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Online Nuclear Data Service

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Abstract: The US National Nuclear Data Center and the IAEA Nuclear Data Section offer online computer access through international networks to their nuclear-physics and photoatomic numeric databases, related bibliographic systems and other related information of interest to basic and applied research and technology. A detailed description of the access procedures, the technical requirements, and the available databases is given.

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usernames: ANONYMOUS for FTP file transfer;
FENDL2 for FTP file transfer of FENDL-2.0;
RIPL for FTP file transfer of RIPL;
NDSOVL for files saved in NDIS Telnet session

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1 Introduction

The National Nuclear Data Center (NNDC) of the Brookhaven National Laboratory, New York, U.S.A. and the Nuclear Data Section (NDS) of the International Atomic Energy Agency, Vienna, Austria offer online computer access to their nuclear-physics and photo-atomic data bases and to other information in their computerized files. This service is currently available without cost to basic and applied researchers in the United States and Canada from NNDC and to the non-OECD countries from NDS. A similar service is available to researchers in the remaining OECD countries from the Nuclear Energy Agency Data Bank, Paris, France.

The information available in this online service includes bibliographic and numeric data covering the entire low and intermediate nuclear physics discipline, evaluated photo-atomic data, electronic and postal addresses for many scientists and engineers who develop and use such data, and a newsletter. These data bases are maintained at the NNDC and the NDS; the contents are supplied by the staff of these data centers and through numerous cooperative national and international exchange activities. Some of the data bases are updated frequently. Online access is the best way to obtain the latest information available at the centers.

The data bases and the online service programs reside on DEC ALPHA computers at each data center. Access to one of these computers can be accomplished over the INTERNET. The service is available 24 hours a day, 7 days a week. Potential users may obtain an overview of the online service without receiving authorization. Such users will be limited short accesses to the databases.

The online system consists of a number of components which can be activated by the user either by commands or by menu selection. The components include data base retrieval programs (Section 4.4) and file manipulation (Section 15), utility (Section ??) functions. The first sections of this document describe general features of the online service. The later sections provide a detailed description of the operation of each component. Special features exist for users with advanced terminals. There is a video output option for use on ANSI-standard video terminals. Instead of sequential terminal output, users with these terminals will get screen-managed displays with menus, scrolled output, and highlighting. Several of the data base retrieval components have data plotting capability. Disk files in PostScript format can be created and downloaded for local plotting. For users with graphics terminals recognizing either Tektronix or Regis instructions, plots can also be generated directly on the terminal.

2 Gaining Access to the Service

2.1 Authorization

Researchers who wish to make use of the this online data service must obtain an **AUTHORIZATION** code. This code will identify a user to the service access control mechanism and permit us to analyze service usage. This authorization may be obtained either by contacting the NNDC or NDS by mail, electronic mail, FAX, or telephone. Alternatively, we have provided a self-sign-up feature by which authorization can be accomplished remotely without contacting the appropriate data center(see Section 2.5). You must use the self-sign-up procedure for service from NNDC.

Mail:	ONLINE DATA SERVICE National Nuclear Data Center Brookhaven National Laboratory P. O. Box 5000 Upton, NY 11973-5000 U.S.A.	ONLINE DATA SERVICE Nuclear Data Section International Atomic Energy Agency P.O. Box 100 A-1400 Wien, AUSTRIA
Telephone:	(516) 344-2901	(43) (1) 2060-21715
FAX:	(516) 344-2806	(43) (1) 2060-7
INTERNET:	"nndc@bnl.gov"	"online@iaeand.iaea.org"

Please supply your name, postal address, telephone number, electronic mail address, file transfer address, and a code of five or six characters which will be your personal authorization code. It will be useful if you supply your FAX number, terminal type and graphics capability of your terminal at the same time. This authorization code may be used by your colleagues. However, the person on record will have to agree to be the point of contact for their colleagues and will be the only one to receive information and documentation updates about the service. This code must be given during the log-in sequence for full access to the online services.

Persons without an authorization code may access the online service by using the code **GUEST**. This authorization code restricts the amount of computer processor time to 30 seconds. Most of the data bases as well as some of the utility features and the **HELP** files, can be used in this limited time. On log-out from this session, a user may sign up directly for full access service. See Section 2.5 for details.

2.2 Required Hardware and Software

It is possible to access the online service with a variety of hardware and software combinations. The first piece of hardware needed is a terminal. This can be anything from a PC to a workstation to a video terminal connected to a mainframe computer. The local computer must be linked to the INTERNET.

2.3 INTERNET Access

Use TCP/IP's **TELNET** command to access the NNDC computer complex

<u>Location</u>	<u>Computer</u>	<u>Address</u>
NNDC	DEC/ALPHA 4100	BNLND2.DNE.BNL.GOV (130.199.112.132)
NDS	DEC/ALPHA 2100	IAEAND.IAEA.ORG (195.212.98.83)

2.4 Logging In

All users of the online data service access the computer through the same VAX/VMS account. This account name (also known as Username) is **NNDC** at NNDC and **IAEANDS** at NDS. When the computer connection is made, the text, **BROOKHAVEN NATIONAL LAB. NNDC COMPUTER SYSTEM OpenVMS** will appear on your terminal at NNDC or **IAEA Nuclear Data Section VAX - VMS** at NDS. The VAX log-in prompt, **Username:**, immediately follows. *At the Username: prompt you should to enter **NNDC** or **IAEANDS**, followed by a RETURN key.* After online service "log-in" messages, you will be prompted for your authorization code. *Enter your assigned authorization code at this prompt.* If you do not have an authorization code and wish to try the features available to those without authorized access, you may enter **GUEST** instead.

The final step in the log-in process is for the user to supply his name. Any number of individuals may use an authorization code, so by supplying a name, each user can be uniquely identified by the system. This feature permits each user to set parameters which automatically customize the computing environment at log-in. If a user does not wish to be uniquely identified and does not desire to have automatic customization at log-in, then the **DEFAULT** response should be given.

For each authorization, there can be any number of users. These users can set up their customized access without referring to NNDC or NDS. The new user need only know the authorization code for an account. The first time that a new user name is encountered during log-in for an account, the user is asked to supply required information interactively. Once this information has been supplied, the new user is recognized and will not be asked to supply this accounting and environment information again. If a user decides to use the name **DEFAULT**, he will be prompted to supply the same information at each session.

A sample log-in dialog at the NNDC follows in which the user responses are given in underlined-boldface. The dialog at NDS is identical in structure.

Username: NNDC

Welcome to OpenVMS AXP Operating System, version V7.1 on node BNLND2
23-MAR-1999 15:25:27

WELCOME TO THE NNDC ONLINE DATA SERVICE
NATIONAL NUCLEAR DATA CENTER
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK, USA

- 12/10/92 Photon interaction cross sections and attenuation coefficients are now available. Use the XRAY command to retrieve from the XCOM data base supplied by NIST. Elements, compounds and mixtures may be specified. Plots are also available.
- 1/24/93 The XRAY command now gives access to polarized photon beam scattering cross sections.
- 2/14/93 A video version of the CINDA retrieval program is now available.

NNDC assigned authorization code (or GUEST): MYCODE

Enter your last name (or DEFAULT or ?) - MYNAME

2.5 Interactive Authorization Request

As mentioned previously, new accounts can be established during a session in which the authorization code **GUEST** is used. After trying out the service, at log-out time, the user is asked if he wishes to sign up for the online data service. If the response is positive, then you will be able to specify the required information interactively. This will be done in either sequential or video mode depending on the type of terminal selected at log-in.

The three video displays for entering the data required for establishing an account are illustrated as well as one of the non-video displays. This data should be entered one field at a time. The input is checked and invalid input rejected. On completion, the new account is established but flagged as inactive. Electronic mail is sent automatically to the online system manager who will activate the account if all information is verified. Normally, this action will be taken before the end of the next working day.

ONLINE SERVICE SIGN UP

First Video Panel

— NNDC Online Service Sign Up —

Authorization code : **FUZZY1**

USER IDENTIFICATION INFORMATION

User Name **RONSEN, L.J.**
Affiliation **UNIVERSITY OF LONG ISLAND**
Country
OK/QUIT **OK**

Enter your COUNTRY name.
For example, UNITED STATES, FRANCE, or BRAZIL.

— Use the UP- and DOWN-ARROWS to move between fields. —

ONLINE SERVICE SIGN UP

Second Video Panel

— NNDC Online Service Sign Up —

Authorization code : **FUZZY1**

USER ELECTRONIC ADDRESS INFORMATION

Telephone **527-629-0001**
FAX
E-Mail Address **B:"RONSON@NPL.ULONG"**
File Transfer Address **I:"RONSON@NPL.ULONG.EDU"**
OK/QUIT **OK**

Enter your FAX number including the country code if outside the US
and Canada. Use only digits without embedded blanks or dashes
For example, in the US, 5163442806,
 outside the US, 033169413769

— Use the UP- and DOWN-ARROWS to move between fields. —

Third Video Panel

NNDC Online Service Sign Up

Authorization code : **FUZZY1**

USER OUTPUT CUSTOMIZATION

Terminal Type **ANSI**

Lines per Screen **24**

Characters per Line **80**

Graphics Capability **Regis**

Expert Flag **ON**

OK/QUIT **OK**

Use space bar to step through terminal graphics options.

None

Tektronix

Regis

Use the UP- and DOWN-ARROWS to move between fields.

ONLINE SERVICE SIGN UP

Sample Non-video Panel

USER IDENTIFICATION INFORMATION

- 1 User Name -
- 2 Affiliation -
- 3 Country -

Select parameters to modify by entering their ID NUMBERS separated by a comma or ALL or DONE or QUIT - ALL

You will be prompted to supply new values for the selected parameters one at a time. If you need help enter a question mark(?).

User Name : - DUNFORD,C.L.

Affiliation : - BROOKHAVEN NATIONAL LABORATORY

Country : - UNITED STATES

USER IDENTIFICATION INFORMATION

- 1 User Name - DUNFORD,C.L.
- 2 Affiliation - BROOKHAVEN NATIONAL LABORATORY
- 3 Country - UNITED STATES

Select parameters to modify by entering their ID NUMBERS separated by a comma or ALL or DONE or QUIT - DONE

3 User Interface

The environment within which the user interacts with the online service is determined by the user's terminal characteristics. There are two modes, **sequential** and **video**. The video environment is used with ANSI standard video terminals whereas the sequential environment is used with all other terminal types. Five terminal types are recognized by the system. Types 1 through 3 are ANSI standard video terminals. Types 4 and 0 are non-ANSI video and hardcopy terminals respectively. More details are available in Section ???. If your terminal is an ANSI video terminal type, you will automatically activate the video interface; non-ANSI video terminals will result in activation of the sequential interface. Even if you have an ANSI video terminal, you may operate in a sequential mode by selecting terminal type 4. However, the video interface can **NEVER** be used on a terminal which is not ANSI standard video. The online service is made aware of your terminal type from your entry in the authorization file.

The service also provides some graphical capabilities. Video terminals which recognize Tektronix or Regis graphics instructions can be used to display graphs of selected data. The graphics capability of your terminal can also be set initially in the authorization data base.

All terminal characteristics, including terminal type, graphics capability, number of characters per line and number of lines per page may be revised by the user from the command level of the online system via the CUSTOMIZE command (see Section ???).

3.1 Computer Environment

The overall control of the user interface relies on features of the VAX/VMS operating system. Many of the conventions and instructions used in this system are identical to those used in VMS. However, only a very limited set of the VMS capability, namely that required to support the functions of the online service is available to the user. Those familiar with VMS, UNIX or MS-DOS should have little difficulty in understanding and using this system.

3.2 Video Environment

In the video environment, the computer has significantly greater control over the presentation of information on the user's terminal. In this mode, portions of the display can remain unchanged while other parts are being modified to display new information. Thus information from earlier activity can be easily retained on the terminal and not lost from being scrolled off. Several highlighting capabilities such as boldface, reverse video and blinking are available to enhance the presentation of information to the user. The use of menu selection techniques is improved by using cursor movement to select menu items rather than character entry from the terminal keyboard.

This environment is characterized by a screen-by-screen rather than line-by-line presentation to the user. Selections are normally made from menus where a limited number of choices is possible, reducing the possibility of erroneous input. Highly structured input is still done on a character by character basis with checking done before additional input is possible. *Should any display become corrupted, enter a control-R to regenerate the display.* The main command level interaction is a four part menu listing all of the commands possible. *The commands to initiate various modules of the online service are selected by cursor movement and initiated by depressing the RETURN key. The HELP capability at the command level is initiated by selecting HELP from the menu* (see Section 5.5).

Most of the online service modules also employ video techniques. Nested levels of menus are employed to provide a clear indication of the options available at any point in the program. In cases where several fields of character input may be entered, cursor movement is used to select the field for entry; no particular order of entry is required. Current values of such things as the output format and file name remain displayed at all times. The current step in a retrieval program is often reached by making selections from one or more nested menu selection. The choices which have been made are clearly indicated on the first line of the video display as a sequence of words representing the successively selected options. Output, when displayed on the user's terminal rather than written in a disk file, can be scrolled both up and down until the user has completed the viewing.

3.2.1 Menus

Where possible, user selections are made from menus. There are two types of menus, one for making single selections of program options or data items and one for making multiple selections from a list of data items.

In the single item selection menus, the menu items appear in **BOLDface**. Use the **ARROW** keys to change the selected menu item. When the desired menu item has been selected, depress the **RETURN**, the **ENTER** or the **SELECT** key on your terminal to execute that menu item. Horizontal menus may be one or more lines in length. The line below the menu gives a brief description of the currently selected option. Vertical option menus use one line per menu item with the item description appearing on the same line as the item. Only menu items representing logically possible options are displayed. The currently selected item appears in **bold-underline-reverse video**.

For single-line horizontal and all vertical menus, the **LEFT-ARROW** and the **UP-ARROW** will move the selection to the prior menu item. The **RIGHT-ARROW** and **DOWN-ARROW** will move the selection to the next menu item. The movement as a result of an **ARROW** key is circular, that is, an attempt to select prior to the first menu item selects the last menu item whereas an attempt to select beyond the last menu item selects the first one. The combination of the keypad key, **PF1**, with the **LEFT-ARROW**(or **UP-ARROW**) or the **RIGHT**(or **DOWN-ARROW**) will move the selection to the first or last menu item respectively.

For a multi-line horizontal menu, the **LEFT-** and **RIGHT-ARROW** perform identically to that for the single-line horizontal menu. However, the **UP-ARROW** moves to the prior menu item in the current menu column and the **DOWN-ARROW** moves to the next menu item in a column. The combination of the keypad key, **PF1**, with the **UP-ARROW** or the **DOWN-ARROW** will move the selection to the first or last menu item in the current menu column respectively.

For all single selection menu types, depressing the space bar or the **TAB** key is equivalent to depressing the **RIGHT-ARROW**. Depressing the **PF1** key before the space bar or **TAB** key is equivalent to depressing the **LEFT-ARROW**. Menu items can also be made the current selected item by depressing the key for the character for the next menu item beginning with that letter.

There are a few single-line horizontal menus where no "help line" appears. In this case only the **ARROW** keys will move the selected item and the movement is not circular as described above.

Multiple selection menus appear as a list in a scrolling window with the additional scroll menu items of **CHOOSE**, **ALL** and **NONE**. **ALL** preselects all of the menu items

whereas NONE clears any previously selected items. When the SELECT, ALL or NONE option is chosen, the scroll menu is replaced with two lines of special key description. The current item is highlighted in inverse video. Use of the DOWN-ARROW and the UP-ARROW move the current position down or up in the menu respectively. To select or deselect the current menu item, depress the RETURN, the ENTER or the SELECT key as a toggle. The current menu item is displayed in bold-underlined characters if selected or normal characters if deselected and the next menu item becomes the current menu item. The scroll window moves when required to display the current item. Use the X-key to escape from the select/deselect mode.

3.2.2 Keyboard Data Entry

When keyboard data entry is required, a prompt will appear on the screen with the data field to be entered appearing in Bold-Reverse video. You may enter the required data or a question mark (?) for more information about the expected data and its format. The field may be edited before completion of the entry. Completion is signalled by the Return key or by exceeding the length of the input field.

3.2.3 Highlighting

Highlighting is often used to indicate the context of information displayed on the screen in video mode. The field and the data in that field where character data entry is required will be highlighted in Reverse-Bold. The value of some universal parameters set via user input will be displayed in Underlined-Bold. Error messages are output in Blinking-Reverse-Bold. Blinking-Reverse highlighting is used to indicate that the computer is performing the indicated task. Bold is used to highlight an item on the display. Messages which indicate that the computer is performing a task will disappear when the task has been completed. Error messages are followed by a time-out, generally of 10 second duration after which the programs continue; the time-out may be terminated by entering ANY character from the terminal keyboard.

3.2.4 Scrolled Output

All output of retrieved data to the user's terminal and all data selection list which may be long, are output in a common scrolled mode. In this mode, the data is displayed in a scroll window. Unchanging information such as data identification and column headers are displayed above the scroll window. Below the scroll window is an option menu. The basic options (at most the first four) are FORWARD, BACKWARD, START and END. These options page the scrolled output forward a page, backward a page, to the beginning or end of the output respectively. Only the logically possible scrolling options are displayed. The menu will contain at least one other option, DONE, the selection of which will terminate the data display. Depending on the display, one or more additional menu items may occur. The operation of the scrolling menu differs from the option menu previously described in only one respect, namely that the UP-ARROW will scroll backward one line only and the DOWN-ARROW will scroll forward one line only.

3.2.5 Screen Images

It is possible to put an image of any screen display into a disk file for further manipulation after a video version system component has been completed. The screen reproduction

is accomplished by entering a control-P. Each control-P will produce a single image in a disk file, so you will need to enter this control sequence for EACH desired frame. The output file will have the name *command_SCREEN.OUT*, for example *ENDF_SCREEN.OUT* when generated from the ENDF component. See Section 3.4 for more information about user produced disk files and Section 15.1.3 for information about transmitting user produced files to your local computer.

3.3 Sequential Environment

The sequential environment mode of the user interface behaves, as suggested, in a sequential manner. Every attempt has been made to emulate the screen presentation and the interaction logic of the video mode. The user responds to prompts on the terminal. The system response to the user input follows sequentially on the terminal. Each of the modules operates also in a sequential mode of prompt, user response, and system response. The module prompt tailored to the expected response. Some of the prompts take the form of simple menus from which the user can select his next step. At all points in the dialog, **HELP** is available. This help occurs in the form of expanded instructions and/or explanation of the expected response and resulting activity. *At the option level help is activated by selecting HELp. Within the various modules of the online service, a question mark (?) response will activate the help dialog* (see Section 5.5).

The sequential mode of operation provides only simple capability for the computer to control and organize the presentation of information on the user's terminal. Except on a hard copy terminal or a video terminal with some kind of memory and a paging feature, only a limited number of lines of output can be viewed at one time. Information and user dialog scroll off the terminal and are lost. This mode of operation represents an older technology. However all capabilities available in the video environment described in the next section are also available in the sequential environment.

Where possible, user selections are made from option menus. In these menus, the user is given a list of the logically possible options. The default option which can be executed simply by depressing the RETURN key, is in upper case letters. The other options are in lower case letters except for the first letter which is upper case. These options can be executed by entering the upper case letter representing the option followed by a RETURN. When selecting the help option (by entering a ? and a RETURN), a list of one line descriptions of all the options is displayed.

3.4 Disk Storage

Disk storage has been allocated for each authorized online system user. Data files may be generated during the execution of one of the system modules. They will be stored in the user's allocated space. These data files may be transmitted to the user's local computer at a later time using the SEND module (see Section 15.1.3). All file manipulation commands will act on data files stored in this disk area. File names are constructed according to standard VAX/VMS conventions, that is, *name.type;version*. *Name* and *type* can be alphanumeric string containing up to 39 characters. *Version* is be numeric. It should not be given in response to the prompt for the specification of an output file, since version numbers are assigned by the operating system.

3.5 Graphics

Several of the data base retrieval modules support graphical output. Disk output is always in PostScript format with the name *Data_base_PLOT.PS*. The file is stored in the user's storage directory where it can be uploaded to the user's local computer with the SEND module (see Section 15.1.3). Plotting to a disk file is activated with the PLOT option. This option appears in every menu where plotting to disk is possible. Plotting is also possible on terminals which recognize Tektronix or Regis graphics instructions. This option is called VIEW. It will appear on the same menus as the PLOT option only if the user's entry in the authorization file indicates either a Tektronix or Regis capable terminal.

4 Choosing Your Module

Once the log-in and set-up steps have been completed, the user can then select the module to be executed. The method of selection for video and sequential modes is described. Each of the modules is described briefly below and in considerable detail later in this document.

4.1 Video Mode

Users operating in the video environment will be presented with a four part screen display, each time a module is selected. The top menu contains three categories of modules, `DATA BASES`, `UTILITIES` and `FILES` as well as the `HELP` and `LOGOUT` selections. Each of the categories of modules corresponds to one of the three option lists arranged left to right across the bottom of the display. When a category is selected, a vertical menu at the screen bottom is activated. The modules which are included in each of these menus are briefly described below. Each menu corresponding to one of the three categories contains two additional selections `DONE` and `LOGOUT`. By selecting `DONE`, the user is returned to the top menu; `LOGOUT` will terminate the connection to the online service. When a module is selected, that module is activated. When the user has finished with the module, the master display will reappear, initialized to the last selection made.

The master display also contains a line describing the authorization level, Full or Limited, the terminal type, the terminal width and lines per page. As mentioned previously, users without authorization (`GUEST`) may still have limited access the service. In this case, a restricted menu is presented in which only those modules accessible to the user appear in boldface. The inaccessible modules are displayed in normal font.

4.2 Sequential Mode

The sequential mode operates similar to the video mode. There two levels of option selection menus as in the video mode. The top level menu is illustrated below. Each option in the menu is followed by a brief description. An option is selected by entering the first three letters (those capitalized) of the option name. Three options, `DATA` bases, `UTIL`ities and `FILE`s are themselves a collection of related modules. Selection of one of these top level options will produce another menu from which to select. The use of these menus is identical to the that of the top level menu. The contents of these second level menus are identical to the contents illustrated in the video mode displays below.

Master Displays in Video Environment

Full Use Authorization

NNDC Online Data Service		
Full Use Authorization	DEC-VT Terminal	132 by 24
DATA BASES	UTILITIES	FILES
DATA BASES - Access to searchable online data bases		
<u>DATA BASES</u> NSR XUNDL ENSDF NUDAT CINDA CSISRS ENDF XRAY RHID MIRD DONE LOGOUT	<u>UTILITIES</u> NEW_FEATURES CUSTOMIZE ADDRESS PHYSCO QCALC POLSCAT DONE LOGOUT	<u>FILES</u> DIRECTORY VIEW SEND DELETE CODES DOCUMENTS LIBRARIES DONE LOGOUT

Limited Use Authorization

NNDC Online Data Service		
Limited Use Authorization	DEC-VT Terminal	132 by 24
Only BOLDFACE Selections are Available		
DATA BASES	UTILITIES	PROBLEM
DATA BASES - Access to searchable online data bases		
<u>DATA BASES</u> NSR XUNDL ENSDF NUDAT CINDA CSISRS ENDF XRAY RHID DONE LOGOUT MIRD	<u>UTILITIES</u> NEW_FEATURES ADDRESS QCALC POLSCAT DONE LOGOUT CUSTOMIZE PHYSCO	<u>FILES</u> DIRECTORY VIEW SEND DELETE CODES DOCUMENTS LIBRARIES

Top Level Menu in Sequential Mode

Select your next option from the following, ** indicated default:

DATA Bases	- Access to searchable online data bases
UTILities	- Access to online service utilities
FILES	- Access to user produced files
PROblem	- Send online service problems or suggestions to manager
** HELp	- Access to online service HELP file
LOGout	- Terminate access to online service

Enter only upper case letters of selected option - DAT

4.3 General Modules

There are three general modules which are available to all users.

PROBLEM – Users who wish to communicate the details of any difficulty encountered or comment on any aspect of the online service should use this option. The message is entered one line at a time in sequential mode. Only the current input line may be edited. In video mode, a simple editor is provided. When the message has been completed, it is sent via electronic mail to the online service manager. A copy also is sent to the user if a default electronic mailing address exists in the authorization file. Be sure that your authorization file entry contains your latest telephone number and electronic mail address. This data will be included in your message automatically and is needed if NDS or NNDC staff wishes to contact you regarding the message.

HELP – This option provides user access to the Help file for the online service (see Section 5.5).

LOGOUT – Use this option to terminate a session with the online data service. A CONFIRM window is provided to prevent accidental logout from the service.

4.4 Data Bases

There are at present seven data bases accessible in the online service and eight commands or menu items which activate the modules which access these data bases. The commands and their descriptions are given below. All but the **MIRD** modules are available to the limited authorization user. The data base names may be followed by one or two symbols to indicate either that they contain a terminal plotting capability, †, or that the disk output from the program may be used in the PLOT utility to generate a graphics file on the disk, ‡.

NSR – Nuclear Science References file – bibliographic data base for low and intermediate energy nuclear physics, covering the period from 1910 to the present. Information added to the data base is published three times a year in **Nuclear Data Sheets**. Each reference represents an entry in the data base. The entry contains the reference citation and for most references published after 1969 a keyword abstract and indexing parameters derived from the keyword abstract. The data base is updated weekly.

XUNDL†‡ – Experimental Unevaluated Nuclear Data List – experimental data on nu-

clear level properties, radiations, radioactive decay and reaction data. The information is organized in data sets, each data set representing a measurement of nuclear reaction, nuclear structure, or radioactive decay for a single nucleus. At the present time, most of the data comes from high-spin experiments. **Available from NNDC only.**

ENSDF†† – Evaluated Nuclear Structure Data File – evaluated experimental data on nuclear level properties, radiations, radioactive decay and reaction data for all known nuclides which have been published in the journal, **Nuclear Data Sheets** and **Nuclear Physics**. The information is organized in data sets, each data set representing a nuclear reaction, radioactive decay or recommended data for a single nucleus.

NUDAT – NUclear DATA – evaluated numeric data extracted or derived from the ENSDF for nuclear level properties and radiations, from the **Nuclear Wallet Cards** for nuclear ground and metastable state properties and evaluated thermal neutron cross sections and resonance integrals from **Neutron Cross Sections, Vol 1** published by Academic Press in 1981/1984.

CINDA – Computer Index of Neutron DATA – bibliographic references to neutron reaction data. This information is organized by reaction and the citations for a single experiment are linked (“blocked”) together. The data base serves as an index to the neutron reaction portion of the experimental nuclear reaction data base, CSISRS.

CSISRS†† – Cross Section Information Storage and Retrieval System – experimental data on neutron, photon, and charged particle reactions. The data compilation is organized by publication with each entry containing one or more tables (subentries) with the measured data for a single quantity. The data exchange format is known as EXFOR and the data base is also known as EXFOR at NDS.

ENDF† – Evaluated Nuclear Data File – evaluated neutron-induced reaction and decay data. The data base is organized by target material or decaying nucleus. For each material, there are “files” for a single data type such as cross sections and angular distributions. Each file is divided into sections which give the data for a given reaction for that data type. Currently the data base contains the evaluated files, ENDF/B-VI, JEF-2, JENDL-3, BROND-2 and CENDL-2.

XRAY† – Photo Atomic Data – evaluated photo-atomic cross sections and attenuation coefficients for elements, compounds and mixtures and polarized scattering cross sections including Compton and Rayleigh scattering and Rayleigh scattering with anomalous corrections. The range covered is from a few keV up to 100 MeV.

RHID†† – Relativistic Heavy-Ion Data – experimental data on heavy-ion reactions. The data compilation is organized by publication with each entry containing one or more tables (subentries) with the measured data for a single quantity using the EXFOR format. There is only limited data available as this compilation has been done on a test basis. **Available from NNDC only.**

MIRD – Medical Internal Radiation Dose – MIRD-like tables and plots of nuclide decay radiations derived from the ENSDF data base.

4.5 Utilities

There are seven utility commands or menu items representing the utility modules of the online system. The commands and their descriptions are given below. Only the first three of these modules are available to the limited authorization user.

NEW_FEATURES – In order to inform users of changes and improvements to the online data service, a NEW_FEATURES utility has been included. The utility can display

a description of the new service features added after a selected date. If you have supplied a default electronic mail address(see the CUSTOMIZE utility) then you may mail the text just retrieved to yourself.

CUSTOMIZE – The user has the ability to modify the environment setting parameters during a session with this command. These parameters include the user's name, affiliation, country, telephone number, FAX number, electronic mail address, expertise flag and terminal description.

Users who are not familiar with the online system should set the expert flag **OFF**. In this case, information is often presented in more detail and data input errors result automatically in the display of the HELP information for that query. Users who feel that they no longer require such additional dialog may tell the system to eliminate such responses by setting the expertise flag **ON**.

The online service recognized five terminal types, four video terminal types and a hardcopy terminal type. The number of lines per page and characters per line and lines per page for a terminal can be set or modified. Additionally, the system video terminals with graphics capability utilizing Tektronix 4010/4014 or Regis graphic instructions. This module permits the user to select the most appropriate description for his terminal including type, characters per line, lines per screen or page and graphics capability.

ADDRESS – The address list contains postal and electronic mail addresses as well as telephone, FAX or Telex numbers for many researchers. The list includes foreign as well as US scientists. The data base contents are not identical at at NNDC and NDS, but reflect the researchers in contact with the each centers.

PHYSICO – PHYSICS COdes – This module is designed to provide a variety of calculational tools for physics quantities. At the present time, the module will calculate internal conversion coefficients and logft values from user supplied input. **Available from NNDC only.**

QCALC – Calculates nuclear reaction Q-values and threshold energies and decay Q-values from the 1993 Atomic Mass Evaluation of G. Audi and A. H. Wapstra. Selected quantities related to atomic masses may also be retrieved.

POLSCAT – Calculates scattering cross sections for a polarized xray beam incident on a multi-element target. This function was formerly a part of the XRAY data base retrieval program.

4.6 Files

There are seven commands or menu items representing the disk file manipulation modules of the online system. The commands and their descriptions are given below. None of these modules are available to the limited authorization user. See Section 3.4 for a brief description of user produced files.

DIRECTORY – This module will display a list of files which exist in the disk storage created by ALL users of the authorization code. An optional file specification with or without "wildcards" can be used to narrow the list of files being displayed.

VIEW – This module will display the contents of a file, a screen/page at a time. The user may select one or more files at a time. These files are displayed sequentially.

SEND – Disk files may be downloaded by an online user to another computer that is networked to the online service host via the INTERNET file transfer capability. The user must have write access to the receiving computer for the network file transfer options to be successful. The user may select one or more files. These files are processed one at a

time with the user being prompted for transmission parameters for each file. At NNDC there is a KERMIT protocol file transfer capability also.

DELETE – The user may delete any file which exists in his disk storage with this option. The user may select one or more files at a time. These files are deleted sequentially with a CONFIRM window before each deletion.

CODES – The user may select one or more computer programs which are maintained and distributed by NNDC or NDS and download them using the network file transfer capabilities of the online service.

DOCUMENTS – The user may select one or more documents or sections of documents distributed by NNDC or NDS and download them using the network file transfer capabilities of the online service. Currently available are sections of the online service document in PostScript format.

LIBRARIES – The user may select one or more nuclear data library files distributed by NNDC or NDS and download them using the network file transfer capabilities of the online service. This file option provides user access to files of nuclear data which are not contained in searchable data bases (see Section 4.4).

5 Data Base Retrievals

There are many common features in the data base retrieval modules of the online service. This section describing these common features should be used in conjunction with the detailed descriptions for using each retrieval program which are given in subsequent sections.

5.1 Option Selection

The user is presented with menus by which the various features of each retrieval program can be activated. Each menu presents a list of options available at that point in the program. Upon selection of a menu item, the indicated option is executed. The selected option may itself contain a menu of options, some or all of which may contain menus. Within the description of each retrieval program, there is a diagram illustrating all of the menus and options in the program and the relationships between them. An option may appear on more than one menu at different levels.

Sequential The menu items are listed on the input terminal, ending with a dash. To select a menu item, simply enter the first character of the option name followed by a RETURN key. A question mark, ?, entered will produce HELP information for the menu.

Video The menu is presented in boldface with the selected item blinking. The selected menu item can be changed by using the cursor movement (Arrow) keys to move through the menu. In this case, the selection moves forward, backward, up or down one item each time the corresponding cursor movement key is depressed. By depressing the PF1 key before a cursor movement key, the selection will move to either the beginning or end of the menu as appropriate. A menu item can also be selected by entering enough characters from the item name to be unique followed by a RETURN key. When the selected menu item is to be executed, just depress the RETURN key.

The terminal display for each option contains the name of the selected menu item as the last word on the first line in boldface. If this option was selected from the top-level menu, only one word will appear. However, if the option has been selected from a lower lying menu level, the item names previously selected from higher level menus are displayed preceding the current option in the order selected as normal characters.

The first option menu which appears after the selection of a data base retrieval module will be referred to as the top-level menu. These menus all contain the following two options in addition to options specific to the program.

HELP — This option permits the user to scan the HELP file for the retrieval program and its associated data base. See Section 5.5 for more information on how to use help files and their contents.

EXIT — When selected, this top-level menu item will terminate the retrieval program. No information from this module is saved unless the user has selected one of the disk file storage options.

Other menus which are activated as part of a selection from a higher level menu will

have the following common menu item.

DONE — The selection of this menu item causes the termination of the option containing the menu and returns the user to the next higher level menu for the next option selection.

5.2 Keyboard Data Entry

User supplied information for items not amenable to menu selection is accomplished via entry of text string. In general, this kind of information is entered following a terminal prompt from the user's keyboard, one character at a time. When the text entry is complete, use a RETURN key to signal the completion to the retrieval program. If the text string entered contains a question mark, then HELP information for the input field is supplied and the entry prompt returns again so that the required data may be entered.

The text string is entered in "insert" mode with each character being echoed on the user's terminal as it is entered. It is possible to perform simple editing on this string during entry. Use the cursor control keys to move the cursor back and forth over the string. A character entered will appear at the cursor position with all existing characters moved to the right. If the delete key is depressed, the the character preceding the cursor position will be removed and all remaining character moved one position to the left.

Since the user is free to enter any character string desired in this data entry mode, the programs must check the input string to see if it is valid within the context of the prompt. If the string fails to pass the checking then the user will be informed of the error and asked to reenter the required data. There are two levels of system user recognized, Expert and Non-expert (see Section 5.4). For non-experts, the program will also display the HELP information for the required data.

Video

The field prompt is followed by reverse-video field of the maximum possible length of the input string. The characters appear as boldface in that field as they are entered. When HELP is requested for an input field, a help window appears above or below the input line.

In cases where the window contains more than one data entry field, each prompt and corresponding input field appear on a different line. The user may move between input fields by using the up and down cursor (Arrow) keys. The current value of the field is displayed in the input field. When the cursor is located at the beginning of the input field, entry of any character will clear the field so that remainder of the input can be entered. If the input data is invalid, the word ERROR flashes at the end of the line and the cursor is moved to the beginning of the input field. At this point, the old string is restored to the input field if an up or down cursor key is depressed.

5.3 Interrupts

The keyboard keys control-Y, control-C, and control-Z can be used to interrupt a program execution on a VAX computer. The F6 function key on a keyboard also has the same functionality as control-Y.

Entering a control-Y while running a retrieval program will cause an immediate termination of the program and a return to the master control menu so that another retrieval program or utility may be selected.

The control-C key has an important function in the retrieval programs and the utility modules. When entered, the current action is terminated softly and control is returned to the point where another choice can be made. In cases when a QUIT option is supplied during the terminal output of a retrieval, the control-C is deactivated. In the case where the program is generating a plot on the user's terminal, a control-C entered will terminate the plot generation.

5.4 New Users

By default, the online service provides automatic help to users when input errors are made in any of the options. In addition, extra information is made available when entering a data base retrieval option. The extra information is available through a menu which appears only on start up of the data base retrieval option. In addition to CONTINUE which when selected, will begin the retrieval functions, this menu has an ABOUT item. When selected, general information about the data base is displayed in HELP mode. In video mode, there is an additional menu item, VIDEO. By selecting this menu item, more detailed information about the video interface is displayed in HELP mode. An experienced user can bypass these features, namely the initial HELP menu and the automatic HELP when a data entry error is made, by setting the EXPERT environment flag with the CUSTOMIZE utility.

5.5 Help

The online service supplies interactive assistance to users through DEC-style HELP files or from information contained within the module.

A DEC-style HELP file consists information about various topics. The organization is hierarchical in nature where any topic may have one or more subtopics under which more detailed information is available. If the user selects HELP from the top-level menu, then the complete HELP file for the module is accessible for view. At each input prompt in a retrieval program where HELP is activated by a question mark (?), the appropriate HELP information is displayed. In some cases, the user may also have access to more detailed information at a lower hierarchical level in the HELP file. Follow the instructions at the bottom of the screen when prompted by the online module.

HELP coming from data stored in the module program is not hierarchical in nature, but may exceed the number of lines available for viewing on the terminal. In this case the information is paged and the instruction

Press RETURN/ENTER to continue, any other key to QUIT.

will appear on the bottom line of the terminal. If the user can not continue without further action, the instruction

Enter any key to continue.

will appear on the bottom line of the terminal.

Sample HELP Display in Video Mode

Nuclear Science References	
RETRIEVE	NEW_FILE
Format : <u>I</u> ncreasing <u>U</u> ser	File : <u>U</u> ser <u>T</u> erminal
Enter output file specs :	<input type="text"/>
<p>The default output file is the user's terminal. If you desire that the output be placed in a disk file, enter the full file specification (name.type as in PU239.DECAY) for the file which will contain your retrieval output. Retrievals will be appended to last file specified if a new file specification is not given before a retrieval is done. To return to default terminal output just enter a RETURN instead of a full file specification.</p>	

5.6 Citation

Each online service module which accesses a data base has a CITE option on the main menu of the program. When selected, this option presents a recommended method for citing any data retrieved from the data base. A sample video-mode display is shown on the following page.

Nuclear Science References

CITATION

To properly cite NSR information retrieved using this program, we suggest the following text:

National Nuclear Data Center, Nuclear Science References, version of 31-Aug-1998. Information extracted from the NSR data base of the NNDC Online Data Service.

For more information, see the Citation Guidelines (BNL-NCS-63381) which is available from this site.

Press any key to continue.

6 NSR

The Nuclear Science References file is a bibliographic data base covering low and intermediate energy nuclear physics, from 1910 to the present. It is supported as a part of the international nuclear structure data evaluation activity and its scope is largely consistent with that activity. Each reference covered is represented by an entry in the data base. An entry contains the reference citation and for most references published after 1968 a keyword abstract with indexing parameters derived from the keyword abstract. The data base is oriented toward nuclear structure physics. Journal articles, conference proceedings, laboratory reports and theses are covered for inclusion in the data base with highest priority being accorded to journals and important conferences. The new contents of the data base are published once a year in the NUCLEAR DATA SHEETS journal. The core journals covered in the data base are enumerated in the introduction to each NSR issue.

6.1 An NSR Entry

Each reference in the NSR data base is uniquely identified by a KEYNUMBER which consists of the last two digits of the publication year, the first two letters of the first author's last name and a final two characters, two digits for a primary reference (journal articles) or two letters for a secondary reference (all other entries), to make the eight-character keynumber unique, for example, 1978KR02 or 1991LAZZ. An entry will be referenced by its unique eight-character code throughout the NSR data base.

An entry contains either a CODEN or a complete reference citation consisting of reference, author and title. In many cases both the CODEN and the full citation are included. The CODEN contains the reference type such a JOUR for journal, REPT for report, etc. For journals, this reference type code is followed by a shortened form of the journal coden, volume number and page. For other reference types, an abbreviated citation follows. For the full citation, the complete reference, authors and title is given.

Most data base entries prepared after 1968 have a keyword abstract which consists of quasi free-text abstract describing the contents of the publication. The abstract contains a complete list of the nuclides, reactions, decays and nuclear quantities mentioned. From this abstract, the indexing parameters called SELECTORS are derived by a computer program. These SELECTORS form the basis for the inverted index used in retrievals. The SELECTORS are designed to recognize logical linkages within the abstract automatically, generally restricting the linkages to those occurring within a sentence or a phrase. For example, if an abstract mentions the reaction $^{52}\text{Cr}(d,p)$ and $^{56}\text{Fe}(d,\alpha)$, the reference would not be retrieved if the user had requested Target : ^{56}Fe and Reaction : (d,p). Each keyword abstract starts with a major topic for the paper such as RADIOACTIVITY, NUCLEAR REACTIONS, NUCLEAR STRUCTURE plus a few others. In the case where a paper falls into more than one category, there will be one set of abstract plus selectors for each major topic.

Because of the emphasis on nuclides, reactions, and decays, retrievals from the data base using one or more selections from these categories will be the most complete and accurate. Retrievals based on some of the broader subject categories may be less complete.

Each of the fields in an NSR entry is preceded by a tag consisting of a left arrow(<), eight characters, and a right arrow(>). The author list is preceded by <AUTHORS >. In order to support superscripts, subscripts, Greek letters and some special symbols in an ASCII file, control characters are included. For example, {+154} represents a superscript 154, |? means \approx , and |q stands for θ . An example of the contents of an NSR entry

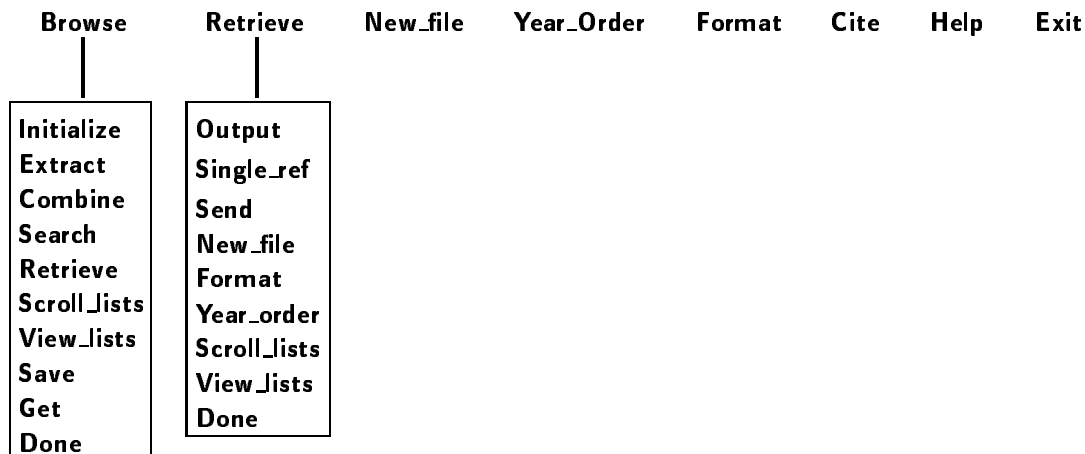
follows

Sample NSR Entry

```
<KEYNO >1988LA05
<HISTORY >A19880516
<CODEN >JOUR PYLBB 202 31
<REFERENCE>Phys.Lett. 202B, 31 (1988)
<AUTHORS >S.Landowne, C.H.Dasso
<TITLE >Pronounced Deformation Effects on Low Energy Transfer Reactions
<KEYWORDS>NUCLEAR REACTIONS {+154},{+144}Sm({+144}Sm,X),{+154}Sm({+154}Sm
,X),E(cm) |? 310-350 MeV; calculated two-neutron pickup |s(|q) vs E.
<SELECTRS>T:154SM;A. T:144SM;A. R:(144SM,X);A. T:154SM;B. R:(154SM,X);B.
C:DSIGMA;A. C:DSIGMA;B.
```

6.2 NSR Options

The menus and the associated options are summarized in the following diagram. The options listed on the top line of the diagram represent the top-level menu. Where an option is itself a menu of sub-options, the secondary menu items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. All top-level options will be given in the text all in capital letters; sub-options will also be given in capital letters with a slash between the option and sub-option. For example BROWSE and BROWSE/EXTRACT. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.



Note that the SCROLL_LISTS option is available for use only in the video mode and the VIEW_LISTS option is available only in sequential mode.

The BROWSE options are designed to create list of keynumbers for user selected retrieval criteria and the RETRIEVE options are designed to retrieve entries corresponding the contents of a keynumber list from the data base. The RETRIEVE option can be activated either in the top menu or from the BROWSE menu. The NEW_FILE, YEAR_ORDER and FORMAT options select the output media, order of reference output and output format respectively. They also appear as part of the RETRIEVE option menu for convenience.

6.3 Retrieval Strategy

The basic strategy for using this data base is to determine the parameters, and the values of those parameters, which most accurately describe the references to be retrieved. The BROWSE top-level option should be used to create lists of keynumbers satisfying the user's criteria. In the BROWSE/EXTRACT option, the program will retrieve and store a list of the keynumbers which satisfy a parameter value. The BROWSE/EXTRACT option supports "wildcards" in the parameter specification when the value of the desired parameter is not known exactly. In this case, the program retrieves a list of possible parameter values and presents them as a menu from which the user can select. It is possible to restrict the publication type, date or entry date using the BROWSE/INITIALIZE option.

One can create reference lists which satisfy more complex criteria by performing Boolean operations on previously created lists using the BROWSE/COMBINE option. For example, if one were searching for papers by an author about a nucleus, one would first generate a keynumber list for the author with the BROWSE/EXTRACT option and then one for the nucleus. Then combine the two lists in the BROWSE/COMBINE option with a logical AND operation.

When you are ready to look at the references corresponding to one or more of the reference lists already created, use the RETRIEVE option or if in the BROWSE option, you may select BROWSE/RETRIEVE instead. With the RETRIEVE/NEW_FILE option, you may specify whether terminal or disk output is desired. You can select the output format with the RETRIEVE/FORMAT option. The RETRIEVE/OUTPUT option allows you to output the entries corresponding to a reference list in the currently selected format and output file.

6.4 Indexing Variables

Reference entries may be retrieved by specifying one or more indexing variables and their desired values. The following table summarizes these variables.

	<u>Definition</u>
Nuclide	nuclide for which nuclear structure information is given
Target	target nuclide in a nuclear reaction
Incident Particle	an incident particle in a nuclear reaction
Outgoing Particle	an outgoing particle in a nuclear reaction
Reaction	a nuclear reaction code
Subject	a special subject code or a nuclear quantity, including all other quantity variables
Measured Quantity	a measured nuclear quantity
Deduced Quantity	a derived nuclear quantity
Calculated Quantity	a calculated nuclear quantity
Other Quantity	a compiled, analyzed or evaluated nuclear quantity
Author	an author's name
Key List	a user supplied keynumber list

Nuclides and Targets

Nuclides and targets are given in the same format. They may be specified either as isotopes or elements. An element is specified by its chemical symbol; an isotope by the mass number followed by the chemical symbol or by the chemical symbol and the mass number separated by a minus(-). The chemical symbol for element 104 and above is taken as the charge number less 100. For specification of an entire mass chain, that is all nuclides (not targets) with the same mass, enter only the mass number.

Valid examples	47TI or TI-47	titanium-47
	NI or NI-0	nickel
	25904	Element-104, mass 259
	100	Mass 100 (nuclides only)

Incident and Outgoing Particles

Incident or outgoing particles are generally entered in the same form as a nuclide, *e.g.* 7LI or LI-7 for lithium-7. However, gamma rays and some light particles which are represented with special symbols are:

gamma rays	G or X-RAY	sigma	S-
neutrinos	NU or NUBAR	neutron	N
electrons	E or E+	proton	P
muons	MU or MU+ or MU-	deuteron	D
kaons	K- or KO or K+	triton	T
pions	PI or PI- or PIO or PI+	alpha	A

Reaction

Nuclear reactions should be entered in standard physics notation, that is (incident particle,outgoing particles). The surrounding parentheses are **OPTIONAL**. The particle codes to be used are those described under incident and outgoing particles. The order of outgoing particles is generally left to right first by particle mass, then by particle charge. *Never include gammas as outgoing particles unless gammas are the only outgoing particles.* If you are uncertain about how to specify a reaction or what reactions are possible use the “wildcard” construction to get a menu of relevant values. Some simple examples are

(N,F) or N,F	for	neutron fission
N,NP	for	(N,NP) and (N,PN)
P,*	for	a menu with all proton induced reactions.
(N,?P*	for	a menu with all neutron induced reactions with a P(proton) as the second character in the outgoing particles field.

When specifying a reaction in the BROWSE/EXTRACT option, you may precede the reaction code by a target specification. The open parenthesis separating the target and the reaction specification **MUST** be included. For example

56FE(N,P)	for	⁵⁶ Fe(n,p)
PB(D,T	for	Pb(d,t)

Subjects and Quantities

The available subject and quantity parameters are listed below. Further details on the meaning of each of these variable values can be found in the online service help-file.

A-SPECTRA	ANALOGS	B(LAMBDA)	B-SPECTRA
BREMSSTRAHLUNG	CE	COULEX	DEFORMATION
DOPPLER	DSIGMA	FISSION	G-MULTIPOLARITY
G-SPECTRA	HI	HIGH-SPN	HYP-DEF
HYP-DEF	HYP-NUC	I-SHIFT	ICPND
LEVEL-PROP	MASSES	MECPD	MESIC-ATOMS
MU	N-SPECTRA	P-SPECTRA	PARAMETERS
POLARIZATION	Q	QUA-GLU	QUADRUPOLE
RADIUS	REL-EFF	RESONANCE	ROT-BANDS
S-FACTOR	SIGMA	SPALLATION	SUP-DEF
SUP-SYM	T1/2	TTY	X-RAYS
YIELDS	YRAST		

In addition there are subject categories for exotic decays where the retrieval parameter can be constructed from the decay mode and the word, DECAY. For example lithium-7 decay is 7LI-DECAY.

Author

The name of any author of a publication can be entered. There are three possible formats illustrated below. If a first initial is not entered, then any paper with an author with the requested last name will be retrieved. If there are multiple authors with the same last name and first initial, their publications will be retrieved together. It is possible that initials of an author have not been given consistently in the literature or even spelling

of the last name may not be consistent particularly for Russian and Chinese names. In such cases, the “wildcard” construction will be helpful.

last name only	BAKER
initial last	BAKER, R.
initial first	R. BAKER
wildcard	DUN*

Key List

This retrieval variable type allows the user to enter a list of keynumbers, the parameter value is any name used to identify the reference list to the user.

6.5 Wildcards in Indexing Variables

When the user is uncertain as to the exact value of a desired indexing parameter, then one or more “wildcards” can be included in the parameter specification. Use a question mark (?) to indicate a single character wildcard, that is, any single character may occur in that position. Use an asterisk (*) to indicate a variable number of any characters in that character position.

Nuclide — Enter a mass number followed by an asterisk and all of the nuclides for that mass number will be presented in a menu. Enter an asterisk followed by a charge number or a chemical symbol and all the nuclides for that charge number will be displayed in a menu.

Target — Enter a mass number followed by an asterisk and all of the stable and long lived isotopes for that mass number will be presented in a menu. Enter an asterisk followed by a charge number or a chemical symbol and all the stable and long lived isotopes for that charge number will be displayed in a menu.

Incident and Outgoing Particles — Enter a mass number and all the particle codes with the same mass number will be displayed in a menu. Enter a zero to get all the light mass particles in a menu.

Subject — Enter combination of letters and wildcards to get a menu of relevant subjects or quantities.

Reaction — Enter reaction code with any of the two wildcard characters. If a wildcard appears in the incident particle field, the menu generation could be very slow since the list of possible reactions is indexed on the incident particle. A menu of possible reactions is displayed. **DO NOT** put a target in the wildcard specification.

Author — Enter an author last name with any of the two wildcard characters. If a wildcard appears in as the first character of the name, the menu generation could be very slow since the list of authors is indexed alphabetically. A menu of possible authors is displayed.

Wildcard Search Menu Display in Video Environment

Nuclear Science References		
BROWSE	EXTRACT	REACTION_SEARCH
<u>REACTION SEARCH (T,P*)</u>		
(T,P)	(T,PE)	(T,PD)
(T,PT)	(T,PA)	(T,PF)
(T,PI-X)	(T,PX)	DONE
(T,PA) - select this REACTION.		

6.6 BROWSE

The BROWSE option which appears in the top-level menu should be used to prepare one or more reference lists for retrieval. This option displays a second-level menu whose options are described here.

Video

The BROWSE display includes a list of the applicable general selection criteria (see BROWSE/INITIALIZE), a list of the previously generated reference lists (see BROWSE/EXTRACT and BROWSE/COMBINE) and the BROWSE menu. If the reference list display does not fit into the space at the bottom of the display, an additional menu item is made available, SCROLL_LISTS, so that the reference lists may be scrolled.

Sequential

The user selects one of the following BROWSE options by entering the first letter of the option name. The BROWSE/VIEW_LISTS option described below occurs only in the sequential mode operation and is functionally related to the BROWSE/SCROLL_LISTS option which occurs only in the video mode operation.

6.6.1 BROWSE/INITIALIZE

Users may select to restrict the publication year, the publication type or the entry cutoff date for the references contained in each reference list generated. This option allows these parameters to be entered. In addition, if any reference lists exist at the when this option is selected, they may be deleted. Entering only blanks and a RETURN key for any field means to use the default.

The publication year selection criteria may be given as a year or range of years. The earliest year of publication for a reference in the file is 1910. The input for this field must be in one of the following formats where YYYY and ZZZZ are the year.

ALL	ALL	no publication year selection (default)
YYYY	1975	a single year
YYYY-ZZZZ	1975-1978	a range of years
YYYY-	1975-	the year entered and all later years
-ZZZZ	-1978	all years up to and including the one entered

As mentioned previously, the references are categorized as either primary (journals) or secondary (reports, conferences, etc.). You may choose to restrict the retrieval to primary references only. Select either of the following:

ALL	no publication type selection (default)
PRIMARY	primary references only

Entering the first letter is sufficient.

If one wishes to perform an incremental retrieval, that is, one which will only include entries entered into the data base on or after some date, then supply a eight-digit entry cutoff date in the form year, month and day (YYYYMMDD). To get entries made on or after September 21, 1985, enter 19850921. No selection on entry date is the default. There are no entries with an entry date prior to October, 1980 as that is the month when NNDC assumed responsibility for this data base. Any earlier date chosen will be

disregarded and treated as if no entry date selection had been made. Entry **NONE** will result in no entry date selection criteria being applied.

Reference lists which have been created previously may be deleted. Select either **Yes** or **No** response to the **Delete Current Lists** prompt. In this way, unneeded reference lists may be deleted. One may also wish to avoid **COMBINING** lists created with inconsistent narrowing parameters such as one list including only the years 1980-1985 and another including only the years 1975-1976.

Video

The prompt and the data entry field for each input item is presented in a single display. Each data entry field is initialized to its current value. Use the **UP** and **DOWN** arrows to move the cursor to the desired entry field. Use the space bar to toggle between values for the fields with only limited valid responses until the desired value is displayed. A **RETURN** will implement the new value. Otherwise, use the keyboard to enter a revised value. If an entry error is made, the line is flagged and the user is positioned to the same field to reenter. If the revised field data is valid, the cursor is positioned at the next field. To complete the option move to the last field and select either **DONE** or **QUIT**. As the user moves to a new data entry field, help information for that field will be displayed at the bottom of the screen.

Sequential

The current values for each of the data fields are displayed, preceded by an identification number. At the prompt, fields can be selected for modification by entering one or more identification numbers separated by commas. Or one can enter **DONE** or **QUIT** to terminate the option, implementing or ignoring the changes, respectively. For the selected fields, the user is prompted one at a time to supply revised values. Use the space bar followed by a **RETURN** to toggle between values for the fields with only limited valid responses until the desired value is displayed. A **RETURN** will implement the new value. Otherwise, use the keyboard to enter a revised value, terminating with a **RETURN**. A question mark will display help for the data item and then return to the input prompt. When all requested fields have been processed, the current values are displayed again and the user is prompted for another selection of fields or to terminate with either **DONE** or **QUIT**.

6.6.2 BROWSE/EXTRACT

The creation of lists of reference keynumbers for user selected values of indexing variables is accomplished with this option. Selection for each of the indexing variable types is described below. In all cases, wildcards can be used in the parameter specification (see Section 6.5). In this case a menu of related valid indexing parameters is presented from which the user may choose. The wildcard parameter search may be initiated also by entering the word, **SEARCH**, or an asterisk (*). In this case, the user will be prompted to enter a wildcard parameter specification. The prompts will continue until a value is selected or a blank specification is entered.

After selecting a variable type and value, the reference list is generated. Upon completion of the list generation, the number of references in the list is displayed. Two confirmation windows pop up one after the other. The first window asks whether or not the reference list is to be displayed on the user's terminal. If the answer is **YES**, then the

list can be examined in exactly the way described in the RETRIEVE/OUTPUT option. If NO, then the second confirmation window pops up. The user may choose whether the list should be kept for later output to terminal or disk from the RETRIEVE option or merged with another list in the BROWSE/COMBINE option or deleted. Further reference list specification requests can be made. Select DONE to terminate the option in video mode; enter a RETURN at the input prompt to terminate in sequential mode.

Nuclides and Targets — Enter a nuclide code for an isotope or a chemical symbol for an element.

Incident and Outgoing Particles — Enter a nuclide or a particle code.

Subject — Enter any valid subject code. The lists created for a subject code may be restricted by using one of the following variable types:

Measured quantity	Deduced quantity
Calculated quantity	Other quantity not included in other categories.

Reaction — Enter any reaction code or target-reaction combination.

Author — Enter an author code in any one of the three valid formats.

Key list — Enter a name by which this reference list is to be identified. The user is then prompted for valid keynumbers, one at a time. The entry of keynumbers is terminated by a blank entry.

Combine — Logically combine two reference lists. Option appears only if two or more reference lists have been previously created. See Section 6.6.3 for details.

List search — Searches references contained in a reference list for a user supplied text string. Option appears only if at least one reference list has been previously created. See Section 6.6.4 for details.

Video

The display includes a list of the current general selection criteria (see BROWSE/INITIALIZE), a list of the previously generated reference lists and a menu of indexing variables. Select an indexing variable from the menu and enter a parameter value at the prompt. If a wildcard value is entered, a new menu is generated from which you can select your parameter value. While the reference list is being generated, the prompt and response will blink. When generation is complete, the number of references found will be displayed. Next two successive confirmation windows, one for displaying the references in the list followed by one for saving the list are presented. After these actions are completed, another selection can be made. Selection of Done will terminate the BROWSE/EXTRACT option. A sample video display follows.

Sequential

At the prompt, select a retrieval variable type by entering the integer identification number to the left of the desired variable. A blank entered is equivalent to selecting the default indicated by an * to the left of the number. A question mark (?) will cause help information to be displayed. After selecting the variable type, the user is prompted to enter a value for that variable type. By entering a question mark (?), the details of parameter value specification for that type are given. If a wildcard value is entered, then a new menu is generated from which you can select your parameter value. To select the parameter value from this menu, you must enter the parameter at the prompt, exactly as it appears in the menu. When reference list generation is complete, the number of references found will be displayed. Then two successive confirmation prompts, one for displaying the references in the list followed by one for saving the list are presented. Then another selection can be made or the option terminated.

Reaction 46TI(N,P) creates a list of all references to the $^{46}\text{Ti}(n,p)$ reaction,
 Author SMITH,A. creates a list of references with A. Smith as an author,
 Nuclide 199PB creates a list of references for the nucleus ^{199}Pb .

BROWSE/EXTRACT Display in Video Environment

Nuclear Science References			
BROWSE		EXTRACT	
Publication Years : <u>61-90</u>		Type : <u>All</u>	Entry Cutoff Date : <u>None</u>
NUCLIDE	TARGET	INCIDENT PARTICLE	
OUTGOING PARTICLE	SUBJECT	MEASURED QUANTITY	
DEDUCED QUANTITY	CALCULATED QUANTITY	OTHER QUANTITY	
REACTION	<u>AUTHOR</u>	KEY LIST	
COMBINE	LIST SEARCH	DONE	
<u>AUTHOR - An author of an NSR reference.</u>			
<u>Number</u>	<u>Contents of Reference List</u>	<u>References</u>	<u>Retrieved</u>
1	A:DUNFORD	4	None
2	A:SMITH,A.	150	None
3	N:239U	331	None
4	T:240PU	228	None
5	M:FISSION	1606	None
6	C:1.AND.2	1	None
7	L:4.AND.fission	29	None

6.6.3 BROWSE/COMBINE

This option should be used to logically combine reference lists previously created with the BROWSE/EXTRACT, the BROWSE/COMBINE or the BROWSE/SEARCH options. The combining operation is limited to the logical AND, OR, and AND NOT functions. For example, one can use this technique to select references where DUNFORD and A. SMITH are coauthors (see the preceding figure). Reference lists which are themselves logical combinations of other lists may be combined using this option to further refine the reference selection.

When the logical combination has been completed, if any references satisfy the logical expression, two confirmation windows pop up one after the other. The first window asks whether or not the reference list is to be displayed on the user's terminal. If the answer is YES, then the list can be examined in exactly the way described in the RETRIEVE/OUTPUT option. If NO, then the second confirmation window pops up. The user may choose whether the list should be kept for later output to terminal or disk from the RETRIEVE option or merged with another list in the BROWSE/COMBINE option or deleted.

The format for a logical expression is

list_number.operation.list_number

If reference lists 1 through 4 have been previously generated then the following are valid examples of logical expressions.

3.OR.4 1.NOT.4 4.AND.2

Video

The video mode display for the BROWSE/COMBINE option includes a list of the current general selection criteria (see BROWSE/INITIALIZE), a list of the previously generated reference lists and an area for specifying the logical operation to be performed. An initial menu appears in this specification area which allows the user to create a new list, CREATE_NEW_LIST, ask for help, HELP, or terminate the option, DONE. When CREATE_NEW_LIST is selected, the menu is replaced by a logical operation specification form consisting of two input fields separated by a vertical menu of the possible logical operations. Enter the reference list number for the first list, select the logical operation from the vertical menu and lastly enter the second reference list number in the right entry field. The logical expression just created, replaces the entry form and the user may edit it and make any required changes. The preceding figure illustrates the logical expression entry sequence. A RETURN will cause the expression to be evaluated. If any references satisfy the logical expression, two successive confirmation windows will appear, one for displaying the references in the list followed by one for saving the list. The initial BROWSE/COMBINE menu returns. More combinations can be created. Selection of Done will terminate the option.

Sequential

When selecting the BROWSE/COMBINE option, a summary of the existing reference lists is displayed, followed by a menu containing CREATE_NEW_LIST, VIEW LISTS, HELP and DONE. To create a new reference list which is the logical combination of two existing lists, select CREATE_NEW_LIST. You will be then prompted for the number of the first reference list. This is followed by a menu to select the logical operation. Finally you will be asked to enter the second reference list number. The expression which you have created will be displayed and you will be asked to confirm that it is correct. When reference list generation is complete, the number of references found will be displayed. Then two successive confirmation prompts, one for displaying the references in the list followed by one for saving the list are presented. Then the next combination can be made. By entering a blank at this point, the BROWSE/COMBINE option is terminated.

BROWSE/COMBINE Sequence in Video Environment

CREATE_NEW_LIST HELP DONE
CREATE_NEW_LIST - Logically combine two reference lists into a new list.
Enter Second REFERENCE List Number
AND
1 . OR . 2
NOT
COMBINE Expression is 1 . OR . 2

6.6.4 BROWSE/SEARCH

This option should be used to create a new list from lists previously created with the BROWSE/EXTRACT, the BROWSE/COMBINE or the BROWSE/SEARCH options which contains only references with text which matches a user input character string.

When the text search operation has been completed, if any references satisfy the logical expression, two confirmation windows pop up one after the other. The first window asks whether or not the reference list is to be displayed on the user's terminal. If the answer is YES, then the list can be examined in exactly the way described in the RETRIEVE/OUTPUT option. If NO, then the second confirmation window pops up. The user may choose whether the list should be kept for later output to terminal or disk from the RETRIEVE option or merged with another list in the BROWSE/COMBINE option or deleted.

Video

The video mode display for the BROWSE/SEARCH option includes a list of the current general selection criteria (see BROWSE/INITIALIZE), a list of the previously generated reference lists and an area for specifying the number of the list of references to be searched. When a reference list is selected the list selection window is replaced by a window in which the text string is supplied. The text search is NOT case sensitive. A blank response to either of these queries will terminate the option without taking any action.

Sequential

When selecting the BROWSE/COMBINE option, a summary of the existing reference lists is displayed. You will be then prompted for the number of list of the references to be searched. This is followed by a prompt to enter the search text. When reference list search is complete, the number of references found will be displayed. Then two successive confirmation prompts, one for displaying the references in the list followed by one for saving the list are presented. You will then be prompted to select another list. By entering a blank at this point, the BROWSE/SEARCH option is terminated.

BROWSE/SEARCH Sequence in Video Environment

Enter REFERENCE List Number - <input type="text" value="2"/>
Search list **2** for string - <input type="text" value="radioactivity"/>

6.6.5 BROWSE/RETRIEVE

This option is identical to the RETRIEVE option described in Section 6.7.

6.6.6 BROWSE/SCROLL_LISTS (*video mode only*)

When there are more reference lists than there is space for them in the lower part of the BROWSE option display, the menu contains a `Scroll_lists` item. This option will allow the user to scan the entire list of reference lists by scrolling. A menu appears at the bottom of the scrolling region. The direction of scrolling is chosen by selecting either UP or Down. When finished, select DONE.

6.6.7 BROWSE/VIEW_LISTS (*sequential mode only*)

In the sequential mode of operation where the list of reference lists is not a permanent feature of the display. When the `View_lists` option is selected the currently available reference list will presented a page at a time on the user's terminal.

6.6.8 BROWSE/SAVE

Reference lists which have been generated in the BROWSE/EXTRACT or /COMBINE options are deleted when the NSR retrieval program is terminated. These lists can be stored in a disk file so that they may be used in a later execution of the program. This option stores the selected reference lists in disk files. The user supplies the name only consisting of letters, numbers or underscores for each disk file. The full file specification is *user_supplied_name.NSR_SAVE*, and is stored in the user assigned disk storage area. **NOTE!!** This does NOT produce a disk file with the NSR entries in it, but only a file with a list of entries. See RETRIEVE/OUTPUT for information on retrieving the NSR entries.

Video

When the BROWSE/SAVE menu option has been selected, a prompt appears requesting entry of the number of the reference list to be saved. A prompt requesting a name for the saved list file follows immediately. After the name has been entered, the file is created and the prompt for the number of the next list to be saved appears. Either enter another list number or a RETURN with no number to terminate the option

Sequential

The sequential mode operation is identical to the video mode operation.

6.6.9 BROWSE/GET

Reference lists which have been stored on disk using the BROWSE/SAVE option can be restored to the currently active reference list by using the BROWSE/GET option. A list of all stored reference lists is displayed, giving the name of the file and the retrieval parameter used to create the reference list contained in the file. The user selects lists to be restored by entering the list names one at a time.

Video

When this option is selected, the list of available stored reference lists is displayed and a prompt appears requesting entry of a stored file name. Upon entry of one of the names, the reference list will be restored to the currently active reference lists and the prompt will reappear. At this point, another saved file can be selected or the option terminated with a RETURN without entering a file name.

Sequential

This option operates identically in sequential and video mode except that the list of available stored reference lists is displayed only immediately after the option is selected.

6.7 RETRIEVE

The top-level RETRIEVE option is used to retrieve one or more list of references which have been previously created in the BROWSE option. Unless at least one such a list has been created, the only output option is the RETRIEVE/SINGLE option.

Video

The RETRIEVE display includes a list of the current output file and format (see NEW_FILE and FORMAT) a list of the previously generated reference lists (see BROWSE/EXTRACT and /COMBINE) and the RETRIEVE menu. If the reference list display does not fit into the space at the bottom of the display, an additional menu item is made available, SCROLL_LISTS, so that the reference lists may be scrolled. Unless at least one reference list has been created, the only output option is the RETRIEVE/SINGLE option.

Sequential

The user selects a RETRIEVE option by entering the first letter of the option name. The RETRIEVE/VIEW_LISTS option described below occurs only in the sequential mode operation and is functionally equivalent to the RETRIEVE/SCROLL_LISTS option which occurs only in the video mode operation. The RETRIEVE/OUTPUT in this menu can be used to output previously generated reference lists. Either enter an O at the prompt or the number of the reference list to be retrieved. Unless at least one reference list has been created, the only output option is the RETRIEVE/SINGLE option.

6.7.1 RETRIEVE/OUTPUT

This option will output NSR entries corresponding to one of the reference lists which have been created previously. If there are no reference lists, then this option will not appear on the menu. If only one reference list has been created in the BROWSE option, the program will immediately retrieve and display the contents of the list. Otherwise the user will be prompted to select the list to be displayed. By entering ALL, all references list can be retrieved one at a time. The output will go to either the user's terminal or to a disk file in the previously selected format.

Video

In the video operation mode, when this option is selected from the menu, a prompt appears asking for the number of the reference list to be retrieved. Select a list and enter the number which corresponds to the selected reference list. If there is only one reference list, then the program immediatThe entry for each reference in the selected list will be output in the selected format. Output to disk proceeds without further interaction with the user.

When output is to the user's terminal, the entry for each reference appears as a single display in the selected format. The retrieval criteria appear at the top of the display. A scrolling region for displaying an NSR entry appears in the middle of the screen with the keynumber as the border label.

A menu appears at the bottom of the display. The menu items have the following meaning.

FORWARD	to display next window for an entry which is too large for full display,
BACKWARD	to display previous window for an entry which is too large for full display,
START	to display first window for an entry which is too large for full display,
END	to display last window for an entry which is too large for full display,
NEXT REF	to go to the next entry,
PRIOR REF	to go to the previous entry,
DONE	to terminate display of current reference list,
QUIT	to terminate display of all reference lists,

The first and last entries in a list will be flagged on the scrolling region border. The following figure illustrates the RETRIEVE/OUTPUT option and the display of an entry in user format.

Sequential

In the sequential mode, when this option is selected, a prompt appears and the user should input the number or the reference list to be retrieved. If the output is going to a disk file, it proceeds without any user interaction. If the output is going to the user's terminal, the entries are then displayed one at a time. The display is nearly identical to that of the video mode. The menu items are displayed at the bottom of the screen and are identical in both modes. Select a menu item by entering the first character of the item name.

6.7.2 RETRIEVE/SINGLE_REF

It is possible to retrieve references one at a time without creating a reference list with the BROWSE option. If the keynumbers for the required references are known, then use this option. The user is prompted for a reference keynumber (see Section 6.1 for format). Any global selection criteria set in the BROWSE/INITIALIZE option are ignored. For valid keynumbers, the reference entry is displayed as described for the RETRIEVE/OUTPUT option. Entry of a blank keynumber terminates the option. If the keynumber entered is invalid, a message is displayed and the option terminated.

6.7.3 RETRIEVE/SEND

Use this option to download the data file containing the current retrieval. This option appears in the RETRIEVE menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

6.7.4 RETRIEVE/NEW_FILE

Use this option to change where the retrieval output will go. This option is identical to the NEW_FILE option described in Section 6.9.

RETRIEVE/OUTPUT Display in Video Mode

Nuclear Science References			
RETRIEVE	OUTPUT		
Format : <u>Increasing User</u>		File : <u>User Terminal</u>	
OUTPUT	SINGLE_REF	NEW_FILE	FORMAT YEAR_ORDER DONE
Enter number of list to be retrieved - 1			
Number	Contents of Reference List	References	Retrieved
1	A:DUNFORD	4	None
2	A:SMITH,A.	150	None
3	N:239U	331	None
4	T:240PU	228	None
5	M:FISSION	1606	None
6	C:1.AND.2	1	None
7	L:4.AND.fission	29	None

Video Mode Output in User Format

Nuclear Science References		
Reference List Title : A DUNFORD		
Publication Years : 61-90	Type : All	Entry Cutoff Date : None
67LI11		
<p>Phys.Rev. 162, 107 (1967) D.Lister, A.B.Smith, C.Dunford Fast-Neutron Scattering from the 182, 184, and 186 Isotopes of Tungsten</p> <p><KEYWORDS>NUCLEAR STRUCTURE 186W,182W,184W; measured not abstracted; deduced nuclear properties.</p>		
NEXT REF	PRIOR REF	QUIT
NEXT REF - Display the next reference in the list.		

6.7.5 RETRIEVE/FORMAT

Use this option to change the format of the retrieval output. This option is identical to the FORMAT option described in Section 6.10.

6.7.6 RETRIEVE/YEAR_ORDER

Normally the NSR entries are retrieved in order of increasing year of publication, that is earliest years first. If the user wishes to change the currently selected output order, this option should be used. See Section 6.8 for details.

6.7.7 RETRIEVE/SCROLL_LISTS

This option is identical to BROWSE/SCROLL_LISTS and operates in video mode only.

6.7.8 RETRIEVE/VIEW_LISTS

This option is identical to BROWSE/VIEW_LISTS and operates in sequential; mode only.

6.8 YEAR_ORDER

Normally the NSR entries are retrieved in order of increasing year of publication, that is earliest years first. If the user wishes to change the currently selected output order, this option should be used.

Video

A two item menu appears with the currently selected order highlighted. Use the cursor movement keys and select the desired output order. When the selection is complete the option terminates and the default output format in the display is updated.

Sequential

In the sequential operating mode, the selection of this option will cause the currently selected output order to be changed to the alternate order and a message is displayed indicating the new output order.

6.9 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you **MUST** use this option to supply a name for the file before proceeding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file **TT:** or **TTY:**.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a RETURN without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

6.10 FORMAT

The output can be generated in one of three formats. This option permits the selection of the output format from the three choices. The default selection is **User** format.

User Format

The **User** format is an expanded human-readable format in which the special symbols, Greek letters and super- and subscripts have been converted to one or more standard ASCII characters. The width of a line of output is 80 characters. The HISTORY, CODEN (unless REFERENCE, AUTHOR and TITLE are missing) and the SELECTRS are not displayed. The previous figure gives an example of 80- character line user format.

Wide User Format

The **Wide User** format is identical to the **User** format except that it is designed for 132 character line output. For terminal output, unless the user has specified that his output device is 132 character capable(see Section ??), the output will revert to standard **User** format.

Exchange Format

The **Exchange** format is illustrated in Section 6.1. This is the internal format for an NSR entry. It consists of 80-character records with special characters, Greek letters and super- and subscripts unexpanded. All of the entry fields are displayed.

HTML Format

The **HTML** format produces an output file which can be viewed in a WEB browser such as NETSCAPE. All internal representations of special characters, Greek letters and super- and subscripts are converted so as to display properly by the browser.

Video

In the video mode, a menu of the three format options is displayed. Upon selection of a format, the option terminates and the file specification in the screen display is updated.

Sequential

The new output format is selected by entering the first character of the format name at the prompt. Entry of a RETURN will select the default format, the **User** format.

7 ENSDF

The Evaluated Nuclear Structure Data File contains evaluated experimental nuclear structure and radioactive decay data. The evaluated data stored in the file is prepared as a cooperative effort by an international network of nuclear physicists. The evaluations are prepared for all nuclides with the same mass number and published after completion and review. The evaluations for masses of 45 and above are published in the NUCLEAR DATA SHEETS journal. The contents of the data file are the source for a computer produced manuscript. At the time of publication, the data for all nuclides of the mass is replaced in the data base. Evaluations for mass numbers 44 and below are published in NUCLEAR PHYSICS. The manuscript is not prepared from an ENSDF formatted data file. Therefore, the contents of this file for these mass numbers must be generated after the publication appears. Recently the data base has been expanded to include new evaluations that have been completed and checked but not yet reviewed in order to make the new evaluations available in a preliminary, prepublication form.

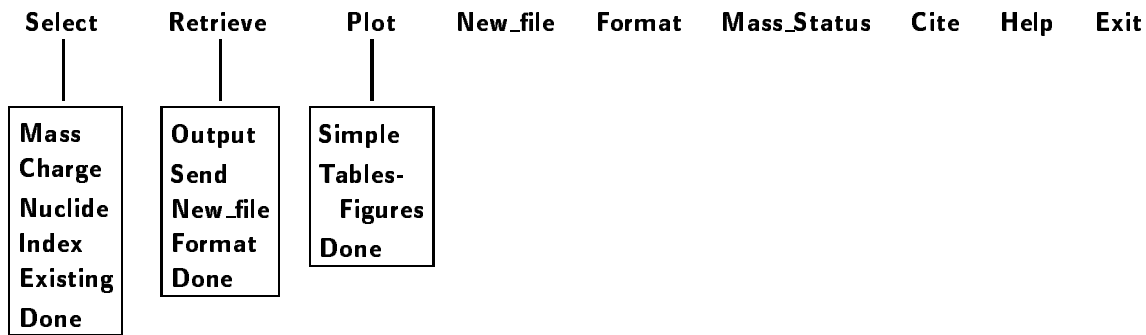
7.1 An ENSDF Data Set

The ENSDF data base consists of a large number of “data sets”. These data sets generally record the nuclear physics properties of a nucleus which have been observed in a nuclear reaction or a radioactive decay in which that nucleus has been produced. For each nucleus, there also exists a data set which contains the adopted properties of a nucleus as deduced by an evaluator from all of the information in the reaction and decay data sets. These data sets are the basic unit of information retrieval from the ENSDF data base. The format of an ENSDF data set is described in detail in BNL-NCS-51655, “EVALUATED NUCLEAR STRUCTURE DATA FILE – A Manual for Preparation of Data Sets”.

All records of a data set are 80 characters in length. The first five characters are used for the nucleus identification. For example, 155SM represents ^{155}Sm . In character position 8, there is a letter which indicates the type of information contained in the record. A non-blank character in character position 7 indicates that the record is a comment record rather than a data record. Character position 6 is used to indicate a continuation record. Each data begins with an identification record and is terminated by a blank record.

7.2 ENSDF Options

The main menu and the associated options are summarized in the following diagram. The options listed on the top line of the diagram represent the top-level menu. Where an option is itself a menu of sub-options, the secondary menu items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. All top-level options will be given in the text all in capital letters; sub-options will also be given in capital letters with a slash between the option and sub-option. For example SELECT and SELECT/NUCLIDE. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.



The SELECT option is used to select one or more data sets from the ENSDF data file. The options listed under SELECT give the user several ways of selecting data sets. The SELECT/EXISTING option is available only if a list of data sets has already been created. These lists are created during the execution of one of the other SELECT options. The RETRIEVE/OUTPUT option will retrieve and display the selected data sets. If a disk file is created, the RETRIEVE/SEND option is active, permitting the user to download the retrieved data. The RETRIEVE option will not appear in the top level menu if there are not any selected data sets. The PLOT option will allow the production of simple level scheme plots (PLOT/SIMPLE) or NDS-style plots (PLOT/TABLES). The NEW_FILE and FORMAT options select the output media and output format respectively. The MASS_STATUS option the user to view the publication status for selected mass-chains.

7.3 Retrieval Strategy

In general, the user should select one or more ENSDF data sets which contain desired information. The most simple approach to this selection of data sets is to select a nucleus. The program then will display a list of all data sets for the chosen nucleus from which the user can then select the data sets to be received. A nucleus may be chosen directly with the SELECT/NUCLIDE option. However, alternate paths to this selection are provided by the SELECT/MASS and SELECT/CHARGE options. In these cases, a mass number or charge number is entered causing a menu of possible nuclides with the appropriate mass or charge number to be displayed. Then a nucleus can be chosen. The data sets in a list generated by the approach always refer to the same nucleus.

A more flexible approach to data set selection is provided by the SELECT/INDEX option. In this case, many more selection criteria can be used to create the data set list from which the data sets to be retrieved will be chosen. The data set list now will contain data set from one or more different nuclides which satisfy the selection criteria.

When you are ready to look at one or more of selected data sets, first you must chose the SELECT/DONE option in order to return to the top-level menu where the RETRIEVE and PLOT options now appear. With the NEW_FILE option, you may specify whether terminal or disk output is desired; with the FORMAT option, you can select the output format. Then select the RETRIEVE option to retrieve the selected data sets in the chosen format and either displayed on the user's terminal or stored in a disk file. Select the PLOT option to output level diagrams or NDS-style pages. The simple level diagrams may be plotted on the user's terminal if the online service CUSTOMIZATION feature has specified one of the supported graphic terminal types.

ENSDF Record Types

<u>Character</u>	<u>Record Type</u>	<u>Meaning</u>
blank	Identification	Data set identification
H	History	Record of a revision to the data set
Q	Q-value	Q-value and particle separation energies
N	Normalization	Normalization for radiation intensities
L	Level	Nuclear level parameters
B	Beta	β^- decay properties
E	EC	Electron conversion or β^+ decay properties
A	Alpha	α decay properties
D	Delayed-Particle	Other particle decay properties
G	Gamma	Gamma-ray properties
X	Cross-Reference	Indicates data sets in which level is observed
R	Reference	NSR Reference

Sample ENSDF Data Set

```

244PU      ADOPTED LEVELS, GAMMAS                               86NDS      870210
244PU H TYP=FUL$AUT=E. N. SHURSHIKOV$CIT=NDS 49,785 (1986)$CUT=1-May-1985$
244PU Q   -75      5 6021      4 7409      104665.5  10      85WA02
244PU CL BAND(A)   K=0+ GROUND-STATE BAND, A=7.68, B=-0.0032
244PU CL E(B)      SEE COULOMB EXCITATION FOR THE MEASURED BE2,BE3 VALUES.
244PU CG E         FROM 83SP03 UNLESS OTHERWISE NOTED.
244PU L 0.0        0+                8.08E+7 Y 10                A
244PU2 L %SF=0.123 6$ %A=99.877 6
244PU CL T         7.5E+7 Y 20 (240NP ACTIVITY (56BU92));
244PU2CL 7.6E+7 Y 20 (240NP ACTIVITY (56DI09));
244PU3CL 8.11E+7 Y 25 (FROM 240PU/244PU AND 242PU/244PU A'S (66FI07));
244PU4CL 8.05E+7 Y 17 (FROM 242PU/244PU A'S (69BE06)).
244PU5CL ORIGINAL T VALUES OF 69BE06 AND 66FI07 WERE CORRECTED FOR ADOPTED
244PU6CL T1/2(242PU)=3.733E+5 Y 12 (85SH15) AND T1/2(240PU)=6569 Y 6 (84SH34).
244PU CL          T(SF)=6.55E+10 Y 32 (66FI07); 6.8E+10 Y 8 (77G003);
244PU2CL 6.56E+10 Y 30 (83MOZL).
244PU3CL          OTHER MEASUREMENT: 55FI36
244PU L 46        2 2+                155 PS      2                A
244PU CL T        FROM BE2 =13.61 18 IN COUL. EX.
244PU CL          BE2 FROM COULOMB EXCITATION.
244PU G 46.1      CA                IF E2                642                S
244PU2 G          LC= 469 $MC= 130 $
244PU3 G BE2W=300 5
244PU L 153      2 4+                A
244PU2 L BE4=0.09 +55-9
244PU CL          BE4 FROM COULOMB EXCITATION.
244PU G 106.2    CA                S

```

7.4 SELECT

The SELECT option which appears in the top-level menu should be used to choose one or more data sets for retrieval. The actual retrieval is done by selecting the RETRIEVE option in the top-level menu. The selection of data sets for retrieval proceeds from a list of data sets satisfying some more general criteria. In simplest form, the list is all data sets for a chosen nucleus. A nucleus can be selected using either the SELECT/NUCLIDE, the SELECT/MASS or the SELECT/CHARGE options described below. Alternately, a data set list can be created with the SELECT/INDEX option using more complex criteria. When a data set list already exists, then the SELECT/EXISTING option can be used to indicate that the previously generated data set list should be used for selection. The second-level menu allows the user to generate the initial data set list according to one of these methods. Each of these options is described in detail below

7.4.1 SELECT/MASS

This option allows the user to create an initial data set list via the nuclide's mass number. When a mass number is entered at the prompt, a list of all nuclides for that mass number for which data sets exist is displayed. If, in addition, there are nuclides for that mass for which a prepublication version of the evaluation is available, they will also be listed. The user then selects a nuclide or ALL nuclides listed. If both published and prepublished versions exist, then the user must select between them. The initial data set list is created and the user is then asked to make his final data set selection as described above.

Video

The user is prompted to supply a nuclear mass number. Data currently exist for nuclides with mass between 1 and 266. By entering a ?-mark, instead of a number, a help screen will appear. After entering a valid mass number, a list of all nuclides with that mass number is displayed as a menu (symbols in boldface). In addition, there are menu items, ALL, and DONE. Select the desired nuclide from the menu. The initial data set list is then created for this nuclide and the user selects the sets to be retrieved as described above. If ALL is selected, then all data sets for all nuclides are selected. This initial data set list is considered the final selected list and the program immediately returns to the top-level menu. When DONE is selected, the option terminates with no initial data set list.

In the case where the data base also contains a prepublication version of the evaluation for the chosen mass, a list of the nuclides for which preliminary new evaluations are available are listed below the menu. If a nuclide is selected for which there both a published and a prepublication version, a menu for selecting between the two appears at the bottom of the screen. After selecting from this menu, the initial data set list is created and data set selection occurs as described above.

Sequential

First the user is prompted to supply a mass number. Data currently exist for nuclides with mass between 1 and 266. By entering a ?-mark, instead of a number, a help will appear on the screen followed by the original input prompt. After entering a valid mass number, a list of all nuclides with that mass number is displayed followed by a prompt to select one of the nuclides. A nucleus is usually entered as the mass number followed by the chemical symbol, exactly as it appears in the list on the user's terminal. However, it is possible to enter a nuclide as a chemical symbol followed by a dash and then the mass number (either 53CR or CR-52). The initial data set list is then created for this nuclide and the user selects the sets to be retrieved as described above. If All is entered at the nuclide prompt, then all data sets for all nuclides are selected. This initial data set list is considered the final selected list and the program immediately returns to the top-level menu. When a blank is entered, the option terminates with no initial data set list.

In the case where the data base also contains a prepublication version of the evaluation for the chosen mass, a list of the nuclides for which preliminary new evaluations are available are listed below the list of all nuclides in the data base for the chosen mass. If a nuclide is selected for which there both a published and a prepublication version, a menu for selecting between the two is presented. After selecting from this menu, the initial data set list is created and data set selection occurs as described above.

SELECT/MASS Display in Video Environment

Evaluated Nuclear Structure Data File								
SELECT	MASS							
Format :	<u>Narrow Table</u>	File :	<u>User Terminal</u>	Selected :	<u>None</u>			
Nuclides with mass 110								
110	110MO	110TC	110RU	110RH	110PD	110AG		
110CD	110IN	110SN	110SB	<u>110TE</u>	110I	110XE		
110BA	ALL	DONE						
NUCLIDES WITH PREPUBLICATION EVALUATIONS								
110	110MO	110TC	110RU	110RH	110PD	110AG	110CD	110IN
110SN	110SB	110TE	110I	110XE	110BA			
110TE								
<u>ARCHIVE</u>	PREPUBLICATION							
ARCHIVE - Select the published version of the desired data.								

7.4.2 SELECT/CHARGE

This option allows the user to create an initial data set list via the nuclide's charge number. When a charge number is entered at the prompt, a list of all nuclides for that charge number for which data sets exist is displayed. If, in addition, there are nuclides for that charge for which a prepublication version of the evaluation is available, they will also be listed. The user then selects a nuclide or ALL nuclides listed. If both published and prepublished versions exist, then the user must select between them. The initial data set list is created and the user is then asked to make his final data set selection as described above. The operation in both video and sequential mode is identical to that of the SELECT/MASS option.

7.4.3 SELECT/NUCLIDE

If this option is chosen, the user immediately selects a nuclide by entering the nuclide symbol. No nuclide lists are displayed. A nucleus is entered as the mass number followed by the chemical symbol or the chemical symbol and the mass number separated by a minus (56FE or FE-56). If an invalid symbol is entered or the symbol for which no data set exist, a message appears on the terminal and the user may enter another choice. When a valid nucleus symbol is entered, either the initial data set list is created or if a prepublication version of the evaluation for the nuclide exists, then a menu is given by which the user can choose. The user selection of data sets from the initial data set list continues as above. When a blank is entered, the option terminates with no initial data set list. The video and sequential modes for this option operate in an identical manner.

7.4.4 SELECT/INDEX

By choosing this option, the user has access to an index to the ENSDF data base in which many data set parameters are stored. The indexed retrieval module is described in detail in Section 7.6. The module operates in a manner similar to the NSR retrieval program described in Section 6. The module returns a list of data sets which are then displayed for final selection by the user as in the other data set SELECT options. When a no data set list is returned by the indexed data set selection module, the option terminates with no initial data set list. No prepublication data sets can be accessed by the option.

7.4.5 SELECT/EXISTING

This option appears in the SELECT menu only if an initial data set list has been created using one of the other SELECT options. The user will then be able to select data sets for retrieval from the initial data set list last created.

7.5 Final Data Set Selection

Once an initial data set list has been generated by any one of the above mentioned techniques, the final data set selection is independent of selection criteria. The data set selection steps are described here.

Video

The initial list of data sets is displayed in a scrolling window on the terminal with a menu on the bottom of the screen. Each data set is given on a single line of the window, including the data set's ID and the number of records in the data set. If there are more data sets than can be displayed in the scrolling window, then the scrolling options, FORWARD, BACKWARD, START and END are added to the bottom menu to move the window over the list. In all cases, the options CHOOSE, ALL, NONE, and DONE appear in the menu.

To choose one or more ENSDF data sets, select CHOOSE, ALL or NONE. The CHOOSE option begins the selection process without changing any prior selections. If ALL is selected, all data sets are preselected. If NONE is selected, no data sets are preselected and any previously selected data sets are deselected. A sample display is given in the following figure. This is a multiple selection menu which is described in detail in Section 3.2.1 as is the use of the keys to make the desired data set selections. These keys are also briefly described below the scrolling window. The current menu item is given in inverse video. Selected items are given in bold-underline. Initially, the current menu item is the first menu item in the list. When selection is completed, use the X-key to return to the scrolling menu.

SELECT/NUCLIDE/DATA_SETS Display in Video Environment

Evaluated Nuclear Structure Data File		
SELECT	NUCLIDE	DATA_SETS
Archive Data Set ID's		Records
59CO	ADOPTED LEVELS, GAMMAS	297
59CO	59FE B- DECAY	75
59CO	59NI EC DECAY	13
55CO	48CA(15N,4NG)	59
59CO	56FE(A,P)	14
59CO	56FE(A,PG)	56
59CO	58FE(P,G)	168
55CO	58FE(P,P')	75
59CO	58FE(3HE,D)	14
<u>59CO</u>	<u>58FE(A,T)</u>	<u>14</u>
59CO	59CO(G,G)	27
59CO	59CO(N,N')	4
59CO	59CO(N,N'G)	172
UP_ARROW – move up one line.		DOWN_ARROW – move down one line.
RETURN – Toggle SELECT/DESELECT.		X – selection completed.

Sequential

The initial list of data sets is displayed on the screen in a non-video scrolling window. The mode of operation and available options are identical to those described in the video mode operation above. When the CHOOSE option is selected, a prompt appears and data sets to be retrieved are entered one at a time. Enter the set numbers for the data sets you wish to select. A negative number will deselect a data set. Entering a blank will complete the CHOOSE option. The CHOOSE option may be selected again if changes are desired. If the ALL menu item is selected, all data sets are selected for retrieval. If the NONE menu item is selected, all data sets are deselected for retrieval. Then use CHOOSE to deselect particular undesired data sets or to select particular desired data sets. Select DONE to complete the data set selection process.

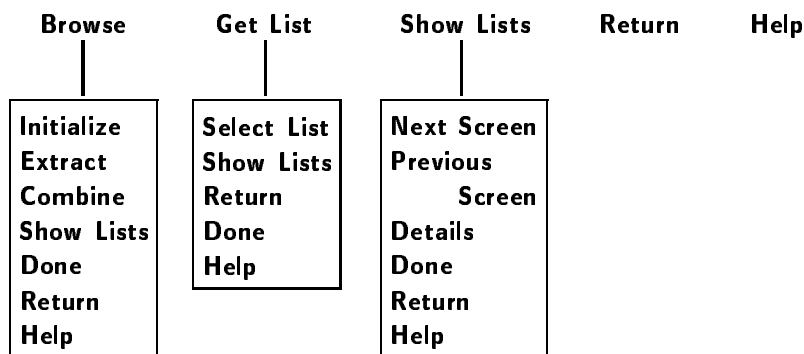
7.6 Indexed Retrieval Module

Users may select ENSDF data sets based on wide variety of criteria by using the SELECT/INDEX option. These criteria include entry date into the data base; nuclide, parent, target, and residual ranges; type of data set (Adopted, Comments, Decay, Mossbauer, Muonic Atom, Reaction, and Reference); and specific types of decay or reaction data.

The first time the SELECT/INDEX option is selected there will be a delay in response as the indexed retrieval module is initialized.

7.6.1 SELECT/INDEX Options

The main menu and the associated options are summarized in the following diagram. The options listed on the top line of the diagram represent the top-level menu for the SELECT/INDEX option. Where an option is itself a menu of sub-options, the secondary menu items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. Several of the sub-options will have additional menus associated with them. These will also be illustrated or described in detail below.



The BROWSE option is designed to create one or more lists of data sets based on user selected retrieval criteria.

The GET LIST option is designed to select one of the data set lists created in the BROWSE option. This list will serve as the initial data set list for the SELECT/INDEX option.

Video

The SHOW LISTS options, which also appear within several of the other options for convenience, allows the user to obtain additional details on the lists created.

Sequential

In the sequential mode the Show Lists option is replaced by a SUMMARIZE option which also appears within several of the other options for convenience.

The RETURN option, which also appears within several of the other options for convenience, returns control to the SELECT option; the next time SELECT/INDEX option is chosen, the user will enter the indexed retrieval module at the same point as when the RETURN option was last executed.

7.6.2 SELECT/INDEX Use Strategy

The retrieval of the data set lists will, in general, take less time and produce a smaller and more useful list of data sets if you follow some of the suggestions made here. Start by specifying the general criteria using the BROWSE/INITIALIZE option. For example, if you are regularly accessing ENSDF for the same type of information, it would be useful to set a lower limit on the entry date (See page 7.12) corresponding to the last date on which you previously selected data sets for the same criteria. Setting limits on nuclides to be considered may be useful. For example, if a user is interested in the properties of the even-even Nd nuclides, this may be specified (See page 7.12).

More detailed selection may be made *via* the BROWSE/EXTRACT options. Retrieval of Comments and Reference data sets is useful only for documentation purposes; the Comments data set contains the general information about the mass-chain evaluation and the Reference data set, all references cited in the evaluation. Individual reference citations may be displayed during retrieval and display of a data set. Except for specific applications (*e.g.*, nuclear medicine or reactor heat calculations) or interests (*e.g.*, the study of heavy-ion fusion-evaporation reactions), the Adopted data sets should be of most interest since they contain all the recommended nuclear structure properties of the nuclide and the justifications for the recommendations. If other data sets are retrieved, the Adopted data sets may still be of use (*e.g.*, the justification for the J^π assignments given in the Decay data sets may only appear in the Adopted.).

Retrieval criteria for reaction data sets may be the most difficult to specify. Some of the specific problems are:

- Reactions with multiple outgoing particles may be indexed in a variety of ways. It is presumed in the indexing that the order of these outgoing particles in the data set identification has relevance. For example, an (α, np) reaction might be indexed as “ (α, np) ,” “ (α, pn) ,” or “ (α, d) .” One should be patient and try the relevant possible combinations.
- Heavy-ion fusion-evaporation reactions are indexed as (HI,XNG) if the data set is identified as “(HI,XNG)” or if the reaction (*e.g.*, $(^{16}\text{O}, 4n\gamma)$) has been identified specifically. In the later case, the data set will also be indexed for the specific reaction and incident and outgoing particles. “(HI,XNG)” is used when the data set combines information from a group of target and incident and outgoing particles. Thus, a retrieval on “(HI,XNG)” will always be complete while that for a specified incident particle or reaction may not be.
- Thermal and resonance neutron capture, and average resonance capture data sets are indexed as such only if they are identified as such in the data set identification. Therefore, retrievals using these selectors may be incomplete. If this is suspected, it may be better to retrieve a list of all the (n, γ) data sets and lists of the data sets not of interest and use the BROWSE/COMBINE option to reduce the initial list.

The SHOW LISTS (video mode) or SUMMARIZE (sequential mode) options should be used as a guide in developing a retrieval strategy.

Additional data set lists may be made using Boolean combinations of existing lists through the BROWSE/COMBINE option. For some retrievals fewer steps may be required if this option is used. In other cases, it may be necessary to use this option to construct more complicated retrieval criteria than available within. An example of the first case would be a retrieval of all Decay data sets for a specific parent range excluding sponta-

neous fission. The user would retrieve lists of data sets for all decay and for spontaneous fission decay and use the Boolean `.NOT.` to obtain the final list.

In many cases, the indices will be checked as specific criteria are selected. If there are no current entries matching the specified criteria, the user is informed immediately and no changes are made in the selection criteria. Some of the sub-options will list only the currently indexed quantities; these include the `DECAY MODE` and `MULTIPARTICLE DECAY` sub-options (See table on page 7.16) and the `CLASS` sub-options (See table on page 7.17).

7.6.3 SELECT/INDEX BROWSE (B)

The `BROWSE` option should be used to prepare one or more data set lists.

Video

The `BROWSE` display includes a list of applicable general selection criteria (see `BROWSE/INITIALIZE`), a list of previously generated data set lists (see `BROWSE/EXTRACT` and `BROWSE/COMBINE`), and the `BROWSE` menu itself.

The display of previously saved lists is titled **DATA LISTS SAVED** and consists of five columns of information. For each list saved there are two lines of information.

Col.	Description
1	List number and entry date; the list number appears in inverse video.
2	The data type. The first line will give the major selection criteria (<i>e.g.</i> , Reaction) and the second, the secondary selection criteria (<i>e.g.</i> , (HI,XNG)).
3	The nuclides or residuals selection criteria. The first line gives the range (<i>e.g.</i> , $A = 200 - 266$) and the second, the type (<i>e.g.</i> , odd-even). If residuals have been selected, the data in this column appear in inverse video.
4	The targets or parents selection criteria. The first line gives the range (<i>e.g.</i> , $A = 200 - 266$) and the second, the type (<i>e.g.</i> , odd-even). If parents have been selected, the data in this column appear in inverse video.
5	Number of data sets in the list and the total number of records contained in the data sets.

Sequential

The user is prompted to specify an option. Additional prompts follow depending on the option chosen. Data set lists previously saved may be seen by using the `Summarize` option.

BROWSE/INITIALIZE (I)

Users may select to restrict the dates of entry into the data base, the range of nuclides, or to return to the SELECT option. The selection criteria are compared to the indices for entry dates and nuclides. If the entry dates or nuclides selected are not currently indexed, the user is informed of this and no changes are made in the selection criteria. If a range is specified, the actual selection criteria will be based on the contents of the indices.

Video

The BROWSE/INITIALIZE display includes a list of current general selection criteria, the BROWSE/INITIALIZE menu and a list of previously generated data set lists (see BROWSE/EXTRACT and BROWSE/COMBINE).

The initial display shows the current range of entry dates in the data base and that all nuclides have been selected. The entry dates and nuclides in the display are updated when the DONE sub-menu item is selected.

Sequential

The BROWSE/INITIALIZE option will prompt first for the entry date and then for the nuclide range.

Entry Date

The entry date of a data set in ENSDF is the date when it was entered into the data base or last revised. Selection of the entry date may be as a date (in the form of YYMMDD), a range of dates, or a lower or upper limit on the date.

ALL	ALL or blank	No entry date selection (default)
YYMMDD	850401	A single date (April 1, 1985)
YYMMDD ₁ -YYMMDD ₂	850401-850530	A range of entry dates (April 1 through May 30, 1985)
YYMMDD-	850401-	The date entered and all later dates (April 1, 1985 to present)
-YYMMDD	-850401	All dates up to and including the one entered (From the earliest entry date through April 1, 1985)

Nuclide

Selections may be for a specific nuclide, mass, or element; a mass, element, or nuclide range; or an upper or lower limit on mass or element. In the case of a mass, charge, or range selection, the user has the option of specifying all nuclei within the range or odd-odd, odd-even, even-even, or even-odd nuclei.

Video

When nuclide is selected a Range menu will appear with the following entries:

MASS	A specific mass, a range of masses, or an upper or lower limit on mass
ELEMENT	A specific element, a range of elements, or an upper or lower limit on element
NUCLIDE	A specific nuclide or a range of nuclides
ALL	All nuclides

Unless ALL is selected, a prompt(A:, Z:, or AZ:) will appear and a single quantity, a range, or an upper or lower limit may be entered. Elements may be specified by either the chemical symbol or charge (*e.g.*, C or 6); nuclides are entered as AAAZZ where AAA is the mass and ZZ is the chemical symbol (*e.g.*, 12C for ¹²C). For $Z \geq 104$, use

the last two digits of the Z as the chemical symbol, *e.g.* 25304 for $Z = 104, A = 253$. Ranges and limits are given as for entry dates.

If a range is specified, it may be followed optionally by a qualifier specifying odd-odd, odd-even, even-even, or even-odd nuclei as in the sequential mode (see page 7.13). If the qualifier is not given, a Type menu will appear with the following entries:

ALL	All nuclides within the range
ODD-ODD	All odd-odd nuclides within the range
ODD-EVEN	All odd-even nuclides within the range
EVEN-EVEN	All even-even nuclides within the range
EVEN-ODD	All even-odd nuclides within the range

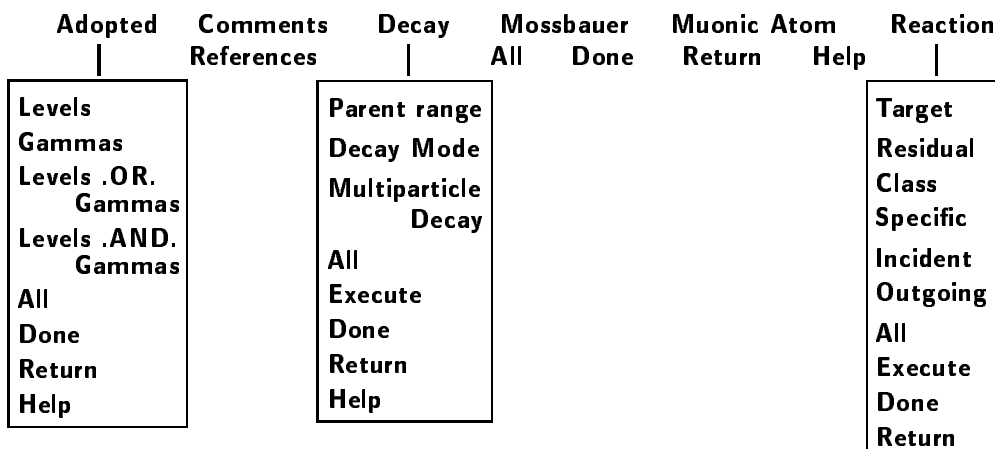
The display showing the retrieval criteria for nuclides will be updated when the DONE sub-menu item is selected.

Sequential

Respond to the prompt by entering A:, Z:, or AZ: for mass, element, and nuclide, respectively followed by the mass, element, nuclide, or range as described for the video mode on page 7.12 and, optionally by /OO, /OE, /EE, or /EO, for odd-odd, odd-even, even-even, or even-odd nuclei, respectively. ALL or a blank entry will select all nuclides.

BROWSE/EXTRACT (EXT)

The creation of lists of data sets for user selected values of indexing variables is accomplished by this option. The options associated with the EXTRACT option are summarized in the following figure. options listed on the top line of the diagram represent the top-level menu for this option or the options available at the prompt. Where an option is itself a menu of sub-options or a prompt for sub-options, the secondary items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. Several of the sub-options will have additional choices associated with them. These will also be illustrated or described below.



Video

The BROWSE/EXTRACT display and its sub-menu displays includes a list of general selection criteria (see BROWSE/INITIALIZE), the current specific selection criteria, a list of data set lists generated previously by this option or the BROWSE/COMBINE, and the BROWSE/EXTRACT menu or sub-menu itself.

When the retrieval of a data set list is begun, a blinking "Working" will appear within the menu window. After the first match, this will be replaced by a line showing the number of matches and total number of records. This line is updated with each new match. When the retrieval

is complete, a menu containing SAVE and NOSAVE will appear at the end of the line. Select SAVE to save the data set list and NOSAVE if the list is not to be saved.

BROWSE/EXTRACT Sub-display in the Video Environment

Evaluated Nuclear Structure Data File				
SELECT	INDEX	BROWSE	EXTRACT	DECAY SF
Entry Date: <u>750430-910807</u>		Nuclides: <u>All</u> <u>All</u>	Parents: <u>A:200-266</u> <u>All</u>	
Parent range		Decay Mode	Multiparticle Decay	
All		Execute	Done	
Return		Help		
DATA LISTS SAVED				
<i>No. and Entry Date</i>	Data Type	Nuclides or <i>Residuals</i>	Targets or <i>Parents</i>	Matches and Records
<i>1</i>	DECAY	All	<i>A:200-266</i>	669
750430-910807	All	All	<i>All</i>	39262
<i>2</i>	DECAY	All	<i>A:200-266</i>	66
750430-910807	Spontaneous F	All	<i>All</i>	1447

Information which is shown in inverse video on a VT-100 terminal are represented by italics in this figure (e.g., *No. and*).

Sequential

The user will be prompted to select one of the options. Depending on the option chosen, additional prompts may follow or the list retrieval may begin immediately.

The current selection criteria may be obtained by using the Summarize option.

When the retrieval of a data set list is begun, "Working" will be printed out. When the retrieval is complete, The total number of matches and records will be printed out along with the question "Do you wish to save this list?". Answer yes (Y) to save the list. Any other response will not save the list.

Adopted (AD)

This option selects adopted data sets based on the criteria chosen from the sub-menu or entered at the prompt and on the criteria specified in BROWSE/INITIALIZE.

Video

Execution of the list retrieval begins when the sub-menu item is selected. Select DONE to return to the BROWSE/EXTRACT menu.

Sequential

Execution of the list retrieval begins when the prompt has been answered. After the retrieval is completed, the user will be asked if he wishes to continue retrieving adopted data. An answer of yes (Y) will continue; any other response will return the user to the BROWSE

/EXTRACT prompt.

BROWSE/EXTRACT Adopted Data Options

LEVELS	(L)	All adopted data sets containing level data
GAMMAS	(G)	All adopted data sets containing gamma data
LEVELS .OR. GAMMAS	(OR)	All adopted data sets containing level or gamma data
LEVELS .AND. GAMMAS	(AN or blank)	All adopted data sets containing level and gamma data (default)
ALL	(AL)	All adopted data sets (default in sequential mode)
DONE	(D)	Return to BROWSE option
RETURN	(R)	Return to SELECT option

Comments (C)

This option selects the comments data sets based on the criteria specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when this option is selected.

Decay (DE)

This option selects decay data sets based on the criteria selected here and on the criteria specified in BROWSE/INITIALIZE.

Video

A menu will appear listing the options described given below. After the decay data criteria have been selected, select Execute to do the retrieval. Select Done when finished.

Sequential

The user will be prompted first for the parent range and then for selecting decay data sets be either decay mode or multiparticle decay. Retrieval will begin when the prompts have been answered. After the retrieval is completed, the user will be asked if he wishes to continue retrieving decay data. An answer of yes (Y) will continue; any other response will return the user to the BROWSE/EXTRACT prompt.

BROWSE/EXTRACT Decay Data Options

PARENT RANGE		Select the parent ranges. Video Menus similar to those for nuclides (see page 7.12) will appear. Sequential Respond to the prompt in the same manner as for nuclides (see page 7.13).																
DECAY MODE	(M0)	Select the decay mode (<i>e.g.</i> , β^- decay). ^a Video A menu listing the currently indexed decay modes will appear. Sequential The decay modes currently indexed will be listed and the user will be prompted to enter the desired decay mode. The list will contain abbreviated codes for the decay modes; these codes are: <table style="margin-left: 40px; border-collapse: collapse;"> <tr> <td style="padding-right: 10px;">A</td> <td style="padding-right: 10px;">α decay</td> <td style="border-left: 1px solid black; padding-left: 10px; padding-right: 10px;">IT</td> <td>Isomeric transition decay</td> </tr> <tr> <td>B+</td> <td>β^+ decay</td> <td style="border-left: 1px solid black; padding-left: 10px; padding-right: 10px;">N</td> <td>Neutron decay</td> </tr> <tr> <td>B-</td> <td>β^- decay</td> <td style="border-left: 1px solid black; padding-left: 10px; padding-right: 10px;">P</td> <td>Proton decay</td> </tr> <tr> <td>EC</td> <td>ϵ decay</td> <td style="border-left: 1px solid black; padding-left: 10px; padding-right: 10px;">SF</td> <td>Spontaneous fission</td> </tr> </table> <p>Multiparticle decays are listed as a combination of these; for example, AP is an α particle decay followed by proton decay and B-2 is a double β^- decay.</p> <p>If the selected decay mode is enclosed in "", only that decay mode is selected. If there are no quotation marks, all decay modes starting with the mode entered will be selected. Thus, "B-" will select only β^- decay while B- will select β^-, $2\beta^-$, β^-n, <i>etc.</i></p>	A	α decay	IT	Isomeric transition decay	B+	β^+ decay	N	Neutron decay	B-	β^- decay	P	Proton decay	EC	ϵ decay	SF	Spontaneous fission
A	α decay	IT	Isomeric transition decay															
B+	β^+ decay	N	Neutron decay															
B-	β^- decay	P	Proton decay															
EC	ϵ decay	SF	Spontaneous fission															
Multiparticle Decay	(MU)	Select the multiparticle decay mode (<i>e.g.</i> , β^-n decay). ^b Video A menu listing the currently indexed decay modes will appear. Sequential The multiparticle decay modes currently indexed will be listed and the user will be prompted to enter the desired decay mode. ^b See DECAY MODE for an explanation of the list and wild card structure.																
ALL	(A)	Select all decay data sets																
EXECUTE		Create a data set list based on the current retrieval criteria (Video mode only)																
Done	(D)	Return to BROWSE/EXTRACT option																
Return	(R)	Return to SELECT option																

^aIn the case of β^+ or ϵ decay, the data sets are indexed based on the data contained within the data sets. Therefore, data sets containing information on β^+ 's will be indexed under β^+ ; those, on ϵ 's under ϵ ; and those containing information on both β^+ 's and ϵ 's under $\epsilon + \beta^+$.

^bFor the purposes of sorting decay modes such as $2\beta^-$ are indexed as B-2.

BROWSE/EXTRACT Reaction Data Options

Target Residual		Select the target ^a or residual ^{a,b} ranges. Video Menus as described on page 7.12 will appear. Sequential Respond to the prompt as described on page 7.13.																
CLASS	(C)	Select a class of reaction or experiment. The following 16 classes are recognized: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Alpha particle transfer</td> <td style="width: 50%;">Inelastic scattering</td> </tr> <tr> <td>Average resonance capture</td> <td>Isobaric analog resonance</td> </tr> <tr> <td>Charge exchange</td> <td>Thermal neutron capture</td> </tr> <tr> <td>Coulomb excitation</td> <td>Pickup</td> </tr> <tr> <td>Elastic scattering</td> <td>Polarization</td> </tr> <tr> <td>Giant dipole resonance</td> <td>Resonances</td> </tr> <tr> <td>Giant quadrupole resonance</td> <td>Stripping</td> </tr> <tr> <td>Heavy-ion fusion-evaporation</td> <td>Two nucleon transfer</td> </tr> </table> Only those classes currently indexed will be displayed or listed. Video Select from the menu displayed. Sequential After the classes are listed a prompt will appear. Enter enough characters to ensure uniqueness (<i>e.g.</i> , S for Stripping).	Alpha particle transfer	Inelastic scattering	Average resonance capture	Isobaric analog resonance	Charge exchange	Thermal neutron capture	Coulomb excitation	Pickup	Elastic scattering	Polarization	Giant dipole resonance	Resonances	Giant quadrupole resonance	Stripping	Heavy-ion fusion-evaporation	Two nucleon transfer
Alpha particle transfer	Inelastic scattering																	
Average resonance capture	Isobaric analog resonance																	
Charge exchange	Thermal neutron capture																	
Coulomb excitation	Pickup																	
Elastic scattering	Polarization																	
Giant dipole resonance	Resonances																	
Giant quadrupole resonance	Stripping																	
Heavy-ion fusion-evaporation	Two nucleon transfer																	
SPECIFIC	(S)	Select a specific reaction. ^c Enter the reaction in nuclear physics notation: (<i>projectile,ejectiles</i>). Wild card selection of reactions may be done by typing only part of the reaction. For example, (A, selects all reactions with an α incident; (A,N selects all reactions with an α incident and a neutron as the first listed outgoing particle. In contrast to the NSR retrieval, trailing γ 's are indexed. Thus, (A,P) is a different retrieval criterion from (A,PG).																
INCIDENT OUTGOING	(I) (O)	Select a specific incident particle. ^c Select a specific set of outgoing particles. ^c Enter the outgoing particle in the order desired. Wild cards are specified in the same manner as in DECAY MODE (See table on page 7.16.).																
ALL EXECUTE	(A)	Select all reaction data sets Create a data set list based on the current retrieval criteria (Video mode only)																
DONE	(D)	Return to BROWSE/EXTRACT option																
RETURN	(R)	Return to SELECT option																

^aTargets and residuals are given in the same format. Both may be specified as isotopes; targets may also be specified as elements. See page 7.12 for the formats. Valid examples are:

47TI ⁴⁷Ti
 NI Nickel (targets only)
 25904 Element-104, mass 259

^bUsually the residual is the same as the nuclide; however, for some resonance studies they differ.

^cIncident or outgoing particles are generally entered in the same form as a nuclide (*e.g.*, 7LI for ⁷Li). However, gamma rays and some light particles are represented with these special symbols:

gamma ray (γ)	G	kaons (K)	K-, K0, or K+	triton (t or ³ H)	T
electrons (e)	E or E+	neutron (n or ¹ n)	N	alpha (α or ⁴ He)	A
muons (μ)	MU	proton (p or ¹ H)	P		
pions (π)	PI, PI+, or PI-	deuteron (d or ² H)	D		

Mossbauer (MO)

This option selects the Mossbauer data sets based on the criteria specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when this option is selected.

Muonic Atom (MU)

This option selects the muonic atom data sets based on the criteria specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when this option is selected.

Reaction (REA)

This option selects reaction data sets based on the criteria selected here and on the criteria specified in specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when the Execute item is selected.

Video

Execution of the list retrieval begins when the EXECUTE item is selected. Selection of the DONE item returns the user to the BROWSE/EXTRACT menu.

Sequential

The user will be prompted

1. to select the desired target range,
2. to select the desired residual range,
3. and to select the class of reaction or experiment, specific reaction, or incident and outgoing particles.

After all the prompts have been answered, the list retrieval begins. When the retrieval is complete, the user will be asked if he wishes to continue selecting reaction data. An answer of yes (Y) will continue the selection of reaction data. Any other response will return to the BROWSE/EXTRACT prompt.

Reference (REF)

This option selects the reference data sets based on the criteria specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when this option is selected.

All (AL)

This option selects all data sets satisfying the criteria specified in BROWSE/INITIALIZE. Execution of the list retrieval begins when this option is selected.

Done (DO)

Return to the BROWSE option.

Return (RET)

Return to the SELECT option.

BROWSE/COMBINE (C)

This option should be used to logically combine data set lists previously created with the BROWSE/EXTRACT or BROWSE/COMBINE options. The combining operation is limited to the following logical functions:

- .AND. Create a list of data sets containing those sets which are listed in both the input lists
- .OR. Create a list of data sets containing those sets which are listed in either of the input lists or in both of the input lists
- .XOR. Create a list of data sets containing those sets which are listed in either of the input lists but not in both of the input lists
- .NOT. Create a list of data sets containing those sets which are listed in the first input list but not the second input list

For example, if one wished to retrieve all decay data sets for parents with $A \geq 200$ except for spontaneous fission, a list would be retrieved for all decay data sets with parent $A \geq 200$ and another list, for all spontaneous fission decay data sets with parent $A \geq 200$.

The format for a logical expression is

list_number.operation.list_number

If data set lists 1 through 4 have been previously generated then the following are valid examples of logical expressions.

- 3.OR.4 All data sets listed in either list 3 or 4
- 1.NOT.4 All data sets listed in list 1 which are not listed in 4
- 4.AND.2 All data sets listed in both list 1 and 2
- 2.XOR.3 All data sets listed in either list 1 or 2 but not in both

The new combined list would be 5.

Video

A menu will appear with the items: New List, Show Lists, Done, and Return. See figure on 7.20.

The NEW LIST option allows the creation of a new list which is the logical combination of two previously saved lists. A display containing a prompt line and a menu of the Boolean operations will appear. The first list number should be entered followed by selection of the Boolean operator. Initially the menu will appear with AND selected. Subsequent NEW LIST displays will have the operator last selected as the default selection. and the entering of the second list number.

Other Options:

SHOW LISTS See Section 7.6.5.

DONE Return to the BROWSE option.

RETURN See Section 7.6.7.

When the retrieval of a data set list is begun, a blinking "Working" will appear within the menu window. After the first match, this will be replaced by a line showing the number of matches and total number of records. This line is updated with each new match. When the retrieval is complete, a menu containing SAVE and NOSAVE will appear at the end of the line. Select SAVE to save the data set list and NOSAVE if the list is not to be saved.

Sequential

The user will be prompted to enter an operation. A carriage return at the prompt will return the user to the BROWSE option. After the combine option has completed the user will be asked if the list should be saved and then returned to the BROWSE option.

When the retrieval of a data set list is begun, "Working" will be printed out. When the retrieval is complete, The total number of matches and records will be printed out along with the question "Do you wish to save this list?". Answer yes (Y) to save the list. Any other response will not save the list.

BROWSE/COMBINE Display in the Video Environment

Evaluated Nuclear Structure Data File				
SELECT	INDEX	BROWSE	COMBINE	
New List	Show Lists	Done	Return	Help
DATA LISTS SAVED				
<i>No. and Entry Date</i>	Data Type	Nuclides or <i>Residuals</i>	Targets or <i>Parents</i>	Matches and Records
<i>1</i>	DECAY	All	<i>A:200-266</i>	669
750430-910807	All	All	<i>All</i>	39262
<i>2</i>	DECAY	All	<i>A:200-266</i>	66
750430-910807	Spontaneous F	All	<i>All</i>	1447

Information which is shown in inverse video on a VT-100 terminal are represented by italics in this figure (e.g., *No. and*).

Combine Display

Evaluated Nuclear Structure Data File				
SELECT	INDEX	BROWSE	COMBINE	NEW LIST
Enter First List Number				
AND OR ■ . XOR . ■ NOT				

New List Display (partial display shown)

7.6.4 GET_LIST (G)

The GET_LIST option allows the selection of a data set list for sorting and retrieval. After a list is selected and sorted, the user is returned to the SELECT option where he may specify which of the data sets in the list should be retrieved.

GET_LIST/SELECT_LIST

The SELECT_LIST option allows the user to select a list for retrieval. If only one list exists, processing begins immediately. If there are more than one list, the user will be prompted for a list number. A prompt or menu will then appear asking for a sort order; the possible choices are: NUCLIDE, PARENT, TARGET, or RESIDUAL. After the sort, the program returns to SELECT, allowing further selection and retrieval. If SELECT/INDEX is selected again, the user will return to GET_LIST.

GET_LIST Other Options

SHOW LISTS	See Section 7.6.5 (Video Mode only).
SUMMARIZE (S)	See Section 7.6.6 (Sequential Mode only).
DONE (D)	Return to the SELECT/INDEX option.
RETURN (R)	See Section 7.6.7.

7.6.5 SHOW_LISTS (Video Mode only)

The SHOW_LISTS option allows the user to scroll through the list of data sets saved if there are too many to fit on the display and to obtain additional details about the lists. These additional details may be obtained by selecting the sub-menu item Details.

SHOW_LISTS/NEXT_SCREEN

Display the next screen of the data lists.

SHOW_LISTS/PREVIOUS_SCREEN

Display the previous screen of the data lists.

SHOW_LISTS/DETAILS

When the DETAILS sub-menu item is selected, the user may move through the display of data set lists and select a list to obtain the details of what is in the list. The details consist of the identification of the data sets retrieved, the number of records in each data set, and the types of records contained in each data set.

Movement through the display is accomplished by the up and down cursor keys and, for terminals with an edit keypad, by the previous screen and next screen keys. Press return to see the details of the highlighted list of data sets. The `delete` key, the right uppermost key on VT-series terminals (may differ with various emulators), will return the user to the SHOW_LISTS.

The display of the details consists of a window showing the retrieval criteria for the list and a tabular display consisting of the following columns:

1. Nuclide
2. Data Set Identification
3. Total number of records
4. Number of level records
5. Number of gamma records
6. Number of radiation records
7. Number of parent records
8. Existence of Q records
9. Existence of N records
10. Number of comment records
11. Number of continuation records

Movement within the tabular display is by the cursor and edit keys, previous and next. The first two columns are fixed and the remaining columns will scroll horizontally as the left and right cursor keys are used. To terminate this display press the delete key.

SHOW_LISTS Other Options

- DONE (D) Return to the SELECT/INDEX option.
RETURN (R) See Section 7.6.7.

7.6.6 SUMMARIZE (S; Sequential Mode only)

The SUMMARIZE option, which also appear within several of the other options for convenience, will show the current general selection criteria (entry date and nuclides); the data type, reaction class, or incident particle; and the number of lists which have been saved. If any lists have been saved, the question "Summarize?" will be asked. If the answer is yes (Y), for each list the selection criteria, number of data sets, and total number of records will be listed and the question "Show the list?" asked. If the answer is yes (Y), the contents of the list will be output.

7.6.7 RETURN

The RETURN option, which also appear within several of the other options for convenience, goes back to the SELECT option; the next time SELECT/INDEX option is selected the user will reenter the option at the same point he was at when RETURN was selected.

7.7 RETRIEVE

The RETRIEVE option supports ENSDF output in text form. It appears in the top-level menu only after the user has selected one or more ENSDF data sets using the SELECT option. A submenu appears on the screen with the options OUTPUT, NEW_FILE, FORMAT and DONE. There will be an additional option, SEND, if the current output is to a disk file and this disk file is not empty.

7.7.1 RETRIEVE/OUTPUT

When selected, this option will output the selected ENSDF data sets to the currently selected output device (user's terminal or disk) in the currently selected format (table or ENSDF).

When output is to the user's terminal, the selected data sets are retrieved one at a time and displayed in the format selected using the FORMAT option (default is Narrow Table). The user can page through the output for each data set. When finished with the current data set, the user can move either forward or backward in the selected data sets. If the output terminal has a graphical display capability, then level and decay diagrams may be displayed with the RETRIEVE/OUTPUT/VIEW option. During terminal output, the user may also select the RETRIEVE/OUTPUT/REFERENCE option in order to request display of a reference citation from the Nuclear Science References (NSR) data base.

When output to disk, the retrieval proceeds uninterrupted in the format selected in the FORMAT option. Upon completion, a message is displayed giving the number of data sets retrieved and written into the output disk file.

Sample output for both the Narrow Table and the ENSDF format in video mode are shown in the figure on the following page. The sequential mode output looks nearly identical, both having a menu at the bottom of the screen to control viewing of the data set.

Video

In video mode, the movement within the output of a data set is controlled by four scrolling options in the menu:

- FORWARD — to move forward a page,
- BACKWARD — to move backward a page,
- START — to move to the first page,
- END — to move to the last page.

When one of the options is not logically possible because of the current position within the data set, then it does not appear in the menu. For example, FORWARD and END do not appear when the window is displaying the last page of the data set output.

One can also move to the next data set using the NEXT_SET and to the previous data set using the PRIOR_SET options. By choosing the Quit option, the retrieval of the current and all other data sets is terminated and the program returned to the top-level menu.

Sequential In sequential mode, the display is nearly identical to that of the video mode. The menu items are displayed at the bottom of the screen and are identical in both modes. Select a menu item by entering the first character of the item name.

VIEW For users with a graphics terminal recognizing either Tektronix or Regis graphics instructions, it is possible to display a series of level diagrams and decay schemes representing the data in the data set currently being viewed. The user must have previously set his terminal graphics capability using the CUSTOMIZE module.

When the VIEW option is selected, a description of the first plot is presented along with a menu by which the user can execute the plot (PLOT), go to the next plot (SKIP) or stop the plotting option (QUIT). If selected, the plot will remain on the terminal until a RETURN-key is pressed. Each plot is described in turn and the user selection menu given until all plots are finished or QUIT is selected.

REFERENCE

When viewing a data set in either video or sequential mode, it is possible to display a reference from the Nuclear Science References data base (see Section 6). When selected, the user is asked to supply the 6-character reference keynumber (*e.g.* 88AJ01). The requested NSR entry, if the entered keynumber is valid, will be displayed on the user's terminal.

7.7.2 RETRIEVE/SEND

Use this option to download the data file containing the current retrieval. This option appears in the RETRIEVE menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

7.7.3 RETRIEVE/NEW_FILE

Use this option to change where the retrieval output will go. This option is identical to the NEW_FILE option described in Section 7.9.

7.7.4 RETRIEVE/FORMAT

Use this option to change the format of the retrieval output. This option is identical to the FORMAT option described in Section 7.10.

Output for Table Format in Video Environment

8BE	ADOPTED LEVELS, GAMMAS	Archive	FIRST SET	
8Be	8Be Adopted levels	88AJ01 (cont)	Page 6	
=====				
E(level)	Jpi	XREF	T1/2	Comments
27494.1 18 0+		I M	5.5 KEV 20	DECAY:D,A ISPIN=2 DECAY: G,N,P,D,T,3HE,A E: FOR PARAMETERS OF THIS STATE SEE TABLE 8.5: PARAMETERS OF THE FIRST T=2 STATE IN 8BE (84AJ01)
28600?				WIDTH: BROAD DECAY: G,P
[*] GIANT RESONANCE: SEE REACTION 7LI(P,G)				
FORWARD BACKWARD START END NEXT_SET VIEW REFERENCE QUIT				
BACKWARD - Go to the prior window of scrolled information.				

Output for ENSDF Format in Video Environment

8BE	ADOPTED LEVELS, GAMMAS	Archive	FIRST SET
8BE L 25500	4+		
8BE2 L	ISPIN=0		
8BEX L	XREF=M		
8BE CL	WIDTH	BROAD	
8BE CL		DECAY:D,A	
8BE L 27494.1	180+	5.5 KEV	20
8BE2 L	ISPIN=2		
8BEX L	XREF=M		
8BE CL		DECAY: G,N,P,D,T,3HE,A	
8BE CL E		FOR PARAMETERS OF THIS STATE SEE TABLE 8.5;	
8BE2CL		PARAMETERS OF THE FIRST T=2 STATE IN 8BE (84AJ01)	
8BE G 9847.6		M1	
8BE2 G	WIDTHG=21.9 EV	39\$BM1W=1.1 2	
8BE L 28600			?
8BEX L	XREF=I		
8BE CL	WIDTH	BROAD	
8BE CL	WIDTH	DECAY: G,P	
BACKWARD START NEXT_SET VIEW REFERENCE QUIT			
BACKWARD - Go to the prior window of scrolled information.			

8BE	ADOPTED LEVELS, GAMMAS	Archive	FIRST SET
	88Aj01		
Nucl.Phys. A490, 1 (1988) F.Ajzenberg-Selove Energy Levels of Light Nuclei A = 5-10 <KEYWORDS>COMPILATION A=5-10; compiled,evaluated structure data			
DONE			
DONE - Viewing completed.			

7.8 PLOT

The PLOT option supports ENSDF output in graphical form. It appears in the top-level menu only after the user has selected one or more ENSDF data sets using the SELECT option. A submenu appears on the screen with the options SIMPLE, TABLES-FIGURES and DONE.

7.8.1 PLOT/SIMPLE

It is possible to plot a series of level diagrams and decay schemes representing the data in the currently selected data sets. The plots will be stored in PostScript format in the user's storage area in a file with the name ENSDF_PLOT.PS unless another name is supplied when prompted immediately after selection of this option. All plots will be placed in a single file. When finished, the user is prompted as to whether or not to download the plot file for output on a local laser printer. If the response is positive, then a form is presented for entry of the transmission parameters (See Section 15.1.3 for details).

7.8.2 PLOT/TABLES-FIGURES

The TABLES/FIGURES option is used to create a disk file in Postscript format containing displays of the selected data sets in Nuclear Data Sheets style. The output file is stored in the user's disk storage area with the name `NDS_PLOT.PS` unless another name is supplied when prompted immediately after selection of this option. All plots will be placed in a single file.

There are four options for displaying the information in the selected data sets.

TABLE	displays only the numerical tables
DRAW	displays only the gamma-decay schemes
BANDS	displays only the nuclear band structures
ALL	display all three types output properly interleaved

After selecting the type of displays desired, the plots are generated and stored in the user selected disk file. When finished, the user is prompted as to whether or not to download the plot file for output on a local laser printer. If the response is positive, then a form is presented for entry of the transmission parameters (See Section 15.1.3 for details).

7.9 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you **MUST** use this option to supply a name for the file before proceeding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file `TT:` or `TTY:`.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a `RETURN` without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

7.10 FORMAT

The output can be generated in one of three formats. This option permits the selection of the output format from the three choices. The default selection is **Narrow Table** format.

Narrow Table Format

The **Narrow Table** format is an expanded human-readable format in which the ENSDF formatted data set is presented as data tables similar to what would be published in the Nuclear Data Sheets. The width of a line of output is 80 characters. An example of this format is shown in the figure on page 7.25.

Wide User Format

The **Wide Table** format is identical to the **Narrow Table** format except that it is designed for 132 character line output. Unless the user has specified that his output device is 132 character capable (see Section ??), the output will revert to standard **Narrow**

Table format.

ENSDF Format

The **ENSDF** format is described and illustrated in Section 7.1. This is format of the data in the ENSDF data base and is used by evaluators to prepare their evaluated data for processing. An example of this format is shown in the figure on page 7.25.

Video

In the video mode, a menu of the three format options is displayed. Upon selection of a format, the option terminates and the file specification in the screen display is updated.

Sequential

The new output format is selected by entering the first character of the format name at the prompt. Entry of a RETURN will select the default format, the **Narrow Table** format.

7.11 MASS_STATUS

The ENSDF data evaluations are carried out simultaneously for all nuclides with the same mass number (mass chain). When the evaluation for a mass chain has been completed, it is reviewed and then published in the Nuclear Data Sheets Journal or in the case of A less than 45, in Nuclear Physics. When submitted for publication in Nuclear Data Sheets, the evaluation is added to the ENSDF data base maintained by the National Nuclear Data Center of Brookhaven National Laboratory. In the case for A less than 45, there can be a significant delay between publication and entry into the data base since the evaluations are coded in ENSDF format by other evaluators after publication.

The MASS_STATUS option is designed to provide the user with information about the publication status of a mass chain. After selecting this option, the user is asked to supply a valid mass number. Information about the mass chain evaluation is then displayed on the terminal. The information includes the publication citation and the cutoff date for literature included in the publication. If a revised evaluation is available in prepublication form, it is so indicated. The user may select any number of mass chains in this option. If a blank mass number is entered the option terminates.

Video

The user enters a mass number and a display similar to the one below is output to the terminal. When finished with the display, depress the RETURN-key and then enter another mass number or the RETURN-key again to terminate the option.

Sequential

In this mode, after the user enters a mass number, the information appears on the terminal and looks just like the video mode display except that the mass number prompt appears immediately at the bottom of the screen.

MASS_STATUS Display in Video Environment

Evaluated Nuclear Structure Data File

MASS_STATUS

Status for Mass 110

This evaluation was originally published in the Nuclear Data Sheets. Data may be incomplete or superceded by work published since the literature cutoff date. For references to later information on the mass chain, see the Nuclear Science References data base.

Evaluation published in the Nuclear Data Sheets:

Volume:38 Page:545 Year:1983

Literature cutoff date for this evaluation: 1-Oct-1982

Revised pre-publication evaluation also available

Press any key to continue.

8 NUDAT

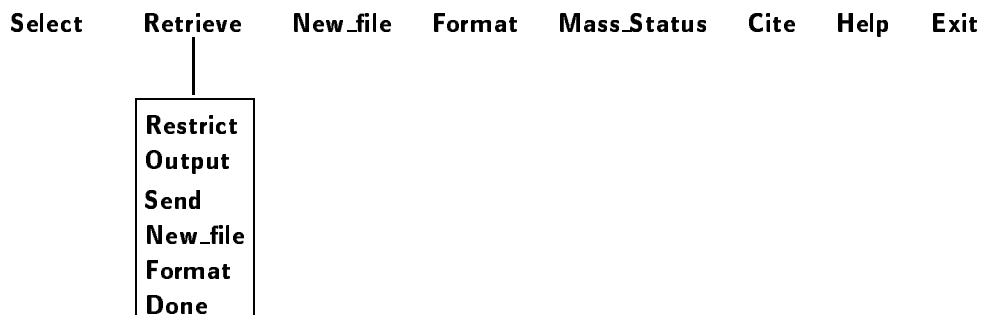
The Nuclear Data file, NUDAT, contains a variety of nuclear data in a form suitable for performing a wide range of searches for data satisfying user chosen constraints. The data base system is written using an ISAM-type data base so that the program will also operate on a PC. The data base contains the following information:

1. Level and gamma ray adopted properties of nuclides derived from the adopted data sets in the ENSDF data base (see Section 7).
2. Nuclear ground and metastable state properties as contained in the "Nuclear Wallet Cards".
3. Radiations seen in radioactive decay of nuclides derived from the radioactive decay data sets in the ENSDF data base.
4. Thermal neutron cross sections and resonance integrals as published in **Neutron Cross Sections**, Vol 1.

The data contained in this data base are designed to be consistent with the contents of the ENSDF data base and are updated concurrently with that data base. In particular, the ground and metastable state properties are more current than those contained in the "Nuclear Wallet Cards" publication. The thermal neutron cross section and resonance integral data are the same as given in the publication since work in this area has been terminated.

8.1 NUDAT Options

The main menu and the associated options are summarized in the following diagram. The options listed on the top line of the diagram represent the top-level menu. Where an option is itself a menu of sub-options, the secondary menu items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. All top-level options will be given in the text all in capital letters; sub-options will also be given in capital letters with a slash between the option and sub-option. For example RETRIEVE and RETRIEVE/OUTPUT. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.



With the **SELECT** option, the user enters data selection values. Records satisfying the selection criteria are store for later use. This information or selected parts thereof may be retrieved with the **RETRIEVE** option. The stored information may be further narrowed with the **RETRIEVE/RESTRICT**. Output to terminal or disk file is accomplished with the **RETRIEVE/OUTPUT** option. The **NEW_FILE** and **FORMAT** options select the

output media and output format respectively. The MASS_STATUS option allows the user to view the publication status for selected mass-chains.

8.2 Retrieval Strategy

The SELECT option should be used to select the type of data desired. Depending on the type of data selected, the user must next supply values for the data retrieval parameters. Only the retrieval parameters appropriate for the selected data type are displayed. The user then enters the selection expression (see Section 8.3.2) for the parameters on which selection is to be made. A blank entry means that no selection will be made on that parameter.

When all selection expressions have been supplied, the program will retrieve all data records which satisfy the selection criteria. The number of records containing the selected information is displayed and the sub-menu displayed. At this point one may either display the retrieved data on the user's terminal or store it in a disk file with the RETRIEVE option. The output can be ordered in several different ways depending on the type of data. The RETRIEVE/RESTRICT option can be used to select a subset of the retrieved data records. This subset of the data records can then be sorted and displayed. With the RETRIEVE/NEW_FILE option, you may specify whether terminal or disk output is desired; with the RETRIEVE/FORMAT option, you can select the output format.

8.3 SELECT

The SELECT option which appears in the top-level menu should be used to choose the data and then to output the selected data to either the user's terminal or to a disk file. The data type is selected and the appropriate retrieval parameter expressions entered.

The data types which may be selected are the following:

- Levels — information about nuclear levels which includes the nucleus, the level energy and its uncertainty, spin-parity, and the half-life and its uncertainty.
- Gammas — information about nuclear gamma rays including their energy and uncertainty, source level energy, intensity, multipolarity, mixing ratio and conversion coefficient.
- Levels and Gammas — information about gamma rays with the addition of spin-parity and half-life of the parent level.
- Wallet Cards — information about ground and meta-stable state properties of nuclei including level energy, mass excess and uncertainty, spin-parity, half-life and uncertainty, decay mode with branching ratio and Q-value. For naturally occurring nuclides, the abundance is given.
- Decay Radiations — information about the radioactive decay of nuclides including radiation type, energy, intensity and dose. For beta radiation both the median and endpoint energies are given.

- Neutron Data — information about thermal neutron cross sections, fission neutron multiplicities and resonance integrals.

The video mode data selection menu is illustrated in the next figure.

Data Type Selection Display in Video Environment

Nuclear Data File - NUDAT	
SELECT	
Format : <u>Wide Table</u>	File : <u>User Terminal</u>
<hr/>	
Base Collection :	Current Collection :
SELECT DATA TYPE	
LEVELS	- Adopted levels from ENSDF.
GAMMAS	- Adopted gamma rays from ENSDF.
LEVELS AND GAMMAS	- Adopted levels and gamma rays from ENSDF.
WALLET CARDS	- Ground and Metastable State Properties.
DECAY RADIATIONS	- ENSDF decay data processed by MEDLIST.
NEUTRON DATA	- Thermal Data and Resonance Integrals from BNL325.
DONE	- Return to top-level menu without selecting.

Video

In video mode, the NUDAT module displays the previous figure which is a menu of data types. Use the UP and DOWN ARROW keys to move between the menu items to select the data type. The initial selection is the previously selected data type. Implement a selection by depressing the RETURN key. You can exit without selecting a data type by choosing the DONE option.

The data selection menu is followed by the parameter selection form illustrated in the following six figures. A different list of parameters for data selection appropriate to the selected data type is presented in the form. Each field is displayed along with its current value. The selection expression in any field can be changed by moving to that field with the UP-ARROW or DOWN-ARROW key and then entering the new value. At the bottom of the display is brief information on the form and contents required for data entry in the selected field. The last item in the form is an OK/QUIT toggle which can be changed by depressing the SPACE BAR. Entry of a RETURN key on this field will cause the data base to be searched for the selected data if the toggle is on OK or will return to the top-level menu if on QUIT.

Parameter Selection in Video Environment

Nuclear Data File - NUDAT	
SELECT	
Retrieval Parameters for Levels	
Mass Number	240-250
Element	
Neutron Number	
ODD/EVEN	<input style="width: 100%;" type="text" value="E-E"/>
E-level(keV)	-100.0&~0.0
Spin-Parity	2+
Half-life	
OK/QUIT	OK
<p style="text-align: center;">You may select the evenness or oddness of the nuclide's neutron and proton numbers. One or more values may be entered, separated by an & for "AND" or an @ for "OR". A value can be negated with a ~. Enter E-E for even-even, O-O for odd-odd or E-O for even-odd.</p> <p style="text-align: center;">Ex. E-E@O-O will select even-even or odd-odd nuclides.</p>	
Use the UP- and DOWN-ARROWS to move between fields.	
Levels	

Nuclear Data File - NUDAT	
SELECT	
Retrieval Parameters for Gammas	
Mass Number	160-170
Element	Er@Yb
Neutron Number	
ODD/EVEN	
E-level(keV)	
E-gamma(keV)	<input style="width: 100%;" type="text" value="300.-600"/>
Multipolarity	E1&M2
OK/QUIT	OK
<p style="text-align: center;">Gamma rays are characterized by their energies (kev). Enter an expression consisting of one or more ranges (a value or two values separated by a -) separated by an & (AND) or an @ (OR). A range can be negated with a ~; -value means <=value; value- means >=value.</p> <p style="text-align: center;">Ex. 500-700 selects gamma ray energies between 500 and 700 keV.</p>	
Use the UP- and DOWN-ARROWS to move between fields.	
Gammas	

Parameter Selection in Video Environment (cont)

Nuclear Data File - NUDAT

SELECT

Retrieval Parameters for Levels and Gammas

Mass Number	164-168
Element	Er@Yb
Neutron Number	
ODD/EVEN	
E-level(keV)	-1000.
Spin-Parity	3/2+
Half-life	
E-gamma(keV)	100-500.
Multipolarity	<input type="text" value="E1&~M2"/>
OK/QUIT	OK

Gamma rays are characterized by their multipolarity. Enter one or more values separated by an & (AND) or an @ (OR). A value can be negated with a ~. Enter a multipolarity in the form E0, E1, E2, etc. for electric; M1, M2, M3, etc. for magnetic radiation.
 Ex. E1&~M2 selects gamma rays with an E1 but not an M2 component.

Use the UP- and DOWN-ARROWS to move between fields.

Levels and Gammas

Nuclear Data File - NUDAT

SELECT

Retrieval Parameters for WALLET CARDS

Mass Number	180-200&~188-190
Element	
E-level(keV)	-0.
Spin-Parity	3/2
Half-life	1.5S-2.3H
Decay Mode	<input type="text" value="B-"/>
OK/QUIT	OK

You may select the decay mode of a nucleus. One or more values may be entered separated by an & for "AND" or an @ for "OR". A value can be negated with a ~. Enter the decay mode in the form of B- for beta-decay, EC for electron-capture/beta+decay, P, N, T, A for proton, neutron, triton and alpha decay respectively or F for spontaneous fission.
 Ex. B-&EC will select beta- and electron capture decays.

Use the UP- and DOWN-ARROWS to move between fields.

WALLET CARDS

Nuclear Data File - NUDAT

SELECT

Retrieval Parameters for Decay Radiations

Mass Number	113@115
Element	In
Half-life	
Decay Mode	
Radiation	<input type="text" value="G@E"/>
R-energy(keV)	
R-intensity	35-
OK/QUIT	OK

You may select the radiation from a nuclide decay. One or more values may be entered separated by an & for "AND" or an @ for "OR". A value can be negated with a ~. Enter decay radiation in the form of B- for beta-, B+ for positrons, E for electrons, G for gamma rays and A for alpha particles.

Ex. B+ will select positron radiations.

Use the UP- and DOWN-ARROWS to move between fields.

Decay Radiations

Nuclear Data File - NUDAT

SELECT

Retrieval Parameters for Neutron Data

Mass Number	
Element	PU
Half-life	
Reaction	F
Sigma	<input type="text" value="150.-"/>
Resonance I.	
OK/QUIT	OK

Data may be selected by the value of thermal neutron cross sections. Cross sections are given in barns. Enter a cross section selection expression. This consists of one or more ranges separated by an & (AND) or an @ (OR). A range can be negated with a ~. A range is either a single value or two values separated by a -. A missing lower value (-A) means $\leq A$; a missing upper value (A-) means $\geq A$.

Ex. 1.E+6- will select cross sections ≥ 1 million barns.

Use the UP- and DOWN-ARROWS to move between fields.

Neutron Data

Sequential

In sequential mode, the NUDAT module will list the possible data types and a integer identification number. At the prompt, enter the identification number for the data type desired. A RETURN without a preceding identification code will select the current default data type which is denoted by an * preceding the identification number. By entering a D for DONE, the user is returned to the top-level menu.

The data selection menu is followed by the parameter selection form. A different list of parameters for data selection appropriate to the selected data type is presented in the form. Each field is displayed along with its current value and an integer identification number. At the prompt, select the fields to modify by entering the ID numbers separated by a comma. Entering ALL will select all parameters. You will be prompted for a new data selection expression for each chosen field one at a time. Enter a new expression, or a question mark (?) for brief information on the form and contents required for data entry in the selected field. A RETURN without any preceding characters will leave the field unchanged. After responding for all chosen fields, the parameter selection form appears again with updated parameter selection values. At this point, additional fields may be modified. Optionally, by entering DONE, the data base will be searched for the selected data, or by entering QUIT, the program will return to the top-level menu. See the preceding six figures which illustrate the video mode input form and which contain the retrieval parameters for each data type.

If no data satisfying the selection criteria are found, the user is informed and returned to the top-level menu. If data are found, the next menu is displayed as well as the number of data records found.

8.3.1 Data Selection Expressions

Data from the NUDAT data base are chosen by supplying a selection expression for one or more of the retrieval parameters. If no selection expression is supplied for a parameter, then it is assumed that all values for that parameter are desired. There are two types of selection expressions, one for numerical data and another for character.

An expression is made up of “ranges”. These ranges are linked by logical operators, either an AND operator (&) or an OR operator (@). Any range can be negated by preceding it with a tilda character (~). A general expression would have the form.

$$\left\{ \sim \right\} range_1 \left\{ \begin{array}{c} @ \\ \& \end{array} \right\} \left\{ \sim \right\} range_2 \left\{ \begin{array}{c} @ \\ \& \end{array} \right\} \left\{ \sim \right\} range_3 \dots$$

An expression is evaluated from left to right. For example, to select data in $range_1$ or in $range_2$ but not in $range_3$ then enter

$$range_1 @ range_2 \& \sim range_3$$

A **character variable** range is just a single character string value for the parameter selection. A **numeric variable** range consists of a single numeric value or two numeric values separated by a minus sign (-). The four possible constructions are

$value_1$	equal to $value_1$
$value_1$ - $value_2$	between $value_1$ and $value_2$
$value_1$ -	greater than or equal to $value_1$
- $value_2$	less than or equal to $value_2$

For example to select values between 130 and 175 except for 150

130-175&~150

8.3.2 Parameter Value Specification

There are 16 different parameters whose values can be specified in order to select data from this data base. Some of these data are essentially numeric in nature and some are character data. Not all parameters are appropriate for a selected data type. The detailed description of how to specify value for each different retrieval parameter is given in the following sections. These parameters are

Mass Number	numeric	nuclide specification
Proton Number (Element)	numeric	nuclide specification
Neutron Number	numeric	nuclide specification
Evenness/Oddness (ODD/EVEN)	character	nuclide property
Level Energy (E-level)	numeric	level specification
Spin-Parity	character	level property
Half-life	numeric	level property
Decay Mode	character	level property
Gamma Energy (E-gamma)	numeric	gamma ray specification
Gamma Multipolarity	character	gamma ray property
Radiation	character	radiation specification
Radiation Energy (R-energy)	numeric	radiation property
Radiation Intensity (R-intensity)	numeric	radiation property
Thermal Data Type (Reaction)	character	thermal data specification
Thermal Data Value (Sigma)	numeric	thermal data property
Resonance Integral (Resonance I.)	numeric	thermal data property

Mass Number — A nuclide is characterized by the number of nucleons (protons and neutrons) in its nucleus. This is a numeric selection parameter. The data base contains information for nuclei with mass numbers between 1 and 266. For example

180-210&~200 selects nuclides with mass numbers between 180 and 210 but not equal to 200.

Proton Number — A nuclide is characterized by the number of protons (which corresponds to a chemical element) in its nucleus. This is a numeric selection parameter. The data base contains information for nuclei with proton numbers between 0 and 109. Chemical symbols may also be entered instead of the equivalent proton number. For example

U@94- selects elements with proton numbers 92 (Uranium)
 and 94 and above.

Neutron Number — A nuclide is characterized by the number of neutrons in its nucleus. This is a numeric selection parameter. The data base contains information for nuclei with neutron numbers between 0 and 160. For example

57-77@82-88 selects nuclides with neutron numbers between 75 and
 77 or between 82 and 88.

Evenness/Oddness — A nuclide is characterized by the evenness or oddness of its neutron number and its proton number. This is a character selection parameter. The parameter may have only three values E-E for even-even nuclides, O-O for odd-odd nuclides, and E-O for even-odd or odd-even nuclides. For example

E-E@O-O selects nuclides with even neutron numbers and even
 proton numbers or odd neutron numbers and odd proton
 numbers.

Level Energy — A level of a nucleus is determined by its excitation energy. This is a numeric selection parameter. Energies must be given in keV. The ground state of a nucleus has an energy of 0.0. For example

-2500 selects nuclear levels less than or equal to 2.5 MeV.

Spin-Parity — A level of a nucleus is characterized by its spin and parity. This is a character selection parameter. Spins are either integral (eg. 3) or half integral (eg. 3/2) and are given in that manner. The parity of a level may be either positive or negative. This parameter may be given as spin only, parity only or as spin and parity in the form 3+ or 3/2-. If the input spin-parity is followed by an integer enclosed in square brackets ([n]), then only the nth level with the requested spin-parity will be selected. For example

2@3- selects nuclear levels with spin 2 (any parity) or 3-
 spin and parity.
2+[1] selects the first level in a nuclide 2+ spin and parity.

Half-life — A level of a nucleus can be characterized by its half-life. This is a numeric selection parameter. It is specified as a floating point number followed by one or more characters to indicate the time unit. The possible time units are

S	– second	MS	– millisecond	EV	– electron volts
M	– minute	US	– microsecond	KEV	– kilo electron volts
H	– hour	NS	– nanoseconds	MEV	– million electron volts
D	– day	PS	– picoseconds		
Y	– year	FS	– femtoseconds		

For stable nuclide states, one may enter STABLE. For example

3S-4H@STABLE selects nuclear states with half-lives between 3 seconds and 4 hours or ones that are stable against decay.

Decay Mode — The decay mode of a nuclear state may be selected. This is a character selection parameter. The possible decay modes and their character codes are

B-	– beta- decay
EC	– electron-capture/positron decay
P	– proton decay
N	– neutron decay
T	– triton decay
A	– alpha decay
F	– spontaneous fission

Use these character codes to select the decay mode. For example

B- selects beta- decays

Gamma Energy — A gamma ray from decay of a nuclear level is specified by its energy. This is a numeric selection parameter. Energies must be given in keV. For example

500-700 selects gamma rays from nuclear level decay between 500 and 700 keV.

Gamma Multipolarity — A decay gamma ray is characterized by its multipolarity. This is a character selection parameter. Electric radiation is given in the form E0, E1, E2, E3, etc.; magnetic radiation in the form M1, M2, M3, etc. For example

E1&~M2 selects gamma rays with an E1 component and no M2 component.

Radiation — The radiation from a radioactive decay may be selected. This is a character selection parameter. The possible radiations and their character codes are

B- - beta- particles
B+ - positrons
E - electrons
G - gamma rays
A - alpha particles

Use these character codes to select the radiation type. For example

B+ selects positrons

Radiation Energy — A decay radiation is characterized by its energy. In the case of beta radiation, this is the median energy of the beta spectrum. This is a numeric selection parameter. Energies must be given in keV. For example

500-900 selects radiations with energies between 500 and 900 keV.

Radiation Intensity — A decay radiation is characterized by its frequency per decay. This is a numeric selection parameter. Intensities must be given in percent (frequency per 100 decays). For example

80.- selects radiations with intensities greater than 80%.

Thermal Data Type — Thermal neutron reaction data type may be selected. This is a character selection parameter. The possible data types and their character codes are

T - total cross section
S - scattering cross section
A - absorption cross section
C - capture cross section
F - fission neutron multiplicity ($\bar{\nu}$)

Use these character codes to select the thermal neutron data type. For example

C@F selects capture and fission cross sections.

Thermal Data Value — Thermal data may be selected by its value. This is a numeric selection parameter. Cross sections are given in barns and multiplicities as number per reaction. For example

1.E+6- selects reactions with cross sections greater than or equal to 1 million barns.

Resonance Integral — Resonance integrals may be selected by their value. This is a numeric selection parameter. Resonance integrals are given in barns. For example

-200.5 selects reactions with resonance integrals less than or equal to 200.5 barns.

8.4 RETRIEVE

When the data selection parameters have been supplied, the data base is searched and the selected data is stored. The number of records satisfying the parameter selection criteria is displayed. To output some or all of this data choose the SELECT option. The video mode display for the RETRIEVE option is given below. Note in the figure below that the RETRIEVE/RESTRICT option has been executed so that the current number of selected data records is less than the original (base) number of data records.

Data Output Menu Display in Video Environment

Nuclear Data File - NUDAT				
RETRIEVE				
Format : <u>Narrow Table</u>		File : <u>User Terminal</u>		
Base Collection : <u>77 Records</u>		Current Collection : <u>42 Records</u>		
RESTRICT	OUTPUT	NEW_FILE	FORMAT	DONE
<div style="border: 1px solid black; padding: 2px;"> OUTPUT - Output the current data collection </div>				

8.4.1 RETRIEVE/RESTRICT

A restricted subset of the data previously selected based on the initial values of the selection parameters may be chosen for display. The RETRIEVE/RESTRICT option accomplishes this task. The execution of this option is identical to the interaction used to specify the primary data selection criteria in both the video and the sequential mode. The input forms are initialized to the initial criteria. Choose and enter the revised parameter selection expressions desired. **Make certain that the revised selection criteria for a parameter is not incompatible with the initial selection criteria.** For example, if the initial selection for the mass number was between 132 and 135 and the restriction selection expression is less than 125, then no data will meet the restricted criteria.

8.4.2 RETRIEVE/OUTPUT

This option will output the currently selected data record to the user's terminal or to a disk file in the selected format. The data may be sorted in a number of ways depending on the data type being output. The following table summarizes the sorting options available. The first option listed is the default.

Levels

Mass number, Proton number, Level energy
Level energy, Mass number, Proton number

Gammas

Mass number, Proton number, Level energy, Gamma energy
Level energy, Mass number, Proton number, Gamma energy
Gamma energy, Mass number, Proton number, Level energy

Levels and Gammas

Mass number, Proton number, Level energy, Gamma energy
Level energy, Mass number, Proton number, Gamma energy
Gamma energy, Mass number, Proton number, Level energy

WALLET CARDS

Mass number, Proton number, State energy, Half-life

Decay Radiations

Mass number, Proton number, Half-life, Radiation
Radiation energy, Mass number, Proton number
Radiation intensity, Radiation energy, Mass number, Proton number

Neutron Data

Mass number, Proton number, State energy

For the four data types given in the table above which have more than one sorting option, a menu for selecting the sorting order is presented in both the video and the sequential modes. For the other two data types where no sorting is supported, the output is immediately generated when the RETRIEVE/OUTPUT option is selected.

When output to disk, the retrieval proceeds uninterrupted in the format selected in the FORMAT option. A message indicating that the output to disk is in progress is displayed.

This message disappears when the retrieval has been completed. When terminal output has been selected, in video mode, the output is scrolled whereas in sequential mode, it is paged.

Video

In video mode, the movement within the output of the data is controlled by four scrolling options in the menu:

- FORWARD — to move forward a page,
- BACKWARD — to move backward a page,
- START — to move to the first page,
- END — to move to the last page.

When one of the options is not logically possible because of the current position within the data output, then it does not appear in the menu. For example, FORWARD and END do not appear when the window is displaying the last page of the data. Selecting DONE indicates that the user has finished viewing the retrieval.

Sequential

In the sequential mode, the display is nearly identical to that of the video mode. The menu items are displayed at the bottom of the screen and are identical in both modes. Select a menu item by entering the first character of the item name.

Output Display for an Levels Retrieval in Video Environment

A	Element	Z	Level Energy (keV)		Jpi	Half-life	PUB Year
22	NE	10	6345.2	0.9	4+	<10 FS	90
22	NE	10	6636.0	1.7	(2,3)+	<14 FS	90
22	NE	10	6691	4	1-		90
22	NE	10	6817	2	2+		90
22	NE	10	6853.4	1.9	1+	236 AS 42	90
22	NE	10	6904	9	(0,1)+		90
22	NE	10	7052	7	1-		90
22	NE	10	7341.1	1.1	(3,4)+		90
22	NE	10	7342	6	0+		90
22	NE	10	7406	2	(1,3)-	62 FS 28	90
22	NE	10	7423.0	0.8	(3,5)+	47 FS 15	90
22	NE	10	7470	20			90
22	NE	10	7489	6	1-		90
22	NE	10	7644	4	2+	0.8 FS 0.3	90
22	NE	10	7664	8	2-		90

FORWARD	BACKWARD	START	END	DONE
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FORWARD - Go to the next window of scrolled information.
--

8.4.3 RETRIEVE/SEND

Use this option to download the data file containing the current retrieval. This option appears in the RETRIEVE menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

8.4.4 RETRIEVE/NEW_FILE

Use this option to change where the retrieval output will go. This option is identical to the NEW_FILE option described in Section 8.5.

8.4.5 RETRIEVE/FORMAT

Use this option to change the format of the retrieval output. This option is identical to the FORMAT option described in Section 8.6.

8.5 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you **MUST** use this option to supply a name for the file before proceeding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file **TT:** or **TTY:**.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a RETURN without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

8.6 FORMAT

The output can be generated in one of two formats. This option permits the selection of the output format from the two choices. The default selection is **Wide Table** format for terminals with 132-character display capability or for disk output.

Wide Table Format

The **Wide Table** format is designed for 132 character line output. For terminal output, unless the user has specified that his output device is 132-character capable(see Section ??), the output will revert to the **Narrow Table** format.

Narrow Table Format

The **Narrow Table** format is a tabular output limited to 80 character output lines. In some cases, the number of fields output will be less than in the wide table format.

8.7 MASS_STATUS

The ENSDF data evaluations from which a large part of the data in this data base are derived, are carried out simultaneously for all nuclides with the same mass number (mass chain). When the evaluation for a mass chain has been completed, it is reviewed and then published in the Nuclear Data Sheets Journal or in the case of A less than 45, in Nuclear Physics. When submitted for publication in Nuclear Data Sheets, the evaluation is added to the ENSDF data base maintained by the National Nuclear Data Center of Brookhaven National Laboratory. In the case for A less than 45, there can be a significant delay between publication and entry into the data base since the evaluations are coded in ENSDF format by other evaluators after publication.

The MASS_STATUS option is designed to provide the user with information about the publication status of a mass chain. After selecting this option, the user is asked to supply a valid mass number. Information about the mass chain evaluation is then displayed on the terminal. The information includes the publication citation and the cutoff date for literature included in the publication. If a revised evaluation is available in prepublication form, it is so indicated. The user may select any number of mass chains in this option. If a blank mass number is entered the option terminates.

Video

The user enters a mass number and a display similar to the one below is output to the terminal. When finished with the display, depress the RETURN-key and then enter another mass number or the RETURN-key again to terminate the option.

Sequential

In this mode, after the user enters a mass number, the information appears on the terminal and looks just like the video mode display except that the mass number prompt appears immediately at the bottom of the screen.

MASS_STATUS Display in Video Environment

Nuclear Data File - NUDAT

MASS_STATUS

Status for Mass 189

This evaluation was originally published in the Nuclear Data Sheets. Data may be incomplete or superceded by work published since the literature cutoff date. For references to later information on the mass chain, see the Nuclear Structure References data base.

Evaluation published in the Nuclear Data Sheets:

Volume:59 Page:869 Year:1990

ENSDF has been updated since its publication.

Literature cutoff date for this evaluation: 31-Oct-1991

Press any key to continue.

9 CINDA

The Computer Index to Neutron Data (CINDA) is a bibliographic file, containing references to neutron reaction data and some photonuclear reaction data. The file covers the literature since the discovery of the neutron. It originated with Prof. Herbert Goldstein of Columbia University as a card index to the nuclear reaction data literature. The effort to maintain this data base is now part of an international collaboration between the Nuclear Data Section of the IAEA, Vienna, which publishes the annual hard copy edition, the NEA Data Bank, Paris, the Nuclear Data Center (CJD), IPPE, Obninsk and the National Nuclear Data Center, Brookhaven National Laboratory.

This bibliography is unique in structure as it is data oriented rather than reference oriented. In the usual bibliography, there is a single entry for each publication or reference. In CINDA, there can be many entries for each publication, one for each data set reported. For example, if a publication reports on a measurement of the total cross sections for Fe and for ^{56}Fe and the differential elastic scattering cross section for Fe, there will be three entries in the data base. All references to the same data are linked together in a CINDA “block” along with references to experimental or evaluated data if available.

9.1 CINDA Organization

The CINDA data base contains a record for each reference to either a measurement, calculation, evaluation or review of a neutron reaction. Each of these records contains the target nuclide, the reaction and quantity, the laboratory where the work was done, the type of reference (journal, conference, etc.), the reference, the energy range, the first author, and brief comments. The reaction and quantity are rather broadly defined. For example, NP refers to the (n,p) reaction cross section and also secondary energy and angular distributions.

Each reference to the same data is linked to a CINDA “block”. This block contains a main reference, usually a journal publication and all other references to the data from journals, conferences, reports, theses, etc. For experimental and evaluated data, the block may also contain a reference to the compiled experimental data in the CSISRS data base or the evaluated data in the ENDF data base.

9.2 CINDA Options

The main menu of the CINDA retrieval program has seven options, SELECT, RETRIEVE, NEW_FILE, FORMAT, CITE, HELP and EXIT. With the SELECT option, the user enters data selection criteria. The CINDA blocks corresponding to the selection criteria can be retrieved with the RETRIEVE option. The RETRIEVE option is active only if data has been selected using the SELECT option. The NEW_FILE and FORMAT options select the output media and output format respectively. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.

9.3 SELECT

The SELECT option should be used to choose the bibliographic data which can then be retrieved and sent to either the user’s terminal or to a disk file. The following retrieval criteria can be specified.

Retrieval Parameters

Parameter	Type
Element	numeric or character
Mass	numeric or character
Quantity	numeric or character
Laboratory	character
Publication Date	numeric
Energy Range	numeric
Publication Type	character
Work Type	character

A detailed description of how to specify input for each different retrieval parameter is given in succeeding sections.

Video

The parameter selection form illustrated in the following figure is used to enter the retrieval criteria. Each field is displayed along with its current value. The selection expression in any field can be changed by moving to that field with the UP-ARROW or DOWN-ARROW key and then entering the new value. At the bottom of the display is brief information on the form and contents required for data entry in the selected field. The last item in the form is an OK/QUIT toggle which can be changed by depressing the SPACE BAR. Entry of a RETURN key on this field will cause the data base to be searched for the selected data if the toggle is on OK or will return to the top-level menu if on QUIT.

Sequential

The data selection menu is followed by the parameter selection form. A list of the retrieval parameters is displayed along with its current value and an integer identification number. At the prompt, select the fields to modify by entering the ID numbers separated by a comma. Entering ALL will select all parameters. You will be prompted for a new data selection expression for each chosen field one at a time. Enter a new expression, or a question mark (?) for brief information on the form and contents required for data entry in the selected field. A RETURN without any preceding characters will leave the field unchanged. After responding for all chosen fields, the parameter selection form appears again with updated parameter selection values. At this point, additional fields may be modified. Optionally, by entering DONE, the data base will be searched for the selected data, or by entering QUIT, the program will return to the top-level menu.

Neutron Reaction Data Bibliography - CINDA	
SELECT	
Format : <u>Narrow User</u>	File : <u>User Terminal</u>
Element	Zr
Mass	92-94
Quantity	TOT
Laboratory	ORL
Publication Date	<input type="text" value="-90"/>
Energy Range(eV)	1.E+5-
Publication Type	
Work Type	E
OK/QUIT	OK
<p>Enter a range of publication dates with two dates separated by a minus sign. Each date has the form year_month (YYMM). A blank implies ALL dates. Missing lower or upper dates mean the lowest or highest possible values respectively.</p> <p>example: 8506-9312 selects June 1985 through December 1993.</p>	
Use the UP- and DOWN-ARROWS to move between fields.	

9.3.1 Retrieval Parameter Selection

A retrieval is made from the CINDA data base on the basis of user supplied values or range of values for one or more of the retrieval parameters. If no selection is supplied for a parameter, then it is assumed that all values for that parameter are desired. A range consists of two values separated by a minus sign (-). The four possible constructions are

$value_1$	equal to $value_1$
$value_1-value_2$	between $value_1$ and $value_2$
$value_1-$	greater than or equal to $value_1$
$-value_2$	less than or equal to $value_2$

There are 8 different parameters whose values can be specified in order to select data from this data base. Some of these data are essentially numeric in nature, some are character data, and some are both. The detailed description of how to specify value for each different retrieval parameter follows.

Element — A target nuclide can be specified its chemical symbol or by the number of protons in its nucleus. The data base contains information for nuclei from H to Ha (recently renamed to Dubnium) ($Z=1$ to 105) and for neutrons ($Z=0$). Element symbols may also be entered interchangeably with proton numbers. Use the code FPROD to retrieve references coded only under the general category of fission products. Use MANY to retrieve references coded only under the general category of many target nuclides. A range of elements is interpreted as all elements with proton numbers between the minimum and maximum specified. For example

U-94	selects target nuclides with proton numbers 92 (Uranium), 93 (Neptunium), and 94 (Plutonium).
FPND	selects only target nuclides indexed as fission products.

Mass — A target nuclide is characterized by the number of nucleons (protons and neutrons) in its nucleus. The data base contains information for target nuclei with mass numbers between 1 and 266. A range specification will retrieve information for all targets with masses between the lower and upper values. Use the code ISOT to indicate all isotopes of a nucleus, ELEM to indicate only the natural element target and COMP for all compounds of the target nucleus. See table below for list of compounds indexed. For example

52-56	selects target nuclides with mass numbers between 52 and 56.
ELEM	selects only natural elemental target nuclides.
D2O	selects only heavy-water elemental targets.

Recognized Compound Codes

Code	Equivalent	Explanation
BNZ	401	Benzene
CXX	403	Organic Compounds
MTH	405	Methane
PFN	407	Paraffin
PHL	409	Phenyl
PLE	411	Polyethylene
WTR	413	Water
CMP	415	Any Compound
OXI	417	Oxide
AIR	419	Air
AMM	421	Ammonia Compounds
HYD	423	Hydrides
DXX	435	Deuterium Compounds
D2O	437	Heavy Water
TXX	445	Tritium Compounds

Quantity — Data are indexed by the reaction and additionally sometimes by the reaction parameter measured. Each recognized quantity is represented by a three character code. For example, SEL represents the elastic scattering cross section and DEL represents the differential elastic scattering cross section. On the other hand, NA represents any parameter of the (n,α) reaction including both cross sections and secondary particle distributions. Each code has a numerical equivalent which determines the output sorting order. A range specification will retrieve information for all quantities with internal numerical equivalents between the lower and upper values.

TOT-DEL	selects total and elastic cross sections and elastic neutron angular distributions.
3-7	selects the same quantities.

Recognized Quantity Codes

Code	Equivalent	Explanation
EVL	1	Evaluation
TOT	3	Total
SEL	5	Elastic
DEL	7	Differential Elastic
POL	9	Polarization
POT	11	Potential Scattering
SIN	13	Total Inelastic
DIN	17	Differential Inelastic
TSL	19	Thermal Scattering Law
SCT	21	Total Scattering
SNE	23	Nonelastic
ABS	25	Absorption
RIA	27	Absorption Resonance Integral
NG	31	Radiative capture
RIG	33	Capture Resonance Integral
SNG	35	Capture Gamma Spectrum
DNG	37	Inelastic Gamma Spectrum
NEG	39	Nonelastic Gamma Spectrum
N2N	41	$(n,2n)$
NXN	43	$(n,xn) n \geq 2$
NEM	45	Neutron emission
NX	46	Nuclide production
NP	47	(n,p)
NNP	49	(n,np)
PEM	50	Proton Emission
ND	51	(n,d)
NND	53	(n,nd)
DEM	54	Deuteron Emission
NT	55	(n,t)

Recognized Quantity Codes (cont.)

Code	Equivalent	Explanation
NNT	57	(n,nt)
TEM	58	Triton Emission
NHE	59	(n, ³ He)
NA	61	(n, α)
NNA	63	(n,n α)
AEM	64	α Emission
NF	65	Fission
RIF	67	Fission Resonance Integral
ALF	69	Capture to Fission Ratio
ETA	71	Neutrons Emitted per Absorption
NU	73	Neutrons Emitted per Fission
NUD	75	Delayed Fission Neutrons
NUF	77	Fission Fragments
SFN	79	Fission Neutron Spectrum
SFG	81	Fission Gamma Spectrum
FPG	83	Fission Product Gamma Spectrum
FPB	84	Fission Product Beta Spectrum
NFY	85	Fission Product Yields
FRS	87	Fission Fragment Spectra
CHG	89	Fission Fragment Charge Distribution
RES	91	Resonance Parameters
STF	93	Strength Functions
LDL	95	Level Density
GN	97	Photo-neutron
GF	99	Photo fission

Laboratory — The laboratory or organization at which the work was done is represented by a three character code. The possible list of codes is extensive. One should refer to the CINDA publication for a complete list of codes and their meaning. A range specification will retrieve information for all laboratories between the lower and upper values in alphabetic order.

BNL	Brookhaven National Laboratory, USA.
ORL	Oak Ridge National Laboratory, USA.
HAR	Harwell Laboratory, UK.

Publication Date — Selection can be made on the basis of the publication date of a reference. This date is entered in the form of year and month (YYMM). A range of publication dates can be given.

8506-9312	selects publications dates between June 1985 and December 1993.
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Energy Range — References may be selected on the basis of the incident energy range covered by the data described in the publication. Energies are stored in the the CINDA data base to two significant figures only, in units of electron-volts. If specified, energies should be given as range of energies. Either floating point or exponential notation may be used. If the energies are entered in units of electron-volts, the energy range must be followed by a comma and a units code. The units codes are MV (mV), K (keV), M (MeV), and G (Gev).

1.0-10.E+6	selects references to data with energies between 1 ev and 10 MeV.
3.5-20.,K	selects references to data with energies between 3.5 keV and 20 keV.

Publication Type — Selection can be made on the basis of the type of reference. The user should enter a single character to make this choice.

A or blank	All	no selection on reference type.
B	Book	select only those references which would appear in the CINDA publication, excluding obsolete or preliminary publications.
P	Primary	select only journal references.

Work Type — Selection can be made on the basis of the type of work described in the reference. The user should enter a single character to make this choice.

A or blank	All	no selection on work type.
E	Experimental	select only those references which report an experimental measurement.
T	Theoretical	select only select only those references which report on theoretical calculations.
R	Review	select only select only those references which report reviews or evaluations.

9.4 RETRIEVE

When the data selection parameters have been supplied, the data base is searched. If no records exist, then the user is informed. Otherwise, the list of CINDA blocks which contain records statsfying the retrieval criteria are saved. The main menu appears with the RETRIEVE option now active as illustrated in the following figure. By executing this option, the currently selected data will be output to the user's terminal or to a disk file in the selected format.

Main Menu Display in Video Environment

Neutron Reaction Data Bibliography - CINDA				
NEUTRON REACTION BIBLIOGRAPHIC RETRIEVAL PROGRAM Data Base last updated on 13-Nov-1997				
Format :	<u>Narrow User</u>	File :	<u>User Terminal</u>	
Element :	<u>ZR</u>	Mass :	<u>92-94</u>	Quantity : <u>TOT</u> Laboratory : <u>ORL</u>
SELECT	RETRIEVE	NEW_FILE	FORMAT	HELP DONE
RETRIEVE - Retrieve current list of CINDA blocks				

When output to disk, the retrieval proceeds uninterrupted in the format selected in the FORMAT option. A message indicating that the output to disk is in progress is displayed. This message disappears when the retrieval has been completed. When terminal output has been selected, in video mode, the output is scrolled whereas in sequential mode, it is paged.

Video

In video mode, the movement within the output of the data is controlled by four scrolling options in the menu:

- FORWARD — to move forward a page,
- BACKWARD — to move backward a page,
- START — to move to the first page,
- END — to move to the last page.

When one of the options is not logically possible because of the current position within the data output, then it does not appear in the menu. For example, FORWARD and END do not appear when the window is displaying the last page of the data. Selecting DONE indicates that the user has finished viewing the information for the current nucleus; selecting QUIT will terminate display of the current retrieval.

Sequential

In the sequential mode, the display is nearly identical to that of the video mode. The menu items are displayed at the bottom of the screen are identical in both modes. Select a menu item by entering the first character of the item name.

A sample CINDA retrieval output is shown below. Information for each target nucleus is displayed separately. If there is more than one full screen to be displayed for a nucleus, then the output can be scrolled. At the top of the screen the target nucleus is displayed. For each reference, the energy range, laboratory, work type, reference type, reference and comments are displayed in one or two lines. A CINDA "block" is indicated by the display of the quantity on the first line of the block. To proceed to the next target nucleus, select DONE from the menu; to terminate the output of retrieved data select QUIT.

Sample CINDA Terminal Output in Video Environment

ZR-93							
Quantity	Energy Range	Lab	(Reference/Comments)				
Total	1.0+0 +2	ORL	Expt Conf	58GENEVA16	150	5809	
				Harvey+.PPR673,NDG,TOF			
	1.0+0 1.0+2	ORL	Expt Prog	WASH-192	32	5703	
				Harvey+			
Total	6.0+1 6.1+3	ORL	Expt Jour	NSE	92	525	8604
				Macklin+ GRPHS.			
	6.0+1 6.0+3	ORL	Expt Rept	DOE-NDC-38	138	8605	
				Macklin+ NDG.			
	1.1+2 6.1+3	ORL	Expt Data	EXFOR12923.		8603	
				TRANSM DATA ON ZR-0,CSISRS/A.			
<div style="display: flex; justify-content: space-around;"> DONE QUIT </div>							
DONE - Proceed to display data for next target nucleus							

9.5 SEND

Use this option to download the data file containing the current retrieval. This option appears in the menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

9.6 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you **MUST** use this option to supply a name for the file before proceeding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file TT: or TTY:.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a RETURN without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

9.7 FORMAT

The output can be generated in one of two formats. This option permits the selection of the output format from the two choices. The default selection is **Wide User** format for terminals with 132-character display capability or for disk output.

Narrow User Format

The **Narrow Table** format is a tabular output limited to 80 character output lines. In this format, two lines are required to display all data for a single reference record. The comments will appear indented on a second line.

Wide User Format

The **Wide Table** format is designed for 132 character line output. In this format, all data for a reference record can be displayed on a single line. For terminal output, unless the user has specified that his output device is 132-character capable(see Section ??), the output will revert to the **Narrow Table** format.

HTML Format

The **HTML** format produces an output file which can be viewed in a WEB browser such as NETSCAPE.

Video

In the video mode, a menu of the three format options is displayed. Upon selection of a format, the option terminates and the file specification in the screen display is updated.

Sequential

The new output format is selected by entering the first character of the format name at the prompt. Entry of a RETURN will select the default format, the **User** format.

11 ENDF

The Evaluated Nuclear Data File (ENDF) is a numeric data file containing reference nuclear data for use in the development and implementation of nuclear technologies such as fission and fusion power, medicine, etc. The ENDF data base contains evaluated nuclear data for the interaction of particles, primarily neutrons, with either elements or nuclei, but also for charged-particle and photon induced reactions. The file also contains data on radiations from nuclear isotopes. The types of data contained in this data file include cross sections, secondary particle distributions, photon production, fission product yields, and data covariance matrices.

The ENDF format and the first ENDF data library were prepared between 1964 and 1966 by the Cross Section Evaluation Working Group coordinated by the National Nuclear Data Center of Brookhaven National Laboratory. The data library produced by this organization is called ENDF/B. In the intervening years, other countries or groups of countries have created their own libraries of evaluated data in the ENDF format. These evaluated data libraries have been included in the ENDF data base. The data base contains the following data libraries:

ENDF/B produced by the United States,

JEF produced by the Western European countries,

JENDL produced in Japan,

BROND produced in Russia,

CENDL produced in China.

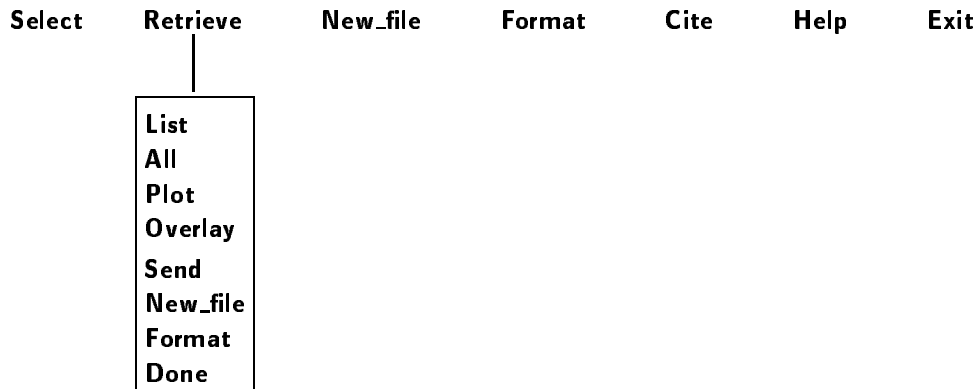
11.1 ENDF Organization

Each data library contains only a single evaluation for a combination of target material and incident particle, for example neutrons incident on ^{238}U . Evaluations also can be made for a material with no incident particle. These evaluations contain spectra from radioactive decay of a material (isotope). An evaluation is organized into “files” identified by an MF number. A “file” contains information about a reaction or decay quantity such as cross sections (File 3), secondary neutron energy distributions (File 5), photon production multiplicities (File 10), etc. A “file” is further divided into “sections”. Each section is identified by an MT number and contains the numeric data for a given reaction. For example, file 3, section 16 contains the (n,2n) cross section and file 6, section 103 contains the secondary proton energy-angle distribution from the (n,p) reaction.

The section contains numeric data in tabular form. In addition, the method for interpolation between data points is defined. Each “file” has its own format for storing the evaluated data. The simplest format is for cross sections which is basically a two-dimensional function. The storage of secondary energy-angle distributions is much more complex due to the three-dimensional nature of the data. The ENDF format is documented in V. McLane et al., “ENDF-102, Data Formats and Procedures for the Evaluated Nuclear Data File”, BNL-NCS-44945 (1997), which is available electronically from the DOCUMENTS option (see Section 15.2.2).

11.2 ENDF Options

The main menu and the associated options are summarized in the following diagram. The options listed on the top line of the diagram represent the top-level menu. Where an option is itself a menu of sub-options, the secondary menu items are listed vertically below the top-level option. Each option and sub-option will be described in detail below. All top-level options will be given in the text all in capital letters; sub-options will also be given in capital letters with a slash between the option and sub-option. For example RETRIEVE and RETRIEVE/OVERLAY. A sample top-level menu in video mode after an evaluation has been selected is illustrated at the bottom of the page. See Section 5.6 and Section 5.5 for a discussion of the CITE and HELP options respectively.



Top Level Menu in the Video Environment

Evaluated Nuclear Data File - ENDF	
EVALUATED NUCLEAR DATA FILE (ENDF) RETRIEVAL PROGRAM	
Data Base Last Updated on 9-May-1997	
Format : <u>Narrow Table</u>	File : <u>User Terminal</u>
<hr/> JEF-2 library Neutron projectile 92-U-238 (9237) JEF COLLAB EVAL-JUN89 MCM,MGS,FHF,CN,YN,KANDA ET AL	
SELECT RETRIEVE NEW_FILE FORMAT CITE HELP EXIT	
RETRIEVE - Retrieve data from selected evaluation	

11.3 SELECT

One must first select an evaluation from the contents of the data base. The RE-TRIEVE option is not active until an evaluation has been selected. This selection is done by specifying first a target nucleus and then a projectile. If there are no evaluations for the selected combination of target material and projectile, a message is displayed and the user is returned to the top-level menu. This step is illustrated in the following figure, First Video Panel.

Target — A target nuclide can be specified by its chemical symbol, representing the number of protons in its nucleus, and by its atomic number, the number of neutrons and protons in its nucleus. Either of the two standard representations is accepted, that is ^{238}U or U-238. Almost all target materials are in their ground state. If you wish to select a target material in an excited state, then enter the isomer level number preceded by an -M, for example AM-243-M1. If you wish to select a natural element target, either do not enter the atomic number or enter a zero for it; for natural iron, enter FE or Fe-0. Some evaluations exist for target nuclei which are chemical compounds, heavy water for example. In these cases the data exist only for incident neutrons. To select a compound enter COMP for the target material. A list chemical compounds will be presented from which you may select.

Projectile — A projectile or incident particle can be specified its standard symbol shown in the following table.

G	gamma ray
N	neutron
P	proton
D	deuteron
T	triton
HE-3	^3He nucleus
A	alpha particle
DECAY	radioactive decay (no projectile)
PHOTON	photo-atomic data (natural elements only)

To specify fission product yields, one must give the projectile/FPY. For neutron fission product yields, enter N/FPY; for spontaneous fission product yields, enter DECAY/FPY.

When the target material and projectile have been entered, the program will generate a list of evaluated data libraries which contain an evaluation for the desired target nucleus and projectile. The user can now select the library from which to retrieve the desired material evaluation. If none of the evaluated data libraries is desired, select QUIT to return to the top-level menu. If the selected evaluation is available both in the original evaluated file and in the 300 degree-K doppler broadened file, then a menu is presented for your further selection. The original evaluation (called BASIC) generally has a resonance parameter representation in the resonance region. The doppler broadened file will have the parameters expanded to a pointwise data file which has been doppler broadened to 300 degrees-K.

Evaluation Selection in Video Environment
First Video Panel

Evaluated Nuclear Data File - ENDF	
SELECT	
Format : <u>Narrow Table</u>	File : <u>User Terminal</u>
Select Evaluation	
Target (Z-A-LEVEL_NUMBER) -	U-238
Projectile (N, P, G, etc) -	<input type="text" value="N"/>

Video

The library selection list illustrated in the following figure (Second Panel) is used to choose an evaluated data library. Each library name is displayed in the list along with a brief description. The highlighted library can be changed by using the UP-ARROW or DOWN-ARROW key. When the desired library is highlighted, press the RETURN key to complete selection. The last item in the list is QUIT which when selected will return the program to the top-level menu. If a doppler broadened version of the file exists, a menu will appear with two items, BASIC and 300 DEGREE K. Choose either the original evaluated file (BASIC) or the doppler broadened file, (300 DEGREE K).

Sequential

In sequential mode, the ENDF module will list the data libraries containing the desired combination of target material and projectile along with an integer identification number. At the prompt, enter the identification number for the data library desired. A RETURN without a preceding identification code will select the current default data library which is denoted by an * preceding the identification number. By selecting QUIT, the user is returned to the top-level menu.

Evaluation Selection in Video Environment (cont.)

Second Video Panel

Evaluated Nuclear Data File - ENDF	
SELECT	
Format : <u>Narrow Table</u>	File : <u>User Terminal</u>
Select a Data Library	
Target - <u>U-238</u>	Projectile - <u>N</u>
ENDF/B-VI - United States evaluated nuclear data file	
JEF-2 - Western European evaluated nuclear data file	
CENDL-2 - Chinese evaluated nuclear data file	
JENDL-3 - Japanese evaluated nuclear data file	
BROND-2 - Russian evaluated nuclear data file	
QUIT - No evaluation selected; return to option menu	

Third Video Panel

Evaluated Nuclear Data File - ENDF	
SELECT	
Format : <u>Narrow Table</u>	File : <u>User Terminal</u>
Select a Data Library	
Target - <u>U-238</u>	Projectile - <u>N</u> Data library - <u>JEF-2</u>
BASIC DATA 300 DEGREE K	
300 DEGREE K - Data file processed to give pointwise data at 300 K	

11.4 RETRIEVE

When the desired nuclear data evaluation has been selected, having specified the target material, the projectile, the data library and perhaps whether the data is desired in doppler broadened form, the user can then select the RETRIEVE option. A menu of options for retrieving and displaying the data appears. The RETRIEVE options are LIST, ALL, PLOT, OVERLAY, NEW_FILE, FORMAT and DONE. The video mode display is illustrated below. The options are displayed along with descriptive material about the evaluation.

RETRIEVE Option Menu in the Video Environment

Evaluated Nuclear Data File - ENDF						
RETRIEVE						
Format : <u>Narrow Table</u>			File : <u>User Terminal</u>			
<u>JEF-2 library</u>		<u>Neutron projectile</u>		<u>92-U-238 (9237)</u>		
JEF COLLAB		EVAL-JUN89		MCM,MGS,FHF,CN,YN,KANDA ET AL		
<u>LIST</u>	ALL	PLOT	OVERLAY	NEW_FILE	FORMAT	DONE
LIST - Retrieve data from selected evaluation						

11.5 RETRIEVE/LIST

With the RETRIEVE/LIST option, the user can display the data in text format on the terminal or store the retrieved information in a disk file depending on whether or not the selected output is a disk file. This selection is set using the NEW_FILE option (see Section 11.14). The standard ENDF format, 80-character text records is always available as output. Two other formats, an 80-character and a 132-character wide tabular format are available for displaying some data types such as cross sections (see Section 11.15). If output is requested for one of the table formats when there is no table format for that data such as double differential particle emission distributions (MF=6), then the data is displayed in the standard ENDF format. If you have a terminal which can interpret REGIS or TEKTRONIX graphics instructions, then terminal graphical displays for many data types are possible.

In order to retrieve ENDF data, one must select a reaction, a quantity and then in cases where table format is desired, an incident particle energy range. The following three

figures illustrate this sequence of actions in video mode.

Reaction Selection — The reactions for which data is available for the selected evaluation appears in a scrolling window. Use the scrolling menu functions to navigate up and down until the desired reaction appears in the window. For each reaction, the corresponding MT number is given along with the quantities for the reaction for which data is available. The quantities are represented by their MF number. Select the CHOOSE option and enter the MT corresponding to the desired reaction (see figure below). If a blank is entered for the MT number, the program returns to the RETRIEVE option menu.

Reaction Selection in the Video Environment

Evaluated Nuclear Data File - ENDF		
RETRIEVE	LIST	SELECT__REACTION
JEF-2 library	Neutron projectile	92-U-238 (9237)
JEF COLLAB	EVAL-JUN89	MCM,MGS,FHF,CN,YN,KANDA ET AL
MT	Reaction	Quantities Evaluated
451	DOCUMENTATION	1
151	(n,resonance data)	2
1	(n>Total)	3, 33
2	(n,Elastic)	3, 4, 33
4	(n,Inelastic)	3, 13, 14, 15, 33
51	(nn') 1-st level	3, 4, 12, 14, 33
52	(nn') 2-nd level	3, 4, 12, 14, 33
53	(nn') 3-rd level	3, 4, 12, 14, 33
54	(nn') 4-th level	3, 4, 12, 14, 33
55	(nn') 5-th level	3, 4, 12, 14, 33
56	(nn') 6-th level	3, 4, 12, 14, 33
57	(nn') 7-th level	3, 4, 12, 14, 33
58	(nn') 8-th level	3, 4, 12, 14, 33
Select a reaction by entering its MT number - <input type="text" value="52"/>		

Quantity Selection — The quantities for which data is available for the selected reaction are then listed on the terminal. For each quantity, the corresponding MF number is given. Enter the MF corresponding to the desired reaction (see figure below). If a blank is entered for the MF number, the program returns to the RETRIEVE option menu. If data is available only for a single quantity, then this input is not requested.

Quantity Selection in the Video Environment

————— Evaluated Nuclear Data File - ENDF —————		
RETRIEVE	LIST	SELECT__QUANTITY
JEF-2 library	Neutron projectile	92-U-238 (9237)
JEF COLLAB	EVAL-JUN89 MCM,MGS,FHF,CN,YN,KANDA ET AL	
	<u>(n,n') 2-nd level</u>	
MF	Quantity Definition	
3	Reaction Cross Section	
4	Emitted Neutron Angular Distributions	
12	Photon Multiplicities (Neutron Induced)	
14	Photon Angular Distributions (Neutron Induced)	
33	Reaction Cross Section Covariance Data	
Select a quantity by entering its MF number - <input style="width: 30px; text-align: center;" type="text" value="3"/>		

Energy Selection — If a table format output has been requested, then the user is next asked to specify the range of incident energies to be presented. This query returns to the screen at the completion of each table display so that different energy regions can be examined. A blank response to the query will return the program to the RETRIEVE option menu.

An incident particle energy is normally given in MeV. An energy range is entered as a floating point number pair separated by a minus. One of the following letters: MV for mv, E for eV, or K for keV, preceded by a comma may be appended to the energy range specification to modify the default input energy units. A missing lower or upper energy indicates the lowest possible and highest possible energies respectively. Selecting ALL, will retrieve the entire energy range.

Examples: .1-10. (for .1 to 10. MeV)
 .1-10.,K (for .1 to 10. keV)

Evaluated Nuclear Data File - ENDF		
RETRIEVE	LIST	SELECT__ENERGY
Format : <u>Narrow Table</u>	File : <u>User Terminal</u>	
JEF-2 library <u>(n,n') 2-nd level</u>	Neutron projectile	92-U-238 (9237) <u>Reaction Cross Section</u>
Select energy range in MeV (E(min)-E(max)) or ALL -	<input type="text" value="1.-20.,M"/>	

11.6 Data Output

When the data selection process has been completed, the chosen data is either displayed on the user's terminal or written to a disk file depending on the current status of the output device (see Section 11.14). If you have a terminal that can display Regis or Tektronix instructions, then graphical output is also possible. Data is displayed in a scrolling window. If ENDF is the selected format, then the data is displayed in the 80-character record ENDF format. All data can be displayed in this mode. Interpreted tabular format is available for cross sections (MF=3), secondary angular distributions (MF=4), secondary energy distributions (MF=5), fission product yields (MF=8), neutron fission multiplicities (MF=1) and photon interaction cross sections (MF=23). Disk and terminal display presentations for the various formats are identical.

11.6.1 Cross Sections

The following figure illustrates the terminal data display when a cross section (MF=3) has been selected. The data display and option selection menu are the same in video and in sequential mode. The first three lines of the display identify the data. The next three lines are column headers. If there is insufficient room on the remainder of the screen to display the complete data table, then the data lines can be scrolled while the identifier and column header lines remain fixed. At the beginning of the data table, the energy range is given along with the average and the $(1/E)$ -weighted average cross section are given. The display for fission neutron multiplicities (MF=1) and for photon interaction cross sections (MF=23) are identical except the no $(1/E)$ -weighted average is given. The multiplicity in MF=1 is given in units of neutrons per fission.

Cross Section Output in the Video Environment

Evaluated Nuclear Data File - ENDF										
JEF-2 library		Neutron projectile		92-U-238 (9237)						
(n,n') 2-nd level		Reaction Cross Section								
Energy MeV	Sigma Barns	Q-value = Energy MeV	-0.1484 MeV Sigma Barns	Energy MeV	Sigma Barns					
Retrieved energy range is 0.14903 to 20.0 MeV.										
Average cross section			= 71.36 millibarns							
Average 1/E weighted cross section			= 0.1335 barns							
0.14903	0.00000E+00	0.16000	6.84606E-04	0.18000	2.69774E-03					
0.20000	5.40651E-03	0.23000	1.09760E-02	0.26000	1.83930E-02					
0.30000	3.09516E-02	0.30850	3.39808E-02	0.32500	4.44180E-02					
0.34000	5.12410E-02	0.35000	5.57900E-02	0.35566	5.86110E-02					
0.40000	8.27270E-02	0.42500	9.76830E-02	0.45000	0.11343					
0.50000	0.14677	0.52220	0.16216	0.55000	0.18174					
0.56110	0.18971	0.60000	0.21884	0.62500	0.23853					
0.65000	0.25896	0.68288	0.28299	0.70000	0.29303					
0.73510	0.30803	0.75000	0.31212	0.79335	0.32469					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">FORWARD</td> <td style="width: 25%;">END</td> <td style="width: 25%;">ONE_VALUE</td> <td style="width: 25%;">VIEW</td> <td style="width: 25%;">DONE</td> </tr> </table>						FORWARD	END	ONE_VALUE	VIEW	DONE
FORWARD	END	ONE_VALUE	VIEW	DONE						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>FORWARD - Go to the next window of displayed information.</td> </tr> </table>						FORWARD - Go to the next window of displayed information.				
FORWARD - Go to the next window of displayed information.										

In addition to the scroll options, the menu contains the ONE_VALUE option and a VIEW option if the output terminal can handle graphics output from the program. Select DONE to return to the RETRIEVE/LIST menu.

ONE_VALUE — Use this option to display the cross section at any energy. When this menu item is selected, the user is prompted to enter an incident particle energy which must be within the energy limits of the data appearing in the table. The energy is requested to be given in MeV. However, other units are possible by appending the symbol for the chosen units in the manner used for entering an energy range as described above. The cross section at the chosen incident energy is then displayed on the terminal. If the energy requested is not one of the energies in the table, then the requested value is obtained by interpolation using the interpolation scheme defined for the cross section in the evaluated data file. One may continue to select incident energies for which the cross section is displayed until a blank is entered in response to the incident energy prompt. Then the ONE_VALUE option is terminated.

VIEW — This option appears in the data display menu if the user terminal has the required graphics capability. When this option is selected, the data in the cross section table is plotted. When finished viewing the plot, press the RETURN-key to return to the table display.

11.6.2 Angular and Energy Distributions

Secondary angular distributions (MF=4) and energy distributions (MF=5) of emitted neutrons are displayed for each incident energy within the selected energy range. Any legendre-coefficient representations of secondary angular distributions are expanded to

give differential cross section as a function of the emitted neutron angle. Tabular representations are presented as stored in the data base. Secondary energy distributions are expanded to tabular form and summed in the case that there are multiple partial representations. A sample terminal output display for an angular distribution is shown in the following figure. Output for secondary energy distributions is identical in presentation.

In addition to the usual scrolling options, the menu has two options, DONE and QUIT. By selecting the DONE option, the user can display the angular distribution at the next available incident energy within the selected energy range. The QUIT option will terminate display of the selected angular distributions and return the program to the incident energy range selection prompt.

VIEW — This option appears in the data display menu when the user terminal has the required graphics capability. When this option is selected, the data in the angular distribution table is plotted. When finished viewing the plot, press the RETURN-key to return to the table display.

Secondary Angular Distribution Output in the Video Environment

Evaluated Nuclear Data File - ENDF					
JEF-2 library (n,elastic)		Neutron projectile Emitted Neutron Angular Distributions		92-U-238 (9237)	
		Energy = 5.0000 MeV			
Angle Degrees	Dsigma #/sr	Angle Degrees	Dsigma #/sr	Angle Degrees	Dsigma #/sr
0.0000	12.923	2.5000	12.770	5.0000	12.323
7.5000	11.608	10.000	10.670	12.500	9.5644
15.000	8.3532	17.500	7.0998	20.000	5.8640
22.500	4.6971	25.000	3.6395	27.500	2.7186
30.000	1.9487	32.500	1.3317	35.000	0.85967
37.500	0.51691	40.000	0.28317	42.500	0.13625
45.000	5.44057E-02	47.500	1.80937E-02	50.000	1.10527E-02
52.500	2.07705E-02	55.000	3.83995E-02	57.500	5.82803E-02
60.000	7.72439E-02	62.500	9.38440E-02	65.000	0.10765
67.500	0.11868	70.000	0.12702	72.500	0.13263
75.000	0.13529	77.500	0.13471	80.000	0.13062
82.500	0.12291	85.000	0.11177	87.500	9.77242E-02
90.000	8.16195E-02	92.500	6.45472E-02	95.000	4.77329E-02

FORWARD	END	VIEW	DONE	QUIT
FORWARD - Go to the next window of displayed information.				

11.6.3 Fission Product Yields

Fission product yields, independent and cumulative, are not given as continuous functions of incident energy. Therefore, instead of a prompt to enter the incident energy range, a menu is presented giving the energies for which data is available. These are generally spectrum averaged energies, THERMAL, FAST, and 14. MEV. Select the DONE option to return to the RETRIEVE/LIST menu. After the energy is selected, one is asked to choose to display yields for a given nuclear mass number (MASS) or yields for a given element (CHARGE) or DONE to return to the energy selection menu. If MASS or CHARGE are selected, one enters either the desired mass or charge number at the prompt. The following figure shows a sample output. If the data overflows the window, scrolling options appear in the menu as well as DONE. Selecting DONE returns you to the mass/charge selection menu.

Fission Product Yield Output in the Video Environment

Evaluated Nuclear Data File - ENDF						
ENDF/B-VI library	Neutron fission product yields			92-U-238 (9237)		
Independent Yields				Fast Fission Product Yields		
Z	A	I	Yield(%/fission)			
52	145	0	6.0781E-10	+-	3.8900E-10	
53	145	0	1.1700E-05	+-	7.4879E-06	
54	145	0	1.3002E-02	+-	8.3215E-03	
55	145	0	0.5556	+-	0.3558	
56	145	0	2.58	+-	0.8237	
57	145	0	0.7089	+-	0.4537	
58	145	0	1.2735E-02	+-	8.1504E-03	
59	145	0	1.1400E-05	+-	7.2961E-06	
60	145	0	5.3400E-10	+-	3.4176E-10	
The total yield for mass 145 is			3.871	+-	1.007	%/fission
DONE						
DONE - Finished displaying this table.						

11.7 RETRIEVE/ALL

This option provides the capability to retrieve a complete evaluation or a complete "file" (data for all reactions for a quantity such as cross sections). The output is only in ENDF format. First the user is prompted to choose a "file" by entering a value of MF. If the entry is a blank, then the entire evaluation will be retrieved. You will be then prompted for a label for retrieved data. This label is the first 66 characters of the first record in the output file. The comments section (MF=1, MT=451) is always retrieved when output is to disk.

The option was designed to provide a convenient method to retrieve an entire evaluation or a "file" from an evaluation for transmission to a remote computer. However it is possible to view the data on a terminal one section at a time. In this case sections

are successively displayed in a scrolling window. In addition to the scrolling options, the window menu has DONE and QUIT. Selection of DONE will bring the next ENDF section unto the scrolling window. Selection of QUIT will terminate the RETRIEVE/ALL option and return the user to the RETRIEVE menu.

11.8 RETRIEVE/PLOT

This option can be used to create plots in PostScript format in a disk file so that the files can be transferred and printed remotely. The process of selecting the reaction, quantity and energy range to be plotted is identical to that in for the RETRIEVE/LIST option (see Section 11.5).

When the required evaluated data has been retrieved, the user is prompted for the name of the output file. If no name is entered, the default, ENDF_PLOT, is used. The extension PS is appended to all supplied names. All plots generated from the selected data will be placed in the file named. A new file will be required for each subsequent data selected for plotting. For cross sections, there will be a single plot per file. For secondary particle distributions, the plot file will contain as many plots as there are incident energies in the selected energy range.

On completion of the plot(s) requested, the user will be asked if it is desired to send the file to another computer. If yes, the dialog will be the same as detailed in Section 15.1.3.

11.9 RETRIEVE/OVERLAY

The overlay option allows the visual intercomparison of a cross section from one or more of the evaluated data libraries in the ENDF data base. In addition the user may place one or more data points on the plot. In this way, an experimental data set can be intercompared with existing evaluations. This overlay capability is similar to that in the CSISRS module of the online service, the difference being that experimental data sets from the CSISRS data base can also be placed on the plot.

If the user has a terminal which can process REGIS or TEKTRONIX graphic instructions, terminal display of the plot generated can be made. Plots stored in a disk file contain PostScript instructions. These files can be downloaded and printed on a PostScript printer.

11.9.1 Reaction Selection

After selecting the RETRIEVE/OVERLAY option, a display is presented which lists all of the reactions for which cross section data (MF=3) are available in the selected evaluation, excluding partial excitation cross sections such as inelastic scattering to some level (MT=51-91). If there are more reactions than can fit in the window, the menu will contain scrolling options. Select the reaction to be plotted by selecting CHOOSE from the menu and then entering the reaction's MT number at the prompt.

Overlay Reaction Selection in the Video Environment

Evaluated Nuclear Data File - ENDF		
RETRIEVE	OVERLAY	SELECT_REACTION
JEF-2 library	Neutron projectile	92-U-238 (9237)
JEF COLLAB	EVAL-JUN89	MCM,MGS,FHF,CN,YN,KANDA ET AL
MT	Reaction	
1	(n,Total)	
2	(n,Elastic)	
4	(n,Inelastic)	
16	(n,2n)	
17	(n,3n)	
18	(n,fission)	
452	Fission Neutron Yields	
453	Delayed Fission Neutron Yields	
456	Prompt Fission Neutron Yields	
102	(n,g)	
Select a reaction by entering its MT number - <input type="text" value="16"/>		

11.9.2 Library Selection

The selected evaluation will always be displayed on the overlay plot. After choosing the reaction to be plotted, a display is presented from which you can select any or all of the other evaluated libraries for overlay and intercomparison with the primary selection. The video-mode display is illustrated below.

Video

The list of evaluated data libraries containing the selected evaluation is displayed in a scrolling window on the terminal with a menu on the bottom of the screen. Each library is given on a single line of the window. If there are more data libraries than can be displayed in the scrolling window, then the scrolling options, FORWARD, BACKWARD, START and END are added to the bottom menu to move the window over the list. In all cases, the options CHOOSE, ALL, NONE, and DONE appear in the menu.

To choose one or more libraries, select CHOOSE, ALL or NONE. The CHOOSE option begins the selection process without changing any prior selections. If ALL is selected, all libraries are preselected. If NONE is selected, no libraries are preselected and any previously selected data sets are deselected. This is a multiple selection menu which is described in detail in Section 3.2.1 as is the use of the keys to make the desired data set selections. These keys are also briefly described below the scrolling window. The current menu item is given in inverse-video. Selected items are given in bold-underline. When selection is completed, use the X-key to return to the scrolling menu.

Sequential

The initial list of data libraries is displayed on the screen in a non-video scrolling window. The mode of operation and available options are identical to those described in the video mode operation above. When the CHOOSE option is selected, a prompt appears and data libraries to be included in the overlay plot are entered one at a time. Enter the numbers for the data libraries you wish to select. A negative number will deselect a data library. Entering a blank will complete the CHOOSE option. The CHOOSE option may be selected again if changes are desired. If the ALL menu item is selected, all data libraries are selected. If the NONE menu item is selected, all data libraries are deselected. Then use CHOOSE to deselect particular undesired data libraries or to select desired data libraries. Select DONE to complete the data library selection process.

Library Selection for Overlays in the Video Environment

Evaluated Nuclear Data File - ENDF	
RETRIEVE	OVERLAY EVALUATIONS
SELECT EVALUATED DATA OVERLAYS	
ENDF/B	- United States ENDF/B-VI evaluated data file
CENDL	- Chinese evaluated data file
JENDL	- Japanese evaluated data file
BROND	- Russian evaluated data file
UP_ARROW	- move up one line.
DOWN_ARROW	- move down one line.
RETURN	- Toggle SELECT/DESELECT.
X	- selection completed.

11.9.3 Energy Selection

When the data libraries to be overlaid have been selected, the names of the selected libraries are displayed with the primary library first and boldfaced. At the bottom of the screen is a prompt for entering the range of incident energies to be plotted. The default response is ALL. An incident particle energy is normally given in MeV. An energy range is entered as a floating point number pair separated by a minus. One of the following letters: MV for mv, E for eV, or K for keV may be appended to the energy range specification to modify the default input energy units. A missing lower or upper energy indicates the lowest possible and highest possible energies respectively. Selecting ALL, will retrieve the entire energy range.

Examples: .1-10. (for .1 to 10. MeV)
 .1-10.,K (for .1 to 10. keV)

11.10 RETRIEVE/OVERLAY options

When the data libraries to overlay and the incident energy range for the evaluated data have been selected, The program is ready to display the data. The figure below shows the video-mode display which appears on the screen. Many details of the plot can be modified by selecting from the menu items at the bottom of the screen.

RETRIEVE/OVERLAY Master Menu in the Video Environment

Evaluated Nuclear Data File - ENDF	
RETRIEVE	OVERLAY
Evaluations of 92-U-238 (n,2n) Being Compared	
JEF	- European evaluated data file
ENDF/B	- United States ENDF/B-VI evaluated data file
JENDL	- Japanese evaluated data file
EVALUATIONS	POINTS E-RANGE X-AXIS Y-AXIS GRID PLOT DONE
PLOT - Generate plot with current specifications.	

11.10.1 PLOT

When the plot option is selected, a display appears giving the present values of all of the parameters for the plot. The menu at the bottom has three items, two, if you do not have a terminal with REGIS or TEKTRONIX capability. If the current parameter values are unsatisfactory, select NOPLOT to return to the RETRIEVE/OVERLAY menu.. Select VIEW to display plot on your terminal. Select PLOT to create a disk file with the plot instructions in PostScript.

The plot appearing on your screen when VIEW is selected, will have the legend box on the right, outside of the display. To return to the master PLOT menu, press RETURN. If PLOT is selected, then you will be prompted for the name for the disk file. When the plot has been generated, you will be asked whether or not to transmit the file to another computer. If yes, then the file will be transmitted as described in Section 15.1.3. When the plotting has been completed, the user is returned to the RETRIEVE/OVERLAY menu.

Plot Menu in the Video Environment

Evaluated Nuclear Data File - ENDF		
RETRIEVE	OVERLAY	PLOT
Evaluations of 92-U-238 (n,2n) Being Compared		
JEF - European evaluated data file		
Selected energy range (eV)	<u>0.000E+00-2.000E+07</u>	
Selected evaluated data overlays	<u>ENDF/B</u>	<u>JENDL</u>
	X-AXIS	Y-AXIS
Axis MIN	<u>0.000E+00</u>	_____
Axis MAX	<u>2.000E+07</u>	_____
Axis STEP	_____	_____
Axis UNITS	<u>Auto</u>	<u>Auto</u>
Axis SCALE	<u>Auto</u>	<u>Auto</u>
No grid drawn on plot	No user supplied data points	
VIEW	PLOT	NOPLOT
PLOT - Plot with current parameters to disk.		

11.10.2 EVALUATIONS

If you wish to change the evaluated libraries being overlaid in the display, select the EVALUATIONS option. This option is the same as the overlay library selection described in Section 11.9.2.

11.10.3 E-RANGE

If you wish to change the range of incident energies plotted, then select E-RANGE. The option is the same as the initial plotting incident energy range selection described in

11.10.4 X-AXIS

Select the X-AXIS menu item if you wish to modify the x-axis plotting parameters, the axis minimum and maximum values, the axis scaling (logarithmic or linear), the energy units (MeV, keV, etc.) and in the case of linear scaling, the increment between major axis divisions. The video input form is illustrated below.

Video

A plotting parameter value can be changed by moving to that field with the UP-ARROW or DOWN-ARROW key. For items which are free form entry, the axis MIN, MAX and STEP, simply enter the new value. For items which require selection from a list of possible values, use the SPACE BAR to move sequentially through the possible values until the desired value is displayed. At the bottom of the display is brief information on the form and contents required for data entry in the selected field. The last item in the form is an OK/QUIT toggle which can be changed by depressing the SPACE BAR. Entry of a RETURN key on this field will modify the axis parameters when OK is selected. If the selected item is QUIT when the RETURN key is pressed, the axis plotting parameter are not changed. In either case you are returned to the RETRIEVE/OVERLAY menu.

Sequential

A list of plotting parameters for the x-axis is presented in the form. Each field is displayed along with its current value and an integer identification number. At the prompt, select the fields to modify by entering the ID numbers separated by a comma. Entering ALL will select all parameters. You will be prompted for a new parameter value for each chosen field one at a time. Enter a new value, or a question mark (?) for brief information on the form and contents required for data entry in the selected field. A RETURN without any preceding characters will leave the field unchanged. After responding for all chosen fields, the parameter selection form appears again with updated parameter values. At this point, additional fields may be modified. By entering DONE, the parameters will be changed to the new values. By entering QUIT, the parameters will not be changed. In either case you are returned to the RETRIEVE/OVERLAY menu.

X-Axis Minimum, Maximum and Step —These axis parameters for the independent variable, incident particle energy, are normally given in eV. One of the following letters: MV for mv, K for keV or M for MeV may be appended to the energy specification to modify the default input energy units. If the minimum and maximum energies are left blank the program will calculate them from the data being plotted. The energy increment or step may be left blank also. For linear scaling, the program will calculate a value in this case. For logarithmic scaling, the step is ignored.

Examples: 10.E+3 or 10.,K (for 10 keV)

X-Axis units —The energy can be plotted in MeV, keV, eV, mV or muv (for micro-electron volts). If Auto is selected, the program will choose the units on the basis of the

data plotted.

X-Axis scale —This parameter can have only three values, Log, Linear and Auto. If the selection is Auto, then the programs selects either Log or Linear based on the data to be plotted

Axis Parameter Form in the Video Environment

————— **Evaluated Nuclear Data File - ENDF** —————

RETRIEVE	OVERLAY	X-AXIS
X-AXIS PLOT SPECIFICATIONS (0.000E+00 to 2.000E+07 eV)		
Axis MIN	(eV)	2.000E+06
Axis MAX	(eV)	2.000E+07
Axis STEP	(eV)	2.,M
Axis UNITS		Auto
Axis SCALE		LIN
OK/QUIT		OK

Enter the distance between x-axis labels in eV. A letter may be appended to the energy specification to modify the default input energy units. Use a comma followed by MV for milli-ev, K for keV, or M for MeV. For example

2.0E-3 or 2.,MV for 2 milli-ev

For logarithmic scaling, the value is ignored. If blank for linear scaling, the program calculates a value.

————— **Use the UP- and DOWN-ARROWS to move between fields.** —————

11.10.5 Y-AXIS

Select the Y-AXIS menu item if you wish to modify the y-axis plotting parameters, the axis minimum and maximum values, the axis scaling (logarithmic or linear), the cross section units (barns, mb, etc.) and in the case of linear scaling, the increment between major axis divisions. The video input form is similar to that for the X-axis illustrated above.

Video

A plotting parameter value can be changed by moving to that field with the UP-ARROW or DOWN-ARROW key. For items which are free form entry, the axis MIN, MAX and STEP, simply enter the new value. For items which require selection from a list of possible values, use the SPACE BAR to move sequentially through the possible values until the desired value is displayed. At the bottom of the display is brief information on the form and contents required for data entry in the selected field. The last item in the form is an OK/QUIT toggle which can be changed by depressing the SPACE BAR. Entry of a RETURN key on this field will modify the axis parameters when OK is selected. If the selected item is QUIT when the RETURN key is pressed, the axis plotting parameter are not changed. In either case you are returned to the RETRIEVE/OVERLAY menu.

Sequential

A list of plotting parameters for the y-axis is presented in the form. Each field is displayed along with its current value and an integer identification number. At the prompt, select the fields to modify by entering the ID numbers separated by a comma. Entering ALL will select all parameters. You will be prompted for a new parameter value for each chosen field one at a time. Enter a new value, or a question mark (?) for brief information on the form and contents required for data entry in the selected field. A RETURN without any preceding characters will leave the field unchanged. After responding for all chosen fields, the parameter selection form appears again with updated parameter values. At this point, additional fields may be modified. By entering DONE, the parameters will be changed to the new values. By entering QUIT, the parameters will not be changed. In either case you are returned to the RETRIEVE/OVERLAY menu.

Y-Axis Minimum, Maximum and Step —These axis parameters for the dependent variable, the cross section, are must be given in barns(b). If the minimum and maximum cross sections are left blank the program will calculate them from the data being plotted. The cross section increment or step may be left blank also. For linear scaling, the program will calculate a value in this case. For logarithmic scaling, the step is ignored.

Examples: 1.E+3 for 100 barns or 3.-3 for 3 mb.

Y-Axis units —The cross section can be plotted in Meb, kb, b, mb or mub (for micro-barns). If Auto is selected, the program will choose the units on the basis of the data plotted.

Y-Axis scale —This parameter can have only three values, Log, Linear and Auto. If the selection is Auto, then the programs selects either Log or Linear based on the data to be plotted

11.10.6 GRID

If you wish to include a grid on the plot, select GRID. This option toggles. When a grid is included in the plot, the menu item is NOGRID. Selecting NOGRID will eliminate the grid from the plot and restore the menu item to GRID.

11.10.7 POINTS

Select the POINTS item on the RETRIEVE/OVERLAY master menu in order to supply data points to be shown on the overlay plots. These points are entered as triplets of the form energy, cross section and cross section uncertainty. The data points might be either experimental or calculated data which you may want to compare visually with one or more evaluated data curves.

When the POINTS option is selected, the POINTS entry menu is displayed along with the values of the existing overlay points. This display for the video mode is shown below. In the case that there are no existing user supplied data points, the menu is not presented as the only active option is ADD.

Data Point Entry in the Video Environment

Evaluated Nuclear Data File - ENDF	
RETRIEVE	OVERLAY POINTS
Evaluations of 92-U-238 (n,2n) Being Compared	
JEF	- European evaluated data file
ENDF/B	- United States ENDF/B-VI evaluated data file
JENDL	- Japanese evaluated data file
 USER SUPPLIED DATA POINTS 	
1.200E+07 , 1.500E+00 , 3.000E-01 1.500E+07 , 5.000E-01 , 1.000E-01	
YES	<input type="checkbox"/> ADD ERASE DELETE
<input type="checkbox"/> ADD - Add data points.	

ADD — When the ADD option has been selected, the user is prompted for an incident energy. The energy is entered in the manner described in Section 11.10.4. When an energy has been specified, then the energy is listed as part of the prompt for a cross section and uncertainty. These items are entered as a pair separated by a comma. These numbers are entered as described in Section 11.10.5. When the entry of one energy is complete, the values are listed with the data points previously entered. The points do not have to be entered in any particular order. If the energy entered is blank, then the ADD option is terminated and the POINTS entry menu reappears with an updated list of points.

ERASE — Select the ERASE option to delete all of the data points that have been entered. Control is returned immediately to the POINTS entry menu.

DELETE — Select the DELETE option to delete the last data point that has been entered. Control is returned immediately to the POINTS entry menu with an updated list of points. If you wish to delete the last two points entered, select DELETE twice.

YES — Select the YES option to end the Point entry option and return to the RETRIEVE/OVERLAY menu.

11.11 RETRIEVE/SEND

Use this option to download the data file containing the current retrieval. This option appears in the menu only when a file of retrieved data exists. This option is identical to the FILE/SEND option described in Section 15.1.3.

11.12 RETRIEVE/NEW_FILE

Use this option to change where the retrieval output will go. This option is identical to the NEW_FILE option described in Section 11.14.

11.13 RETRIEVE/FORMAT

Use this option to change the format of the retrieval output. This option is identical to the FORMAT option described in Section 11.15.

11.14 NEW_FILE

The output from the retrieval can be displayed on the user's terminal or stored in a disk file. This option can be used to change the currently selected output destination. The default destination is the user's terminal. If you wish to direct output to a disk file, you **MUST** use this option to supply a name for the file before proceeding with the retrieval. The disk storage of output files and their naming conventions are discussed in Section 3.4. The user's terminal can be indicated by specifying a file TT: or TTY:.

When this option is selected, a prompt appears and the user enters a new file specification. Entering a RETURN without a file specification is interpreted as selecting the user terminal for output. The video and sequential mode operation is the same.

11.15 FORMAT

The output can be generated in one of three formats. This option permits the selection of the output format from the three choices. The default selection is **Narrow Table** format.

Narrow Table Format

The **Narrow Table** format is available for some but not all quantity types in the ENDF format. The data is presented as X-Y pairs, three pairs of columns displayed in an 80 character-wide format. For three-dimensional functions, a table is generated for each incident energy.

Wide Table Format

The **Wide Table** format is identical to the **Narrow Table** format except that it is designed for 132-character line output. For terminal output, unless the user has specified that his output device is 132 character capable (see Section ??), the output will revert to the default **Narrow Table** format. In this format, there are 5 X-Y data pairs per row.

ENDF Format

The **ENDF** format is the basic ENDF format as described in the ENDF format manual (ENDF-102). The format has been designed primarily for machine processing. That is why the table format described above has been introduced in order to make the information easier to read.

Video

In the video mode, a menu of the three format options is displayed. Upon selection of a format, the option terminates and the file specification in the screen display is updated.

Sequential

The new output format is selected by entering the first character of the format name at the prompt. Entry of a RETURN will select the default format, the **User** format.

15 Disk Files

Users of the online data service have access to data files containing text information, data and graphics. These files can come from two different sources. The first source of such files is the data base modules which will store data retrievals or graphical displays as disk files at the option of the user. These files are stored in disk space allocated to users of a given authorization code. The second source of data file accessible to the user is the anonymous FTP area which contains documents, computer program sources, and miscellaneous data bases not accessible from the online data base retrieval modules.

This chapter describes in detail the various options available for accessing these disk files. All of these options are activated by first selecting the FILES menu item in the master menu. The FILES options are given in the illustration below. Users without full authorization, that is those using the GUEST authorization code, do not have access to these options.

User-generated data files are purged after five days; graphics files after two days.

Files Option Selection Menu	
NNDC Online Data Service	
Full Use Authorization	DEC-VT Terminal 132 by 24
DATA BASES	UTILITIES
FILES	PROBLEM HELP LOGOUT
DIRECTORY	- Display a list of user created files,
VIEW	- Display contents of a user created file,
SEND	- Transmit user created files to another computer,
DELETE	- Delete user created files,
CODES	- Download computer program source code,
DOCUMENTS	- Download online data service and other documentation,
LIBRARIES	- Download complete nuclear data libraries,
DONE	- Return to the master menu,
LOGOUT	- Terminate access to the online data service.

15.1 User-Generated Files

User-generated disk files contain either data or graphic information. The format of the data files depends on the data base from which the information was retrieved and the user selected output format. All graphic data files are in PostScript format. The user has four options for accessing these files, DIRECTORY, VIEW, SEND, and DELETE. In all cases, the user is asked to supply a file specification. If the specification is blank, all files will be selected. The file specification may contain multiple character wildcards (*) or single character wildcards (%). Some examples are

U237.ENSDF *.PS U*.EN%%

All files matching the input file specification are displayed in a scrolling window. If no matching files are found, a message is displayed.

15.1.1 DIRECTORY

The DIRECTORY option simply displays the names, sizes and creations dates of the user generated files matching the input criteria in a scrolling window. The user can navigate through the list with the FORWARD, BACKWARD, START, or END menu items when the list is too large to fit into a single window. When finished, selecting the DONE menu item will return the user to the FILES menu.

15.1.2 VIEW

The VIEW option allows the user to look at the contents of one or more files which have been generated. After entry of the file selection criteria, the names, sizes and creation dates of the files matching the selection criteria are displayed in a scrolling window as with the DIRECTORY option output. However, there are three menu items which allow for the selection of one or more files to be displayed on the user's terminal. The selecting the CHOOSE menu item allows the user to choose files to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select files with all files initially selected or all files initially not selected, respectively.

Video

In video mode, the current file is highlighted. Use the UP_ARROW and DOWN_ARROW keys to make another file current. Use the RETURN key to toggle between selected and unselected status for a the current file. A selected file is displayed as underlined bold-characters. An unselected file is displayed in normal characters. When all desired files have been selected, press the X-key to exit from the selection mode.

Sequential

In sequential mode, all files are displayed in the scrolling window with a sequence number for unique file identification. For selected files, the sequence number is preceded by an asterisk. In selection mode, the user is asked to select files one at a time by entering the file's sequence number. A negative number will unselect that file. A blank or zero will terminate the selection mode.

The scroll window menu returns again on exit from the selection process. One can once again select CHOOSE, ALL or NONE to modify the list of selected files. Select the DONE menu option when ready to VIEW the selected files.

Each file is displayed one at a time in a scrolling window. The specification for the file being displayed is given in the window header. The normal scrolling window menu of FORWARD, BACKWARD, START, and END can be used to view the file. Records which are more than 80-characters long are broken at the eightieth character and displayed on two lines with the second line indented. To go on to the next selected file, select the DONE menu option. To interrupt the option before all files have been viewed, select the QUIT menu option.

15.1.3 SEND

The SEND option allows the user to transmit one or more files which have been generated to another computer. Five protocols are available for transmitting the file. The table below shows these protocols and availability from the NNDC and NDS online services.

	NNDC	NDS
INTERNET	x	x
OPEN	x	x
KERMIT	x	

After entry of the file selection criteria, the names, sizes and creation dates of the files matching the selection criteria are displayed in a scrolling window as with the DIRECTORY option output. However, there are three menu items which allow for the selection of one or more files to be transmitted. Selecting the CHOOSE menu item allows the user to choose files to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select files with all files initially selected or all files initially not selected, respectively.

The file selection process is identical to that described in the VIEW option above. When selection has been completed, the user is given a menu to select the method of transmission. As indicated above, the methods available are different in the different online services. The same transmission method is used for all selected files. You must select the SEND option for each different transmission mode desired.

An input form is displayed for each file to be transmitted using the selected mode. Displayed above the form is the name of the file being transmitted, the number of records and the number of bytes contained in the file. The form has been initialized with any default information. This default information is initially based on the machine code and account name specified for file transfer for the user's authorization code. This information can be temporarily or permanently modified using the CUSTOMIZE option (see Section ??). Any successful file transmission will reset the default values for the remainder of the session. Defaults for password and file directory are set in this manner. The destination file name is always initialized to the source file name.

INTERNET

This file transfer method uses the TCP/IP standard file transfer protocol via FTP. At the present time, only ASCII file transfer is permitted from the online service. For the security conscious, this method requires transmission of a password over the networks. Another method for transfer without sending a password on the network, OPEN, is described below. A typical video display for INTERNET file transfer follows.

NNDC Online Data Service	
FILES	SEND
SEND	CSISRS_PLOT.PS;1
	Records=875
	Bytes=35028
INTERNET Destination Information	
Machine Code	bnlnd2.dne.bnl.gov
Account Name	<input type="text" value="RYAN"/>
Password	XXXXXX
Directory	
File Name	CSISRS_PLOT.PS
OK/QUIT	OK

Enter the user name or account name in proper format.

For example: WILLIAMS or P1387, etc.

Use the UP- and DOWN-ARROWS to move between fields.

If the default file transmission parameters need to be changed, select the fields and enter the changes before selecting "OK" to initiate the file transfer. The INTERNET node designation should be entered in the Machine Code field. Either the alphanumeric form (BNLND2.DNE.BNL.GOV) or the numeric form (130.199.112.132) are acceptable. The user Account Name and Password should conform to the requirements of the receiving computer. If there is no password, leave that field blank. The directory and file names must conform to the conventions of the operating system on the receiving computer. For VMS operating systems, use a period (.) to separate directory levels; for UNIX use a slash (/); and for DOS use a backslash (\). A blank directory indicates that the default directory is to be used.

File transmission is initiated by selecting the OK/QUIT field and pressing RETURN with OK in the field. The success or failure of the transmission is indicated. Failure is most likely caused by a bad transmission parameter or by the receiving computer being down or having inadequate free disk storage. If QUIT is selected in the OK/QUIT when a RETURN is entered, the file will not be transmitted. A prompt window will appear asking whether to continue to process the next file or whether to skip processing any remaining file selections.

OPEN

Special FTP accounts have been set up on the NNDC and the NDS computers from which users can “get” files which have been produced during an online data service session. The account names are NDCONL at NNDC and NDSOVL at IAEA/NDS. These accounts have no password and are read only. Retrieving a file from this account does not require transmission of any password over the INTERNET. Selected files are copied one at a time from the user’s storage to this “open” storage. The user may change the file name in the OPEN area as illustrated below. If a file with the same name including version number exists already in the OPEN area, it is replaced. Since it is expected that the user will retrieve these files as soon as his current session is finished, the files are deleted six hours after creation.

NNDC Online Data Service			
FILES	SEND		
SEND	XRAY.WATER;1	Records=2572	Bytes=350280
<u>COPYing file to the OPEN Area</u>			
New File Name :	<input type="text" value="XRAY.H20"/>		

KERMIT

This file transfer method uses the SEND option of the KERMIT protocol for file transfer. It is available only in the NNDC online service. This capability has been maintained primarily for those users who continue to access the service *via* modem; however, it may also be used with network connections. The INTERNET file transfer method is preferred and the future availability of KERMIT at NNDC can not be guaranteed. Use of this file transfer method requires a terminal emulator which supports at least the RECEIVE option of the KERMIT protocol (*e.g.*, MS-DOS KERMIT 3.11 or Microsoft Windows Terminal). There are no additional input requirements for the service. A typical video display for KERMIT file transfer follows.

NNDC Online Data Service			
FILES	SEND		
SEND	CF252.ADECAY;1	Records=2572	Bytes=350280
<u>KERMIT SENDING to user's computer</u>			
Escape to local and RECEIVE.			

Upon seeing the message "Escape to local and RECEIVE", follow the method required by the local terminal emulator to do this. Two examples are:

MS-DOS KERMIT 3.11		
Alt-x		Hold down the Alt key and press the x key
MS-Kermit> receive		Receive the file from the online data service
MS-Kermit> connect		Get back to the service when the file is transferred
MS Windows Terminal		
Settings	Binary Transfers	Select Kermit
Transfers	Receive Binary File	Specify local file name and directory

The progress of the file transfer will be monitored and displayed by the local KERMIT.

Upon completion of the file transfer a prompt window will appear asking whether to continue to process the next file or whether to skip processing any remaining file selections.

15.1.4 DELETE

The DELETE option allows the user to delete one or more files which have been stored in the user's disk storage. After entry of the file selection criteria, the names, sizes and creation dates of the files matching the selection criteria are displayed in a scrolling window as with the DIRECTORY option output. However, there are three menu items which allow for the selection of one or more files to be displayed on the user's terminal. The selecting the CHOOSE menu item allows the user to choose files to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select files with all files initially selected or all files initially not selected, respectively.

The file selection process is identical to that described in the VIEW option above. When file selection has been completed, the files are processed one at a time. A confirmation window appears for each selected file until each file has been processed. If the response is YES, then the file is deleted; if NO the file is not deleted.

15.2 Data Center Supplied Files

The NNDC and NDS store in computerized format a number of documents, computer programs and non-searchable data collections. This collection is continually being revised and augmented. These files are available for retrieval and transmission from the online service as well as from the FTP anonymous account. The selected files are transmitted as described above in the SEND option. A single selection may imply more than one related file. In such cases the file selection list will include each of these files. Should the user not wish to transmit all of the related files, individual file selection can be done at the transmission prompt for each file.

15.2.1 CODES

The CODES option allows selection and downloading of computer code source programs maintained and distributed the data center. Four categories of computer codes are currently offered. They are all related to processing of ENDF and ENSDF format data files. The user must select one of these categories from the first menu presented in this option.

- ENSDF_ANALYSIS - Programs to process ENSDF format files and produced derived physics results.
- ENSDF_UTILITY - Programs to check, list and plot files in ENSDF format.
- ENDF_PREPRO - Programs to process ENDF format files including plotting, pointwise and doppler broadened data files, and general utilities maintained by Dermott Cullen (LLNL).
- ENDF_UTILITY - Programs to check, list and plot and ENDF format data file.

MOST computer programs are available in two versions, one containing only ANSI-77 standard Fortran source code and the other containing source code with VAX/VMS extensions to ANSI-77 Fortran. The next menu allows selection of source code type. In those cases where only one source code is available, then that version will be transmitted irrespective of the source code type selection.

Next a list of programs and documentation for the selected category of computer codes is displayed in a scrolling window from which one or more codes can be selected. In addition to the scrolling menu items, there are three menu items which allow for the selection of one or more codes from the code list. Selecting the CHOOSE menu item allows the user to choose codes to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select codes with all codes initially selected or all codes initially not selected, respectively.

Computer Code Selection Menu

NNDC Online Data Service			
FILES	CODES	SELECT_FILES	
ENDF Utility Programs			
The following programs are written to process ENDF format evaluated data files. They will process either ENDF-5 or ENDF-6 format files. These files are also available via a standard ftp account (BNLND2.DNE.BNL.GOV).			
DOCUMENTATION	- 28-Feb-96	Utility code documentation in PostScript	
STANEF 6.10	- 14-Dec-95	Converts ENDF file to standard format	
CHECKR 6.10	- 14-Dec-95	ENDF format checking code	
FIZCON 6.10.1	- 25-Feb-96	ENDF procedure checking code	
PSYCHE 6.10	- 14-Dec-95	ENDF physics checking code	
LISTEF 6.10	- 14-Dec-95	Creates summary and annotated listings	
PLOTEF 6.10.1	- 28-Feb-96	Plots ENDF data	
GETMAT 6.10	- 14-Dec-95	Retrieves ENDF evaluation from a file	
INTER 6.10	- 14-Dec-95	Calculates standard cross section values	
SETMDC 6-15	- 14-Dec-95	Converts machine dependent code	
<input type="checkbox"/> CHOOSE <input type="checkbox"/> ALL <input type="checkbox"/> NONE <input type="checkbox"/> DONE			
<input type="checkbox"/> CHOOSE - Select one or more items from the list.			

The code selection process is identical to that described in the VIEW option above. When selection has been completed, the user is given a menu to select the method of transmission. The same transmission is used for all selected codes. The files associated with the codes selected are then transferred according to the transmission method selected as described under the SEND option above.

15.2.2 DOCUMENTS

The DOCUMENTS option allows selection and downloading of PostScript formatted documents maintained and distributed the data center. Three categories of documents are currently offered. The user must select one of these categories from the first menu presented in this option.

- ONLINE - Sections of the online service and related documentation.
- STRUCTURE - Documents on nuclear structure and related data bases.
- ENDF - Documents relating to the evaluated nuclear data system.
- REACTION - Documents on nuclear reactions and related data bases.

Next a list of documents for the selected document category is displayed in a scrolling window from which one or more documents can be selected. In addition to the scrolling menu items, there are three menu items which allow for the selection from the document list. Selecting the CHOOSE menu item allows the user to choose documents to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select documents with all documents initially selected or all documents initially not selected, respectively. The selection and transmission the selected document files then proceeds just as for the CODES option.

15.2.3 LIBRARIES

The LIBRARIES option allows selection and downloading of nuclear data libraries maintained and distributed the data center. These libraries are offered in the form deposited with the data centers. They are not searchable from the online data service. Two categories of libraries are currently offered. The user must select one of these categories from the first menu presented in this option.

- IRDF - International Reactor Dosimetry File developed by the IAEA Nuclear Data Section.
- MASSES - The 1995 edition of the Audi-Wapstra atomic mass evaluation.

Next a list of libraries for the selected library category is displayed in a scrolling window from which one or more files can be selected. In addition to the scrolling menu items, there are three menu items which allow for the selection from the file list. Selecting the CHOOSE menu item allows the user to choose files to be processed preserving any prior selections. By selecting the ALL or NONE menu item, the user can also select files with all files initially selected or all files initially not selected, respectively. The selection and transmission the selected library files then proceeds just as for the CODES option.