BNL–NCS–63380
INFORMAL REPORT

EXFOR Basics

A Short Guide to the Nuclear Reaction Data Exchange Format

Victoria McLane

National Nuclear Data Center

on behalf of the

Nuclear Data Centers Network

July 1996

Brookhaven National Laboratory
Upton, NY 11973-5000, USA

Acknowlegements

This work was performed under the auspices of the U. S. Department of Energy, Division of Nuclear Physics, Office of Energy Research.

The author would like to thank the members of the Nuclear Data Center Network, especially, H. D. Lemmel and O. Schwerer of the International Atomic Energy Agency Nuclear Data Section, for their contributions.

Table of Contents

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 data between the Nuclear Reaction Data Centers[2]. In addition to storing the data and its' bibliographic information, experimental information, including source of uncertainties, is also compiled. The status and history of the data set is also included, *e.g.*, the source of the data, any updates which have been made, and correlations to other data sets.

EXFOR was originally conceived for the exchange of neutron data through discussions held between personnel from laboratories situated in Saclay, Vienna, Livermore and Brookhaven, and accepted as a result of a meeting of the neutron data centers at Saclay, Vienna, Brookhaven and Obninsk, held in Moscow in November, 1969. As a result of two meetings held in Vienna in 1975/1976 and attended by an increased number of data centers, the format was further developed, and finally adapted to cover all types of nuclear reaction data.

EXFOR is designed for flexibility in order to meet the diverse needs of the nuclear data compilation centers. This 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 exchange format, as outlined, allows a large variety of numerical data tables with explanatory and bibliographic information to be transmitted in an easily machine-readable format (for checking and indicating possible errors) and a format that can be read by personnel (for passing judgement on and correcting any errors indicated by the machine).

The data presently included in the EXFOR exchange 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.

---

[1] For a complete guide to the EXFOR System, see Nuclear Data Center Network, *EXFOR Manual: Nuclear Reaction Data Format*, Report BNL-NCS-63330 (1996), edited by V. McLane, Brookhaven National Laboratory, U. S. A.

[2] See Appendix A for information on obtaining nuclear reaction data, including a list of the Nuclear Reaction Data Centers and their areas of responsibility.

EXCHANGE FILE FORMAT

An exchange file consists of 80-character records, and contains a number of entries (works); each entry is assigned an accession number. An entry is divided into a number of subentries (data tables); each subentry is assigned a subaccession number (the accession number plus a subentry number). The subaccession numbers are associated with the table throughout the life of the EXFOR system.

The subentries are further subdivided into bibliographic or descriptive information (hereafter called BIB information), common data that applies to all lines of a data table in a subentry and, finally, a data table.

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. In order to accomplish this, the first subentry of each work, which is given subentry number one, must contain only information that applies to all other subentries; it does not contain a data table. This subentry is subdivided into common BIB information (alphanumeric) and common data (numeric) information. Two levels of hierarchy are thereby established to avoid repetition of information. See figure on page 4.

Record identification

The format of columns 1-66 of each record is dependent on the record type. Columns 67-80 are used to identify uniquely all records and to flag altered records. These columns are divided into five fields as follows:

67-71	Accession number	} Subaccession number
72-74	Subentry number	
75-79	Sequence number	
80	Alter flag	

System identifiers

Each of the sections of an EXFOR entry begins and ends with a system identifier. Each of the following basic system identifiers refers to one of these sections.

TRANS	- A file in 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

These basic system identifiers are combined with the modifiers

NO
END

to indicate three conditions:

- The beginning of a unit (basic system identifier only)
- The end of unit (modifier END preceding the basic system identifier)
- A positive indication that a unit is intentionally omitted (modifier NO preceding the basic system identifier)

The following system identifiers records are defined:

1. A **transmission** is:

   Headed by TRANS CXXX yymmdd
   CXXX = file identification
   yymmdd = date file was generated

   Ended by ENDTRANS N1
   N1 = number of entries on the file

2. An **entry** is:

   Headed by ENTRY CXXXX yymmdd
   CXXXX = accession number
   yymmdd = date entry was last updated

   Ended by ENDENTRY N1
   N1 = Number of subentries in the entry (including NOSUBENT's).

3. A **subentry** is:

   Headed by SUBENT N1 yymmdd
   N1 = subaccession number
   yymmdd = date subentry was last updated

   Ended by ENDSUBENT N1
   N1 = number of records in the subentry (excluding SUBENT and ENDSUBENT records)

   If a subentry has been deleted, the following record is included in the file:
   NOSUBENT N1 yymmdd
   N1 = subaccession number
   yymmdd = date subentry was last deleted

4. A **BIB Section** is:

   Headed by BIB N1 N2
   N1 = Number of keywords in the BIB section
   N2 = number of records in the BIB section

   Ended by ENDBIB N1
   N1 = number of records in the BIB section (excluding BIB and ENDBIB records)

   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 or records in the common data section (including data titles and units, excluding COMMON and ENDCOMMON records)

   Ended by ENDCOMMON N1

   N1 = number or records in the common data section (including data titles and units, excluding COMMON and ENDCOMMON records)

   If no COMMON section is given, the following record is included:

   NOCOMMON

6. A **DATA Section**[3] is:

   Headed by DATA N1 N2

   N1 = number of fields in the data table

   N2 = number of lines (rows) in the data table

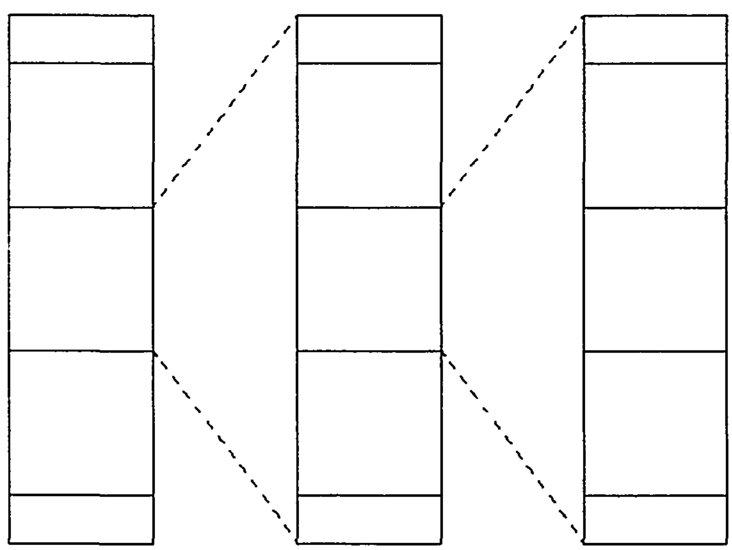
   Ended by ENDDATA N1

   N1 = number of records in the data table section (including data titles and units; excluding DATA and ENDDATA records)

   If no DATA section is given, the following record is included:

   NODATA

The transmission file has the following form:



[3] The DATA section (or NODATA) does not appear in the first (or common) subentry.

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)
-	(minus)
.	(decimal point/full stop)
)	(right parenthesis)
(	(left parenthesis)
*	(asterisk)
/	(slash)
=	(equals)
'	(apostrophe)
,	(comma)
%	(percent)
<	(less than)
>	(greater than)
:	(colon)
;	(semi-colon)
!	(exclamation mark)
?	(question mark)
&	(ampersand)

BIB SECTION

The BIB Section contains the bibliographic (*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 up to four 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 (see page ?)

Information-identifier keywords are used to identify specific information, which may be given in coded form, with or without free text explanation, or in free text without codes. These keywords may, in general, appear in any order within the BIB section.

BIB information for a given subentry consists of the information contained in the BIB section of that subentry together with the BIB information in subentry 001. Therefore, 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 Pointers, page 15).

An information-identifier keyword is not repeated within any one BIB section; for continuation records, the keyword is blank. 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. See example on page 12.

Information-identifier keyword table. For more details of the usage of these keywords, see Appendix B.

	Keyword	Links to data heading
Bibliography	TITLE	
	AUTHOR	
	INSTITUTE	
	EXP-YEAR	
	REFERENCE	
	REL-REF	
	MONIT-REF	
Data Specification	REACTION	
	RESULT	
Related Data	MONITOR	MONIT, *etc.*
	ASSUMED	ASSUM, *etc.*
	DECAY-DATA	DECAY-FLAG
	DECAY-MON	
	PART-DET	
	RAD-DET	
	HALF-LIFE	HL1, *etc.*
	EN-SEC	E1, *etc.*
	EMS-SEC	EMS1, *etc.*
	MOM-SEC	M1, *etc.*
	MISC-COL	MISC, *etc.*
	FLAG	FLAG
Physics	INC-SOURCE	optional
	INC-SPECT	EN-DUMMY,EN-MEAN,KT
	SAMPLE	
	METHOD	
	FACILITY	
	ANALYSIS	
	DETECTOR	
	CORRECTION	
	COVARIANCE	
	ERR-ANALYS	ERR-, or -ERR1, *etc.*
Other	ADD-RES	
	COMMENT	
	CRITIQUE	
Bookkeeping	STATUS	
	HISTORY	

Machine-retrievable information (Codes)

Machine-retrievable information (code) may be used:

- to define the actual BIB information,
- as a link to the COMMON and DATA section,
- to code numerical data.

The code is enclosed in parentheses and left adjusted so that the opening parenthesis appears in column 12. Several codes may be associated with a given information-identifier keyword.

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

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

In general, 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.

Codes may be used singly or in conjunction with one or more other codes. 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;

b.) each code on a separate record, enclosed in it's own set of parenthesis starting in column 12, followed by free text.

However, for keywords for which the code string includes retrievable information in addition to a code, only (b) is permitted.

Examples:

```
STATUS(DEP)
STATUS(DEP,COREL)
STATUS(DEP,10048007)
```

Free text

Free text may be entered in columns 12-66 under each of the information-identifier keywords in the BIB section and may be continued onto any number of records. It may include parentheses, if necessary, although, a left parenthesis in the text ***will not*** be used in column 12 (as this implies the opening parenthesis of machine-retrievable information).

The language of the free text is English.

Codes and free text

In general, coded information given with an information-identifier keyword is for the purpose of machine processing and the free text is self-explanatory. That is, coded information is expanded into clear English and amplified as necessary in the free text. However, for some keywords, such an expansion of the codes is not given, on the assumption that such expansion will be done by an editing program. For other keywords, an indication may be given that the coded information is not expanded in the free text.

An indication that the code is not expanded is given by:

either a decimal point/full stop immediately following the closing parenthesis,
or a completely blank field between the closing parenthesis and column 66.

Coding of nuclides and compounds.

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

- Z mass number; up to 3 digits, no leading zeros
- S element symbol; 1 or 2 characters
- A atomic weight; up to 3 digits, no leading zeroes. A single zero denotes natural isotopic composition.
- X isomer code denoting the isomeric state
  X may have the following values:
  - G for ground state (of a nucleus which has a metastable state); omitted if there are no metastable states
  - M if only one metastable state is known
  - 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-M1
```

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

Example: `26-FE-CMP`

Examples of BIB Sections

```
1   11    12                22
ENTRY       00001
SUBENT      00001001
BIB
AUTHOR      (J.W.DOW,M.P.JONES)  This space may contain any free text.
                       The beginning of a new BIB entry is indicated by a
                       non-blank in the keyword field (columns 1-10).
INSTITUTE   (3AAABBB)  Since the keyword field is non-blank, this is
                       considered a new BIB entry.
INC-SOURCE  (ABC,WXYZ) This is an example of a BIB entry with more than
                       one piece of machine-retrievable information in one
                       set of parenthesis.  The absence of a pointer in
                       column 11 shows that this information refers to all
                       data.
COMMENT     This is an example of a BIB entry without machine-retrievable
            information.
          1 The pointer in column 11 indicates that this record, and the
            following records until a new pointer is encountered, refer to
            all data with the same pointer in all following subentries.
ENDBIB
NOCOMMON
ENDSUBENT
SUBENT      00001002
BIB
REACTION  1 (92-U-235(N,EL),,WID)       This is an example of multiple
          2 (92-U-235(N,F),,WID)        reactions with pointers
ANALYSIS  1 (CDEFG).   This is an example of a BIB entry with more than
                       one piece of machine-retrievable information, each
                       coded in its own
          2 (HIJ).     set of parenthesis.  Each part of the BIB entry is
                       linked by a pointer in column 11 to other
                       information in this subentry and in subentry 1 with
                       the same pointer.  The point after the closing
                       parenthesis indicates that the contents of the code
                       in parenthesis is not expanded in free text, as
                       would be required if the point were absent.
ENDBIB
NOCOMMON
DATA
EN          DATA      1 DATA-ERR  1 DATA      2
EV          MILLI-EV    MILLI-EV    MILLI-EV

ENDDATA
ENDSUBENT
ENDENTRY
```

COMMON AND DATA SECTIONS (Data Tables)

A data table is, generally, a function of one or more independent variables: *i.e.*, X, X′ vs. Y with associated errors for X, X′ and Y (*e.g.*, X = energy; X′ = angle; Y = differential cross section) and any associated variables (*e.g.*, standard).

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′ is 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)

The format of the common data (COMMON) and point data (DATA) sections is identical. Each section is a table of data with a heading and units associated with each field. The only difference between the common data and the point data table is that the common data contains constant parameters that apply to each line of a point data table. The point data table contains rows of information; each row, generally, contains values as a function of one or more independent variables (*e.g.*, angle, angular error, cross section, cross section error).

Each record contains six information fields, each 11 columns wide, up to six fields of information may be contained on a record. If more than six fields are used, the remaining information is continued on the following record(s). The number of fields in each section 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 point value, the remaining two fields are left blank, and, in the case of the data point table, the information for the next point 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 section are as follows:

- Field headings left adjusted to the beginning of each field (columns 1, 12, 23, 34, 45, 56). Plus, perhaps, a pointer[4], placed in the last (eleventh) column of a field heading to link the field with specific BIB records, COMMON fields, and/or DATA fields of the same subentry or subentry 001.
- Data units left adjusted to the beginning of each field) columns 1, 12, 23, 34, 45, 56).

[4] See page 13 for information on pointers.

- The numerical data which is fortran-readable using an "E" format.

  FORTRAN-readable according to an "E format means, in detail:

  - 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 number is entered for a given field, and successive fields are not integrally associated with one another.

1	12	23	34	45	56	66
COMMON						
EN	EN-ERR	E	E-ERR			
MEV	MEV	MEV	MEV			
2.73	0.16	1.38	0.21			
ENDCOMMON						

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	ANG	
ANG-ERR						
MEV	MEV	MEV	MEV	MEV	ADEG	
ADEG						
4.1	0.05	0.1	3.124	3.175	90.	
10.						
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 in the left-most independent variable. Values in following independent-variable fields are monotonic until the value in the preceding independent-variable field 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 on page ?). 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     :          :
 10.4     : 0.8      : 234.     : 8.7      :          :          :
 22.9     : 1.2      : 127.     : 4.2      :          :          :
 39.1     : 0.9      :          :          :83.2      :          :
 59.1     : 0.7      : 14.8     : 2.9      :          :          :
ENDDATA   :          :          :          :          :          :
```

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.

In the BIB section, the pointer is given on the first record of the information to which it is attached and is not repeated on continuation records. The pointer is assumed to refer to all BIB information until either another pointer is encountered, or until a new information-identifier keyword is encountered. This implies that pointer-independent information for each keyword appears first.

Appendix A

Nuclear Reaction Data Centers

Principal Centers and their service areas[1].

United States and Canada National Nuclear Data Center Bldg. 197D Brookhaven National Laboratory P. O. Box 5000 Upton, NY11973-5000 USA	Responsibility for: 1, C, L, P Telephone: +1 516-344-2902 Fax: +1 516-344-2806 Internet: nndc@bnl.gov or nndc*nn*@bnl.gov[2] WWW: http://www.nndc.bnl.gov
O. E. C. D. Nuclear Energy Agency NEA Data Bank 12, boulevard des Iles 92130 Issy-les-Moulineaux FRANCE	Responsibility for: 2 Telephone: +33 (1) 45 24 10 71 Fax: +33 (1) 45 24 11 10 Internet: nea@nea.fr or *name*@nea.fr WWW: http://www.nea.fr
Russian Federation Federal Research Center IPPE Centr Yadernykh Dannykh Ploschad Bondarenko 249 020 Obninsk, Kaluga Region RUSSIA	Responsibility for: 4, Q Telephone: +7 084-399-8982 Telefax: +7 095-230-2326 Internet: manokhin@cjd.obninsk.su
Remaining Countries IAEA Nuclear Data Section Wagramerstr. 5 P.O.Box 100 A-1400 Vienna AUSTRIA	Responsibility for: 3, D, G, V Telephone: +43 (1) 2360-1709 Telefax: +43 (1) 234 564 Internet: *name*@iaeand.iaea.or.at

Other Participating Centers

Russian Nuclear Structure and Nuclear Reaction Data Center National Scientific Research Center Kurchatov Institute 46 Ulitsa Kurchatova 123 182 Moscow RUSSIA	Responsibility for: A, B Telephone: +7 095 196 1612 +7 095 196 9968 Telefax: +7 095 943 0073 Internet: CHUKREEV@CAJAD.KIAE.SU

Center for Photonuclear Experimental Data
Institute of Nuclear Physics
Moskovskiy Gos. Universitet
Vorob'evy Gory
119 899 Moscow RUSSIA

Responsibility for: M
Telephone: +7 095 939 3483
Telefax: +7 095 939 0896
Internet: varlamov@cdfe.npi.msu.su

China Nuclear Data Center
China Institute of Atomic Energy
P.O. BOX 275 (41)
Beijing 102413 CHINA

Responsibility for: S
Telephone: +86 10 6935-7830
Telefax: +86 10 6935-7008
Internet: tong@mipsa.ciae.ac.cn

Nuclear Data Group
The Institute of Physical & Chemical Research (RIKEN)
2-1 Hirosawa, Wako-Shi
Saitama 351-01 JAPAN

Responsibility for: R
Telephone: +81 48 462-1111 (ext. 3272)
Telefax: +81 48 462-4641
Internet: TENDOW@postman.RIKEN.GO.JP

Japan Charged-Particle Nuclear Reaction Data Group
Dept. of Physics
Hokkaido University
Kita-10 Nisha-8, Kita-ku
Sapporo 060 JAPAN

Responsibility for: E
Telephone: +81 11 386-8111
Telefax: +81 11 386-8113
Internet: kato@nucl.phys.hokaido.ac.jp

Cyclotron Application Department
Institute of Nuclear Research of the Hungarian Acad. Sciences
Bem tèr 18/c, P. O. Box 51
H-4001 Debrecen HUNGARY

Telephone: +36 52-417-266
Telefax: +36 52-416-181
Internet: tarkanyi@atomki.hu

The following center has contributed in the past, but is no longer compiling data.

Charged Particle Nuclear Data Group
Institute for Radiochemie
Kernforschungszentrum Karlsruhe
Postfach 3640
D-75 Karlsruhe GERMANY

(Formerly reponsible for B, P)

1.The first character of the accession indicates the area of responsibility for the data.

2.*nn* = first and last initial of person to be contacted, *e.g.*, NNDCCD@BNL.GOV.

Appendix B

Information Identifier Keywords

A listing of all information-identifier keywords follows, 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 found 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: `ANALYSIS (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).

The reaction and the quantity fields are 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 (A.B.NAME, C.D.DOE)`

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

CORRECTION Gives free text information about corrections applied to the data in order to obtain the values given under DATA.

COVARIANCE Gives free text covariance information provided by the experimentalist, or flags the existence of a covariance data file. (See Appendix D for the Covariance Data Field format).

Example:
```
COVARIANCE  (COVAR) Covariance file exists and may be obtained
                    upon request
```

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

DECAY-DATA Gives decay data which has been assumed or measured by the author and used to obtain the data given.[1] The general code format is: ((decay flag) nuclide, half-life, radiation)

Decay flag. Coded as a fixed-point number which also appears in the data section under the heading DECAY-FLAG. If the flag is omitted, its parentheses are also omitted.

Nuclide. A nuclide code. For the ground state, when there are no known metastable states, no isomer code is given.

Half-life. The half-life of the nuclide specified, coded as a floating-point number, followed by a code giving the unit of time.

Radiation. Consists of three subfields: type of radiation, energy, and abundance. This field may be omitted. This field may also be repeated, each radiation field being separated by a comma.

Type of radiation. A radiation code from the Dictionary 33. 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).

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*** f.)

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

Examples:

a.	DECAY-DATA	(40-ZR-89-M)	(half-life and radiation omitted) information on the decay data for the nucleus specified is given in free text)
b.	DECAY-DATA	(60-ND-140,3.3D)	(radiation field omitted)
		(59-PR-140,,B+/EC,,0.500)	(half-life and energy omitted)
c.	DECAY-DATA	(25-MN-50-G,0.286SEC,B+,6610.)	(abundance omitted)
d.	DECAY-DATA	(25-MN-50-M,1.76MIN,DG,785.,,B+)	(two radiation fields, 2nd with energy and abundance omitted)
e.	DECAY-DATA	((1.)60-ND-138,5.04HR,DG,328.,0.065)	(decay flag, all fields present)
f.	DECAY-DATA	(60-ND-139-M,5.5HR,DG,708./738.,0.64)	(abundance given is the total abundance of both γ rays)
g.	DECAY-DATA	(60-ND-139-G,30.0MIN,B+,,0.257,DG,405.,0.055)	(two radiation fields)
		(60-ND-139-M,5.5HR,DG,738.,0.37, DG,982.,0.29, DG,403.,0.03,B+,,0.006)	(4 radiation fields, extending over multiple records)

[1] Decay data relevant to the monitor reaction are coded under the keyword DECAY-MON.

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 COINC is used, then the codes for the detectors used in coincidence follow within the same parenthesis.

Examples:
```
DETECTOR    (GELI)
DETECTOR    (COINC,NAICR,NAICR)
```

EMS-SEC Gives information about secondary squared effective mass of a particle or particle system, and defines secondary-mass fields given in the data table. The format of the coded information is: (root heading[2],particle). Particle codes are found in Dictionary 33.

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

EN-SEC Give information about secondary energies, and defines secondary-energy fields given in the data table. The format of the coded information is: (root heading[2],particle). Particle codes are found in Dictionary 33.

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

ERR-ANALYS Used to explain 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

Correlation Factor Field contains the correlation factor, coded as a floating point number. Field is optional and used only with systematic data uncertainty headings of the form ERR-*n*.

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
ENDBIB
NOCOMMON
DATA
EN          EN-ERR     DATA       ERR-T      ERR-S
MEV         MEV        MB         MB         PERCENT
...         ...        ...        ...        ...
```

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

<u>**EXP-YEAR**</u> 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     (65)`

<u>**FACILITY**</u> Defines the main apparatus used in the experiment. Codes are found in Dictionary 18. The facility code may be followed by an institute code (from Dictionary 3), which specifies the location of the facility.

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

<u>**FLAG**</u> Provides information to specific lines in a data table. The code is a fixed-point number which links with the number given in the data section under the data heading FLAG.

Example:
```
BIB
...
FLAG        (1.) Data averaged from 2 runs
            (2.) Detector 1 used at this energy
            (3.) Detector 2 used at this energy
ENDBIB
...
DATA
EN          DATA        FLAG        FLAG
KEV         MB          NO-DIM      NO-DIM
1.2         123.        1.
2.3         234.        1.          2.
3.4         456.                    3.
ENDDATA
```

<u>**HALF-LIFE**</u> Gives information about half-life values and defines half-life fields given in the data table. The general code format is: (heading,nuclide). Particle codes are found in Dictionary 33.

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

<u>**HISTORY**</u> Documents the handling of an entry or subentry. The general code format is: (yymmddX), where X is a history code from Dictionary 15.

Example: `HISTORY      (951001A) Data corrected.`

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

Example:
```
INC-SOURCE   (PHOTO)
INC-SOURCE   (POLNS,D-T)
```

<u>**INC-SPECT**</u> 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.

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

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

Flag. Coded as a fixed-point number which also appears in the data section under the data heading LEVEL-FLAG. When the flag is omitted, its parenthesis is also omitted.

Nuclide. A nuclide code.

Level identification. Identification of the level whose properties are specified. If the field is omitted, its separating comma is omitted.

Level Energy. 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. 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 off the fields will be present.

Spin. 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
```

<u>MOM-SEC</u> Gives information about secondary linear momentum, and defines secondary-momentum fields given in the data table. The general code format is: (root heading[3],particle), where the particle field may contain either a particle code from Dictionary 33 or a nuclide code.

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

<u>MONITOR</u> 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 code format is: ((root heading) reaction,quantity)

The reaction and quantity field coding rules are identical to those for REACTION, except that the quantity may be omitted when only the reaction is known. (In this case, no monitor information will be given in the COMMON or DATA section).

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

REACTION     : (AAAAA)
MONITOR      : ((MONIT1)CCCCC)
             : ((MONIT2)DDDDD)
             : ...
DATA         :
EN           : DATA        MONIT1       MONIT2
...          :
```

<u>MONIT-REF</u> Gives references for the standard (or monitor) data used in the experiment. The general code format is: ((heading)subaccession#,author,reference)

Heading: Data heading of the field containing the standard value. When the heading is omitted, its parenthesis is also omitted.

Subaccession Number: EXFOR data set in which the standard data is given. Cnnnn001 refers to the entire entry. Cnnnn000 refers to an unknown subentry.

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

Reference. May contain up to 6 subfields, coded as for the keyword REFERENCE.

Example:
```
MONIT-REF   ((MONIT1)B0017005,J.GOSHAL,J,PR,80,939,50)
            ((MONIT2),A.G.PANONTIN+,J,JIN,30,2017,68)
```

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

PART-DET Gives information about the particles[4] detected directly in the experiment. The code is either a particle code from Dictionary 33, 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.

Examples:

```
PART-DET    (A)
PART-DET    (3-LI-6)
            (3-LI-7)
```

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

Flag: a fixed-point number which also appears in the data section under the data heading DECAY-FLAG. If this field is omitted, its' parenthesis is also omitted.

Nuclide. A nuclide code.

Radiation: Radiation (particle) codes from Dictionary 33; each separated by a comma.

Examples:

```
a) RAD-DET     (96-CM-240,A)
b) RAD-DET     (25-MN-52-M,DG,B+)
c) RAD-DET     (48-CD-115-G,B-)
               (49-IN-115-M,DG)
d) RAD-DET    1(94-PU-237-M2,SF)
              2(94-PU-237-M2,SF)
e) RAD-DET     ((1.)48-CD-115-G,B-)
               ((2.)49-IN-115-M,DG)
```

[4] Decay radiations are entered using the keyword RAD-DET and/or DECAY-DATA.

REACTION Specifies the data presented in the DATA section in fields headed by DATA[5]. The general code format: (reaction,quantity,data type).

Reaction: consists of four subfields.

SF1. Target nucleus. Contains either:

a) a nuclide code, with the following exceptions:
   A = 0 denotes natural isotopic mixture
   X may not have the value G

b) a compound code

c) a variable nucleus code (see Variable Nucleus on page B.10).

   Example: `(ELEM/MASS(0,B-),,PN)`

SF2. Incident projectile. Contains either:

a) a particle code from Dictionary 33,

b) for particles heavier than an α, a nuclide code (isomer coded omitted).

SF3. Process. Contains either:

a) a process code from Dictionary 30, *e.g.*, TOT

b) a particle code from Dictionary 33, which may be preceded by a multiplicity factor, whose value may be 2→99[6], *e.g.*, 4A.

c) for particles heavier than α, a nuclide code (the atomic weight may not have the value zero). If more than one of the same nuclide is emitted, the nuclide code is repeated.

   Example: `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`

   Particles are ordered starting with the "lightest" at the left of the subfield[7], followed by nuclide codes, in Z, A order, followed by process codes (see exception for SEQ under SF4, following).

If SF5 contains the branch code UND[8], particle codes given in SF3 represent only the sum of emitted nucleons, implying that the product nucleus has been formed via different reaction channels; (DEF) in SF5 denotes that it is not evident whether the reaction channel is defined.

---

[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.

[7] Lowest Z, then lowest A.

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

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) a blank,

b) a nuclide code. For isomeric ratios and sums, the isomer code may consist of a combination of codes separated by a slash or a plus sign; the use of these separators is algebraic, *e.g.*, M1+M2/G. The code T is used to denote the sum over all isomers.

c) a variable nucleus code (see Variable Nucleus, page B.10).

Examples:

```
REACTION    (92-U-235(N,F)ELEM/MASS,CUM,FY)
REACTION    (92-U-235(N,F)54-XE-124,CUM,FY)
REACTION    (51-SB-123(N,G)51-SB-124-M1+M2/T,,SIG/RAT)
REACTION    (28-NI-0(N,X)0-G-0,,SIG)   γ production cross section
REACTION    (26-FE-56(N,EL),,WID)
REACTION    (40-ZR-0(N,G),,SIG)
```

Quantity.: consists of four subfields. All combinations of codes existing in the subfields 1-3 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.

SF7: Particle Considered. Indicates to which of several outgoing particles the quantity refers. Multiple code, *e.g.*, for a quantity describing the correlation between outgoing particles, are separated by a slash.

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

Data Type. Indicates whether the data are experimental, theoretical, evaluated, *etc*. Codes are found in Dictionary 35. If this field is omitted, the data are experimental.

<u>**Variable Nucleus**</u>. 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 SF4 or SF1 of the reaction contains one of the following codes:

ELEM	- if the Z (Mass number) of the nuclide is given in the data table.
MASS	- if the A (atomic weight) 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 or data table as variables under the data headings ELEMENT and/or MASS with units NO-DIM.

If the data heading 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.

<u>Decay data</u> for each entry under ELEMENT/MASS(ISOMER) and their related parent or daughter nuclides is 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*** (see page B.2). If the half-life is the only decay data given, this may be entered in the data table under the data heading HL.

<u>**Variable Number of Emitted Nucleons**</u>. 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 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.

<u>**Reaction Combinations**</u>. For experimental data sets referring to complex combinations of materials and reactions, the code units are connected into a single machine-retrievable ***field***, with appropriate separators and parentheses used in exactly the same manner as in FORTRAN to define algebraic operations. The complete ***reaction combination*** is enclosed in parentheses.

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

Examples:

```
REACTION     ((92-U-235(N,F),,SIG)/(79-AU-197(N,G)79-AU-198,,SIG))
REACTION     (((28-NI-58(N,N+P)27-CO-57,,SIG)+(28-NI-58(N,D)27-CO-57,,SIG))/
             (13-AL-27(N,A)11-NA-24,,SIG))
```

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

Example:

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

REFERENCE Gives information on references which contain information about the data coded. Other related references are not code under this keyword (see REL-REF, MONIT-REF). The general code 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 follow; parenthesized subfields may be omitted, along with their field separators.

Type of Reference = B or C; Books and Conferences
The general code format is: (B or C,code,volume,(part),page(paper #),date). Codes are found in Dictionary 7.

Type of Reference = J: Journals
The general code format is: (J,code,volume,(issue #),page(paper #),date). Codes are found in Dictionary 5.

Type of Reference = P or R or S; Reports
General code format: (P or R or S,report-number,(volume/part),(page),date)

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

More than one identification may be given for a document, each code being in its' own parentheses and separated from the other codes by "=" (an equal sign). The primary code is given first. (See last example).

Examples:

`(J,XYZ,5,(2),89,6602)`	Journals XYZ, Volume 5, issue#2, page 89, February 1966
`(J,PR,104,1319,5612)`	Phys. Rev. Volume 104, page 1319, December 1956
`(B,MARION,4,(1),157,60)`	Book by Marion, Volume 4, part 1, page 157, published in 1960.
`(C,66WASH,1,456,6603)`	1966 Washington Conference Proceedings Volume No. 1, page 456, March 1966
`(C,67KHAROV,,(56),6702)`	1967 Kharkov Conference Proceedings, paper number 56, February 1967.
`(R,UCRL-5341,5806)`	UCRL report number 5351, published in June 1958.
`(P,WASH-1068,185,6603)`	WASH progress report number 1068, page 185, published in March 1966.
`(W,BENZI,661104)`	private communication from Benzi received on November 4, 1966.
`(T,ANONYMOUS,58,6802)`	Thesis by Anonymous, page 58, published in February 1968.
`((R,USNDC-7,143,7306)=(R,EANDC(US)-181,143,7306))`	Report to U. S. Nuclear Data Committee number 7, page 143, June 1973, also has a report number of 101 from the European-American Nuclear Data Committee.

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

Code: a code from Dictionary 17.

Subaccession number: EXFOR subaccession number for the reference given, if it exists. Cnnnn001 refers to the entire entry. Cnnnn000 refers to ant unassigned subentry.

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

Reference: coded as for REFERENCE.

Example:

REL-REF	(C,B9999001,A.B.NAME+,J,XYZ,5,(2),90,7701)	Critical remarks by A.B.Name, *et al.*, in journal XYZ, volume 5, issue #2, p. 90, January 1977.

<u>RESULT</u> 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)
```

<u>SAMPLE</u> Gives information on the structure, composition, shape, *etc.*, of the measurement sample.

<u>STATUS</u> Gives information on the status of the data presented. Entered in one of the general code forms, or, for cross reference to another data set, the general code form is: (code,subaccession-number).

Code: a code from Dictionary 16.

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

Examples:

STATUS	(SPSDD,10048009)	data set is superseded by subentry 10048009.
STATUS	(DEP,34567004)	data set is dependent on subentry 34567004
	(APRVD)	data set has been seen and approved by author
STATUS	(COREL,40367)	data set is correlated with entry 20367

<u>TITLE</u> Gives a title for the work referenced.

Appendix C

COVARIANCE DATA FILE FORMAT

Where covariance data files are large, the covariance data may be stored in a separate covariance file. The existence of this file will be indicated in the corresponding EXFOR data set using the 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)

Appendix D

Table of Dictionaries

A partial listing of the following dictionaries is included. 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.

<u>Area 1: United States and Canada</u>

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
1USABET	Bettis Atomic Power Lab., Westinghouse, Pittsburgh,PA
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
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
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
1USAMTR	Idaho Nuclear Corp., Idaho Falls, ID
1USANBS	National Bureau of Standards, Washington, DC
1USANIS	National Inst.of Standards & Techn., Gaithersburg, MD
1USAOHO	Ohio University, Athens, OH
1USAORL	Oak Ridge National Laboratory, Oak Ridge, TN
1USARPI	Rensselaer Polytechnic Institute, Troy, NY
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
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
Italy	
2ITYBOL	ENEA Centro Ricerche Energia di Bologna
2ITYCAT	Univ. of Catania
2ITYPAD	Padua, University and Lab. Nat. Legnaro
Japan	
2JPNJAE	JAERI, Tokai
2JPNKYU	Kyushu Univ., Dept.of Nucl.Eng., Fukuoka
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
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 Natl.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
Croatia	
3CRORBZ	Inst.Rudjer Boskovic, Zagreb
3CROZAG	Univ. of Zagreb, Zagreb
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
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	
4UKRIFU	Inst. Fiziki Acad. Sci. Ukraine, Kiev
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 proc.
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
APS	Acta Polytechnica Scandinavica
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
DA	Dissertation Abstracts
DOK	Doklady Akademii Nauk
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
ZN	Zeitschrift fuer Naturforschung
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
60WALTAIR	Low Energy Nuclear Physics Symp., Waltair 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
63MANCHST	Nuclear Physics Conf., Manchester 1963
64BOMBAY	Neutron Inelastic Scattering Symp., Bombay 1964
64CHANDGRH	Nuclear and Solid State Physics Symp., Chandigarh 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
66LYON	Light Nuclei Colloquium, Lyon, 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
67KANPUR	Nuclear and Solid State Physics Symp., Kanpur 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
72CHANDG	Nuclear and Solid State Physics Symp. Chandigarh 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
73PETTEN	Nuclear Physics Symp., Petten 1973
73ROCH	Physics & Chemistry of Fission Symp., Rochester 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
75DELHI	Conf. on Few-Body Problems, Delhi 1976
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
77PUNE	Nuclear Physics and Solid State Physics Symp., Poona 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
78GRAZ	Conf. on Few Body Systems and Nuclear Forces, Graz 1978
78HARWELL	Conf. on Neutron Physics and Nuclear Data, Harwell 1978
79AIX	Symp. on Fast Reactor Physics, Aix-en-Provence 1979
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
80LANZHO	Chinese Nuclear Physics Conf., Lanzhou 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
85JAIPUR	Symp. on Nuclear Physics, Jaipur 1985
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
89ALIGAR	Nuclear Physics Symp., Aligarh 1989
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

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 18: 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.

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 ^{252}Cf
CM244	Spontaneous fission of ^{244}Cm
CM246	Spontaneous fission of ^{246}Cm
CM248	Spontaneous fission of ^{248}Cm
COMPT	Compton scattering
D-BE	Deuteron-Beryllium
D-C12	Deuteron-^{12}C
D-C14	Deuteron-^{14}C
D-D	Deuteron-Deuterium
D-LI	Deuteron-Lithium
D-LI7	Deuteron-^{7}Li
D-N15	Deuteron-^{15}N
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
MPH=	Monoenergetic photon reaction =
P-BE	Proton-Beryllium
P-D	Proton-Deuterium
P-LI7	Proton-^{7}Li
P-T	Proton-Tritium
PHOTO	Photo-neutron
POLNS	Polarized neutron source
POLTR	Polarized target
PU240	Spont.fission of ^{240}Pu
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
POT	Parameters of nuclear potential
RANGE	Range of recoils measured
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
ASEP	Separation by mass separator
ASSOP	Associated particle
BCINT	Beam current integrated
BGCT	β-γ coincidence technique
BSPEC	β-ray spectrometry
BURN	Burn-up
CADMB	Cadmium bath
CHRFL	Christiansen filter
CHSEP	Chemical separation
COINC	Coincidence
DIFFR	Diffraction
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 γ-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
MAGFR	Magnetic field rotation
MANGB	Manganese bath
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
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	BF_3 neutron detector
BPAIR	Electron-pair spectrometer
CEREN	Cerenkov detector
COIN	Coincidence counter arrangement
CSICR	Cesium-Iodide crystal
D4PI	4π detector
FISCH	Fission chamber
GE-IN	Germanium intrinsic detector
GELI	Ge(Li) detector
GEMUC	Geiger-Mueller counter
GLASD	Glass detector
HE3SP	^{3}He 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
4PI1A	4π times differential cross section at one angle

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

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

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 γ transition
E-LVL-INI	Initial level of γ 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 (±½ FWHM)
ERR	Systematic uncertainty, defined under ERR-ANALYS
ERR-S	Statistical uncertainty (1 σ)
ERR-T	Total uncertainty (1 σ)
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
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 (π) of resonance
POL-BM	Beam polarization
POL-TR	Target polarization
POLAR	Polarity
Q-VAL	Q-value
RAP	Rapidity (relativistic data, function of (energy+mom($\parallel$))/(energy-mom($\parallel$))
RAP-PS	Pseudo rapidity (relativistic data, function of (mon+mom($\parallel$))/(mon-mom($\parallel$))
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 subfield 3, 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	α 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: $k^2\ d\sigma/d\Omega = \Sigma\ (a(L)*p(L))$
2AG	times 2 * isotopic abundance and statistical weight factor
2G	times 2 * staistical weight factor
2L2	form: $d\sigma/d\Omega = 1/2\ \Sigma\ (2L+1)*a(L)*p(L)$
2MT	times 2π * transverse secondary mass
2PT	times 2π* 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: $a_0 + a_1*\sin^2 + a_2*\sin^2*\cos + a_3*\sin^2*\cos^2$
EPI	epithermal 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: $4\pi\ d\sigma/d\Omega = \Sigma\ (2L+1)*a(L)*p(L)$
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	$(d\sigma/d\Omega)/(d\sigma/d\Omega$ at $0°) = \sum a(L)*p(L)$RSD relative to 90° data
RSL	form: $(4\pi/\sigma)*(d\sigma/d\Omega) = \sum (2L+1)*a(L)*p(L)$
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 sine^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 code from Dictionary 33 given in place of the character.

(CUM),FY	Fission-product yield (assumed cumulative)
(CUM),PY	Product yield (assumed cumulative)
(CUM),SIG	Cross section (assumed cumulative)
(CUM),TTY	Thick-target yield (assumed cumulative)
(CUM)/(M)/UND,SIG	Cross section, uncertain if cumulative or +meta, undefined reasction
(CUM)/M+,SIG	Cross section, including isomeric trans., uncertain if cumulative
(CUM)/UND,SIG	Cross section, undefined reaction (assumed cumulative)
(CUM)/UND,TTY	Thick-target yield, undefined reaction (assumed cumulative)
(DEF),SIG	Cross section (assumed reaction defined)
(M),PY	Product yield (uncertain if isomeric transition included)
(M),SIG	Cross section (uncertain if isomeric transition included)
(M),TTY	Thick-target yield (uncertain if isomeric transition included)
(M)/UND,SIG	Cross section, undefined reaction (uncertain if isomeric transition incl.)
,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 $d^3\sigma/dA/d\Omega/dE$
,DA/DA/DE,*/*/*	Triple diff.cross section $d^3\sigma/d\Omega(*1)/d\Omega(*2)/dE(*3)$
,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	η/ν
,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 (σ*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 $d/d\Omega$
,TTY	Thick-target yield
,TTY/DA	Differential thick target yield $d/d\Omega$

,TTY/DA/DE	Differential thick target yield d/dΩ/dE
,TTY/DE	Differential thick target yield d/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/dA 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 d/d(fragmant energy)
CHN,FY	Total chain yield of fission products
CHN,FY/DE	Total chain fission yield, differential d/d(fragment energy)
CN,DA	Differential cross section dσ/dΩ, compound nucleus contribution
CN,FY	Fission-product yield, compound nucleus contribution
CN,NU	$\bar{\nu}$, 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
CN/SEQ,SIG	Cross section, specified sequence, compound nucleus contribution
CN/SEQ/PAR,SIG	Partial cross section, specified sequence, compound nucleus contrib.
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,PY	Cumulative product yield
CUM,SIG	Cumulative cross section
CUM,TTY	Cumulative thick-target yield
CUM/(M),SIG	Cumulative cross section (uncertain if isomeric transition included)
CUM/(M),TTY	Cum.thick-target yield (uncertain if isomeric transition included)
CUM/(M)/UND,SIG	Cum.cross section, undef. reaction (uncertain if isomeric transition incl.)
CUM/M-,SIG	Cumulative cross section, excluding isomeric transition
CUM/M-,TTY	Cumulative thick-target yield, excluding isomeric transition

CUM/TER,FY	Cumulative fission product yield for ternary fission
CUM/UND,SIG	Cumulative cross section, undefined reaction
CUM/UND,TTY	Cumulative thick-target yield, undefined reaction
DI,DA	Differential c/s d/dA, direct interaction contribution
DI,DA/DE	Double diff. c/s d2/dA/dE, direct interaction contribution
DI,SIG	Cross section, direct interaction contribution
DI/PAR,DA	Partial diff. c/s d/dA, 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
DI/SEQ,SIG	Partial cross section, specif. sequence, 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/CUM,NU	Cumulative delayed neutron yield
DL/IND,NU	Independent delayed neutron yield
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 $d\sigma/d\Omega$ for electric polarity
EP,SIG	Cross section for electric polarity
EP/PAR,INT	Coss 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,AKE/DA	Average kinetic energy at given angle, direct formation
IND,DA	Differential cross section $d\sigma/d\Omega$, direct formation
IND,DA,*	Differential cross section $d\sigma/d\Omega$, of particle specified, direct formation
IND,DA/DE	Double differential cross section $d^2\sigma/d\Omega/dE$, direct formation
IND,FY	Independent fission yield

IND,FY,*	Independent yield of particle specified from prompt fission prod.
IND,FY/DE	Differential independent fission yield d(yield)/d(fragment energy)
IND,FY/RAT	Independent fission yield ratio
IND,PY	Independent product yield
IND,SIG	Independent cross section
IND,SIG/RAT	Independent cross section ratio
IND,TTY	Independent thick-target yield
IND/(M),SIG	Independent cross section (isomeric transition uncertain)
IND/M+,FY	Independent fission-product yield, including isomeric transition
IND/M+,SIG	Independent cross section, including isomeric transition
IND/M+,TTY	Independent thick-target yield, including isomeric transition
IND/M+/UND,SIG	Independent cross section, undefined reaction, including isomeric transition
IND/TER,FY	Independent fission yield for ternary fission
IND/UND,SIG	Independent cross section, undefined reaction
IND/UND,SIG/RAT	Independent cross-section ratio, undefined reaction
IND/UND,TTY	Independent thick-target yield, undefined reaction
LEN,SIG	'Low-energy' component of cross section
M+,PY	Product yield, including formation via isomeric transition
M+,RI	Resonance integral, including formation via isomeric transition
M+,SIG	Cross section, including formation via isomeric transition
M+,TTY	Thick-target yield, including formation via isomeric transition
M+/(DEF),SIG	Cross section, including via isomeric transition, uncert. if reaction def.)
M+/UND,SIG	Cross section, including via isomeric transition, undefined reaction
M+/UND,TTY	Thick target yield,including isomeric transition, undefined reaction
M-,SIG	Cross section, excluding isomeric transition
M-,TTY	Thick-target yield, excluding isomeric transition
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, $d\sigma/d\Omega$
PAR,DA,*	Partial differential cross section, $d\sigma/d\Omega$, 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 $d^3\sigma/d\Omega/d\Omega/dE$
PAR,DA/DA/DE,*/*/*	Partial triple differential cross section $d^3\sigma/dA(*1)/d\Omega(*2)/dE(*3)$
PAR,DA/DE	Partial double differential cross section
PAR,FM/DA	Partial differential cross section, $d\sigma/d\Omega$, for polynomial of 1st kind
PAR,INT/DA,*	Integral over incident en. of partial diff. c/s, $d\sigma/d\Omega$, of particle specified
PAR,MLT,*	Partial multiplicity of particle specified
PAR,NU	Partial yield of neutrons
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
PAR/(CUM)/UND,SIG	Partial cross section, undefined reaction, assumed cumulative
PAR/(DEF),SIG	Partial cross section (uncertain if reaction defined)
PAR/CUM,SIG	Partial cumulative cross section
PAR/IND,DA	Partial differential cross section, $d\sigma/d\Omega$, direct formation
PAR/IND,SIG	Partial independent cross section
PAR/UND,DA,*	Partial diff. cross section, $d\sigma/d\Omega$, of particle spec., undefined reaction
PAR/UND,SIG	Partial cross section, undefined reaction
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, $d\sigma/d\Omega$ of prompt neutrons
PR,DA/DE,N	Double differential cross section of prompt neutrons, $d^2\sigma/d\Omega/dE$
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, $d/d\Omega$, of primary fragments specified
PRE,DA/KE,*	Kinetic energy distribibution, $d\sigma/d\Omega$, of primary fragment specified
PRE,DE,*	Energy spectrum of primary fragments specified
PRE,FY	Primary fission yield
PRE,FY/DE	Primary fission yield d/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 d/d(kinetic energy)
SEQ,DA,*	Diff. cross section, $d/d\Omega$, for reaction sequence & particle specified

SEQ,INT	Cross section integral over incident energy, for specified reaction sequence
SEQ,PY	Product yield for specified reaction sequence
SEQ,SIG	Cross section for specified reaction sequence
SEQ,TTY	Thick target yield for specified reaction sequence
SEQ/PAR,DA,*	Partial diff. cross section, d/dΩ, for reaction sequence & particle specified
SEQ/PAR,SIG	Partial cross section for specified reaction sequence
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, dσ/dΩ, 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, d/dΩ, 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
UND,SIG	Cross section, undefined reaction
UND,SIG/RAT	Cross section ratio, undefined reaction
UND,TTY	Thick target yield, undefined reaction

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