY	Decay curve analysis
DIFFR	Difference spectrum
DTBAL	Detailed balance
INTAD	Integration of angular distribution
INTED	Integration of energy distribution
LEAST	Least-structure method
MLA	Multilevel analysis
PHDIF	Photon difference
PLA	Penfold-Leiss method
REDUC	Reduction method
REGUL	Regularization method
RFN	R-function formalism
SHAPE	Shape analysis
SLA	Single level analysis
THIES	Thies's method
UNFLD	Unfolding procedure
WSP	Woods-Saxon potential

Dictionary 24: Data Headings: used at the beginning of the COMMON and DATA fields to indicate the significance of the variable given; also used under the keywords ASSUMED, MONITOR, HALF-LIFE, MISC, and ERR-ANALYS as links to the data field.

The codes given in this dictionary may be followed by one of the following suffixes.

-1, -2, *etc.*	1st, 2nd, *etc.*, value, when more than one defined
-APRX	value is approximate
-CM	value is in center-of-mass (quantities without this suffix are in the laboratory system
-DN	value for denominator of a reaction ratio
-ERR	uncertainty on value
-MIN	minimum value
-MAX	maximum value
-MEAN	mean value
-NM	value for numerator of a reaction ratio
-NRM	value at which data is normalized
-RSL	resolution of value

ANAL-STEP	Analysis energy step
ANG	Angle
ASSUM	Assumed value, defined under ASSUMED
COS	Cosine of angle
DATA	Value of quantity Specified under REACTION
DECAY-FLAG	Decay flag. link to information under DECAY-DATA
E	Energy of outgoing particle
E-DGD	Degradation in secondary particle energy vs. incident energy
E-EXC	Excitation energy
E-GAIN	Gain in secondary particle energy vs. incident energy
E-LVL	Level energy
E-LVL-FIN	Final level of ? transition
E-LVL-INI	Initial level of ? transition
ELEMENT	Atomic number of element
EMS	Effective mass squared
EN	Energy of incident projectile
EN-DUMMY	Dummy incident projectile energy, for broad spectrum
EN-RES	Resonance energy
EN-RSL-FW	Incident projectile energy resolution (FWHM)
EN-RSL-HW	Incident projectile energy resolution (?? FWHM)
ERR	Systematic uncertainty, defined under ERR-ANALYS
ERR-S	Statistical uncertainty (1 s)
ERR-T	Total uncertainty (1 s)
FLAG	Flag, link to information under FLAG
HL	Half-life of nuclide specified
ISOMER	Isomeric state for nuclide given
KT	Spectrum temperature
LVL-FLAG	Level flag, link to information under LEVEL-PROP
LVL-NUMB	Level number

MASS	Atomic mass of nuclide
MASS-RATIO	Ratio of atomic masses of fission fragments
MISC	Miscellaneous information, defined under MISC-COL
MOM	Linear momentum of incident projectile
MOM-SEC	Linear momentum of outgoing particle
MOMENTUM L	Angular momentum (*l*) of resonance
MONIT	Normalization value, for reaction given under MONITOR
MSS-T	Transverse mass of outgoing projectile (relativistic data)
MSS-TK	Transverse mass minus rest mass of outgoing projectile (relativistic data)
MU-ADLER	μ (for Adler-Adler resonance parameters)
N-OUT	Number of emitted neutrons, for variable number of nucleons in reaction
NUMBER	Fitting coefficient number
P-OUT	Number of emitted protons, for variable number of nucleons in reaction
PARITY	Parity (p) of resonance
POL-BM	Beam polarization
POL-TR	Target polarization
POLAR	Polarity
Q-VAL	Q-value
RAP	Rapidity (relativistic data, function of (energy+mom(?))/(energy-mom(?))
RAP-PS	Pseudo rapidity (relativistic data, function of (mon+mom(?))/(mon-mom(?))
SPIN J	Spin (J) of resonance
STAT-W G	Statistical-weight factor (g)
TEMP	Sample temperature
THICKNESS	Sample thickness

Dictionary 30: Process Codes: used in REACTION subfield 3, and simarly under ASSUMED and MONITOR.

ABS	Absorption
EL	Elastic scattering
F	Fission
INL	Inelastic scattering
NON	Nonelastic (= total minus elastic)
PAI	Pair production (for photonuclear reactions)
SCT	Total scattering (elastic + inelastic)
THS	Thermal neutron scattering
TOT	Total
X	Process unspecified
XN	Variable number of emitted neutrons
YP	Variable number of emitted protons

Dictionary 33: Particle Codes: used in REACTION quantity subfields 2, 3, 7, and simarly under ASSUMED and MONITOR. Also used under the keywords DECAY-DATA, DECAY-MON, PART-DET and RAD-DET, and as the second field under the keywords EN-SEC, EMS-SEC, and MOM-SEC.

0	(no outgoing particles)
A	a particles
AR	Annihilation radiation
B	Decay β
B+	Decay β+
B-	Decay β-
D	Deuterons
DG	Decay γ
DN	Delayed neutrons
E	Electrons
EC	Electron capture
FF	Fission fragments
G	γ
HE3	^{3}He
HE6	^{6}He
HF	Heavy fragment
ICE	Internal-conversion electrons
LCP	Light charged particle (Z<7)
LF	Light fragment
N	Neutrons
P	Protons
PI	π, unspecified
PIN	π-
PIP	π+
PN	Prompt neutrons
RCL	Recoil nucleus
RSD	Residual nucleus
SF	Fragments from spontaneous fission
T	Tritons
XR	X-rays

Dictionary 34: Modifier Codes: used in REACTION the 4th quantity subfield (REACTION SF8), and similarly, under ASSUMED and MONITOR.

(A)	uncertain if corrected for natural isotopic abundance
1K2	form: k^2 dσ/dΩ = Σ (a(L)*p(L))
2AG	times 2 * isotopic abundance and statistical weight factor
2G	times 2 * staistical weight factor
2L2	form: dσ/dΩ = 1/2 Σ (2L+1)*a(L)*p(L)
2MT	times 2p * transverse secondary mass
2PT	times 2p* transverse secondary momentum
4AG	times 4 * isotopic abundance and statistical weight factor
4PI	times 4π
A	times natural isotopic abundance
AA	Adler-Adler formalism
AG	times isotopic abundance and statistical weight factor
AL1	Associated Legendre polynomials of the first kind
ANA	analyzing power
ASY	asymmetry of polarization of outgoing particles
AV	average
AYY	spin-correlation function, spins normal to scattering plane
BRA	Bremsstrahlung spectrum average
BRS	average over part of Bremsstrahlung spectrum
COS	Cosine coefficients
CS2	form: $a_0 + a_1*\sin^2 + a_2*\sin^2*\cos + a_3*\sin2*\cos^2$
EPI	epi-thermal neutron spectrum average
FCT	times a factor (see text)
FIS	fission spectrum average
FST	fast reactor neutron spectrum average
G	times statistical weight factor
L4P	form: 4π ds/dΩ = Σ (2L+1)*a(L)*p(L)
LEG	Legendre coefficients
LIM	given for a limited energy range
MSC	approximate definition only (see text)
MXW	Maxwellian average
PP	Incident projectile parallel/perpendicular to reaction plane
RAT	ratio
RAW	raw data (see text)
REL	relative data
RES	at peak of resonance
RM	Reich-Moore formalism
RMT	R-matrix formalism
RNV	non-1/v part
RS	times 4π/σ
RS0	(dσ/dΩ)/(dσ/dΩ at 0°) = Σ a(L)*p(L)
RSD	relative to 90° data
RSL	form: (4p/σ)*(dσ/dΩ) = Σ (2L+1)*a(L)*p(L)

RTE	times square-root(E)
RTH	relative to Rutherford scattering
RV	1/v part only
S0	times total peak cross section
S2T	form: $d\sigma/d\Omega = a_0 + a_1 * \sin^2(T) + a_2 * \sin^2(2*T)$
SN2	sum in the power of $\sin^2$
SPA	spectrum average
SQ	quantity squared
SS	spin-spin
SUM	sum
TT	measured for thick target
VGT	Vogt formalism

Dictionary 35: Data Type Codes: used in REACTION subfield 9.

CALC	Calculated data
DERIV	Derived data
EVAL	Evaluated data
EXP	Experimental data
RECOM	Recommended data

Dictionary 36: Quantity Codes: used for quantity (REACTION subfields 5-7), and simarlarly under ASSUMED and MONITOR. They may be combined with modifer codes from Dictionary 34 to form the complete quantity string. The code * in the 3rd field (SF7) signifies that any particle code from Dictionary 33 given in place of the character.

The following branch codes may appear at the beginning of the string:

CUM	cumulative
(CUM)	uncertain if reaction is cumulative
M+	including decay from metastable state
M-	excluding decay from metastable state
(M)	uncertain if decay from metastable state included.
SEQ	given for reaction sequence specified
UND	the reaction is undefined, only the sum of outgoing nucleons is known.
(DEF)	Compiler is uncertain whether the reaction is defined.

,AG,,AA	Adler-Adler symmetry coefficient
,AH,,AA	Adler-Adler asymmetry coefficient
,AKE	Average kinetic energy of outgoing particle
,AKE/DA,*	Avgerage kinetic energy of fission fragment at given angle
,ALF	Capture-to-fission cross section ratio
,AMP	Scattering amplitude
,AP	Most probable mass of fission products
,AP,*	Most probable mass of fragment specified
,ARE	Resonance area
,COR	Angular correlation
,COR,*/*	Angular correlation between particles specified
,COR,*/*/*	Angular correlation between particles specified
,D	Average level spacing
,DA	Differential cross section with respect to angle
,DA,*	Differential cross section with respect to angle for particle specified
,DA/DA	Double differential cross section $d^2\sigma/d\Omega/d\Omega$
,DA/DA,*/*	Double diff. cross section $d^2\sigma/d\Omega(*1)/d\Omega(*2)$
,DA/DA/DE	Triple diff.cross section $d^3\sigma/dA/dO/dE$
,DA/DA/DE,*/*/*	Triple diff.cross section $d^3\sigma/d\Omega(*1)/dO(*2)/dE(*3)$
,DA/DE	Double diff.cross section $d^2\sigma/d\Omega/dE$
,DA/DE,*	Double diff.cross section $d^2\sigma/d\Omega/dE$ of particle specified
,DA/DE/DE,*/*/*	Triple diff.cross section $d^3\sigma/d\Omega(*1)/dE(*2)/dE(*3)$
,DA/KE,*	Kinetic energy of fission fragment specified with respect to angle
,DA/TYA,P	Differential cross section with respect to Treiman-Yang angle
,DE	Energy spectrum of outgoing particles
,DE,*	Energy spectrum of particle specified
,ECO	Energy correlation
,EMC	Effective mass correlation
,EN	Resonance energy
,ETA	Neutron yield (η)
,ETA/NU	$\eta / \bar{\nu}$

,FM/DA	Angular distribution, of 1st kind
,FM2/DA	Spin-polarization probability of 1st kind
,INT	Cross-section integral over incident energy
,J	Spin J
,KE,*	Kinetic energy of fission fragments specified
,KER	Kerma factor
,L	Momentum l
,LDP	Level density parameter
,MCO	Linear momentum correlation
,MLT	Multiplicity of outgoing particle
,MLT,*	Multiplicity of particle specified
,NU	Total neutron yield ($\bar{\nu}$)
,PHS	Relative phase
,PN	Delayed neutron emission probability
,POL	Spin-polarization probability
,POL,*	Spin-polarization probability of particle specified
,POL/DA	Spin-polarization probability $d\sigma/d\Omega$
,POL/DA,*	Diff. spin-polarization probability $d\sigma/d\Omega$ of particle specified
,PTY	Parity
,PY	Product yield
,RAD	Scattering radius
,RI	Resonance integral
,SCO	Spin-cut-off factor
,SGV	Reaction rate (s*velocity)
,SIG	Cross section
,SIG,*	Cross section for production of particle specified
,SIG/RAT	Cross section ratio
,SIG/TMP	Temperature-dependent cross section
,SPC	Gamma spectrum
,SPC/DA	Gamma spectrum as function of angle
,STF	Strength function
,SWG	Statistical weight factor g
,TEM	Nuclear temperature
,TTT	Thick-target yield per unit time
,TTT/DA	Thick-target yield per unit time $dY/d\Omega$
,TTY	Thick-target yield
,TTY/DA	Differential thick target yield $dY/d\Omega$
,TTY/DA/DE	Differential thick target yield $dY/d\Omega/dE$
,TTY/DE	Differential thick target yield dY/dE
,WID	Resonance width, Γ
,WID/RED	Reduced width, Γ_0
,ZP	Most probable charge of fission products
1,WID	Resonance width for channel 1
2,DE	Energy spectrum of 2nd secondary particle
2,WID	Resonance width for channel 2
3,WID	Resonance width for channel 3

4,WID	Resonance width for channel 4
BA,AMP	Bound-atom scattering amplitude
BA,SIG	Bound-atom cross section
BA/COH,AMP	Bound-atom coherent scattering amplitude
BA/PAR,AMP	Partial bound-atom scattering amplitude
BIN,AKE,*	Average kinetic energy of fission fragment specified
BIN,AP,*	Most prob. mass of fission fragment specified in binary fission
BIN,SIG	Binary fission cross section
BIN/TER,DA/RAT,*	Binary/ternary differential dist. $d\sigma/d\Omega$ of fission fragment specified
BIN/TER,SIG/RAT	Binary/ternary cross section ratio
CHG,FY	Total element yield of fission products
CHG,FY/DE	Total element fission yield, differential dY/d(fragment energy)
CHN,FY	Total chain yield of fission products
CHN,FY/DE	Total chain fission yield, differential dY/d(fragment energy)
CN,DA	Differential cross section $d\sigma/d\Omega$, compound nucleus contribution
CN,FY	Fission-product yield, compound nucleus contribution
CN,NU	?v, compound nucleus contribution
CN,PY	Product yield, compound nucleus contribution
CN,SIG	Cross section, compound nucleus contribution
CN/PAR,SIG	Partial cross section, compound nucleus contribution
COH,AMP	Coherent scattering amplitude
COH,SIG	Coherent cross section
CUM,FY	Cumulative fission-product yield
CUM,FY/RAT	Cummulative fission-product yield isomeric ratio
CUM/TER,FY	Cumulative fission product yield for ternary fission
DI,DA	Differential c/s $d\sigma/d\Omega$, direct interaction contribution
DI,DA/DE	Double diff. c/s $d^2\sigma/d\Omega/dE$, direct interaction contribution
DI,SIG	Cross section, direct interaction contribution
DI/PAR,DA	Partial diff. c/s $d\sigma/d\Omega$, direct interaction contribution
DI/PAR,DA/DE	Partial double diff. c/s d2/dA/dE, direct interaction contribution
DI/PAR,SIG	Partial cross section, direct interaction contribution
DL,AKE,*	Average kinetic energy of delayed particle specified
DL,DE,*	Delayed energy spectrum of particle specified
DL,NU	Delayed neutron yield
DL,SIG,*	Delayed emission cross section of particle specified
DL,SPC	Intensity of delayed gammas
DL/PAR,AKE,*	Average kinetic energy for specified delayed particle group
DL/PAR,DE,*	Energy spectrum for specific delayed particle group
DL/PAR,NU	Partial yield of delayed neutrons
DL/PAR,SIG,*	Partial delayed emission cross section for particle specified
EM,DA	Particle emission angular distribution
EM,DA/DE	Double differential emission cross section, $d\sigma/d\Omega/dE$
EM,DE	Particle emission energy spectrum
EM,SIG	Emission cross section
EM/PAR,DA	Particle emission partial differential cross section, $d\sigma/d\Omega$
EM/PAR,SIG	Partial emission cross section

EP,DA	Partial differential cross section dσ/dΩ for electric polarity
EP,SIG	Cross section for electric polarity
EP/PAR,INT	Cross section integral over incident energy for electric polarity
EP/PAR,SIG	Partial cross section for electric polarity
FA,SIG	Free-atom cross section
FA/COH,SIG	Free-atom coherent scattering cross section
FA/INC,SIG	Free-atom incoherent scattering cross section
FA/PAR,AMP	Partial free-atom scattering amplitude
HEN,SIG	'High-energy' component of cross section
INC,AMP	Incoherent scattering amplitude
INC,SIG	Incoherent scattering cross section
IND,FY	Independent fission yield
IND,FY,*	Independent yield of particle specified from prompt fission prod.
IND,FY/DE	Differential independent fission yield dY/d(fragment energy)
IND,FY/RA	Independent fission yield ratio
IND/TER,FY	Independent fission yield for ternary fission
LEN,SIG	'Low-energy' component of cross section
MP,SIG	Cross section for magnetic polarity given
PAR,ARE	Partial resonance area
PAR,COR	Partial reaction, angular correlation
PAR,DA	Partial differential cross section, dσ/dΩ
PAR,DA,*	Partial differential cross section, dσ/dΩ, of particle specified
PAR,DA/DA	Partial double differential cross section $d^2\sigma/d\Omega/d\Omega$
PAR,DA/DA,*/*	Partial double differential cross section $d^2\sigma/d\Omega(*1)/d\Omega(*2)$
PAR,DA/DA/DE,*/*/*	Partial triple differential cross section $d^3\sigma/d\Omega(*1)/d\Omega(*2)/dE(*3)$
PAR,DA/DE	Partial double differential cross section dσ/dΩ
PAR,FM/DA	Partial differential cross section, dσ/dΩ, for polynomial of 1st kind
PAR,INT/DA,*	Integral over incident en. of partial diff. c/s, dσ/dΩ, of particle specified
PAR,MLT,*	Partial multiplicity of particle specified
PAR,NU	Partial yield of neutrons $\bar{\nu}$
PAR,POL/DA	Differential spin-polarization probability for partial reaction
PAR,SIG	Partial cross section
PAR,SIG,*	Partial cross section for particle specified
PAR,STF	Partial strength function
PAR,TTY	Partial thick target yield
PAR,TTY,*	Partial thick target yield for particle specified
PAR,WID	Partial width
POT,RAD	Potential scattering radius
POT,SIG	Potential scattering cross section
PR,AKE,N	Average kinetic energy of prompt neutrons
PR,COR,N/N	Angular correlation of prompt neutrons
PR,COR/DE,N/FF	Angle-energy correlation of prompt neutrons with fission fragments
PR,DA,N	Differential cross section, dσ/dΩ of prompt neutrons
PR,DA/DE,N	Double differential cross section of prompt neutrons, d2σ/dΩ/dE
PR,DE,N	Energy spectrum of prompt fission neutrons
PR,NU	Prompt neutron yield ($\bar{\nu}$)

PR,SIG	Prompt cross section
PR,SPC	Intensity of prompt gammas
PR/PAR,NU	Partial prompt neutron yield ($\bar{\nu}$)
PR/TER,DA,N	Ang.dist.of prompt neutrons from ternary fission
PR/TER,NU	Prompt $\bar{\nu}$ for ternary fission
PR/TER,NU/DE,A	Prompt $\bar{\nu}$ for ternary fission as a function of alpha energy
PR/TER,SPC	Prompt gamma spectrum from ternary fission
PRE,AKE,*	Average kinetic energy of fragment specified
PRE,AP,*	Most probable mass, pre-neutron-emission, of fragment specified
PRE,DA,*	Differential cross section, $d\sigma/d\Omega$, of primary fragments specified
PRE,DA/KE,*	Kinetic energy distribribution, $d\sigma/d\Omega$, of primary fragment specified
PRE,DE,*	Energy spectrum of primary fragments specified
PRE,FY	Primary fission yield
PRE,FY/DE	Primary fission yield dY/d(kinetic energy)
PRE,KE,*	Kinetic energy of primary fragments specified
PRE/BIN,FY	Primary fission yield, binary fission
PRE/TER,FY	Primary fission yield, ternary fission
SEC,AKE,FF	Average kinetic energy of post-neutron-emission fragment
SEC,AP,*	Most probable mass of post-neutron-emission fragment specified
SEC,FY	Post-neutron-emission fission yield
SEC/CHN,FY	Pre-delayed-neutron chain yield
SEC/CHN,FY/DE	Pre-delayed-neutron chain yield dY/d(kinetic energy)
TER,AKE,*	Average kinetic energy of particle specified, ternary fission
TER,AP	Most probable mass of fragment, ternary fission
TER,AP,*	Most prob. mass of ternary fission fragment specified
TER,COR,*/*	Angular correlation of particle *1 & particle *2, ternary fission
TER,DA,*	Differential cross section, $d\sigma/d\Omega$, of particle specified, ternary fission
TER,DA/DE,*	Double-differential cross sect. $d^2\sigma/d\Omega/dE$ of particle spec., ternary fission
TER,DA/KE,*	Kinetic energy distribution, $dE_{kin}/d\Omega$, of particle specified, ternary fission
TER,DE,*	Energy spectrum of particle specified, ternary fission
TER,FY	Fission yield, ternary fission
TER,FY,*	Fission yield of fragment specified, ternary fission
TER,SIG	Cross section, ternary fission
TER,SIG,*	Cross section of particle specified, ternary fission
TER,ZP	Most probable charge of fragment, ternary fission
TER/BIN,SIG/RAT	Ternary/binary fission cross section ratio

Dictionary 37: Result Codes: used with the keyword RESULT.

CAPTA	$g\,\Gamma_n\,\Gamma\gamma\,/\,\Gamma$
FRCUM	Fractional cumulative yield
FRIND	Fractional independent yield
RVAL	R-value

Appendix E

Example of an EXFOR Entry

Attached is an example of a complete entry in the EXFOR format.

```
TRANS               X023   20000424                                   X005500000000
ENTRY              X0055   20000424                                   X005500000001
SUBENT          X0055001   20000424                                   X005500100001
BIB                   11         20                                   X005500100002
INSTITUTE  (1USAPEN,4RUSKUR)                                          X005500100003
REFERENCE  (J,PR/C,49,2549,199405)                                    X005500100004
AUTHOR     (R.W.ZURMUHLE,Z.LIU,D.R.BENTON,S.BARROW,N.WIMER,           X005500100005
           Y.MIAO,C.LEE,J.T.MURGATROYD,X.LI,V.Z.GOLDBERG,             X005500100006
           M.S.GOLOVKOV)                                              X005500100007
TITLE      Observation of 12C cluster transfer by angular             X005500100008
           correlation measurements                                   X005500100009
FACILITY   (VDGT,1USAPEN)                                             X005500100010
SAMPLE     A 30 microg/cm**2 self-supporting 12C target used.         X005500100011
METHOD     (BCINT,SITA)                                               X005500100012
DETECTOR   (MAGSP) Deuterons were momentum analyzed in a double       X005500100013
           focusing magnetic spectrometer.                            X005500100014
           (PSSSD) Deuterons were detected in the focal plane         X005500100015
           with double-sided position sensitive silicon               X005500100016
           detector covered with a Ta foil to stop beam               X005500100017
           particles that otherwise might strike the detector.        X005500100018
ADD-RES    (COMP).Distorted Wave Born Approximation and Hauser        X005500100019
           Feshbach Formalism.                                        X005500100020
STATUS     (APRVD) Approved by author, 5 April 2000.                  X005500100021
HISTORY    (20000327C)                                                X005500100022
ENDBIB                22          0                                   X005500100023
NOCOMMON               0          0                                   X005500100024
ENDSUBENT             23          0                                   X005500199999
SUBENT          X0055002   20000424                                   X005500200001
BIB                    6         15                                   X005500200002
REACTION   (6-C-12(7-N-14,D+A)10-NE-20,PAR,DA/CRL)                    X005500200003
EN-SEC     (E-EXC1,12-MG-24)                                          X005500200004
           (E-EXC2,10-NE-20)                                          X005500200005
           ANG1 is angle between incident beam and deuterons.         X005500200006
           ANG2 is angle between deuterons and alpha particles.       X005500200007
DETECTOR   An annular detector subdivided into ten segments,          X005500200008
           also used at small angles. Each annulus had a width        X005500200009
           of 12 mm and was separated from adjacent segments          X005500200010
           with 1-mm wide inactive masks.                             X005500200011
ERR-ANALYS (DATA-ERR) Uncertainty read from figures.                  X005500200012
           (ANG2-ERR) Data-point reader uncertainty.                  X005500200013
FLAG       (1.) Data taken with the annular detector.                 X005500200014
           (2.) Data taken with position sensitive strip              X005500200015
           detectors.                                                 X005500200016
STATUS     (CURVE) Data scanned from Fig.3 in reference.              X005500200017
ENDBIB                15          0                                   X005500200018
COMMON                 4          3                                   X005500200019
ANG1       E-EXC1     E-EXC2     ANG2-ERR                             X005500200020
ADEG       MEV        MEV        ADEG                                 X005500200021
  0.       13.45        0.       0.4                                  X005500200022
ENDCOMMON              3          0                                   X005500200023
DATA                   5         95                                   X005500200024
EN         ANG2-CM    DATA       DATA-ERR   FLAG                      X005500200025
MEV        ADEG       ARB-UNITS  ARB-UNITS  NO-DIM                    X005500200026
 33.         8.0       71.        16.         1.                      X005500200027
 33.        11.3       34.         8.         1.                      X005500200028
 33.        14.5       35.         7.         1.                      X005500200029
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 33.        16.7      30.         4.         2.                      X005500200030
 33.        17.3      26.         5.         1.                      X005500200031
  ...        ...       ...         ...        ...
 33.       108.0      11.0        4.0        2.                      X005500200075
 42.        11.4      28.0        4.         1.                      X005500200076
 42.        15.9      17.7        2.         1.                      X005500200077
 42.        17.7      18.7        2.5        2.                      X005500200078
 42.        19.9      16.7        1.8        1.                      X005500200079
  ...        ...       ...         ...        ...
 42.       112.7      5.9         1.5        2.                      X005500200122
ENDDATA            97          0                                     X005500200123
ENDSUBENT         122          0                                     X005500299999
SUBENT       X0055003   20000424                                     X005500300001
BIB                 3          3                                     X005500300002
REACTION   (6-C-12(7-N-14,D+A)10-NE-20,PAR,DA,D)                     X005500300003
ERR-ANALYS (DATA-ERR) Relative uncertainty given.                    X005500300004
STATUS     Data taken from Table III in reference.                   X005500300005
ENDBIB              3                                                X005500300006
COMMON              1          3                                     X005500300007
EN         E-EXC                                                     X005500300008
MEV        MEV                                                       X005500300009
 33.        13.45                                                    X005500300010
ENDCOMMON           3                                                X005500300011
DATA                3          5                                     X005500300012
ANG        DATA       DATA-ERR                                       X005500300013
ADEG       MB/SR      PER-CENT                                       X005500300014
  6.01      0.39      10.                                            X005500300015
 12.3       0.40      10.                                            X005500300016
 18.3       0.27      11.                                            X005500300017
 30.4       0.28      11.                                            X005500300018
 36.5       0.27      11.                                            X005500300019
ENDDATA             7                                                X005500300020
ENDSUBENT          19                                                X005500399999
SUBENT       X0055004   20000424                                     X005500400001
BIB                 3          3                                     X005500400002
REACTION   (6-C-12(7-N-14,D+A)10-NE-20,PAR,SIG)                      X005500400003
ANALYSIS   (INTAD)                                                   X005500400004
ERR-ANALYS (DATA-ERR) Absolute uncertainty given.                    X005500400005
STATUS     (DEP,X0055003) Data taken from text in reference.         X005500400006
ENDBIB              3                                                X005500400007
NOCOMMON            0          0                                     X005500400008
DATA                3          1                                     X005500400009
EN         E-LVL      DATA       DATA-ERR                            X005500400010
MEV        MEV        MB         MB                                  X005500400011
 33.        13.45       3.6        0.5                               X005500400012
ENDDATA             3                                                X005500400013
ENDSUBENT          12                                                X005500499999
ENDENTRY            3                                                X005599999999
ENDTRANS            1                                                Z999999999999
```