SWEPP Gamma-Ray Spectrometer System Software User's Guide

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ABSTRACT

The SWEPP Gamma-Ray Spectrometer (SGRS) System has been developed by the Radiation Measurements and Development Unit of the Idaho National Engineering Laboratory to assist in the characterization of the radiological contents of contact-handled waste containers at the Stored Waste Examination Pilot Plant (SWEPP). In addition to determining the concentrations of gamma-ray-emitting radionuclides, the software also calculates attenuation-corrected isotopic mass ratios of specific interest, and provides controls for SGRS hardware as required. This document serves as a user's guide for the data acquisition and analysis software associated with the SGRS system.

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1. INTRODUCTION

Nondestructive analysis systems are in use at the Stored Waste Examination Pilot Plant (SWEPP) to characterize the radiological contents of contact-handled waste containers. Drums, bins, and boxes from various waste generators, including Rocky Flats and Argonne National Laboratory West, are currently stored at SWEPP. Before these containers can be shipped to the Waste Isolation Pilot Plant (WIPP), compliance to WIPP's storage, shipping, and disposal requirements must be verified.

This document describes how to use version 1.00 of the two software components of the SWEPP Gamma-Ray Spectrometer (SGRS) System, excluding the core VAX Gamma-Ray Analysis Program (VAXGAP) version 1 analysis code [1, 2]. A software design description is also available [3]. The two components are the Gamma-Ray Data Acquisition (GC) program, which provides the user interface to the detector system and turntable, and the Gamma-Ray Isotopic Ratio Analysis (GIDXC) program, which calculates isotopic ratios from the analysis results [4]. Further development of the code responsible for isotopic ratio calculations, and likely modifications to this user's guide, will occur as additional drum and box content codes [5] are encountered.

GC and GIDXC are being developed by the staff of the Software Development Section of the Radiation Measurements and Development Unit, with technical direction from L. O. Johnson, L. V. East, and E. B. Nieschmidt.

1.1 Purpose

This document covers the user interface for GC and GIDXC. The primary purpose of this document is to provide a detailed guide to the user-accessible features of GC and GIDXC. The intended audience includes the users of GC and GIDXC; developers and validation and verification analysts may also find this document of interest in its description of the practical aspects of the programs.

1.2 Scope

This document presents detailed instructions on using GIDXC and the various commands available through the GC user interface.

1.3 Definitions, Acronyms, and Abbreviations

Terminology related to the core VAXGAP routines, and related somewhat to gamma-ray spectral analysis in general, follows that used in References 1, 2, and 3. Further, a general understanding of terminology related to the Digital Equipment Corporation's VMS operating system, DECnet communication protocol, DECwindows Motif graphical user interface, FORTRAN compiler, and GKS (Graphical Kernel System) plotting routines is desirable. Otherwise, this document explicitly defines technical terms as they are presented and avoids unnecessary technical jargon for the sake of the general reader.

1.4 Overview

Section 2 reviews the hardware and software requirements for using these programs. Section 3 describes the use of GC, while Section 4 describes the use of GIDXC. Section 5 lists the appropriate references for this document. User-readable listings of the isotope, insert, limit, and interference libraries

available for use with GC and GIDXC are presented in Appendix A. Appendix B contains samples of the hardcopy output generated by GC and GIDXC. A document (Reference 6) presenting an informal overview of the VMS windowing environment and how to navigate within it, along with instructions on transferring ASCII text files between the VMS and DOS operating systems, is attached as Appendix C.

1.5 Registered Trademarks and Copyrights

DEC, DECnet, DECwindows, GKS (Graphical Kernel System), VAX, and VMS are registered trademarks of Digital Equipment Corporation (DEC). Motif is a registered trademark of Open Systems Foundation. Slo-Syn is a registered trademark of The Superior Electric Company.

2. HARDWARE AND SOFTWARE REQUIREMENTS.

2.1 Hardware

GC and GIDXC are designed to run on a DEC VAX computer (or workstation). At a minimum, a DEC VT330 terminal (or equivalent) is necessary for the user; the GC display routine, DAS [2], requires an X-windowing terminal and a mouse. Hardcopy output and spectral plots are generated on an attached laser printer. Canberra acquisition interface modules (AIMs) are connected to the computer via thin-wire Ethernet and provide the communication link between the computer and the gamma-ray detector systems. Canberra's turntable, equipped with Superior Electric's Slo-Syn model SS2000D6 packaged drive [7] and model SS20001 programmable motion control [8], is connected to the computer's serial port via an RS-232 cable.

2.2 Software

2.2.1 Language and Tools

GC and GIDXC were developed using DEC FORTRAN and GKS and the DECwindows Motif graphical user interface under the VMS operating system. The VMS operating system, along with run-time versions of FORTRAN and GKS, are required for execution of the programs. The core VAXGAP code, along with Canberra's (formerly Nuclear Data's) AIM control library (composed of FORTRAN-callable NMC_ functions), must also be installed.

2.2.2 Necessary Files for Execution

The following isotope, insert, limit (or required), and interference libraries [1, 2], respectively, are required for analyzing spectra: `GE$ISOTOPE$LIB:SWEPP.LIB`, `GE$LIMIT$LIB:INSERT.LIB` and `SWEPPREQ.LIB`, and `GE$INTERF$LIB:SWEPPIF.LIB`. User-readable listings of the contents of these libraries are found in Appendix A. The following user-batch program communication files are needed within the directory pointed to by the logical `SY$LOGIN` for any given user: `A1.INPUT`, `A1.OUTPUT`, `A2.INPUT`, `A2.OUTPUT`, `A3.INPUT`, `A3.OUTPUT`, `A4.INPUT`, `A4.OUTPUT`, `GIDXC.INPUT`, `GIDXC.OUTPUT`, `SLOSYN.DAT`, `SLOSYN_SPAWN_IN.DAT`, and `SLOSYN_SPAWN_OT.DAT`. These program communication files, which can be created by executing the DCL^a command program `INEL$EXE:GC_USER_INITIALIZATION` (see Section 3.2), are generally empty, unless an error occurs during data processing; in that case, the appropriate `.OUTPUT` file may contain some information useful for the user, developer, or system administrator in tracking down and correcting the cause of the error.

The installation of VAXGAP on the computer creates a specific directory structure on the disk pointed to by the logical `GAP$DISK`. The directory structures for this disk and the system disk, including GC- and GIDXC-related additions, and the logicals that point to specific directories within the directory trees, are presented in Figure 1.

a. DCL is an abbreviation for DEC's command language within the VMS operating system. The DCL prompt is the prompt the VMS operating system presents to the user after the user logs in.

<u>e disk</u>	<u>root directories</u>	<u>subdirectories . . .</u>	<u>associated logicals</u>	<u>contents</u>
DKA100: (system-specific)			GAP\$DISK, \$USER	VAXGAP; data, results, and user directories
	DIFFERENCES	CONFIGURED NONCONFIGURED PRECERTIFICATION	DIF\$CON DIF\$NON DIF\$PRE	difference files from core VAXGAP changes from other post-certification changes from other pre-certification changes
	NETWORK	EXE	RML\$NET	network-related control command files
	OPERATOR		-	user files
	VAXGAPCODE	GAP GAP_V2 INEL LIBRARY WIRE	EXE SRC EXE SRC EXE SRC SRC V2SRC EXE	GAP\$EXE GAP\$SRC GAPV2\$EXE GAPV2\$SRC INEL\$EXE INEL\$SRC LIB\$SRC LIBV2\$SRC WIRE\$EXE
				core VAXGAP executables source code for the above core VAXGAP version 2 executables source code for the above GC and GIDXC (and non-core VAXGAP) executables source code for the above VAXGAP function object library and source code same for VAXGAP version 2 historical location of some conversion routines
	VAXGAPDATA	LIBRARY RESULTS SLOT SPECTRUM TABLES	INTERF ISOTOPE LIMIT PD BATCH EFFCRV PAN_RATIOS BACKGROUND DETECTOR BK EU GN TH EFF	GE\$INTERF\$LIB GE\$ISOTOPE\$LIB GE\$LIMIT\$LIB GE\$PD\$LIB BATCH\$RESULTS EFFCRV\$RESULTS PAN\$RATIOS SLOT\$BKG SLOT\$SPC BK\$SAVE EU\$SAVE GN\$SAVE, GE\$SAVE TH\$SAVE AT\$TABLE EFFICIENCY\$TABLES
				interference libraries isotope libraries limit libraries parent-daughter correction libraries radionuclide activity results files by spectrum results from efficiency curve determinations isotopic mass ratio results file by container slot-specific spectrum files, QC/calibration data slot-specific background files background spectrum files europium calibration spectrum files sample (i.e., general) spectrum files thorium calibration files attenuation coefficient tables detector efficiency curves
DKA0: (system-specific)			\$SYSTEM, \$DATA	operating system, compilers, . . .
	NDAIMLIB		LIB_CAM	Canberra's AIM control library
	VAXGAPDATA	SPECTRUM BK EU GN TH	BK\$DATA EU\$DATA GN\$DATA, GE\$DATA TH\$DATA	background spectrum files archive europium calibration spectrum files archive sample (i.e., general) spectrum files archive thorium calibration files archive

Figure 1. Directory Structures Related to Core VAXGAP Routines and to GC and GIDXC.

3. GC USER INTERFACE

3.1 Overview

GC provides the interface between the user and the detector system and turntable. It also allows the user to perform diagnostic measurements on the detector system and spectral analyses using GIDXC.

3.2 Initialization of the User's Environment

To create the necessary program communication files (see Section 2.2.2), execute the DCL command program INEL\$EXE:GC_USER_INITIALIZATION by entering the command^b

GC_INIT

at the DCL prompt.^c This program should be executed only once for each user's account. Although multiple user accounts may be initialized using this command, only one user can access GC at a time due to the nature of communications with the detector systems and turntable. In short, only one user should have control of the SGRS hardware at any one time to avoid confusion and disruption of one user's work by another user.

3.3 Starting GC

There are two ways to start GC. The first is by entering the command

GC

at the DCL prompt. This starts GC directly.

The second way, to be described in more detail in Section 3.5.3.7, is to start data acquisition for a bar-coded barrel (or drum) on the turntable by entering

BS <container id>

b. Some commands entered at the DCL prompt, such as GC_INIT, GC, and GIDXC, are called symbols within VMS. Symbols, generally, are abbreviations for commands to run programs or for lengthy DCL commands. For example, GC is an abbreviation for the command RUN INEL\$EXE:GC; GC_INIT is an abbreviation for the command @INEL\$EXE:GC_USER_INITIALIZATION. Symbols are also used within VAXGAP to point to AIMS; A1\$AIM, e.g., contains the Ethernet address for the AIM associated with detectors A1 and A2. Logicals, as contrasted to symbols, point to directories or devices, or they contain values. For instance, the logical INEL\$EXE points to a directory that contains the programs associated with SGS (GC, for example).

c. Throughout this document entering a command implies striking the return key after typing in the command. Also, commands to be entered will be offset from the rest of the text on their own line and will appear in bold text.

at the DCL prompt, where <container id> is the identification code found on the barrel's bar code label.^d This DCL command format varies from the GC command format described in Section 3.5.3.7 in that no delimiters are used between the command and the parameter(s) associated with the command.

Either of these commands brings up GC's main screen from which other commands can be entered, and the progress of data acquisitions and of batch and print queue activity can be monitored.

3.4 Description of GC's Main Screen

GC's main screen is presented in Figure 2. The main screen is composed of two sub-screens (or virtual displays): the upper sub-screen displays detector system and turntable status information, and the lower sub-screen is where the user enters commands and where messages resulting from the execution of those entered commands are displayed.

3.4.1 Status Sub-Screen

The detector system and turntable status sub-screen is set up in a table-like format. The middle five columns on the screen display detector system-specific information (at present only four detector systems are in use, so the fifth column is X-ed out). At the top of each of these columns is a letter-number designator (i.e., the detector identifier) for the appropriate detector system. The left-most column details what information is presented for each detector system:

- "STATUS" means whether the detector system is on or off
- "LIVE" and "REAL" refer, respectively, to the detector live and real times
- "INTERVAL" is the user-defined count length (in seconds) for the detector system and
- "ID" is the computer-assigned spectrum identification code, beginning with the detector identifier (A1, e.g.) and ending with a nine-digit date-and-time stamp, for the last spectrum saved from the detector system.

The detector system-specific values corresponding to each of these parameters will be displayed

d. This bra-ket (bra = <, ket = >) construct will be used throughout this document. Again, when the user sees <description of desired value> in a command, the <description of desired value> is to be replaced with the desired value, with the bra and ket omitted. For example, the GC version of the BS command, described in detail in section 3.5.3.7,

BS;<container id>,<sec>

becomes

BS;001262,3600

where the bar code label contains the value 001262 and a one-hour (or 3600-second) count is desired.

in reverse video, in the column for the appropriate detector.^e If no value is displayed for a parameter, that value is not applicable at the present time or is unknown. For instance, when GC is first started, and if the detector systems are all off, then there is no real or live time to be displayed; that is why those areas are blank in Figure 2.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM						
DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS-->	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>		ROTATING? <u>N</u>
LIVE--->						ON COUNT? <u>Y</u>
REAL--->						MONITOR PU REGION? <u>N</u>
INTERVAL						COUNTS IN PU REGION: 0
ID----->						ANALYZE AT 30000
MESSAGES:						
CMD>						

Figure 2. GC's Main Screen.

The last column contains a number of user-defined parameters related to data acquisition and the status of the turntable:

- "CONTAINER" is the identification code for the barrel, drum, bin, or box currently being examined -- if no code has been provided, "(none)" is displayed
- "ROTATING?" refers to whether the turntable is currently in motion, while
- "ON COUNT?" refers to whether the turntable will be in motion during data acquisition (i.e., during a count)
- "MONITOR PU REGION?" refers to whether the number of counts in a particular plutonium isotope region of the gamma-ray spectrum (from 144.2 to 148.5 keV) will be monitored
- "COUNTS IN PU REGION" is the maximum number of counts observed by any of the

e. Because of graphical limitations with the production of this document, reverse video will be rendered as underlined bold in all figures of GC's main screen. The words "reverse video" will be used, though, to allow the user to more easily interpret the actual screens.

detectors in the 144.2- to 148.5-keV region and

- "ANALYZE AT" is the trigger level for stopping data acquisition and then saving and analyzing the spectra, even if the user-specified count length has not yet been reached.

As for the parameters in the status sub-screen, values corresponding to each of these parameters will be displayed in reverse video (again, reverse video is rendered as underlined bold in the figures).

3.4.2 Commands Sub-Screen

The commands sub-screen consists of two regions. The first region is at the bottom of the commands sub-screen; this is where the user enters commands. This region is clearly marked by the "CMD>" prompt ("CMD" being an abbreviation for "command"), and when GC is ready to accept commands a blinking cursor appears after this prompt.^f

The second region is the upper portion of the commands sub-screen. This is where informational, confirmatory, and error messages are displayed that result from execution of the commands entered by the user, and so the region is marked by the "MESSAGES:" label. Informational messages generated by GC appear in this region below the "MESSAGES:" label; old messages will be written over by messages from later commands. Confirmatory and error messages appear above the "CMD>" prompt and are erased upon another command being entered; confirmatory messages ask the user to confirm the execution of certain commands (e.g., EXIT; when counts are in progress -- see Section 3.5.2), while error messages usually refer to mistakes in how a command was entered (e.g., missing or inappropriate information). Examples of all of these types of messages will be presented.

3.5 Description of GC's Commands

All GC commands are entered from the "CMD>" prompt that appears at the bottom of the screen (see Figure 2). **DO NOT ATTEMPT TO ENTER A COMMAND IF THE BLINKING CURSOR DOES NOT APPEAR AFTER THE "CMD>" PROMPT!** Doing so can cause the interface to lock up and not allow any other commands to be entered; this should only be of concern, though, when the computer system is extremely busy or malfunctioning. (If the interface does lock up, the user will need to strike control-y to interrupt the program^g and return control to the DCL prompt; at this point, GC can be restarted.)

The format of any GC command is as follows:

<command>;<command-related parameter #1>,<parameter #2>,...

where <command> refers to the GC command being entered, a semicolon separates the GC command from any parameters, and <command-related parameter #1>, etc. refer to the comma-delimited list of parameter(s) that may need to be included with the command. Whether there are parameters or not, a semicolon must follow any GC command, as depicted in the examples.

f. The cursor is not included in the various GC main screen figures.

g. Striking control-y means to hold down the control key (sometimes labelled Ctrl) while striking the letter y key. This applies in general to any control-<key> key stroke combination, as well as to alt-<key> key stroke combinations.

The first two commands to be described do not appear in the GC help screens. Descriptions of the various commands that appear in the GC help screens follow, grouped as they are displayed in the GC help screens. Examples of how to enter the commands will be presented, especially in the beginning sections, along with figures showing the results of entering the commands as displayed by GC; in the latter sections fewer examples and figures will appear.

3.5.1 HELP;

Entering

HELP;

at the "CMD>" prompt (with the trailing semicolon) will cause the screens presented in Figures 3 through 6 to be displayed, one at a time, on the terminal. While these screens are presented, the normal GC main screen will not be visible; it will return after all of the help screens have been viewed. At the end of each screen the message "Press the 'Return' key to continue." will appear; once the user has reviewed the current help screen, pressing the return key either will display the next help screen or, after all of the help screens have been displayed, will return the user to the GC main screen.

Figure 3 displays the first GC help screen. This screen contains help for the group of commands used for data acquisition. These commands are described in more detail in Section 3.5.3 and include

```
COMMANDS AVAILABLE IN "GC" - SCREEN 1 OF 4

DATA ACQUISITION COMMANDS

M;<count limit>....Toggle whether Pu-count monitoring occurs during a count.

RI;.....Initialize the barrel turner (and stop rotation).
RT;.....Toggle whether sample rotation occurs during a count.
R;.....Manually start (or stop) sample rotation.

SP;<detector>.....Set the analysis parameters for the specified detector.

S;<detector(s)>,<sec>....
    ....Start a count on the specified detector(s) for "sec" seconds.
BS;<container id>,<sec>....
    ....Same as S, but for all detectors.

STOP;<detectors>...Stop data collection on the specified detector(s).
BSTOP;.....Same as STOP, but for all detectors.
```

Figure 3. GC Help Screen #1.

- M; for toggling on and off the monitoring of a plutonium isotope region in the gamma-ray spectrum during acquisition
- RI; for initializing communications with the turntable controller
- RT; for toggling whether turntable rotation should occur during acquisition

- R; for toggling on and off turntable rotation
- SP; for specifying spectral analysis parameters
- S; and BS; for starting data acquisition and
- STOP; and BSTOP; for stopping data acquisition.

Figure 4 displays the second GC help screen. This screen contains help for the group of commands used for spectrum storage and analysis. These commands are described in more detail in

```

COMMANDS AVAILABLE IN "GC" - SCREEN 2 OF 4

SPECTRUM STORAGE AND ANALYSIS COMMANDS

D;<detector(s)>,<weight in kg>,<content code>,<comments>....
.....Read the data out of each of the specified detectors and
store the spectrum on the disk.
BD;.....Same as D, but for all detectors.

DA;<detector(s)>,<weight in kg>,<content code>,<comments>....
.....Same as D, and then initiate an analysis of the spectrum.
BDA;.....Same as DA, but for all detectors.

BKG;<detector(s)>.....Read the data out of the specified detector(s) and store
the spectrum(a) in the background directory on the disk.

A;<spectrum id>.....Analyze the specified, already stored spectrum.
BA;<spectrum id(s)>...Analyze the specified spectra (comma-delimited list) and
generate a barrel summary report (the full id is required
for the first spectrum; the detector id alone can be used
to for subsequent spectra with otherwise identical ids).
FBA;<spectrum id(s)>..Same as BA, but with printed individual detector analyses.

```

Figure 4. GC Help Screen #2.

Section 3.5.4 and include

- D; and BD; for storing on disk spectral data retrieved from an AIM
- DA; and BDA; for storing on disk spectral data retrieved from an AIM and then analyzing the data
- BKG; for storing on disk spectral backgrounds retrieved from an AIM and then performing a background analysis and
- A;, BA;, and FBA; for analyzing data already stored on disk.

Figure 5 displays the third GC help screen. This screen contains help for the groups of commands used for detector calibration. These commands are described in more detail in Section 3.5.5 and include

- CBE and PEQE for performing europium-152-based detector calibrations

COMMANDS AVAILABLE IN "GC" - SCREEN 3 OF 4

DETECTOR CALIBRATION COMMANDS

CBE;<detector>....Energy calibrate the specified detector using a Eu-152 calibration source.
PEQE;<detector>....Energy calibrate the specified detector using a Eu-152 calibration source and determine pulser equivalent energies.
PEQEH;<detector>...Print the calibration history from PEQE for the specified detector.

CBT;<detector>....Energy calibrate the specified detector using a Th-228 calibration source.
PEQT;<detector>....Energy calibrate the specified detector using a Th-228 calibration source and determine pulser equivalent energies.
PEQTH;<detector>...Print the calibration history from PEQT for the specified detector.

Figure 5. GC Help Screen #3.

- CBT and PEQT for performing thorium-228-based detector calibrations and
- PEQEH and PEQTH for printing PEQE and PEQT calibration histories, respectively.

Figure 6 displays the fourth GC help screen. This screen contains help for the groups of commands used for spectrum display and batch job- and queue-related functions. These commands are

COMMANDS AVAILABLE IN "GC" - SCREEN 4 OF 4

SPECTRUM DISPLAY OPTIONS

DAS;<detector>(<optional isotope library>)....
....Create a spectrum display window.

BATCH JOB- AND QUEUE-RELATED COMMANDS

TYPELOG;.....Type on the monitor the last BATCH_GIDXC_ANALYSIS.LOG file.
PRINTLOG;.....Print the last BATCH_GIDXC_ANALYSIS.LOG file (on SYS\$PRINT).
SHOWQUE;.....Display on the monitor the status of all queues.

Figure 6. GC Help Screen #4.

described in more detail in Section 3.5.6 and include

- DAS for displaying the spectrum currently stored in an AIM associated with a detector system

- TYPELOG; and PRINTLOG; for displaying or printing the log file from a GIDXC analysis and
- SHOWQUEUE; for displaying the status of all batch and print queues.

3.5.2 EXIT; and QUIT;

To exit from GC the user can enter

EXIT;

or

QUIT;

at the "CMD>" prompt. Striking control-z will also serve this purpose. In the case where an acquisition is in progress, the user will receive the confirmatory message depicted in Figure 7, where some ten-hour counts are depicted as in-progress. As the message states, the user can now exit from GC by repeating the command (EXIT;, QUIT;, or control-z), but at the risk of preventing any automatic spectral data processing and analysis once the acquisition has been completed. For instance, if a waste barrel was being

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS-->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		ROTATING? <u>Y</u>
LIVE---->	<u>33432</u>	<u>33432</u>	<u>33432</u>	<u>33433</u>		ON COUNT? <u>Y</u>
REAL---->	<u>33432</u>	<u>33432</u>	<u>33432</u>	<u>33433</u>		MONITOR PU REGION? <u>N</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		COUNTS IN PU REGION: <u>0</u>
ID----->						ANALYZE AT <u>30000</u>
MESSAGES:						
THERE ARE COUNTS IN PROGRESS - EXITING NOW WILL PREVENT AUTOMATIC PROCESSING REPEAT THE COMMAND TO CONFIRM EXITING AT THIS TIME CMD>EXIT;						

Figure 7. Confirmatory Message from EXIT;.

counted overnight, exiting GC at the end of the work day would prevent GC from automatically saving and analyzing the spectral data after the acquisition was completed. (Note, though, that exiting GC does not stop data acquisition. The detector systems are designed to continue acquiring data for the specified length of time even if the computer is turned off; the acquired data is retained in the associated AIM for reading later.)

If the user does not reenter the command and either enters another command or just strikes the return key, the confirmatory message disappears.

3.5.3 Data Acquisition Commands

The following commands are used in data acquisition operations.

3.5.3.1 M;<count limit> A spectral data acquisition started using the GC commands S; and BS; (see Sections 3.5.3.6 and 3.5.3.7, respectively) can be stopped in three different ways. GC will automatically stop an acquisition once it has reached the end of its specified count length. The user can also tell GC to stop acquisitions using the STOP; and BSTOP; commands (see Sections 3.5.3.8 and 3.5.3.9, respectively). The third way involves GC monitoring the number of counts within a particular region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed (the current region is 144.2-148.5 keV); GC stops all acquisitions once a certain number of counts are acquired in that region by any of the detectors, even if the desired count length has not been reached. The M; command is used to toggle^h whether such monitoring is being performed and to reset the target number of counts (or analysis trigger level) at which acquisition should be stopped. This command is issued during an ongoing data acquisition and will be applied to that acquisition.

For example, to start monitoring on the acquisition displayed in Figure 7, enter

M;35000

at the "CMD>" prompt; this will begin monitoring with the target number of counts changed from the default value of 30,000 to 35,000. (If the command had been entered without the 35,000, monitoring would have been started using the default target value of 30,000.) Note, in Figure 8, that the parameter value associated with "MONITOR PU REGION?" has changed from "N" to "Y" and the value associated with "ANALYZE AT" has changed from 30,000 to 35,000, and the current acquisition continues. To turn monitoring off again, reenter the M; command; turning monitoring off does not stop the acquisition.

3.5.3.2 RI; To initialize communications with the turntable controller, enter

RI;

at the "CMD>" prompt. This command is automatically executed when GC starts, so the only time a user would need to use it is when the communication link with the turntable has been disrupted or the turntable has been powered down and powered back up.

3.5.3.3 RT; To toggle whether turntable rotation should occur during data acquisition, enter

RT;

at the "CMD>" prompt. Entering this command changes the value of the parameter associated with "ON COUNT?" on GC's main screen, as depicted in Figure 9, where the value has changed from the "Y" found in Figure 2 to "N". Changing this parameter during acquisition does not change whether the turntable is rotating for that acquisition; to change whether the turntable is currently rotating, use the R; command

h. Toggle here, and throughout the document, means to turn something off if it is currently on, or to turn it on if it is currently off.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER:
STATUS->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		(none)
LIVE---->	<u>33542</u>	<u>33542</u>	<u>33542</u>	<u>33543</u>		ROTATING? <u>Y</u>
REAL---->	<u>33542</u>	<u>33542</u>	<u>33542</u>	<u>33543</u>		ON COUNT? <u>Y</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		MONITOR PU
ID----->						REGION? <u>Y</u>
						COUNTS IN
						PU REGION:
						<u>0</u>
						ANALYZE AT
						<u>35000</u>

MESSAGES:

CMD>M;35000

Figure 8. Changing the Analysis Trigger Level Using M;.

described in Section 3.5.3.4. Changes to this parameter will apply to acquisitions started after the change is made.

3.5.3.4 R; To toggle whether the turntable is currently rotating, enter

R;

at the "CMD>" prompt. This command can be used for turning a barrel on the turntable (so that the bar code label is visible, for instance) and for starting an inadvertently forgotten rotation of a barrel during data acquisition. For another instance, suppose the user wishes to stop barrel rotation during the ongoing acquisition depicted in Figure 8. Entering the R; command stops turntable rotation and changes the value of the "ROTATING?" parameter, as shown in Figure 10, from "Y" to "N".

3.5.3.5 SP;<detector> To change the spectral analysis parameters associated with any one detector, enter

SP;<detector>

at the "CMD>" prompt, where <detector> is replaced with the appropriate letter-number detector identifier (A1, e.g.). The GC main screen disappears and the text screen presented in Figure 11 appears. This text screen has three columns: the first describes each of the spectral analysis parameters, the second contains the current value of the parameter, and the third is where the user enters a new value. As the text screen reminds the user, strike the return key until the cursor is on the same line as the parameter to be changed; the cursor will wrap back around to the first parameter when the return key is struck with the cursor next

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS-->	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>		ROTATING? <u>N</u>
LIVE--->						ON COUNT? <u>N</u>
REAL--->						MONITOR PU REGION? <u>N</u>
INTERVAL						COUNTS IN PU REGION: <u>0</u>
ID----->						ANALYZE AT <u>30000</u>
MESSAGES: CMD>RT;						

Figure 9. Toggling the Rotation "ON COUNT?" Parameter.

to the last parameter.

To make a change to the list, strike the return key until the cursor is on the line of the desired

"Return key advances to next line. Type "Ctrl Z" to exit.

NUCLIDE LIBRARY:	<u>MASTER</u>
REQUIRED ENERGY LIBRARY:	<u>SWEPPREQ</u> ZEROLIM
INTERFERENCE LIBRARY:	<u>SWEPPIF</u>
BACKGROUND CORRECT (YES or NO)?	<u>YES</u>
PRINT RESULTS (YES or NO)?	<u>YES</u>
SAVE RESULTS (YES or NO)?	<u>YES</u>
SAVE DIRECTORY:	<u>GE\$SAVE</u>

Figure 11. Spectral Analysis Parameter Menu with Changes.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS-->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		ROTATING? <u>N</u>
LIVE---->	<u>33578</u>	<u>33578</u>	<u>33578</u>	<u>33579</u>		ON COUNT? <u>Y</u>
REAL---->	<u>33578</u>	<u>33578</u>	<u>33578</u>	<u>33579</u>		MONITOR PU REGION? <u>Y</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		COUNTS IN PU REGION: <u>0</u>
ID----->						ANALYZE AT <u>35000</u>
MESSAGES: CMD>R;						

Figure 10. Stopping Barrel Rotation During Data Acquisition Using R;.

parameter. Enter the new parameter value and strike the return key; the new value should appear in the second column in place of the last value displayed there. When all of the desired changes have been made, striking control-z saves the new list of parameters and the GC main screen reappears. In Figure 11, the user has changed the nuclide (or isotope) library to be used to MASTER and is about to specify that no required energy (or limit) library is to be used by entering ZEROLIM. Changes made to the spectral parameter list are saved in files named SLOT\$SPC:<detector identifier>.ANP and will apply to all subsequent analyses submitted via GC or GIDXC, even if the user exits GC and then returns to it.

The first three parameters specify the various libraries to be used [1, 2]. The currently available choices are those listed in Appendix A: for "NUCLIDE LIBRARY", the user can choose from SWEPP, MASTER, and ENVLIB; for "REQUIRED ENERGY LIBRARY", the choices are SWEPPREQ, ZEROLIM, and ENVLIM; and for "INTERFERENCE LIBRARY", the choices are SWEPPIF, NOINTLIB, and ENVINTLIB. Because of dependencies that exist between these libraries, they should be used in sets: SWEPP, SWEPPREQ, and SWEPPIF make up the standard set for use with GC and GIDXC; MASTER, ZEROLIM, and NOINTLIB make up a second set of more general applicability; and ENVLIB, ENVLIM, and ENVINTLIB make up a third set useful for analyzing environmental samples.

As for the rest of the parameters,

- "BACKGROUND CORRECT" specifies whether a background correction should be performed (this should be set to "YES" in general and especially when low activity levels are expected)
- "PRINT RESULTS" specifies whether a hard-copy version of the results should be printed

(there is rarely a reason for setting this parameter to "NO")

- "SAVE RESULTS" specifies whether the radionuclide activities calculated during an analyses should be saved in a file in the BATCH\$RESULTS directory and
- "SAVE DIRECTORY" is the logical that points to the directory in which the spectrum file should be saved.

3.5.3.6 S;<detector(s)>,<sec> To start data acquisition on one detector or a series of detectors, enter

S;<detector(s)>,<sec>

at the "CMD>" prompt, where <detector(s)> is replaced with either a single detector identifier (e.g., A2) or a sequential series of detector identifier (e.g., A1-A3 but not A1, A2, A3) and <sec> is replaced with the desired count length in seconds. For the sake of example, suppose the user enters

S;A1-A4

as the command; the results are presented in Figure 12.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS->	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>		ROTATING? <u>N</u>
LIVE---->						ON COUNT? <u>Y</u>
REAL---->						MONITOR PU
INTERVAL						REGION? <u>N</u>
ID----->						COUNTS IN
						PU REGION:
						<u>0</u>
						ANALYZE AT
						<u>35000</u>
MESSAGES:						
INCOMPLETE COMMAND - COUNT TIME MISSING OR BAD						
BAD OR UNKNOWN COMMAND--"S;A1-A4"						
CMD>S;A1-A4						

Figure 12. Incorrectly Starting Data Acquisition Using S;.

As the error message explains, the count time has been left off of the S; command. There is no default count time for acquisitions started using S;.

Upon the user entering this command correctly, the AIMs associated with the specified detector

systems are cleared of any previously acquired data, the live and real times are reset to zero, and a new acquisition is started, as depicted in Figure 13; a message also appears to tell the user that the specified acquisitions have been started. This command should be used for starting calibration or background measurements, or when automatic saving of the acquired spectra and GIDXC analysis are NOT needed; otherwise, it is preferable to use the command BS; described in Section 3.5.3.7. Also, plutonium region monitoring is not automatically initiated when acquisitions are started via the S; command (as contrasted to when the BS; command is used -- see Section 3.5.3.7); use M; (Section 3.5.3.1) to start plutonium region monitoring for counts started via the S; command.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM						
DETECTOR	A1	A2	A3	A4		CONTAINER: (none)
STATUS-->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		ROTATING? <u>Y</u>
LIVE--->	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		ON COUNT? <u>Y</u>
REAL--->	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		MONITOR PU REGION? <u>Y</u>
INTERVAL	<u>3600</u>	<u>3600</u>	<u>3600</u>	<u>3600</u>		COUNTS IN PU REGION: <u>0</u>
ID----->						ANALYZE AT <u>35000</u>
MESSAGES: DATA COLLECTION STARTED ON ADC A1 A2 A3 A4 CMD>S;A1-A4,3600						

Figure 13. Correctly Starting Data Acquisition Using S;.

3.5.3.7 BS;<container id>,<sec> To start acquisitions on all detector systems known to GC (which currently number four), enter

BS;<container id>,<sec>

at the "CMD>" prompt, where <container id> is replaced with the contents of the bar code label found on the barrel, and <sec>, as above, is the desired count length in seconds. This second command parameter is optional for BS, with a default valueⁱ of 36,000 seconds (or ten hours).

After this command is entered, GC asks the user to enter three additional pieces of information; the requests appear above the "CMD>" prompt and the user is to enter the responses at the "CMD>" prompt:

- ENTER THE WEIGHT IN KILOGRAMS -- here GC expects the net weight of the

i. The default value is the value that will be assumed by the program if the user does not enter a value.

barrel's contents in kilograms; numbers, with or without a decimal point, are expected from the user

- ENTER THE CONTENT CODE -- here GC expects the content code for the barrel [5] and
- ENTER ANY COMMENTS -- the user can enter one line of comments here; if there are no comments to be entered, the user can just strike the return key.

Once these pieces of information are entered, all of the AIMs associated with the detector systems are cleared of any previously acquired data, the live and real times are reset to zero, and new acquisitions are started, as depicted in Figure 14; a message also appears to tell the user that the specified acquisitions have been started. All of this is similar to what occurs when starting acquisitions with the S; command.

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: 001246
STATUS->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		ROTATING? <u>Y</u>
LIVE--->	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		ON COUNT? <u>Y</u>
REAL--->	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>		MONITOR PU REGION? <u>Y</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		COUNTS IN PU REGION: <u>0</u>
ID----->						ANALYZE AT <u>35000</u>
MESSAGES: DATA COLLECTION STARTED ON ADC A1 A2 A3 A4 ESTIMATED COUNT LENGTH TO REACH ANALYSIS TRIGGER LEVEL NOT CALCULABLE THE PRESENCE OF A LEAD LINER CANNOT YET BE RELIABLY DETERMINED CMD>BS;001246,3600						

Figure 14. Starting Data Acquisition Using BS;.

Additional things that occur include an updating of the parameter value associated with "CONTAINER:" to the container id entered as part of the BS; command. If plutonium region monitoring is to be performed, it starts, the value associated with "COUNTS IN PU REGION:" is periodically updated, and the message "ESTIMATED COUNT LENGTH TO REACH ANALYSIS TRIGGER LEVEL NOT CALCULABLE" initially appears below the message about data collection starting. Once sufficient counts are available in the specific plutonium region (i.e., presently >100 counts), the message changes to one similar to that found in Figure 15. Note that this estimated count length can change rather dramatically early in the acquisition; as the number of counts in the plutonium region increases, the estimate will become more stable and precise.

Excessive attenuation of gamma-rays from within the barrel can prevent the determination of

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: 001246
STATUS-->	<u>ON</u>	<u>ON</u>	<u>ON</u>	<u>ON</u>		ROTATING? <u>Y</u>
LIVE---->	<u>922</u>	<u>922</u>	<u>920</u>	<u>921</u>		ON COUNT? <u>Y</u>
REAL---->	<u>922</u>	<u>922</u>	<u>922</u>	<u>922</u>		MONITOR PU REGION? <u>Y</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		COUNTS IN PU REGION: <u>159</u>
ID----->						ANALYZE AT <u>35000</u>

MESSAGES:

DATA COLLECTION STARTED ON ADC A1 A2 A3 A4

ESTIMATED COUNT LENGTH TO REACH ANALYSIS TRIGGER LEVEL = 181807 SEC

LEAD LINER LIKELY PRESENT: 413.7-keV:129.3-keV = 21 (I.E., > 10)

CMD>BS;001246,3600

Figure 15. Monitoring Data Acquisition Progress After Executing BS;.

reliable isotopic mass ratios. Because of this, the presence of a lead liner (a typical attenuator in the waste barrels) is also monitored for once the number of counts in specific regions reach acceptable levels. (In particular, the determination is deemed reliable once the number of counts between 127.3 and 131.3 keV exceeds 100; a lead liner is deemed to be present if the ratio of the counts between 411.7 and 415.7 keV and the aforementioned region exceeds ten.) Until the count levels in the appropriate regions are sufficiently high, the message "THE PRESENCE OF A LEAD LINER CANNOT YET BE RELIABLY DETERMINED" appears. Once sufficient counts are attained, the message will change to reflect whether a lead liner appears to be present (for instance, as displayed in Figure 15, "LEAD LINER LIKELY PRESENT: 413.7-keV:129.3-keV = 21 (I.E., > 10)" or appear to not be present (for instance, "LEAD LINER LIKELY NOT PRESENT: 413.7-keV:129.3-keV = 0 (I.E., < 10)"). In this latter case, it is likely not worthwhile to allow the acquisition to continue, and so it should be stopped using BSTOP; (see Section 3.5.3.9).

3.5.3.8 STOP;<detectors> To stop data acquisition on one detector or a series of detectors, enter

STOP;<detector(s)>

at the "CMD>" prompt, where <detector(s)> is replaced with either a single detector identifier (e.g., A2) or a sequential series of detector identifier (e.g., A1-A3 but not A1,A2,A3). Data acquisition is stopped for each of the specified detectors and its "STATUS" is changed from "ON" to "OFF" upon execution of this command, much as is displayed in the figure associated with the BSTOP; command. A message is also displayed as further notice that the specified acquisitions have been stopped. If the acquisition stopped with STOP; was started with BS;, GC proceeds as if BSTOP; had been entered (see Section

3.5.3.9).

3.5.3.9 BSTOP; To stop all detectors, as when stopping an acquisition started via BS; because a lead liner appears to be present (see Figure 15), enter

BSTOP;

at the "CMD>" prompt. As reflected in Figure 16, a number of things happen upon this command being executed; among them

- barrel rotation stops (and so the value associated with "ROTATING?" changes to "N")
- data acquisition for all of the detector systems is stopped (and so the "STATUS" for each is changed to "OFF")
- the spectrum acquired by each detector system is saved (and so the "ID" for each is updated) and
- the spectra are submitted for a full GIDXC analysis (with appropriate messages being displayed on the screen -- see Section 4 for more details on all that GIDXC does).

These same changes and messages occur when an acquisition started using BS; is automatically stopped by GC because either the specified count length has elapsed or the analysis trigger level has been reached (see Section 3.5.3.1).

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER: 001246 ROTATING? N ON COUNT? Y MONITOR PU REGION? Y COUNTS IN PU REGION: 159 ANALYZE AT 35000
STATUS-->	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>		
LIVE--->	<u>1158</u>	<u>1158</u>	<u>1156</u>	<u>1156</u>		
REAL--->	<u>1158</u>	<u>1158</u>	<u>1158</u>	<u>1158</u>		
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		
ID----->	<u>A1480213480</u>	<u>A1480213480</u>	<u>A1480213480</u>	<u>A1480213480</u>		
MESSAGES: DATA READ AND SAVED TO FILE FROM ADC A1 A2 A3 A4 SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES - IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS CMD>BSTOP;						

Figure 16. Stopping Data Acquisition Using BSTOP;.

3.5.4 Spectrum Storage and Analysis Commands

The following commands are used in spectrum storage and analysis operations.

3.5.4.1 D;<detector(s)>,<weight in kg>,<content code>,<comments> This command should be used for saving intermediate or final spectra acquired using the S; command to start the acquisition. Since the acquisitions were not started using BS;, GC does not know the weight of the container and its content code, and so it must ask for them before a GIDXC analysis can be performed. The user can also enter one line of comments relevant to the container. The spectral data, retrieved from the appropriate AIMS, will be saved in the save area specified in the detector-specific spectral analysis parameters (see Section 3.5.3.5). A message noting that the data has been saved (identical to the message displayed in Figure 16) will appear within the command sub-screen.

3.5.4.2 BD;<weight in kg>,<content code>,<comments> This command should be used for saving intermediate spectra acquired using the BS; command to start the acquisition. Although the acquisitions could have been started using BS;, S; could also have been used; because of this, GC may not know the weight of the current container and its content code, and so they need to be provided. The spectral data, retrieved from the appropriate AIMS, will be saved in the save area specified in the detector-specific spectral analysis parameters (see Section 3.5.3.5). A message noting that the data has been saved (identical to the message displayed in Figure 16) will appear within the command sub-screen.

This command may appear redundant; these functions are performed automatically by GC whenever an acquisition started using BS; is stopped. The command finds some utility, though, when the user wishes to save the current spectra part way through an acquisition. Execution of this command does not stop data acquisition, nor does it interfere with the normal post-acquisition processing performed by GC.

3.5.4.3 DA;<detector(s)>,<weight in kg>,<content code>,<comments> This command performs the data-saving functions of D; and then submits any saved spectra individually for analysis using GIDXC. Messages identical to those presented in Figure 16, related to the starting of data analysis and where to look if no output appears at the printer in a few minutes, will be displayed.

3.5.4.4 BDA;<weight in kg>,<content code>,<comments> This command performs the data-saving functions of BD; and then submits the saved spectra for a full GIDXC analysis, with only a barrel summary report and a PAN\$RATIOS file being generated (see Section 4).

Much as with BD;, this command may also appear redundant; these functions are performed automatically by GC whenever an acquisition started using BS; is stopped. Similar to BD;, the command finds some utility when the user wishes to save and analyze the current spectra part way through an acquisition. For instance, suppose the user needs some preliminary estimates on the isotopic mass ratios or radionuclide concentrations for a particular barrel; BDA; allows the user to generate those preliminary estimates.

For the reasons noted in the discussion of BD;, GC may not know the weight and content code of the current container and so they need to be entered with this command as well. Execution of this command does not stop data acquisition, nor does it interfere with the normal post-acquisition processing performed by GC. The messages presented in Figure 16 that are related to the starting of data analysis and where to look if no output appears at the printer in a few minutes will be displayed.

3.5.4.5 BKG;<detector(s)> This command performs similar data-saving functions to those

D; performs, the only differences being that the spectra are saved to a different save areas (BK\$SAVE, specifically) and that the message displayed makes special note that background spectra are being saved. No analysis is performed on these spectra; if the user wishes to analyze these spectra using GIDXC either the DA; command should be used (this will save the spectra again, under a different name and to the save area specified in the spectral analysis parameters; see Section 3.5.3.5) or the DCL version of the GIDXC command should be used to analyze the spectra (see Section 4) after having executed D; to save them.

3.5.4.6 A;<spectrum id> This command allows the user to submit a single spectrum for a GIDXC analysis, with full single-spectrum output being generated. The spectrum id (or name) should be entered just as it appears in the status sub-screen. All spectrum ids are eleven characters long and begin with a letter-number detector identifier. For example, to submit for GIDXC analysis for the spectrum saved for detector A1 in Figure 16, enter

A;A1480213480

at the "CMD>" prompt. If the user were to mistakenly leave off the trailing zero from the above spectrum id and enter

A;A148021348

at the "CMD>" prompt, GC would respond by displaying "THE SPECIFIED SPECTRUM NAME 'A148021348' IS NOT 11 CHARACTERS LONG" as an error message.

Upon the user successfully entering an A; command, GC will display analysis-related messages akin to those presented in Figure 16, this time specifying the name of the spectrum being analyzed.

3.5.4.7 BA;<spectrum id(s)> This command allows the user to submit a single spectrum or a series of spectra for a full GIDXC analysis, with only an XTP plot being generated for each of the specified spectra, along with a barrel summary report and a PAN\$RATIOS file for the set of spectra (see Section 4). A series of spectrum ids can be specified in one of two ways. In the first method, all of the spectrum ids are explicitly entered. For example, for the first three spectra saved in Figure 16, the user could enter

BA;A1480213480,A2480213480,A3480213480

at the "CMD>" prompt. This method is typically used when the nine-digit portion of the spectrum ids following the letter-number detector identifier varies among the spectra to be analyzed as a set.

When this nine-digit portion is the same for all of the spectra, as it is in the above example, the user can use a second method to specify a series of spectra. This second method involves entering detector-identifier-only abbreviations for all but the first spectrum id listed; for the above set of spectra, for instance, the user would enter

BA;A1480213480,A2,A3

at the "CMD>" prompt.

Upon the user successfully entering a BA; command, GC will display analysis-related messages identical to those presented in Figure 16.

3.5.4.8 FBA;<spectrum Id(s)> This command is akin to BA;, and it differs from BA; only in that the full QIDXC analysis performed will also generate full single-spectrum output for each of the specified spectra.

3.5.5 Detector Calibration Commands

The following commands are used in detector calibration operations.

3.5.5.1 CBE;<detector> This command performs a calibration for a non-pulsed detector system (i.e., one not equipped with pulsers) based on the europium-152 spectrum currently stored in the AIM associated with the specified detector [1, 2]. For instance, after having acquired a spectrum from a europium-152 source on non-pulsed detector system A1, the user enters

CBE;A1

at the "CMD>" prompt to request a calibration. The GC main screen disappears and the message "PERFORMING NONPULSERED EUROPIUM CALIBRATION" appears at the top of the screen. During a successful CBE calibration, no other status messages appear; Reference 2 contains information on the error messages that can be generated in the case of an unsuccessful CBE session. (Note that, because the current detector systems are equipped with pulsers, this command and CBT will likely not be used.)

3.5.5.2 PEQE;<detector> This command is akin to CBE;, except that it assumes the detector system is equipped with pulsers [1, 2]. After having acquired a spectrum from a europium-152 source on pulsed detector system A1, the user enters

PEQE;A1

at the "CMD>" prompt. As with CBE;, the GC main screen disappears and the message "PERFORMING PULSERED EUROPIUM CALIBRATION" appears at the top of the screen. Also, during a successful PEQE calibration, no other status messages appear; Reference 2, again, contains information on the error messages that can be generated in the case of an unsuccessful PEQE session. A sample of the output generated by a successful PEQE calibration appears in Appendix B.1.

The generated output contains the results of the latest calibrations on the first page; this includes the new energy and width equations, how well the individual spectral energies agree with the values calculated using the new energy equation, and the fit flags and calculated activities for the individual spectrum peaks. The detector system for which the calibration was performed and the spectrum id under which the calibration spectrum was saved are noted on this first page.

Subsequent sets of pages, entitled "CALIBRATION NUCLIDE DATA" and "SPECTROMETER CALIBRATION DATA" present a summary of recent calibration results for the detector system of interest. The former set includes a per-energy breakdown of the peak fit results, along with the individual peak activities and the average of the individual activities (the net activity). The latter set details the pulser-related information.

3.5.5.3 PEQEH;<detector> This command generates a listing of the calibration history for the specified detector system. To generate such a listing for detector system A1, for example, the user enters

PEQEH;A1

at the "CMD>" prompt. The GC main screen disappears and the message "GENERATING PULSERED EUROPIUM CALIBRATION HISTORY FOR A1" appears at the top of the screen. This message is followed by two questions, asking for the range of dates (the starting date and the ending date, inclusive) to be covered by the history listing. The dates should be entered in the form MMDDYY.^j For the history listing that appears in Appendix B.2, the starting date entered was 010194 (for January 1, 1994) and the ending date entered was 061594 (for June 15, 1994). Once acceptable values are entered for both dates (and GC will tell you if an invalid date has been entered by displaying "BAD INPUT--PLEASE REENTER"), the GC main screen returns and the listing is printed.

The output generated specifies the detector system of interest, as well as the user-specified range of dates the history is to cover. The calibrations displayed are those that fall within the user-specified range of dates. On the first pages, for each energy, the calculated activity for each calibration and the average value for all calibrations displayed is presented, along with a flag when necessary to indicate a value that is approaching or outside the control limits. The following page lists the net activities (i.e., averaged over all of the individual activities) for all calibrations displayed. Finally there is a summary of energy- and width-equation-related and pulser-related information for all calibrations displayed, and some notes, some of which explain the flags that may have appeared.

3.5.5.4 CBT;<detector> This command performs the same functions as CBE, except for a spectrum acquired from a thorium-228 source; the messages displayed will reflect this difference.

3.5.5.5 PEQT;<detector> This command performs the same functions as PEQE, except for a spectrum acquired from a thorium-228 source; the messages displayed and output generated will reflect this difference.

3.5.5.6 PEQTH;<detector> This command performs the same functions as PEQEH, except for a spectrum acquired from a thorium-228 source; the messages displayed and output generated will reflect this difference.

3.5.6 Spectrum Display Commands

The following command is used in spectrum display operations.

3.5.6.1 DAS;<detector>(<optional isotope library>) DAS within GC is a subroutine version of the DAS program described in Reference 2. To generate a DAS display for detector A1, for example, the user can enter

DAS;A1

at the "CMD>" prompt. By default, the SWEPP isotope library (see Appendixes A.1 and A.2) is used for identifying peaks in the displayed spectrum. The user can specify that another isotope library be used; to generate a DAS display for detector A1, using the MASTER isotope library (see Appendixes A.6 and

j. This is the standard date format used throughout VAXGAP for user input. Six digits are expected: MM is the ordinal number of the month (01 for January, 02 for February, . . .), DD is the date (01 for the 1st, 02 for the 2nd, 10 for the 10th, . . .) and YY is the last two digits of the year. Any leading or trailing zeros must be included (e.g., 1 is not acceptable for MM for January).

A.7) for peak identification, for example, the user enters,

DAS;A1,MASTER

at the "CMD>" prompt.

As noted above, DAS within GC is a subroutine version of the DAS program described in Reference 2. The user cannot view another detector system's acquisition without exiting from this version of DAS and reentering the DAS; command. The subroutine version has only three buttons: "QUIT" returns the user to GC's main screen, "ID" labels the peaks found in the spectrum as per the chosen isotope library, and "SIZE" allows the user to set the number of channels to be viewed.

3.5.7 Batch Job- and Queue-Related Commands

The following commands are used in checking on the status of batch and print queue jobs.^k

3.5.7.1 TYPELOG; Suppose the user has waited a few minutes and no output has appeared from a requested GIDXC analysis. As instructed to do so in such cases (see Figure 16), the user should check the log file [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG for errors. TYPELOG; and PRINTLOG; provide the means whereby the user can view the most-recent analysis log file without exiting from GC. TYPELOG; displays the contents of the log file through a series of screens. To view an analysis log file, then, the user enters

TYPELOG;

at the "CMD>" prompt. The GC main screen disappears and the entirety of the analysis log file are typed out onto the monitor. Once the entire file is typed out, the message "Press the 'Return' key to continue." appears at the bottom of the screen. The user may wish to use the "Hold" (or F1) key to pause the typing to view some portion of the file.^l If GC is running in a DECterm window, the user can also wait until all of the file is typed out and then, before striking the return key to return to the GC main screen, scroll the window's contents to view the desired portions of the file. Portions of a typical log file are presented in Figure 17; ellipses mark areas where some of the file has been omitted.

3.5.7.2 PRINTLOG; To have the contents of the most-recent analysis log file printed at the system printer, the user enters

PRINTLOG;

at the "CMD>" prompt. The GC main screen will blink once when the print job is submitted to the system printer.

3.5.7.3 SHOWQUE; To display the contents of the batch and print queues, the user enters

k. Batch queues, such as SYSS\$BATCH, are where the GIDXC analyses are performed; this allows GC to continue running without having to wait for a GIDXC analysis to complete. Files to be printed on the system printer are sent to a print queue called SYSS\$PRINT; print queues allow the user to send multiple files to the printer for printing, even before any of the files have completed printing.

l. This is a feature of DEC keyboards and the VMS operating system; it applies at any time while the user is logged in and not just when GC is running.


```

$! BATCH ANALYSIS COMMAND FILE ISSUED FROM GC PROGRAM
$!      EWK 3/4/92

```

```

$ next:
$   if p9 .eqs. "" then goto summary
$   if f$search("ge$save:A13B2313092.dge",1) .eqs. ""
$   endif
$   DEFINE/USER_MODE A1$$SPECTRUM$ID A13B2313092
$   DEFINE/USER_MODE IF$PRINT N
$   RUN INEL$EXE: BATCH_GIDXC_ANALYSIS
$   index = index + 1
$   if index .eq. 2 then p9 = p4
$   if index .eq. 3 then p9 = p5
$   if index .eq. 4 then p9 = p6
$   if index .eq. 5 then p9 = p7
$   if index .eq. 6 then p9 = p8
$   if index .eq. 7 then goto summary
$   goto next
$
$
$ summary:
$   if p2 .nes. "Y" then exit
$   @inel$exe:batch_gidxc_summary A13B2313092 A23B2313092 A33B2313092 A43B2313092
$
$
$
$ if p1 .nes. "" then define/user_mode A1$$SPECTRUM$ID A13B2313092
$ if p2 .nes. "" then define/user_mode A2$$SPECTRUM$ID A23B2313092
$ if p3 .nes. "" then define/user_mode A3$$SPECTRUM$ID A33B2313092
$ if p4 .nes. "" then define/user_mode A4$$SPECTRUM$ID A43B2313092
$ if p5 .nes. "" then define/user_mode A5$$SPECTRUM$ID
$ if p6 .nes. "" then define/user_mode A6$$SPECTRUM$ID
$ !
$ ! Compile a summary report.
$ !
$ summary:
$   run inel$exe:batch_gidxc_summary
Job S0000009E (queue SY$SPRINT, entry 607) holding
$ !
$ ! Exit
$ !
$EXIT

```

Figure 17. Portions of a Typical BATCH_GIDXC_ANALYSIS.LOG File.

SHOWQUE;

at the "CMD>" prompt. As with the log file in TYPELOG;, status information on all of the queues is displayed before the "Press the 'Return' key to continue." message appears. Again, the "Hold" (or F1) key can be used to pause the display of information; also, if GC is running in a DECterm window, the user can, before striking the return key to return to GC's main screen, scroll the window's contents to view desired portions of the status information. A typical display, generated by SHOWQUE; shortly after an FBA; command was entered, is presented in Figure 18.

Batch queue SYS\$BATCH, busy, on SWP::

Entry	Jobname	Username	Status
----	-----	-----	-----
302	BATCH_GIDXC_ANALYSIS	OPERATOR	Executing

Terminal queue SYS\$PRINT, idle, on SWP::LTA0:, mounted form LASER80
(stock=DEFAULT)

Entry	Jobname	Username	Blocks	Status
----	-----	-----	-----	-----
303	SPECTRA	OPERATOR	30	Printing
304	S00000169	OPERATOR	147	Pending

Figure 18. SHOWQUEUE;-Generated Display.

The first queue listed in Figure 18 is the SYS\$BATCH batch queue. A GIDXC analysis job, BATCH_GIDXC_ANALYSIS, submitted by user OPERATOR, is executing; this is the analysis job started by the FBA; command. The second queue is the SYS\$PRINT print queue. The first job in this print queue, SPECTRA, is the XTP plot GIDXC has generated for the first spectrum it analyzed, and it is being printed. The second job, S00000169, is the full spectrum analysis output for this same spectrum, and it is pending (i.e., it is waiting for SPECTRA to finish printing before it starts printing).

4. GIDXC

4.1 Overview

GIDXC performs the isotopic ratio calculations on a single gamma-ray spectrum or on a set of spectra from a single container measurement. In the latter case, a summary report is generated, along with a file called the PAN\$RATIOS file that contains certain isotopic ratios for use by the SWEPP Assay System (SAS) [9]. GIDXC is implemented here as a batch routine. GIDXC is part of a number of GC commands (see Section 3.3, and parts of Sections 3.5.3 and 3.5.4), and it can be used as a command at the DCL prompt. It is composed of two main routines: BATCH_GIDXC_ANALYSIS, which performs the spectrum analysis, and BATCH_GIDXC_SUMMARY, which generates a summary report if requested.

4.2 GIDXC as a Command at the DCL Prompt

As a command at the DCL prompt, GIDXC allows the user to analyze a single spectrum or a set of spectra, generating full single-spectrum output for each spectrum specified; it does not generate a summary report or a PAN\$RATIOS file if multiple spectra are specified. To analyze a single spectrum, for instance, the user enters

GIDXC <spectrum id>

at the DCL prompt, where <spectrum id> is eleven-characters long, beginning with the letter-number detector identifier and ending with nine digits. (Remember that, used as a command at the DCL prompt, there is no delimiter between the command and the parameter(s).) As an example, then, the user could enter

GIDXC A1490043931

at the DCL prompt. (Note that there is a space between the command and the spectrum identifier; this command is being entered at the DCL prompt, not at the GC prompt.)

GIDXC assumes that the spectrum to be analyzed is stored in either the GE\$SAVE (also known as GN\$SAVE) save area or the OLDSWEPP\$SAVE^m (also known as OS\$SAVE) save area; if it does not find the specified spectrum in one of these two save areas, it will print a message such as "SPECTRUM A1490043931 NOT FOUND" and return the user to the DCL prompt. Spectra stored in other save areas cannot be analyzed using the GIDXC command; the user can copy spectra to be analyzed from other save areas to GE\$SAVE or OS\$SAVE and then use the GIDXC command.

To analyze multiple spectra (up to six), the user lists all of the spectrum ids after the GIDXC. For instance, to analyze two spectra, generating full single-spectrum output for each, the user enters

GIDXC <spectrum id #1> <spectrum id #2>

at the DCL prompt. As an example, the user could enter

m. OLDSWEPP\$SAVE is the save area where gamma-ray spectra acquired on the one-detector prototype to SGS are stored.

at the DCL prompt to request GIDXC analyses of both of these spectra.

4.3 Output Generated by GIDXC

Depending on how GIDXC is executed, up to four different kinds of output could be generated:

- full single-spectrum output, providing detailed spectrum analysis information and a radionuclide activity summary [1, 2], along with the values of various isotopic mass ratios [4] of both regulatory and diagnostic interest
- an XTP [2] plot of the plutonium isotope region of the gamma-ray spectrum between 120 and 200 keV (automatically included as part of the full single-spectrum output)
- a summary of the isotopic mass ratios and true-positive radionuclide activities for a set of spectra (all associated with a single barrel) and
- a PAN\$RATIOS file containing the average isotopic mass ratios for a set of spectra, readable by the SAS [9].

If GIDXC is executed as a command at the DCL prompt, the first two items listed above are generated for every existing spectrum that is specified. Within GC, an automatic GIDXC analysis of a set of spectra generates the last two items (an automatic GIDXC analysis results from an acquisition started using the GC command BS; completing or being manually stopped). The last two items are also generated using the GC command BA; where as the GC command A; generates the first two kinds of

Table 1. Expected Output from various GIDXC Analysis Execution Modes.

execution mode	Full single-spectrum output?	XTP plot?	Summary Report?	PAN\$RATIOS file?
Automatic analysis from GC	NO	YES	YES	YES
Analysis via GC command A;	YES	YES	NO	NO
Analysis via GC command BA;	NO	YES	YES	YES
Analysis via GC command FBA;	YES	YES	YES	YES
Analysis via GIDXC as a DCL command	YES	YES	NO	NO

output for the spectrum specified. Finally, the GC command FBA; generates all four of these kinds of output. Table 1 presents this expected-output breakdown in tabular form. The following sections describe these items in more detail.

4.3.1 Summary Report for a Set of Spectra

This piece of output, a sample of which is presented in Appendix B.3, is probably the one of greatest general interest to the user. The summary starts off by identifying the barrel of interest and its content code [5], and the individual spectra, along with their respective acquisition parameters, used in generating the summary.

The isotopic mass ratios [4] are presented next. The grand weighted averages are taken over all the valid values for all detectors and no outlier testing [3] is performed on the set of values. What follows does take into account outlier testing: for each detector and each valid ratio for that detector, the average isotopic mass ratio presented includes the value for the detector system itself and all other detector's values that are not outliers relative to it; which detectors are included are listed along with the specific ratio.

The last part of the listing details the radionuclide-specific activities for all tagged transuranic (TRU) radionuclides and for all other radionuclides with true-positive activities greater than five percent of that found for plutonium-239.

4.3.2 PAN\$RATIOS File

The PAN\$RATIOS file contains the isotopic mass fractions for various plutonium isotopes calculated on the basis of the summary report's isotopic mass ratios, as well as isotopic mass ratios between various plutonium isotopes and plutonium-239, americium-241 and plutonium-239, uranium-235 and plutonium-239, and americium-241 and uranium-235. There is one file for each barrel, located in the directory pointed to by the logical PAN\$RATIOS, and the file name is of the form <bar code label identification code>.GAM. The file is to be used by the SAS [9] and is accessible by SAS via an Ethernet connection between the VAX workstation and the personal computer on which SAS is running. The file that would correspond to the summary report found in Appendix B.3 is found in Appendix B.4.

4.3.3 Full Single-Spectrum Output

A full single-spectrum output, such as the sample in Appendix B.5, is an elaboration of the normal output generated by VAXGAP [1, 2]. In addition to detailed information on peak fitting and radionuclide tag assignments, and a summary of the calculated activities, the full single-spectrum output includes the attenuation factors (the so-called x- and t-effective) calculated from the spectrum [4, 5] and various isotopic mass ratios. For diagnostic purposes, there is also a large amount of information related to calculating the mass ratios using different combinations of lines; the former set of mass ratios are those that appear in the summary report.

4.3.4 XTP Plot

An XTP plot, such as the one presented in Appendix B.6 (and corresponding to the full single-spectrum output found in Appendix B.5), displays the peak fits performed in the spectral region from 120-200 keV [2].

5. REFERENCES

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8. "Installation Instructions for Slo-Syn SS20001 Programmable Motion Control," The Superior Electric Company, Revision B.
9. S. D. Matthews and E. S. Marwil, *SWEPP Assay System Software Design Description*, EGG-RAAM-10424, September 1993 (and documents referenced therein).

APPENDIXES

Appendix A. User-Readable Isotope, Insert, Limit, and Interference Library Listings

The following are user-readable listings of the SWEPP isotope, insert, limit (or required), and interference libraries used by GIDXC, along with additional isotope (MASTER and ENVLIB), limit (ENVLIM), and interference libraries (ENVINTLIB) available through both the DAS option within GC and other core VAXGAP analysis routines and those isotope libraries (EU_- and TH_CALIBRATION) used in detector calibration.

A.1 Isotope Library GE\$ISOTOPE\$LIB:SWEPP.LIB, Sorted by Energy

This listing was generated using the VAXGAP PRLIB command [2].

SWEPP

PAGE 1

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
42.8167	96	244	CM	18.1000 Y	0.25E-01	1
57.8137	92	232	U	69.8000 Y	0.20E+00	1
99.8530	94	238	PU	87.7000 Y	0.74E-02	2
100.1065	73	182	TA	115.0000 D	0.14E+02	2
102.9516	95	241	AM	432.7000 Y	0.20E-01	5
103.6529	94	241	PU	14.4000 Y	0.10E-03	2
104.2340	94	240	PU	6.56E+03 Y	0.71E-02	2
105.3129	63	155	EU	4.8500 Y	0.22E+02	1
109.1784	92	235	U	7.04E+08 Y	0.15E+01	3
113.6723	73	182	TA	115.0000 D	0.19E+01	3
118.9680	92	233	U	1.59E+05 Y	0.41E-02	3
120.8160	92	233	U	1.59E+05 Y	0.33E-02	3
121.7824	63	152	EU	13.5100 Y	0.28E+02	2
122.3106	91	231	PADA	3.28E+04 Y	0.12E+01	3
122.3107	89	227	ACDA	21.7700 Y	0.12E+01	3
123.1001	63	154	EU	8.5880 Y	0.40E+02	2
125.2100	94	239	PU	2.41E+04 Y	0.71E-04	4
125.2880	95	241	AM	432.7000 Y	0.41E-02	5
129.0348	92	232	U	69.8000 Y	0.68E-01	2
129.2960	94	239	PU	2.41E+04 Y	0.63E-02	2
133.5386	58	144	CE	285.0000 D	0.11E+02	1
133.5387	58	144	CEPR	285.0000 D	0.11E+02	2
135.3284	92	233	U	1.59E+05 Y	0.23E-02	3
143.7680	92	235	U	7.04E+08 Y	0.11E+02	2
144.1835	91	231	PADA	3.28E+04 Y	0.32E+01	2
144.2010	94	239	PU	2.41E+04 Y	0.30E-03	3
146.0940	94	239	PU	2.41E+04 Y	0.12E-03	4
146.3450	92	233	U	1.59E+05 Y	0.66E-02	2
146.5495	95	241	AM	432.7000 Y	0.46E-03	1
148.5396	94	241	PU	14.4000 Y	0.19E-03	1
152.4308	73	182	TA	115.0000 D	0.72E+01	2
152.7200	94	238	PU	87.7000 Y	0.94E-03	1
154.1766	91	231	PADA	3.28E+04 Y	0.55E+01	2
154.1767	89	227	ACDA	21.7700 Y	0.55E+01	2

156.3874	73 182 TA	115.0000 D	0.27E+01	3
159.9276	94 241 PU	14.4000 Y	0.66E-05	3
160.0674	94 239 PU	2.41E+04 Y	0.50E-05	5
160.3080	94 240 PU	6.56E+03 Y	0.40E-03	1
161.4820	94 239 PU	2.41E+04 Y	0.12E-03	4
161.6994	95 241 AM	432.7000 Y	0.90E-05	6
163.3570	92 235 U	7.04E+08 Y	0.51E+01	3
164.5220	92 233 U	1.59E+05 Y	0.62E-02	2
164.5925	94 241 PUDA	14.4000 Y	0.19E+01	3
165.9215	95 241 AM	432.7000 Y	0.24E-04	6
169.5593	95 241 AM	432.7000 Y	0.17E-03	6
176.3161	51 125 SB	2.7590 Y	0.69E+01	2
179.3948	73 182 TA	115.0000 D	0.31E+01	3
185.7220	92 235 U	7.04E+08 Y	0.57E+02	1
186.1109	90 230 THDA	7.54E+04 Y	0.34E+01	3
198.3530	73 182 TA	115.0000 D	0.15E+01	3
200.9572	94 238 PU	87.7000 Y	0.41E-05	5
202.1060	92 235 U	7.04E+08 Y	0.11E+01	3

ENERGY	Z A NUCLIDE	HALF LIFE	BR	I-CODE
203.5500	94 239 PU	2.41E+04 Y	0.57E-03	3
203.8694	95 241 AM	432.7000 Y	0.29E-05	6
205.3180	92 235 U	7.04E+08 Y	0.50E+01	3
208.0077	95 241 AM	432.7000 Y	0.79E-03	6
208.0078	94 241 PUDA	14.4000 Y	0.22E+02	2
208.1710	92 233 U	1.59E+05 Y	0.23E-02	3
209.3852	90 232 THDA	1.40E+10 Y	0.41E+01	2
209.3853	88 228 RAAC	5.7500 Y	0.41E+01	3
210.5809	91 231 PADA	3.28E+04 Y	0.11E+01	3
210.5810	89 227 ACDA	21.7700 Y	0.11E+01	3
222.1099	73 182 TA	115.0000 D	0.76E+01	2
229.3220	73 182 TA	115.0000 D	0.36E+01	3
235.9695	91 231 PADA	3.28E+04 Y	0.11E+02	2
235.9696	89 227 ACDA	21.7700 Y	0.11E+02	2
238.6320	90 228 THDA	1.9130 Y	0.44E+02	2
240.9870	90 228 THDA	1.9130 Y	0.41E+01	3
241.9192	88 226 RADA	1.60E+03 Y	0.74E+01	2
241.9193	92 234 UDA	2.46E+05 Y	0.74E+01	2
241.9194	90 230 THDA	7.54E+04 Y	0.74E+01	2
244.6989	63 152 EU	13.5100 Y	0.75E+01	2
245.3450	92 233 U	1.59E+05 Y	0.36E-02	3
247.9678	63 154 EU	8.5880 Y	0.66E+01	2
256.2410	91 231 PADA	3.28E+04 Y	0.67E+01	2
256.2411	89 227 ACDA	21.7700 Y	0.67E+01	2
258.1807	92 238 UPA	4.47E+09 Y	0.81E-01	2
264.0755	73 182 TA	115.0000 D	0.36E+01	3
267.5441	94 241 PUDA	14.4000 Y	0.73E+00	1
269.3929	91 231 PADA	3.28E+04 Y	0.13E+02	1
269.3930	89 227 ACDA	21.7700 Y	0.13E+02	1
270.2561	90 232 THDA	1.40E+10 Y	0.38E+01	2
270.2562	88 228 RAAC	5.7500 Y	0.38E+01	3
277.2830	90 228 THDA	1.9130 Y	0.23E+01	3
283.6729	91 231 PADA	3.28E+04 Y	0.16E+01	2
286.1099	91 231 PADA	3.28E+04 Y	0.16E+01	2
286.1100	89 227 ACDA	21.7700 Y	0.16E+01	2
291.3540	92 233 U	1.59E+05 Y	0.54E-02	3
295.0908	88 226 RADA	1.60E+03 Y	0.19E+02	2
295.0909	92 234 UDA	2.46E+05 Y	0.19E+02	2
295.0910	90 230 THDA	7.54E+04 Y	0.19E+02	2
299.9681	89 227 ACDA	21.7700 Y	0.21E+01	2

PAGE 2

300.0229	91	231	PADA	3.28E+04	Y	0.45E+01	2
300.0336	90	228	THDA	1.9130	Y	0.33E+01	3
300.1750	93	237	NPPA	2.14E+06	Y	0.66E+01	2
302.6690	91	231	PADA	3.28E+04	Y	0.25E+01	2
304.5108	91	231	PADA	3.28E+04	Y	0.11E+01	3
304.5109	89	227	ACDA	21.7700	Y	0.11E+01	3
312.0117	93	237	NPPA	2.14E+06	Y	0.39E+02	1
317.1327	92	233	U	1.59E+05	Y	0.78E-02	1
320.5410	92	233	U	1.59E+05	Y	0.29E-02	3
322.5410	95	241	AM	432.7000	Y	0.15E-03	6
323.8752	91	231	PADA	3.28E+04	Y	0.39E+01	2
323.8753	89	227	ACDA	21.7700	Y	0.39E+01	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
328.0698	90	232	THDA	1.40E+10	Y	0.35E+01	2
328.0699	88	228	RAAC	5.7500	Y	0.35E+01	3
329.8370	89	227	ACDA	21.7700	Y	0.27E+01	2
329.9137	91	231	PADA	3.28E+04	Y	0.41E+01	2
332.3608	95	241	AM	432.7000	Y	0.15E-03	6
332.3609	94	241	PUDA	14.4000	Y	0.12E+01	3
332.8450	94	239	PU	2.41E+04	Y	0.49E-03	3
335.4005	95	241	AM	432.7000	Y	0.49E-03	6
338.2850	91	231	PADA	3.28E+04	Y	0.27E+01	2
338.2851	89	227	ACDA	21.7700	Y	0.28E+01	2
338.4199	90	232	THDA	1.40E+10	Y	0.12E+02	2
338.4200	88	228	RAAC	5.7500	Y	0.12E+02	2
340.5896	93	237	NPPA	2.14E+06	Y	0.45E+01	2
344.2811	63	152	EU	13.5100	Y	0.27E+02	2
345.0130	94	239	PU	2.41E+04	Y	0.56E-03	3
350.0907	91	231	PADA	3.28E+04	Y	0.13E+02	2
350.0908	89	227	ACDA	21.7700	Y	0.13E+02	2
351.8664	88	226	RADA	1.60E+03	Y	0.36E+02	2
351.8665	92	234	UDA	2.46E+05	Y	0.36E+02	2
351.8666	90	230	THDA	7.54E+04	Y	0.36E+02	2
368.5083	94	239	PU	2.41E+04	Y	0.90E-04	4
368.5925	95	241	AM	432.7000	Y	0.22E-03	6
375.0540	94	239	PU	2.41E+04	Y	0.16E-02	3
376.5762	95	241	AM	432.7000	Y	0.14E-03	6
380.1910	94	239	PU	2.41E+04	Y	0.30E-03	3
380.4155	51	125	SB	2.7590	Y	0.15E+01	3
382.6980	94	239	PU	2.41E+04	Y	0.26E-03	3
392.9140	94	239	PU	2.41E+04	Y	0.55E-03	4
398.6635	93	237	NPPA	2.14E+06	Y	0.14E+01	3
409.6246	90	232	THDA	1.40E+10	Y	0.22E+01	2
409.6247	88	228	RAAC	5.7500	Y	0.22E+01	3
411.1260	63	152	EU	13.5100	Y	0.22E+01	3
413.7130	94	239	PU	2.41E+04	Y	0.15E-02	1
415.9324	93	237	NPPA	2.14E+06	Y	0.17E+01	3
422.5980	94	239	PU	2.41E+04	Y	0.12E-03	4
427.8752	51	125	SB	2.7590	Y	0.29E+02	1
433.9360	47	108	AGM	127.0000	Y	0.90E+02	2
443.9034	63	152	EU	13.5100	Y	0.31E+01	3
444.9428	91	231	PADA	3.28E+04	Y	0.13E+01	3
444.9429	89	227	ACDA	21.7700	Y	0.13E+01	3
446.8110	47	110	AGM	249.7600	D	0.37E+01	3
451.4810	94	239	PU	2.41E+04	Y	0.19E-03	4
463.1049	90	232	THDA	1.40E+10	Y	0.46E+01	2
463.1050	88	228	RAAC	5.7500	Y	0.46E+01	3
463.3670	51	125	SB	2.7590	Y	0.10E+02	2
475.3573	55	134	CS	2.0652	Y	0.15E+01	3

511.8647	45	106	RH	29.80000	S	0.21E+02	2
562.6522	90	232	THDA	1.40E+10	Y	0.10E+01	3
562.6523	88	228	RAAC	5.7500	Y	0.10E+01	3
563.2370	55	134	CS	2.0652	Y	0.84E+01	3
569.3207	55	134	CS	2.0652	Y	0.15E+02	2
581.5247	90	232	THDA	1.40E+10	Y	0.15E+01	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
581.5248	88	228	RAAC	5.7500	Y	0.15E+01 3
583.1910	90	228	THDA	1.9130	Y	0.31E+02 2
591.8112	63	154	EU	8.5880	Y	0.48E+01 2
600.5002	51	125	SB	2.7590	Y	0.18E+02 2
604.7101	55	134	CS	2.0652	Y	0.98E+02 2
606.6332	51	125	SB	2.7590	Y	0.50E+01 2
609.3111	88	226	RADA	1.60E+03	Y	0.46E+02 1
609.3112	92	234	UDA	2.46E+05	Y	0.46E+02 1
609.3113	90	230	THDA	7.54E+04	Y	0.46E+02 1
614.2810	47	108	AGM	127.0000	Y	0.90E+02 1
616.1807	45	106	RH	29.80000	S	0.74E+00 2
620.3600	47	110	AGM	249.7600	D	0.28E+01 3
621.9170	45	106	RH	29.80000	S	0.98E+01 1
635.8897	51	125	SB	2.7590	Y	0.11E+02 2
657.7620	47	110	AGM	249.7600	D	0.95E+02 2
661.6600	55	137	CS	30.2500	Y	0.85E+02 1
662.4258	95	241	AM	432.7000	Y	0.36E-03 6
665.4420	88	226	RADA	1.60E+03	Y	0.16E+01 3
665.4421	92	234	UDA	2.46E+05	Y	0.16E+01 3
665.4422	90	230	THDA	7.54E+04	Y	0.16E+01 3
671.3815	51	125	SB	2.7590	Y	0.18E+01 3
677.6230	47	110	AGM	249.7600	D	0.10E+02 2
687.0150	47	110	AGM	249.7600	D	0.64E+01 3
692.4855	63	154	EU	8.5880	Y	0.17E+01 3
696.5100	58	144	CEPR	285.0000	D	0.13E+01 2
702.6450	41	94	NB	2.00E+04	Y	0.10E+03 2
706.6820	47	110	AGM	249.7600	D	0.16E+02 2
722.6994	95	241	AM	432.7000	Y	0.13E-03 6
722.9290	47	108	AGM	127.0000	Y	0.91E+02 2
723.3563	63	154	EU	8.5880	Y	0.20E+02 2
724.1990	40	95	ZR	63.9800	D	0.44E+02 2
724.1991	40	95	ZRNB	63.9800	D	0.44E+02 2
727.2466	90	228	THDA	1.9130	Y	0.67E+01 2
742.8172	94	238	PU	87.7000	Y	0.78E-05 5
744.2770	47	110	AGM	249.7600	D	0.47E+01 3
755.2773	90	232	THDA	1.40E+10	Y	0.13E+01 3
755.2774	88	228	RAAC	5.7500	Y	0.13E+01 3
756.7290	40	95	ZR	63.9800	D	0.55E+02 1
756.7291	40	95	ZRNB	63.9800	D	0.55E+02 2
756.8083	63	154	EU	8.5880	Y	0.43E+01 2
763.9440	47	110	AGM	249.7600	D	0.22E+02 2
765.8070	40	95	ZRNB	63.9800	D	0.22E+03 1
766.4124	94	238	PU	87.7000	Y	0.33E-04 5
766.4125	92	238	UPA	4.47E+09	Y	0.30E+00 2
768.3499	88	226	RADA	1.60E+03	Y	0.49E+01 2
768.3500	92	234	UDA	2.46E+05	Y	0.49E+01 2
768.3500	90	230	THDA	7.54E+04	Y	0.49E+01 2
772.2775	90	232	THDA	1.40E+10	Y	0.11E+01 3
772.2776	88	228	RAAC	5.7500	Y	0.11E+01 3
778.9030	63	152	EU	13.5100	Y	0.13E+02 1
785.5095	90	228	THDA	1.9130	Y	0.11E+01 3
785.8274	88	226	RADA	1.60E+03	Y	0.10E+01 3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
785.8275	92	234	UDA	2.46E+05 Y	0.10E+01	3
785.8276	90	230	THDA	7.54E+04 Y	0.10E+01	3
786.2867	94	238	PU	87.7000 Y	0.47E-05	5
794.7914	90	232	THDA	1.40E+10 Y	0.46E+01	2
794.7916	88	228	RAAC	5.7500 Y	0.46E+01	3
795.8674	55	134	CS	2.0652 Y	0.86E+02	1
801.9511	55	134	CS	2.0652 Y	0.87E+01	3
806.1550	88	226	RADA	1.60E+03 Y	0.12E+01	3
806.1552	92	234	UDA	2.46E+05 Y	0.12E+01	3
806.1552	90	230	THDA	7.54E+04 Y	0.12E+01	3
810.7915	27	58	CO	70.8600 D	0.99E+02	1
818.0310	47	110	AGM	249.7600 D	0.73E+01	3
834.8430	25	54	MN	312.3000 D	0.10E+03	1
835.6032	90	232	THDA	1.40E+10 Y	0.17E+01	3
835.6033	88	228	RAAC	5.7500 Y	0.17E+01	3
860.5640	90	228	THDA	1.9130 Y	0.45E+01	2
863.9741	27	58	CO	70.8600 D	0.69E+00	3
867.3900	63	152	EU	13.5100 Y	0.42E+01	2
871.1190	41	94	NB	2.00E+04 Y	0.10E+03	1
873.2299	63	154	EU	8.5880 Y	0.11E+02	2
873.4679	45	106	RH	29.80000 S	0.43E+00	3
884.6850	47	110	AGM	249.7600 D	0.73E+02	1
911.1572	90	232	THDA	1.40E+10 Y	0.29E+02	1
911.1573	88	228	RAAC	5.7500 Y	0.29E+02	1
934.0389	88	226	RADA	1.60E+03 Y	0.32E+01	3
934.0390	92	234	UDA	2.46E+05 Y	0.32E+01	3
934.0391	90	230	THDA	7.54E+04 Y	0.32E+01	3
937.4930	47	110	AGM	249.7600 D	0.34E+02	2
964.1102	63	152	EU	13.5100 Y	0.14E+02	2
964.6375	90	232	THDA	1.40E+10 Y	0.58E+01	2
964.6376	88	228	RAAC	5.7500 Y	0.58E+01	3
968.9707	90	232	THDA	1.40E+10 Y	0.17E+02	2
968.9708	88	228	RAAC	5.7500 Y	0.17E+02	2
996.3293	63	154	EU	8.5880 Y	0.10E+02	2
1000.9970	92	238	UPA	4.47E+09 Y	0.84E+00	1
1001.7018	73	182	TA	115.0000 D	0.20E+01	3
1004.7747	63	154	EU	8.5880 Y	0.18E+02	2
1038.5920	55	134	CS	2.0652 Y	0.99E+00	3
1050.3599	45	106	RH	29.80000 S	0.15E+01	2
1085.8420	63	152	EU	13.5100 Y	0.10E+02	2
1089.7670	63	152	EU	13.5100 Y	0.17E+01	3
1112.0870	63	152	EU	13.5100 Y	0.14E+02	2
1115.5460	30	65	ZN	244.2600 D	0.51E+02	1
1120.2727	88	226	RADA	1.60E+03 Y	0.15E+02	2
1120.2737	92	234	UDA	2.46E+05 Y	0.15E+02	2
1120.2738	90	230	THDA	7.54E+04 Y	0.15E+02	2
1121.3010	73	182	TA	115.0000 D	0.35E+02	2
1128.0422	45	106	RH	29.80000 S	0.40E+00	3
1129.6609	13	26	AL	7.20E+05 Y	0.25E+01	3
1155.1825	88	226	RADA	1.60E+03 Y	0.17E+01	3
1155.1835	92	234	UDA	2.46E+05 Y	0.17E+01	3
1155.1836	90	230	THDA	7.54E+04 Y	0.17E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1167.9443	55	134	CS	2.0652 Y	0.18E+01	3
1173.2380	27	60	CO	5.2719 Y	0.10E+03	2
1189.0500	73	182	TA	115.0000 D	0.17E+02	2
1212.9700	63	152	EU	13.5100 Y	0.14E+01	3

1221.4080	73	182	TA	115.0000	D	0.27E+02	1
1231.0160	73	182	TA	115.0000	D	0.12E+02	2
1238.1073	88	226	RADA	1.60E+03	Y	0.59E+01	2
1238.1083	92	234	UDA	2.46E+05	Y	0.59E+01	2
1238.1084	90	230	THDA	7.54E+04	Y	0.59E+01	2
1257.4180	73	182	TA	115.0000	D	0.15E+01	3
1274.5420	11	22	NA	2.6032	Y	0.10E+03	1
1274.5435	63	154	EU	8.5880	Y	0.35E+02	1
1280.9519	88	226	RADA	1.60E+03	Y	0.15E+01	3
1280.9529	92	234	UDA	2.46E+05	Y	0.15E+01	3
1280.9530	90	230	THDA	7.54E+04	Y	0.15E+01	3
1289.1560	73	182	TA	115.0000	D	0.14E+01	3
1299.1520	63	152	EU	13.5100	Y	0.16E+01	3
1332.5020	27	60	CO	5.2719	Y	0.10E+03	1
1365.1844	55	134	CS	2.0652	Y	0.30E+01	3
1377.6586	88	226	RADA	1.60E+03	Y	0.40E+01	3
1377.6595	92	234	UDA	2.46E+05	Y	0.40E+01	3
1377.6597	90	230	THDA	7.54E+04	Y	0.40E+01	3
1384.3000	47	110	AGM	249.7600	D	0.24E+02	2
1401.4832	88	226	RADA	1.60E+03	Y	0.14E+01	3
1401.4841	92	234	UDA	2.46E+05	Y	0.14E+01	3
1401.4843	90	230	THDA	7.54E+04	Y	0.14E+01	3
1407.9697	88	226	RADA	1.60E+03	Y	0.25E+01	3
1407.9707	92	234	UDA	2.46E+05	Y	0.25E+01	3
1407.9708	90	230	THDA	7.54E+04	Y	0.25E+01	3
1408.0220	63	152	EU	13.5100	Y	0.21E+02	2
1459.1932	90	232	THDA	1.40E+10	Y	0.11E+01	3
1459.1942	88	228	RAAC	5.7500	Y	0.11E+01	3
1460.8300	19	40	K	1.26E+09	Y	0.11E+02	1
1475.7880	47	110	AGM	249.7600	D	0.40E+01	3
1489.1600	58	144	CEPR	285.0000	D	0.28E+00	3
1496.0311	90	232	THDA	1.40E+10	Y	0.10E+01	3
1496.0321	88	228	RAAC	5.7500	Y	0.11E+01	3
1505.0400	47	110	AGM	249.7600	D	0.13E+02	2
1509.2189	88	226	RADA	1.60E+03	Y	0.22E+01	3
1509.2198	92	234	UDA	2.46E+05	Y	0.22E+01	3
1509.2200	90	230	THDA	7.54E+04	Y	0.22E+01	3
1562.2191	45	106	RH	29.80000	S	0.16E+00	3
1562.3030	47	110	AGM	249.7600	D	0.10E+01	3
1588.2271	90	232	THDA	1.40E+10	Y	0.36E+01	2
1588.2280	88	228	RAAC	5.7500	Y	0.36E+01	3
1593.0000	63	154	EU	8.5880	Y	0.10E+01	3
1596.5818	63	154	EU	8.5880	Y	0.18E+01	3
1620.7350	90	228	THDA	1.9130	Y	0.15E+01	3
1630.4746	90	232	THDA	1.40E+10	Y	0.19E+01	3
1630.4756	88	228	RAAC	5.7500	Y	0.19E+01	3
1661.2577	88	226	RADA	1.60E+03	Y	0.11E+01	3
1661.2587	92	234	UDA	2.46E+05	Y	0.11E+01	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1661.2588	90	230	THDA	7.54E+04	Y	0.11E+01
1674.7526	27	58	CO	70.8600	D	0.52E+00
1729.5803	88	226	RADA	1.60E+03	Y	0.30E+01
1729.5813	92	234	UDA	2.46E+05	Y	0.30E+01
1729.5814	90	230	THDA	7.54E+04	Y	0.30E+01
1764.4901	88	226	RADA	1.60E+03	Y	0.16E+02
1764.4911	92	234	UDA	2.46E+05	Y	0.16E+02
1764.4912	90	230	THDA	7.54E+04	Y	0.16E+02
1808.6484	13	26	AL	7.20E+05	Y	0.10E+03
1847.4147	88	226	RADA	1.60E+03	Y	0.21E+01

1847.4156	92	234	UDA	2.46E+05	Y	0.21E+01	3
1847.4158	90	230	THDA	7.54E+04	Y	0.21E+01	3
2118.5254	88	226	RADA	1.60E+03	Y	0.12E+01	3
2118.5264	92	234	UDA	2.46E+05	Y	0.12E+01	3
2118.5266	90	230	THDA	7.54E+04	Y	0.12E+01	3
2185.6621	58	144	CEPR	285.0000	D	0.70E+00	1
2204.0906	88	226	RADA	1.60E+03	Y	0.50E+01	2
2204.0916	92	234	UDA	2.46E+05	Y	0.50E+01	2
2204.0918	90	230	THDA	7.54E+04	Y	0.50E+01	2
2447.6750	88	226	RADA	1.60E+03	Y	0.16E+01	3
2447.6760	92	234	UDA	2.46E+05	Y	0.16E+01	3
2447.6763	90	230	THDA	7.54E+04	Y	0.16E+01	3
2614.5330	90	228	THDA	1.9130	Y	0.36E+02	1

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SWEPP

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
11	22	NA	2.6032 Y	1274.5420	9.99E+01	1
13	26	AL	7.20E+05 Y	1129.6609	2.47E+00	3
				1808.6484	9.98E+01	1
19	40	K	1.26E+09 Y	1460.8300	1.07E+01	1
25	54	MN	312.3000 D	834.8430	1.00E+02	1
27	58	CO	70.8600 D	810.7915	9.94E+01	1
				863.9741	6.90E-01	3
				1674.7526	5.19E-01	3
27	60	CO	5.2719 Y	1173.2380	9.99E+01	2
				1332.5020	1.00E+02	1
30	65	ZN	244.2600 D	1115.5460	5.08E+01	1
40	95	ZR	63.9800 D	724.1990	4.42E+01	2
				756.7290	5.45E+01	1
40	95	ZRNB	63.9800 D	724.1991	4.42E+01	2
				756.7291	5.45E+01	2
				765.8070	2.20E+02	1
41	94	NB	2.00E+04 Y	702.6450	9.98E+01	2
				871.1190	9.99E+01	1
45	106	RH	29.80000 S	511.8647	2.07E+01	2
				616.1807	7.38E-01	2

				621.9170	9.81E+00	1
				873.4679	4.29E-01	3
				1050.3599	1.53E+00	2
				1128.0422	3.98E-01	3
				1562.2191	1.58E-01	3
47	108 AGM	127.0000 Y		433.9360	9.05E+01	2
				614.2810	8.98E+01	1
				722.9290	9.08E+01	2
47	110 AGM	249.7600 D		446.8110	3.75E+00	3
				620.3600	2.81E+00	3
				657.7620	9.46E+01	2
				677.6230	1.04E+01	2
				687.0150	6.43E+00	3
				706.6820	1.64E+01	2
				744.2770	4.71E+00	3
				763.9440	2.23E+01	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
47	110 AGM	249.7600 D		818.0310	7.31E+00	3
				884.6850	7.27E+01	1
				937.4930	3.44E+01	2
				1384.3000	2.43E+01	2
				1475.7880	4.02E+00	3
				1505.0400	1.30E+01	2
				1562.3030	1.03E+00	3
51	125 SB	2.7590 Y		176.3161	6.90E+00	2
				380.4155	1.51E+00	3
				427.8752	2.94E+01	1
				463.3670	1.04E+01	2
				600.5002	1.78E+01	2
				606.6332	5.00E+00	2
				635.8897	1.13E+01	2
				671.3815	1.81E+00	3
55	134 CS	2.0652 Y		475.3573	1.50E+00	3
				563.2370	8.38E+00	3
				569.3207	1.54E+01	2
				604.7101	9.76E+01	2
				795.8674	8.55E+01	1
				801.9511	8.70E+00	3
				1038.5920	9.91E-01	3
				1167.9443	1.79E+00	3
				1365.1844	3.02E+00	3
55	137 CS	30.2500 Y		661.6600	8.52E+01	1
58	144 CE	285.0000 D		133.5386	1.12E+01	1
58	144 CEPR	285.0000 D		133.5387	1.12E+01	2
				696.5100	1.34E+00	2
				1489.1600	2.79E-01	3
				2185.6621	7.00E-01	1
63	155 EU	4.8500 Y		105.3129	2.23E+01	1
63	152 EU	13.5100 Y		121.7824	2.84E+01	2

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244.6989	7.53E+00	2
344.2811	2.66E+01	2
411.1260	2.24E+00	3
443.9034	3.12E+00	3
778.9030	1.30E+01	1
867.3900	4.21E+00	2
964.1102	1.45E+01	2
1085.8420	1.01E+01	2
1089.7670	1.73E+00	3
1112.0870	1.35E+01	2
1212.9700	1.41E+00	3
1299.1520	1.63E+00	3
1408.0220	2.09E+01	2

63	154	EU	8.5880 Y	123.1001	4.05E+01	2
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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
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63	154	EU	8.5880 Y	247.9678	6.60E+00	2
				591.8112	4.84E+00	2
				692.4855	1.69E+00	3
				723.3563	1.97E+01	2
				756.8083	4.34E+00	2
				873.2299	1.14E+01	2
				996.3293	1.03E+01	2
				1004.7747	1.79E+01	2
				1274.5435	3.55E+01	1
				1593.0000	1.03E+00	3
				1596.5818	1.83E+00	3

73	182	TA	115.0000 D	100.1065	1.40E+01	2
				113.6723	1.92E+00	3
				152.4308	7.18E+00	2
				156.3874	2.73E+00	3
				179.3948	3.14E+00	3
				198.3530	1.52E+00	3
				222.1099	7.59E+00	2
				229.3220	3.63E+00	3
				264.0755	3.63E+00	3
				1001.7018	2.00E+00	3
				1121.3010	3.48E+01	2
				1189.0500	1.65E+01	2
				1221.4080	2.73E+01	1
				1231.0160	1.16E+01	2
				1257.4180	1.52E+00	3
				1289.1560	1.40E+00	3

88	228	RAAC	5.7500 Y	209.3853	4.12E+00	3
				270.2562	3.77E+00	3
				328.0699	3.46E+00	3
				338.4200	1.24E+01	2
				409.6247	2.20E+00	3
				463.1050	4.56E+00	3
				562.6523	1.01E+00	3
				581.5248	1.50E+00	3
				755.2774	1.32E+00	3
				772.2776	1.09E+00	3
				794.7916	4.59E+00	3
				835.6033	1.71E+00	3
				911.1573	2.87E+01	1

				964.6376	5.77E+00	3
				968.9708	1.74E+01	2
				1459.1942	1.06E+00	3
				1496.0321	1.05E+00	3
				1588.2280	3.59E+00	3
				1630.4756	1.95E+00	3
88	226	RADA	1.60E+03 Y	241.9192	7.41E+00	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
88	226	RADA	1.60E+03 Y	295.0908	1.87E+01	2
				351.8664	3.58E+01	2
				609.3111	4.61E+01	1
				665.4420	1.56E+00	3
				768.3499	4.89E+00	2
				785.8274	1.05E+00	3
				806.1550	1.23E+00	3
				934.0389	3.16E+00	3
				1120.2727	1.50E+01	2
				1155.1825	1.69E+00	3
				1238.1073	5.92E+00	2
				1280.9519	1.47E+00	3
				1377.6586	4.02E+00	3
				1401.4832	1.39E+00	3
				1407.9697	2.48E+00	3
				1509.2189	2.19E+00	3
				1661.2577	1.15E+00	3
				1729.5803	3.05E+00	3
				1764.4901	1.59E+01	2
				1847.4147	2.12E+00	3
				2118.5254	1.21E+00	3
				2204.0906	4.99E+00	2
				2447.6750	1.55E+00	3
89	227	ACDA	21.7700 Y	122.3107	1.18E+00	3
				154.1767	5.53E+00	2
				210.5810	1.12E+00	3
				235.9696	1.11E+01	2
				256.2411	6.67E+00	2
				269.3930	1.35E+01	1
				286.1100	1.57E+00	2
				299.9681	2.08E+00	2
				304.5109	1.08E+00	3
				323.8753	3.86E+00	2
				329.8370	2.71E+00	2
				338.2851	2.75E+00	2
				350.0908	1.26E+01	2
				444.9429	1.26E+00	3
90	230	THDA	7.54E+04 Y	186.1109	3.36E+00	3
				241.9194	7.41E+00	2
				295.0910	1.87E+01	2
				351.8666	3.58E+01	2
				609.3113	4.61E+01	1
				665.4422	1.56E+00	3
				768.3500	4.89E+00	2
				785.8276	1.05E+00	3
				806.1552	1.23E+00	3
				934.0391	3.16E+00	3

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1120.2738	1.50E+01	2
1155.1836	1.69E+00	3
1238.1084	5.92E+00	2

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
90	230	THDA	7.54E+04 Y	1280.9530	1.47E+00	3
				1377.6597	4.02E+00	3
				1401.4843	1.39E+00	3
				1407.9708	2.48E+00	3
				1509.2200	2.19E+00	3
				1661.2588	1.15E+00	3
				1729.5814	3.05E+00	3
				1764.4912	1.59E+01	2
				1847.4158	2.12E+00	3
				2118.5266	1.21E+00	3
				2204.0918	4.99E+00	2
				2447.6763	1.55E+00	3
90	232	THDA	1.40E+10 Y	209.3852	4.12E+00	2
				270.2561	3.77E+00	2
				328.0698	3.46E+00	2
				338.4199	1.24E+01	2
				409.6246	2.20E+00	2
				463.1049	4.56E+00	2
				562.6522	1.01E+00	3
				581.5247	1.50E+00	3
				755.2773	1.32E+00	3
				772.2775	1.09E+00	3
				794.7914	4.59E+00	2
				835.6032	1.71E+00	3
				911.1572	2.87E+01	1
				964.6375	5.77E+00	2
				968.9707	1.74E+01	2
				1459.1932	1.06E+00	3
				1496.0311	1.05E+00	3
				1588.2271	3.59E+00	2
				1630.4746	1.95E+00	3
90	228	THDA	1.9130 Y	238.6320	4.35E+01	2
				240.9870	4.07E+00	3
				277.2830	2.30E+00	3
				300.0336	3.25E+00	3
				583.1910	3.06E+01	2
				727.2466	6.66E+00	2
				785.5095	1.10E+00	3
				860.5640	4.50E+00	2
				1620.7350	1.50E+00	3
				2614.5330	3.59E+01	1
91	231	PADA	3.28E+04 Y	122.3106	1.18E+00	3
				144.1835	3.22E+00	2
				154.1766	5.52E+00	2
				210.5809	1.12E+00	3
				235.9695	1.11E+01	2
				256.2410	6.66E+00	2
				269.3929	1.34E+01	1
				283.6729	1.65E+00	2

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
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91	231	PADA	3.28E+04 Y	286.1099	1.57E+00	2
				300.0229	4.48E+00	2
				302.6690	2.47E+00	2
				304.5108	1.07E+00	3
				323.8752	3.85E+00	2
				329.9137	4.06E+00	2
				338.2850	2.75E+00	2
				350.0907	1.26E+01	2
				444.9428	1.25E+00	3
92	232	U	69.8000 Y	57.8137	2.00E-01	1
				129.0348	6.82E-02	2
92	235	U	7.04E+08 Y	109.1784	1.54E+00	3
				143.7680	1.10E+01	2
				163.3570	5.08E+00	3
				185.7220	5.72E+01	1
				202.1060	1.08E+00	3
				205.3180	5.01E+00	3
92	233	U	1.59E+05 Y	118.9680	4.06E-03	3
				120.8160	3.32E-03	3
				135.3284	2.32E-03	3
				146.3450	6.57E-03	2
				164.5220	6.23E-03	2
				208.1710	2.29E-03	3
				245.3450	3.62E-03	3
				291.3540	5.37E-03	3
				317.1327	7.76E-03	1
				320.5410	2.90E-03	3
92	234	UDA	2.46E+05 Y	241.9193	7.41E+00	2
				295.0909	1.87E+01	2
				351.8665	3.58E+01	2
				609.3112	4.61E+01	1
				665.4421	1.56E+00	3
				768.3500	4.89E+00	2
				785.8275	1.05E+00	3
				806.1552	1.23E+00	3
				934.0390	3.16E+00	3
				1120.2737	1.50E+01	2
				1155.1835	1.69E+00	3
				1238.1083	5.92E+00	2
				1280.9529	1.47E+00	3
				1377.6595	4.02E+00	3
				1401.4841	1.39E+00	3
				1407.9707	2.48E+00	3
				1509.2198	2.19E+00	3
				1661.2587	1.15E+00	3
				1729.5813	3.05E+00	3
				1764.4911	1.59E+01	2
				1847.4156	2.12E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
92	234	UDA	2.46E+05 Y	2118.5264	1.21E+00	3
				2204.0916	4.99E+00	2
				2447.6760	1.55E+00	3
92	238	UPA	4.47E+09 Y	258.1807	8.10E-02	2

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			766.4125	2.96E-01	2	
			1000.9970	8.39E-01	1	
93	237 NPPA	2.14E+06 Y	300.1750	6.63E+00	2	
			312.0117	3.86E+01	1	
			340.5896	4.50E+00	2	
			398.6635	1.41E+00	3	
			415.9324	1.74E+00	3	
94	238 PU	87.7000 Y	99.8530	7.35E-03	2	
			152.7200	9.37E-04	1	
			200.9572	4.10E-06	5	
			742.8172	7.78E-06	5	
			766.4124	3.30E-05	5	
			786.2867	4.71E-06	5	
94	241 PU	14.4000 Y	103.6529	1.02E-04	2	
			148.5396	1.86E-04	1	
			159.9276	6.58E-06	3	
94	240 PU	6.56E+03 Y	104.2340	7.14E-03	2	
			160.3080	4.02E-04	1	
94	239 PU	2.41E+04 Y	125.2100	7.11E-05	4	
			129.2960	6.31E-03	2	
			144.2010	3.04E-04	3	
			146.0940	1.19E-04	4	
			160.0674	5.00E-06	5	
			161.4820	1.23E-04	4	
			203.5500	5.69E-04	3	
			332.8450	4.94E-04	3	
			345.0130	5.56E-04	3	
			368.5083	8.96E-05	4	
			375.0540	1.55E-03	3	
			380.1910	3.05E-04	3	
			382.6980	2.59E-04	3	
			392.9140	5.53E-04	4	
			413.7130	1.47E-03	1	
			422.5980	1.22E-04	4	
			451.4810	1.89E-04	4	
94	241 PUDA	14.4000 Y	164.5925	1.87E+00	3	
			208.0078	2.16E+01	2	
			267.5441	7.31E-01	1	
			332.3609	1.21E+00	3	
95	241 AM	432.7000 Y	102.9516	1.96E-02	5	
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
95	241 AM	432.7000 Y	125.2880	4.10E-03	5	
			146.5495	4.60E-04	1	
			161.6994	9.00E-06	6	
			165.9215	2.40E-05	6	
			169.5593	1.72E-04	6	
			203.8694	2.90E-06	6	
			208.0077	7.90E-04	6	
			322.5410	1.50E-04	6	
			332.3608	1.50E-04	6	
			335.4005	4.95E-04	6	

		368.5925	2.20E-04	6
		376.5762	1.38E-04	6
		662.4258	3.60E-04	6
		722.6994	1.30E-04	6
96	244 CM	18.1000 Y	42.8167	2.48E-02
				1

A.3 Insert Library GE\$LIMIT\$LIB:INSERT.LIB

This listing was generated using the "P" (for print) option of MAKE_LIM [11].

LISTING FILE FOR THE LIMIT LIBRARY INSERT
GENERATED ON 6-JUL-94 AT 13:55:41

The current limit library documentation file is
ge\$limit\$lib:INSERT.doc, revision date/time = 6-JUL-1994 13:55:40.64

The associated limit library file is
ge\$limit\$lib:INSERT.lib, revision date/time = 26-JUL-1993 10:07:42.06

The associated isotope library file is
ge\$isotope\$lib:SWEPP.lib, revision date/time = 31-JAN-1994 15:51:52.95

Entry	Nuclide	Energy	ICODE	Half-life	Branching ratio	Isomer?
1	94-PU -239	144.2010	3	2.41E+04 Y	0.000	N
2	94-PU -239	161.4820	4	2.41E+04 Y	0.000	N
3	94-PU -240	160.3080	1	6.56E+03 Y	0.000	N
4	94-PU -241	148.5396	1	14.4000 Y	0.000	N
5	95-AM -241	146.5495	1	432.7000 Y	0.000	N

A.4 Limit Library GE\$LIMIT\$LIB:SWEPPREQ.LIB

This listing was generated using the "P" (for print) option of MAKE_LIM [11].

LISTING FILE FOR THE LIMIT LIBRARY SWEPPREQ
GENERATED ON 6-JUL-94 AT 13:55:54

The current limit library documentation file is
ge\$limit\$lib:SWEPPREQ.doc, revision date/time = 6-JUL-1994 13:55:54.34

The associated limit library file is
ge\$limit\$lib:SWEPPREQ.lib, revision date/time = 31-JAN-1994 14:42:09.75

The associated isotope library file is
ge\$isotope\$lib:SWEPP.lib, revision date/time = 31-JAN-1994 15:51:52.95

Entry	Nuclide	Energy	ICODE	Half-life	Branching ratio	Isomer?
1	63-EU -152	121.7824	2	13.5100 Y	28.370	N
2	63-EU -152	778.9030	1	13.5100 Y	12.970	N
3	63-EU -152	1408.0220	2	13.5100 Y	20.850	N
4	92- U -235	143.7680	2	7.04E+08 Y	10.960	N
5	92- U -235	163.3570	3	7.04E+08 Y	5.080	N
6	92- U -235	185.7220	1	7.04E+08 Y	57.200	N
7	92- U -235	205.3180	3	7.04E+08 Y	5.010	N
8	94-PU -238	152.7200	1	87.7000 Y	0.001	N
9	94-PU -239	129.2960	2	2.41E+04 Y	0.006	N
10	94-PU -239	203.5500	3	2.41E+04 Y	0.001	N
11	94-PU -239	332.8450	3	2.41E+04 Y	0.000	N
12	94-PU -239	345.0130	3	2.41E+04 Y	0.001	N
13	94-PU -239	375.0540	3	2.41E+04 Y	0.002	N
14	94-PU -239	413.7130	1	2.41E+04 Y	0.001	N
15	95-AM -241	125.2880	5	432.7000 Y	0.004	N
16	95-AM -241	165.9215	6	432.7000 Y	0.000	N
17	95-AM -241	169.5593	6	432.7000 Y	0.000	N

A.5 Interference Library GE\$INTERF\$LIB:SWEPPIF.LIB

This listing was generated using the VAXGAP EDINTFER command [2].

INTERFERENCE LIBRARY					SWEPPIF				
CONTAMINATED LINES:					CLEAN LINES:				
ENERGY	Z	ELE	A	ISOMER	ENERGY	Z	ELE	A	ISOMER
152.72	94	PU	238	NO	156.39	73	TA	182	NO
661.66	55	CS	137	NO	722.69	95	AM	241	NO
756.73	40	ZR	95	NO	996.33	63	EU	154	NO
1000.99	92	UPA	238	NO	1189.05	73	TA	182	NO
1274.54	11	NA	22	NO	1004.77	63	EU	154	NO
144.20	94	PU	239	NO	163.36	92	U	235	NO
146.09	94	PU	239	NO	144.20	94	PU	239	NO
146.55	95	AM	241	NO	144.20	94	PU	239	NO
160.31	94	PU	240	NO	148.54	94	PU	241	NO
125.29	95	AM	241	NO	129.30	94	PU	239	NO
345.01	94	PU	239	NO	778.90	63	EU	152	NO
160.31	94	PU	240	NO	129.30	94	PU	239	NO
161.48	94	PU	239	NO	165.92	95	AM	241	NO
203.55	94	PU	239	NO	165.92	95	AM	241	NO

A.6 Isotope Library GE\$ISOTOPE\$LIB:MASTER.LIB, Sorted by Energy

This listing was generated using the VAXGAP PRLIB command [2].

MASTER

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
27.7908	52	129	TE	1.16000 H	0.16E+02	2
30.4000	41	93	NBM	16.1300 Y	0.52E-03	1
39.5710	53	129	I	1.57E+07 Y	0.75E+01	1
46.5200	82	210	PB	22.3000 Y	0.41E+01	1
53.1480	56	133	BA	10.5700 Y	0.22E+01	3
53.1716	82	214	PB	26.80000 M	0.11E+01	3
53.1717	88	226	RAPB	1.60E+03 Y	0.11E+01	3
53.2306	92	234	U	2.46E+05 Y	0.12E+00	1
57.3817	58	143	CE	1.3750 D	0.12E+02	2
57.6091	52	127	TEM	109.0000 D	0.51E+00	1
57.8137	92	232	U	69.8000 Y	0.20E+00	1
58.9921	90	232	TH	1.40E+10 Y	0.19E+00	1
58.9922	90	232	THPB	1.40E+10 Y	0.19E+00	4
58.9923	90	232	THBI	1.40E+10 Y	0.19E+00	3
58.9924	90	232	THAC	1.40E+10 Y	0.19E+00	3
58.9925	90	232	THTL	1.40E+10 Y	0.19E+00	3

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58.9926	90	232	THRA	1.40E+10	Y	0.19E+00	3
58.9927	90	232	THTH	1.40E+10	Y	0.19E+00	2
59.0315	59	144	PRM	7.20000	M	0.79E-01	1
59.5364	95	241	AM	432.7000	Y	0.36E+02	1
60.0153	63	155	EU	4.8500	Y	0.11E+01	3
61.4268	51	127	SB	3.8500	D	0.14E+01	2
61.4618	93	239	NP	2.3550	D	0.13E+01	3
63.1208	70	169	YB	32.0220	D	0.44E+02	2
63.2878	90	234	TH	4.47E+09	Y	0.38E+01	1
65.7207	73	182	TA	115.0000	D	0.28E+01	3
66.0599	34	75	SE	119.6400	D	0.11E+01	3
66.9373	55	136	CS	13.1600	D	0.12E+02	2
67.7500	73	182	TA	115.0000	D	0.41E+02	2
69.6734	64	153	GD	241.6000	D	0.23E+01	3
69.6734	62	153	SM	1.9458	D	0.53E+01	2
71.9834	74	187	W	23.90000	H	0.11E+02	2
72.8035	90	232	THTL	1.40E+10	Y	0.77E+00	9
74.8137	90	232	THPB	1.40E+10	Y	0.11E+02	8
74.9693	90	232	THTL	1.40E+10	Y	0.13E+01	8
75.3429	91	233	PA	27.0000	D	0.13E+01	3
77.1073	90	232	THPB	1.40E+10	Y	0.18E+02	8
77.3432	78	197	PT	18.30000	H	0.17E+02	2
77.3433	80	197	HG	2.6710	D	0.19E+02	1
77.5714	56	142	BA	10.60000	M	0.11E+02	2
79.1310	47	108	AGM	127.0000	Y	0.76E+01	2
79.6117	56	133	BA	10.5700	Y	0.26E+01	3
80.1034	58	144	CE	285.0000	D	0.15E+01	2
80.1845	53	131	I	8.0210	D	0.26E+01	3
80.9601	42	101	MO	14.60000	M	0.38E+01	2
80.9894	54	133	XE	5.2440	D	0.38E+02	1
80.9895	56	133	BA	10.5700	Y	0.34E+02	2
81.1304	52	131	TEM	1.2500	D	0.41E+01	2
84.2551	69	170	TM	128.6000	D	0.33E+01	1
84.2570	90	228	TH	1.9130	Y	0.12E+01	1
84.2571	90	232	THTH	1.40E+10	Y	0.12E+01	1
84.6808	73	182	TA	115.0000	D	0.27E+01	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
84.7132	73	183	TA	5.1000	D	0.13E+01	3
84.7893	90	232	THTL	1.40E+10	Y	0.46E+00	9
86.3575	55	136	CS	13.1600	D	0.63E+01	2
86.5423	63	155	EU	4.8500	Y	0.33E+02	2
86.6519	91	233	PA	27.0000	D	0.20E+01	3
86.7879	65	160	TB	72.3000	D	0.13E+02	2
87.1902	90	232	THPB	1.40E+10	Y	0.63E+01	8
88.0341	46	109	PD	13.70000	H	0.36E+01	1
88.0342	48	109	CD	1.2666	Y	0.37E+01	1
88.9854	63	156	EU	15.1900	D	0.89E+01	2
89.3561	72	175	HF	70.0000	D	0.23E+01	3
89.9547	90	232	THAC	1.40E+10	Y	0.34E+01	8
91.1040	60	147	ND	10.9800	D	0.28E+02	2
92.5640	90	234	TH	4.47E+09	Y	0.54E+01	2
93.3500	90	232	THAC	1.40E+10	Y	0.56E+01	8
93.6151	70	169	YB	32.0220	D	0.27E+01	3
94.7035	66	165	DY	2.33400	H	0.36E+01	1
96.7337	34	75	SE	119.6400	D	0.35E+01	3
97.4316	64	153	GD	241.6000	D	0.28E+02	1
99.0808	73	183	TA	5.1000	D	0.65E+01	2
99.5475	89	228	AC	6.13000	H	0.13E+01	2
99.5476	90	232	THAC	1.40E+10	Y	0.13E+01	2

100.1065	73 182 TA	115.0000 D	0.14E+02	2
102.0643	52 131 TEM	1.2500 D	0.79E+01	2
103.1806	62 153 SM	1.9458 D	0.28E+02	1
103.1807	64 153 GD	241.6000 D	0.20E+02	2
105.3129	63 155 EU	4.8500 Y	0.22E+02	1
105.3616	90 232 THAC	1.40E+10 Y	0.20E+01	8
106.1272	93 239 NP	2.3550 D	0.27E+02	2
107.9332	73 183 TA	5.1000 D	0.11E+02	2
109.1784	92 235 U	7.04E+08 Y	0.15E+01	3
109.7802	70 169 YB	32.0220 D	0.17E+02	2
109.8945	8 19 O	26.91000 S	0.25E+01	3
111.6609	68 171 ER	7.52000 H	0.21E+02	2
111.8601	52 132 TE	3.2583 D	0.19E+01	3
112.9489	71 177 LU	6.7100 D	0.64E+01	2
113.6723	73 182 TA	115.0000 D	0.19E+01	3
113.8060	70 175 YB	4.1900 D	0.19E+01	2
116.4001	52 132 TE	3.2583 D	0.19E+01	3
116.6894	68 171 ER	7.52000 H	0.23E+01	3
118.1901	70 169 YB	32.0220 D	0.19E+01	3
121.1192	34 75 SE	119.6400 D	0.17E+02	2
121.2579	61 147 PM	2.6234 Y	0.29E-02	1
121.7190	36 90 KR	32.32000 S	0.36E+02	2
121.7758	63 152 EUM	9.32000 H	0.72E+01	2
121.7824	63 152 EU	13.5100 Y	0.28E+02	2
122.0614	27 57 CO	271.7900 D	0.86E+02	1
123.1001	63 154 EU	8.5880 Y	0.40E+02	2
123.7774	56 131 BA	11.8000 D	0.29E+02	2
124.0523	68 171 ER	7.52000 H	0.91E+01	2
127.2200	43 101 TC	14.20000 M	0.29E+01	3
129.0348	89 228 AC	6.13000 H	0.29E+01	2

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
129.0349	90	232	THAC	1.40E+10 Y	0.29E+01	2
129.0350	92	232	U	69.8000 Y	0.68E-01	2
129.2960	94	239	PU	2.41E+04 Y	0.63E-02	2
129.4341	76	191	OS	15.4000 D	0.26E+02	1
129.5966	44	105	RU	4.44000 H	0.56E+01	2
129.5967	45	105	RHM	45.00000 S	0.20E+02	1
130.5239	70	169	YB	32.0220 D	0.11E+02	2
131.4968	90	228	TH	1.9130 Y	0.13E+00	2
131.4969	90	232	THTH	1.40E+10 Y	0.13E+00	2
132.9411	72	181	HF	42.3900 D	0.43E+02	2
133.5386	58	144	CE	285.0000 D	0.11E+02	1
133.5819	56	131	BA	11.8000 D	0.22E+01	3
134.2277	74	187	W	23.90000 H	0.86E+01	2
135.4063	53	134	I	52.60000 M	0.41E+01	2
136.0017	34	75	SE	119.6400 D	0.59E+02	2
136.1687	72	181	HF	42.3900 D	0.58E+01	3
136.4743	27	57	CO	271.7900 D	0.11E+02	2
138.0396	55	138	CS	32.20000 M	0.15E+01	3
138.3717	49	116	INM	54.15000 M	0.33E+01	2
140.4740	42	99	MO	2.7470 D	0.91E+02	1
140.5110	43	99	TCM	6.00700 H	0.89E+02	1
142.6520	26	59	FE	44.5100 D	0.98E+00	3
143.7680	92	235	U	7.04E+08 Y	0.11E+02	1
144.1246	73	183	TA	5.1000 D	0.25E+01	3
144.2010	94	239	PU	2.41E+04 Y	0.30E-03	3
145.4404	58	141	CE	32.5000 D	0.49E+02	1
149.1725	44	105	RU	4.44000 H	0.17E+01	2
149.7166	52	131	TE	25.00000 M	0.69E+02	1

149.7167	52	131	TEM	1.2500	D	0.51E+01	2
151.1809	36	85	KRM	4.48000	H	0.75E+02	1
152.4308	73	182	TA	115.0000	D	0.72E+01	2
153.2948	55	136	CS	13.1600	D	0.75E+01	2
153.9039	54	138	XE	14.08000	M	0.60E+01	2
155.0641	75	188	RE	16.98000	H	0.15E+02	1
156.0217	50	117	SNM	13.6100	D	0.21E+01	3
156.3874	73	182	TA	115.0000	D	0.27E+01	3
158.5603	50	117	SNM	13.6100	D	0.86E+02	1
158.9887	52	123	TE	119.7000	D	0.84E+02	1
159.3815	21	47	SC	3.3510	D	0.68E+02	1
161.1445	73	183	TA	5.1000	D	0.12E+02	2
162.3250	73	183	TA	5.1000	D	0.48E+01	2
162.7047	56	140	BA	12.7650	D	0.62E+01	2
163.3570	92	235	U	7.04E+08	Y	0.51E+01	3
163.9316	54	131	XEM	11.9000	D	0.19E+01	1
163.9794	55	136	CS	13.1600	D	0.46E+01	2
165.8530	56	139	BA	1.41000	H	0.22E+02	1
165.8531	58	139	CE	137.6400	D	0.80E+02	1
165.9245	36	88	KR	2.84000	H	0.31E+01	2
166.4293	90	228	TH	1.9130	Y	0.11E+00	3
166.4294	90	232	THTH	1.40E+10	Y	0.11E+00	3
170.6772	12	27	MG	9.46200	M	0.79E+00	3
172.9045	41	98	NBM	51.30000	M	0.31E+01	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
174.9815	54	139	XE	39.68000	S	0.19E+02	2
175.3571	21	48	SC	1.8208	D	0.75E+01	2
176.3161	51	125	SB	2.7590	Y	0.69E+01	2
176.6428	55	136	CS	13.1600	D	0.14E+02	2
177.2144	70	169	YB	32.0220	D	0.21E+02	2
179.3948	73	182	TA	115.0000	D	0.31E+01	3
181.0688	42	99	MO	2.7470	D	0.61E+01	3
184.0948	43	101	TC	14.20000	M	0.17E+01	3
185.7220	92	235	U	7.04E+08	Y	0.57E+02	2
186.1109	88	226	RA	1.60E+03	Y	0.33E+01	1
186.1111	88	226	RAPB	1.60E+03	Y	0.33E+01	3
186.1111	88	226	RABI	1.60E+03	Y	0.33E+01	3
190.3143	56	141	BA	18.27000	M	0.46E+02	1
191.3619	78	197	PT	18.30000	H	0.37E+01	1
191.3620	80	197	HG	2.6710	D	0.58E+00	3
191.9430	42	101	MO	14.60000	M	0.19E+02	2
192.3490	26	59	FE	44.5100	D	0.30E+01	2
195.9997	42	101	MO	14.60000	M	0.29E+01	2
196.3389	36	88	KR	2.84000	H	0.26E+02	2
197.0338	65	160	TB	72.3000	D	0.51E+01	2
197.1420	8	19	O	26.91000	S	0.96E+02	2
197.2817	36	89	KR	3.16000	M	0.18E+01	3
197.9581	70	169	YB	32.0220	D	0.35E+02	1
198.3530	73	182	TA	115.0000	D	0.15E+01	3
198.5959	32	75	GE	1.37967	H	0.12E+01	2
198.5960	34	75	SE	119.6400	D	0.15E+01	3
200.6369	52	131	TEM	1.2500	D	0.75E+01	2
202.1060	92	235	U	7.04E+08	Y	0.11E+01	3
202.4712	39	90	YM	3.19000	H	0.97E+02	1
203.5500	94	239	PU	2.41E+04	Y	0.57E-03	3
204.1136	41	95	NBM	3.6100	D	0.23E+01	3
205.3180	92	235	U	7.04E+08	Y	0.50E+01	3
205.7955	77	192	IR	73.8300	D	0.33E+01	3
208.3629	71	177	LU	6.7100	D	0.11E+02	1

209.3852	89	228	AC	6.13000	H	0.41E+01	2
209.3853	90	232	THAC	1.40E+10	Y	0.41E+01	2
209.7554	93	239	NP	2.3550	D	0.34E+01	2
209.8695	73	183	TA	5.1000	D	0.45E+01	2
215.6448	65	160	TB	72.3000	D	0.40E+01	2
215.7538	90	228	TH	1.9130	Y	0.26E+00	2
215.7539	90	232	THTH	1.40E+10	Y	0.26E+00	2
216.0480	56	131	BA	11.8000	D	0.20E+02	2
218.6504	54	139	XE	39.68000	S	0.52E+02	1
220.5121	53	135	I	6.55000	H	0.17E+01	2
220.9741	36	89	KR	3.16000	M	0.20E+02	2
221.4590	35	82	BR	1.4708	D	0.23E+01	3
222.1099	73	182	TA	115.0000	D	0.76E+01	2
225.4392	54	139	XE	39.68000	S	0.27E+01	3
227.7152	55	138	CS	32.20000	M	0.15E+01	3
228.1865	93	239	NP	2.3550	D	0.11E+02	2
228.2601	52	132	TE	3.2583	D	0.88E+02	1
229.3220	73	182	TA	115.0000	D	0.36E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
231.5658	56	142	BA	10.60000	M	0.12E+02 2
231.5753	58	143	CE	1.3750	D	0.20E+01 3
233.2071	54	133	XEM	2.1880	D	0.10E+02 1
234.4322	36	90	KR	32.32000	S	0.25E+01 2
235.4974	53	134	I	52.60000	M	0.22E+01 3
235.6800	41	95	NBM	3.6100	D	0.25E+02 1
238.6320	82	212	PB	10.64000	H	0.44E+02 1
238.6321	90	232	THPB	1.40E+10	Y	0.44E+02 1
239.6122	56	131	BA	11.8000	D	0.24E+01 3
240.9340	52	131	TEM	1.2500	D	0.76E+01 2
240.9870	88	224	RA	3.6600	D	0.41E+01 1
240.9871	90	232	THRA	1.40E+10	Y	0.41E+01 1
241.6350	38	92	SR	2.71000	H	0.30E+01 2
241.9192	82	214	PB	26.80000	M	0.74E+01 2
241.9193	88	226	RAPB	1.60E+03	Y	0.74E+01 2
242.1779	36	90	KR	32.32000	S	0.92E+01 2
242.6559	54	138	XE	14.08000	M	0.35E+01 2
244.2652	73	183	TA	5.1000	D	0.87E+01 2
244.6989	63	152	EU	13.5100	Y	0.75E+01 2
246.0609	73	183	TA	5.1000	D	0.28E+02 1
247.9678	63	154	EU	8.5880	Y	0.66E+01 2
249.3230	36	90	KR	32.32000	S	0.13E+01 2
249.4167	56	131	BA	11.8000	D	0.28E+01 3
249.7924	54	135	XE	9.10400	H	0.90E+02 1
252.7457	51	127	SB	3.8500	D	0.82E+01 2
254.2669	40	97	ZR	16.90000	H	0.13E+01 3
255.0702	50	113	SN	115.0900	D	0.19E+01 3
255.2269	56	142	BA	10.60000	M	0.21E+02 1
258.1807	91	234	PAM	4.47E+09	Y	0.81E-01 2
258.4458	54	138	XE	14.08000	M	0.32E+02 1
260.9080	48	115	CD	2.2275	D	0.19E+01 3
261.0788	70	169	YB	32.0220	D	0.19E+01 3
262.7488	53	132	I	2.28400	H	0.14E+01 3
262.8453	44	105	RU	4.44000	H	0.65E+01 2
264.0755	73	182	TA	115.0000	D	0.36E+01 3
264.6556	32	75	GE	1.37967	H	0.11E+02 1
264.6557	34	75	SE	119.6400	D	0.59E+02 1
266.9072	39	93	Y	10.25000	H	0.68E+01 1
270.2561	89	228	AC	6.13000	H	0.38E+01 2
270.2562	90	232	THAC	1.40E+10	Y	0.38E+01 2

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272.6467	37	89	RB	15.20000	M	0.14E+01	3
273.6848	55	136	CS	13.1600	D	0.13E+02	2
274.5627	38	91	SR	9.52000	H	0.10E+01	3
276.3877	56	133	BA	10.5700	Y	0.72E+01	2
276.9071	56	141	BA	18.27000	M	0.23E+02	2
277.2830	81	208	TL	3.05300	M	0.64E+01	2
277.2831	90	232	THTL	1.40E+10	Y	0.23E+01	2
277.6017	93	239	NP	2.3550	D	0.14E+02	1
278.5582	51	126	SB	12.4000	D	0.22E+01	3
278.5703	52	131	TEM	1.2500	D	0.18E+01	3
279.1967	80	203	HG	46.5950	D	0.81E+02	1
279.5381	34	75	SE	119.6400	D	0.25E+02	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
282.5220	70	175	YB	4.1900	D	0.31E+01	2
284.2989	53	131	I	8.0210	D	0.62E+01	3
288.4619	53	135	I	6.55000	H	0.31E+01	2
289.8163	54	139	XE	39.68000	S	0.85E+01	2
290.9805	51	127	SB	3.8500	D	0.19E+01	2
291.7270	73	183	TA	5.1000	D	0.38E+01	2
293.2735	58	143	CE	1.3750	D	0.42E+02	1
293.5511	77	194	IR	19.15000	H	0.25E+01	2
295.0908	82	214	PB	26.80000	M	0.19E+02	2
295.0909	88	226	RAPB	1.60E+03	Y	0.19E+02	2
295.9393	68	171	ER	7.52000	H	0.29E+02	2
295.9582	77	192	IR	73.8300	D	0.29E+02	2
296.6051	54	139	XE	39.68000	S	0.20E+02	2
296.8904	51	126	SB	12.4000	D	0.49E+01	2
298.5756	65	160	TB	72.3000	D	0.27E+02	2
300.0336	82	212	PB	10.64000	H	0.33E+01	3
300.0337	90	232	THPB	1.40E+10	Y	0.33E+01	3
300.1750	91	233	PA	27.0000	D	0.66E+01	2
302.8513	56	133	BA	10.5700	Y	0.18E+02	2
303.9236	34	75	SE	119.6400	D	0.13E+01	3
304.1778	56	141	BA	18.27000	M	0.25E+02	2
304.8568	36	85	KRM	4.48000	H	0.14E+02	2
304.8671	56	140	BA	12.7650	D	0.43E+01	2
306.2778	45	105	RH	1.4733	D	0.51E+01	2
306.8311	43	101	TC	14.20000	M	0.88E+02	1
307.7382	70	169	YB	32.0220	D	0.11E+02	2
308.3306	68	171	ER	7.52000	H	0.64E+02	1
308.4568	77	192	IR	73.8300	D	0.30E+02	2
309.1371	56	142	BA	10.60000	M	0.26E+01	2
312.0117	91	233	PA	27.0000	D	0.39E+02	1
312.7460	19	42	K	12.35900	H	0.32E+00	3
313.1553	73	183	TA	5.1000	D	0.69E+01	2
315.8825	93	239	NP	2.3550	D	0.16E+01	3
316.4894	44	105	RU	4.44000	H	0.11E+02	2
316.5080	77	192	IR	73.8300	D	0.83E+02	1
319.2204	45	105	RH	1.4733	D	0.19E+02	1
319.4140	60	147	ND	10.9800	D	0.19E+01	3
320.0841	22	51	TI	5.76000	M	0.93E+02	1
320.0842	24	51	CR	27.7060	D	0.99E+01	1
328.0698	89	228	AC	6.13000	H	0.35E+01	2
328.0699	90	232	THAC	1.40E+10	Y	0.35E+01	2
328.4583	77	194	IR	19.15000	H	0.13E+02	1
328.7576	57	140	LA	1.6782	D	0.21E+02	2
332.8450	94	239	PU	2.41E+04	Y	0.49E-03	3
334.2768	52	131	TEM	1.2500	D	0.96E+01	2
334.3136	93	239	NP	2.3550	D	0.21E+01	3

335.3655	41	98	NBM	51.30000	M	0.11E+02	2
336.2585	48	115	CD	2.2275	D	0.50E+02	2
336.2585	49	115	INM	4.48600	H	0.46E+02	1
338.4199	89	228	AC	6.13000	H	0.12E+02	2
338.4200	90	232	THAC	1.40E+10	Y	0.12E+02	2
340.5896	91	233	PA	27.0000	D	0.45E+01	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
340.6219	55	136	CS	13.1600	D	0.49E+02 2
343.3964	72	175	HF	70.0000	D	0.87E+02 1
343.6760	56	141	BA	18.27000	M	0.14E+02 2
344.2811	63	152	EU	13.5100	Y	0.27E+02 1
344.2859	63	152	EUM	9.32000	H	0.24E+01 2
345.0130	94	239	PU	2.41E+04	Y	0.56E-03 3
345.1641	36	89	KR	3.16000	M	0.12E+01 3
345.8287	72	181	HF	42.3900	D	0.15E+02 2
350.6550	58	143	CE	1.3750	D	0.34E+01 3
351.8664	82	214	PB	26.80000	M	0.36E+02 1
351.8665	88	226	RAPB	1.60E+03	Y	0.36E+02 1
353.9939	73	183	TA	5.1000	D	0.11E+02 2
355.4156	49	116	INM	54.15000	M	0.82E+00 3
355.4615	40	97	ZR	16.90000	H	0.23E+01 3
355.9992	56	133	BA	10.5700	Y	0.62E+02 1
356.1947	36	89	KR	3.16000	M	0.41E+01 2
360.3179	52	127	TE	9.35000	H	0.14E+00 2
362.2630	36	88	KR	2.84000	H	0.22E+01 2
363.8492	56	142	BA	10.60000	M	0.46E+01 2
364.4832	53	131	I	8.0210	D	0.82E+02 1
365.0518	52	131	TEM	1.2500	D	0.12E+01 3
366.3223	28	65	NI	2.52000	H	0.46E+01 2
366.4236	42	99	MO	2.7470	D	0.12E+01 3
369.4584	36	89	KR	3.16000	M	0.14E+01 3
373.1938	56	131	BA	11.8000	D	0.13E+02 2
375.0540	94	239	PU	2.41E+04	Y	0.16E-02 3
380.1910	94	239	PU	2.41E+04	Y	0.30E-03 3
380.4155	51	125	SB	2.7590	Y	0.15E+01 3
381.6000	39	94	Y	18.70000	M	0.20E+01 2
382.6980	94	239	PU	2.41E+04	Y	0.26E-03 3
383.8406	56	133	BA	10.5700	Y	0.89E+01 2
389.8273	56	141	BA	18.27000	M	0.13E+01 3
391.6898	50	113	SN	115.0900	D	0.65E+02 1
392.4948	65	160	TB	72.3000	D	0.13E+01 2
393.4020	44	105	RU	4.44000	H	0.37E+01 2
393.6316	54	139	XE	39.68000	S	0.62E+01 2
396.3278	70	175	YB	4.1900	D	0.65E+01 1
396.5595	54	138	XE	14.08000	M	0.63E+01 2
398.6635	91	233	PA	27.0000	D	0.14E+01 3
400.6568	34	75	SE	119.6400	D	0.12E+02 2
401.4551	54	138	XE	14.08000	M	0.22E+01 3
402.6372	36	87	KR	1.27183	H	0.50E+02 1
403.9879	56	131	BA	11.8000	D	0.13E+01 3
405.4623	53	134	I	52.60000	M	0.73E+01 2
408.9480	55	138	CS	32.20000	M	0.47E+01 2
409.6246	89	228	AC	6.13000	H	0.22E+01 2
409.6247	90	232	THAC	1.40E+10	Y	0.22E+01 2
411.1260	63	152	EU	13.5100	Y	0.22E+01 3
411.5917	36	89	KR	3.16000	M	0.25E+01 2
411.8044	79	198	AU	2.6943	D	0.96E+02 1
412.1878	51	127	SB	3.8500	D	0.37E+01 2
413.4927	44	105	RU	4.44000	H	0.22E+01 2

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
413.7130	94	239	PU	2.41E+04 Y	0.15E-02	1
414.6096	51	126	SB	12.4000 D	0.85E+02	2
415.9324	91	233	PA	27.0000 D	0.17E+01	3
416.9160	49	116	INM	54.15000 M	0.29E+02	2
417.6665	53	135	I	6.55000 H	0.35E+01	2
417.9268	52	127	TE	9.35000 H	0.10E+01	1
418.0133	53	130	I	12.36000 H	0.34E+02	2
423.7198	56	140	BA	12.7650 D	0.31E+01	2
425.0786	56	142	BA	10.60000 M	0.57E+01	2
427.8752	51	125	SB	2.7590 Y	0.29E+02	1
430.6625	38	92	SR	2.71000 H	0.33E+01	2
432.3586	39	95	Y	10.30000 M	0.20E+01	2
432.5231	57	140	LA	1.6782 D	0.29E+01	3
432.7523	72	175	HF	70.0000 D	0.16E+01	3
433.3716	53	134	I	52.60000 M	0.42E+01	2
433.4497	36	90	KR	32.32000 S	0.12E+01	2
433.9360	47	108	AGM	127.0000 Y	0.90E+02	2
434.3734	41	98	NBM	51.30000 M	0.12E+01	3
434.6144	54	138	XE	14.08000 M	0.20E+02	2
437.5849	56	140	BA	12.7650 D	0.19E+01	2
438.6340	30	69	ZNM	13.76000 H	0.95E+02	1
439.9097	60	147	ND	10.9800 D	0.12E+01	3
442.9172	53	128	I	24.99000 M	0.16E+02	1
443.9034	63	152	EU	13.5100 Y	0.31E+01	3
445.7084	51	127	SB	3.8500 D	0.42E+01	2
446.8110	47	110	AGM	249.7600 D	0.37E+01	3
448.5198	39	92	Y	3.54000 H	0.23E+01	2
452.3299	52	131	TE	25.00000 M	0.18E+02	2
452.3300	52	131	TEM	1.2500 D	0.15E+01	3
455.4591	54	137	XE	3.81800 M	0.31E+02	1
457.5394	56	141	BA	18.27000 M	0.48E+01	2
458.8935	53	134	I	52.60000 M	0.13E+01	3
459.5202	52	129	TE	1.16000 H	0.77E+01	1
462.1221	56	141	BA	18.27000 M	0.48E+01	2
462.7822	55	138	CS	32.20000 M	0.31E+02	2
462.9409	52	131	TEM	1.2500 D	0.18E+01	3
463.1049	89	228	AC	6.13000 H	0.46E+01	2
463.1050	90	232	THAC	1.40E+10 Y	0.46E+01	2
463.3292	49	116	INM	54.15000 M	0.83E+00	3
463.3670	51	125	SB	2.7590 Y	0.10E+02	2
467.2209	56	141	BA	18.27000 M	0.55E+01	2
468.0715	77	192	IR	73.8300 D	0.48E+02	2
469.3541	44	105	RU	4.44000 H	0.17E+02	2
473.6144	51	127	SB	3.8500 D	0.25E+02	2
475.3573	55	134	CS	2.0652 Y	0.15E+01	3
477.6050	4	7	BE	53.2000 D	0.10E+02	1
478.0130	75	188	RE	16.98000 H	0.10E+01	3
479.4911	39	90	YM	3.19000 H	0.91E+02	2
479.5337	74	187	W	23.90000 H	0.21E+02	1
481.9971	72	181	HF	42.3900 D	0.81E+02	1
484.5779	77	192	IR	73.8300 D	0.32E+01	3
486.4539	56	131	BA	11.8000 D	0.19E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
487.0262	57	140	LA	1.6782 D	0.44E+02	2
487.3109	52	129	TE	1.16000 H	0.14E+01	3
488.9096	53	134	I	52.60000 M	0.14E+01	3
489.2168	20	47	CA	4.5360 D	0.67E+01	2

490.3829	58 143 CE	1.3750 D	0.20E+01	3
491.4924	54 139 XE	39.68000 S	0.13E+01	3
492.3620	48 115 CD	2.2275 D	0.80E+01	2
492.6179	36 90 KR	32.32000 S	0.11E+01	3
492.6671	52 131 TE	25.00000 M	0.48E+01	3
496.2583	56 131 BA	11.8000 D	0.44E+02	1
497.0539	44 103 RU	39.2550 D	0.90E+02	1
497.7242	36 89 KR	3.16000 M	0.77E+01	2
499.2531	44 105 RU	4.44000 H	0.20E+01	2
505.9070	53 132 I	2.28400 H	0.50E+01	2
505.9655	42 101 MO	14.60000 M	0.12E+02	2
507.6987	40 97 ZR	16.90000 H	0.51E+01	2
514.0090	36 85 KR	10.7200 Y	0.43E+00	1
514.0091	38 85 SR	64.8490 D	0.99E+02	1
514.4314	53 134 I	52.60000 M	0.22E+01	3
520.4613	35 83 BR	2.39000 H	0.62E-01	2
522.6762	53 132 I	2.28400 H	0.16E+02	2
526.5628	53 135 I	6.55000 H	0.13E+02	2
526.5629	54 135 XEM	15.65000 M	0.81E+02	1
526.5750	53 128 I	24.99000 M	0.15E+01	3
527.9100	48 115 CD	2.2275 D	0.27E+02	1
529.6505	35 83 BR	2.39000 H	0.13E+01	1
529.8521	53 133 I	20.80000 H	0.86E+02	1
531.0134	60 147 ND	10.9800 D	0.13E+02	1
531.4449	43 101 TC	14.20000 M	0.10E+01	3
536.1009	53 130 I	12.36000 H	0.99E+02	1
537.3096	56 140 BA	12.7650 D	0.24E+02	1
539.1068	53 130 I	12.36000 H	0.14E+01	3
539.4855	36 90 KR	32.32000 S	0.29E+02	2
540.8681	53 134 I	52.60000 M	0.76E+01	2
543.7256	51 127 SB	3.8500 D	0.28E+01	2
545.0455	43 101 TC	14.20000 M	0.60E+01	3
546.5641	53 135 I	6.55000 H	0.71E+01	2
546.9872	55 138 CS	32.20000 M	0.11E+02	2
547.0200	53 132 I	2.28400 H	0.13E+01	3
550.9000	39 94 Y	18.70000 M	0.49E+01	2
551.5169	74 187 W	23.90000 H	0.49E+01	2
554.3500	35 82 BR	1.4708 D	0.71E+02	2
554.3762	36 90 KR	32.32000 S	0.47E+01	2
554.7978	51 126 SB	12.4000 D	0.18E+01	3
555.5648	38 91 SR	9.52000 H	0.61E+02	2
555.5649	39 91 YM	49.71000 M	0.95E+02	1
559.0797	33 76 AS	1.0967 D	0.45E+02	1
561.1139	39 92 Y	3.54000 H	0.24E+01	2
562.6522	89 228 AC	6.13000 H	0.10E+01	2
562.6523	90 232 THAC	1.40E+10 Y	0.10E+01	3
563.2370	55 134 CS	2.0652 Y	0.84E+01	3
563.2683	33 76 AS	1.0967 D	0.12E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
564.0900	51	122	SB	2.7000 D	0.71E+02	1
569.3207	55	134	CS	2.0652 Y	0.15E+02	2
573.1299	51	126	SB	12.4000 D	0.67E+01	2
577.1678	36	89	KR	3.16000 M	0.56E+01	2
581.5247	89	228	AC	6.13000 H	0.15E+01	2
581.5248	90	232	THAC	1.40E+10 Y	0.15E+01	3
583.1910	81	208	TL	3.05300 M	0.85E+02	2
583.1911	90	232	THTL	1.40E+10 Y	0.31E+02	2
584.9670	56	131	BA	11.8000 D	0.12E+01	3
585.9959	36	89	KR	3.16000 M	0.16E+02	1

586.1083	53	130	I	12.36000	H	0.17E+01	3
586.2961	52	131	TEM	1.2500	D	0.20E+01	3
588.5851	77	192	IR	73.8300	D	0.45E+01	3
589.6543	42	101	MO	14.60000	M	0.56E+01	2
590.9282	42	101	MO	14.60000	M	0.16E+02	2
591.8112	63	154	EU	8.5880	Y	0.48E+01	2
592.0648	76	185	OS	93.6000	D	0.13E+01	3
592.9862	51	126	SB	12.4000	D	0.75E+01	2
595.3820	53	134	I	52.60000	M	0.11E+02	2
599.5115	63	156	EU	15.1900	D	0.23E+01	2
600.5002	51	125	SB	2.7590	Y	0.18E+02	2
602.0459	52	131	TE	25.00000	M	0.42E+01	3
602.5672	40	97	ZR	16.90000	H	0.14E+01	3
602.7300	51	124	SB	60.2000	D	0.98E+02	1
604.0521	51	127	SB	3.8500	D	0.43E+01	2
604.4146	77	192	IR	73.8300	D	0.81E+01	3
604.7101	55	134	CS	2.0652	Y	0.98E+02	2
605.0319	35	84	BR	31.80000	M	0.17E+01	2
606.3300	35	82	BR	1.4708	D	0.13E+01	3
606.6332	51	125	SB	2.7590	Y	0.50E+01	2
608.1845	54	135	XE	9.10400	H	0.29E+01	3
608.5581	22	51	TI	5.76000	M	0.12E+01	3
609.3111	83	214	BI	19.90000	M	0.46E+02	1
609.3112	88	226	RABI	1.60E+03	Y	0.46E+02	1
610.2985	44	103	RU	39.2550	D	0.56E+01	3
612.4657	77	192	IR	73.8300	D	0.53E+01	3
613.1157	54	139	XE	39.68000	S	0.51E+01	3
614.2810	47	108	AGM	127.0000	Y	0.90E+02	2
618.3354	74	187	W	23.90000	H	0.61E+01	2
619.0703	36	90	KR	32.32000	S	0.10E+01	3
619.1100	35	82	BR	1.4708	D	0.43E+02	2
620.0352	56	131	BA	11.8000	D	0.16E+01	3
620.0663	38	91	SR	9.52000	H	0.18E+01	3
620.3600	47	110	AGM	249.7600	D	0.28E+01	3
621.1804	53	132	I	2.28400	H	0.16E+01	3
621.8187	53	134	I	52.60000	M	0.11E+02	2
621.9170	45	106	RH	1.0200	Y	0.98E+01	1
625.1650	56	141	BA	18.27000	M	0.33E+01	3
625.4727	74	187	W	23.90000	H	0.11E+01	2
627.3832	55	139	CS	9.27000	M	0.16E+01	2
627.9756	53	134	I	52.60000	M	0.22E+01	3
630.2711	53	132	I	2.28400	H	0.14E+02	2

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
633.0767	75	188	RE	16.98000	H	0.13E+01 3
635.8897	51	125	SB	2.7590	Y	0.11E+02 2
636.9747	53	131	I	8.0210	D	0.71E+01 3
641.2542	57	142	LA	1.54167	H	0.47E+02 2
644.9802	41	98	NEM	51.30000	M	0.56E+01 2
645.1631	77	194	IR	19.15000	H	0.12E+01 3
645.8550	51	124	SB	60.2000	D	0.74E+01 2
646.1100	76	185	OS	93.6000	D	0.81E+02 1
646.2847	63	156	EU	15.1900	D	0.70E+01 1
647.8530	56	141	BA	18.27000	M	0.56E+01 2
650.5872	53	132	I	2.28400	H	0.27E+01 3
652.8076	38	91	SR	9.52000	H	0.11E+02 2
654.2997	52	131	TE	25.00000	M	0.15E+01 3
656.2463	44	105	RU	4.44000	H	0.20E+01 2
656.3478	51	126	SB	12.4000	D	0.22E+01 3
657.0624	33	76	AS	1.0967	D	0.62E+01 2

657.7620	47	110	AGM	249.7600	D	0.95E+02	1
657.8970	37	89	RB	15.20000	M	0.10E+02	2
658.2213	41	97	NB	1.20167	H	0.98E+02	1
658.8791	52	127	TEM	109.0000	D	0.13E-01	3
661.6600	55	137	CS	30.2500	Y	0.85E+02	1
664.5760	58	143	CE	1.3750	D	0.53E+01	2
665.1075	52	131	TEM	1.2500	D	0.43E+01	2
665.4420	83	214	BI	19.90000	M	0.16E+01	2
665.4421	88	226	RABI	1.60E+03	Y	0.16E+01	3
666.3698	51	126	SB	12.4000	D	0.10E+03	1
667.7339	53	132	I	2.28400	H	0.99E+02	2
668.5634	53	130	I	12.36000	H	0.96E+02	2
669.8646	53	132	I	2.28400	H	0.49E+01	2
671.3815	51	125	SB	2.7590	Y	0.18E+01	3
671.6200	53	132	I	2.28400	H	0.52E+01	2
673.9084	36	87	KR	1.27183	H	0.19E+01	3
674.6799	51	126	SB	12.4000	D	0.37E+01	2
676.3369	44	105	RU	4.44000	H	0.15E+02	2
677.3566	53	134	I	52.60000	M	0.78E+01	2
677.6230	47	110	AGM	249.7600	D	0.10E+02	2
685.7275	51	127	SB	3.8500	D	0.35E+02	1
685.7441	74	187	W	23.90000	H	0.26E+02	2
686.0191	53	130	I	12.36000	H	0.11E+01	3
687.0150	47	110	AGM	249.7600	D	0.64E+01	3
692.4855	63	154	EU	8.5880	Y	0.17E+01	3
692.7900	51	122	SB	2.7000	D	0.37E+01	3
694.9048	51	126	SB	12.4000	D	0.10E+03	2
695.6788	42	101	MO	14.60000	M	0.72E+01	2
695.8412	52	129	TEM	33.6000	D	0.30E+01	1
696.3801	36	89	KR	3.16000	M	0.18E+01	3
696.5100	59	144	PR	17.29000	M	0.13E+01	2
696.8638	51	126	SB	12.4000	D	0.32E+02	2
698.3680	35	82	BR	1.4708	D	0.28E+02	2
698.4531	51	127	SB	3.8500	D	0.35E+01	2
702.6450	41	94	NB	2.00E+04	Y	0.10E+03	2
703.7614	40	97	ZR	16.90000	H	0.93E+00	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
706.5551	53	133	I	20.80000	H	0.15E+01	3
706.6820	47	110	AGM	249.7600	D	0.16E+02	2
709.3248	51	124	SB	60.2000	D	0.13E+01	3
713.1110	42	101	MO	14.60000	M	0.34E+01	2
713.1304	52	131	TEM	1.2500	D	0.14E+01	3
713.7810	51	124	SB	60.2000	D	0.23E+01	3
713.9437	41	98	NBM	51.30000	M	0.86E+01	2
717.4179	76	185	OS	93.6000	D	0.41E+01	2
720.4111	51	126	SB	12.4000	D	0.54E+02	2
721.9574	58	143	CE	1.3750	D	0.51E+01	2
722.5526	51	127	SB	3.8500	D	0.18E+01	2
722.6986	41	98	NBM	51.30000	M	0.71E+02	2
722.7860	51	124	SB	60.2000	D	0.11E+02	2
722.8918	53	131	I	8.0210	D	0.18E+01	3
722.9290	47	108	AGM	127.0000	Y	0.91E+02	1
723.3563	63	154	EU	8.5880	Y	0.20E+02	2
723.4995	63	156	EU	15.1900	D	0.59E+01	2
723.9975	54	139	XE	39.68000	S	0.17E+01	3
724.1990	40	95	ZR	63.9800	D	0.44E+02	2
724.2661	44	105	RU	4.44000	H	0.47E+02	1
726.8862	53	132	I	2.28400	H	0.53E+01	3
727.2466	83	212	BI	2.5229	D	0.66E+01	1

727.2467	90 232	THBI	1.40E+10 Y	0.66E+01	1
728.7039	53 132	I	2.28400 H	0.11E+01	3
729.5334	52 129	TEM	33.6000 D	0.70E+00	2
730.7876	53 134	I	52.60000 M	0.18E+01	3
731.2928	36 90	KR	32.32000 S	0.14E+01	2
732.5092	54 139	XE	39.68000 S	0.16E+01	3
736.8399	35 84	BR	31.80000 M	0.13E+01	3
738.5132	36 89	KR	3.16000 M	0.42E+01	2
739.0282	56 141	BA	18.27000 M	0.43E+01	3
739.4824	53 130	I	12.36000 H	0.82E+02	2
739.5078	42 99	MO	2.7470 D	0.12E+02	2
743.3182	40 97	ZR	16.90000 H	0.93E+02	2
744.2170	52 131	TEM	1.2500 D	0.16E+01	3
744.2770	47 110	AGM	249.7600 D	0.47E+01	3
749.7239	38 91	SR	9.52000 H	0.24E+02	2
751.6608	57 140	LA	1.6782 D	0.44E+01	2
752.6000	39 94	Y	18.70000 M	0.14E+01	3
755.2773	89 228	AC	6.13000 H	0.13E+01	2
755.2774	90 232	THAC	1.40E+10 Y	0.13E+01	3
756.7290	40 95	ZR	63.9800 D	0.55E+02	1
756.8083	63 154	EU	8.5880 Y	0.43E+01	2
763.0576	81 208	TL	3.05300 M	0.19E+01	3
763.9440	47 110	AGM	249.7600 D	0.22E+02	2
765.2646	65 160	TB	72.3000 D	0.20E+01	2
765.8070	41 95	NB	34.9750 D	0.10E+03	1
766.4124	91 234	PAM	4.47E+09 Y	0.30E+00	2
766.7329	53 134	I	52.60000 M	0.41E+01	2
768.3499	83 214	BI	19.90000 M	0.49E+01	2
768.3500	88 226	RABI	1.60E+03 Y	0.49E+01	2
772.2775	89 228	AC	6.13000 H	0.11E+01	2

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
772.2776	90 232		THAC	1.40E+10 Y	0.11E+01	3
772.6824	53 132		I	2.28400 H	0.76E+02	1
772.8931	74 187		W	23.90000 H	0.40E+01	2
773.6761	52 131		TEM	1.2500 D	0.38E+02	2
776.5160	35 82		BR	1.4708 D	0.83E+02	1
776.6127	36 89		KR	3.16000 M	0.11E+01	3
777.9188	42 99		MO	2.7470 D	0.44E+01	3
778.9030	63 152		EU	13.5100 Y	0.13E+02	2
780.1202	53 132		I	2.28400 H	0.12E+01	3
782.4791	52 131		TEM	1.2500 D	0.78E+01	2
783.9791	51 127		SB	3.8500 D	0.15E+02	2
785.5095	83 212		BI	2.5229 D	0.11E+01	2
785.5096	90 232		THBI	1.40E+10 Y	0.11E+01	2
785.8274	82 214		PB	26.80000 M	0.10E+01	3
785.8275	88 226		RAPB	1.60E+03 Y	0.10E+01	3
787.3228	41 98		NBM	51.30000 M	0.93E+02	1
788.0963	54 139		XE	39.68000 S	0.31E+01	3
791.6619	41 98		NBM	51.30000 M	0.76E+01	2
793.7713	52 131		TEM	1.2500 D	0.14E+02	2
794.7914	89 228		AC	6.13000 H	0.46E+01	2
794.7916	90 232		THAC	1.40E+10 Y	0.46E+01	2
795.8674	55 134		CS	2.0652 Y	0.86E+02	1
801.9511	55 134		CS	2.0652 Y	0.87E+01	3
802.3930	35 84		BR	31.80000 M	0.59E+01	2
806.1550	83 214		BI	19.90000 M	0.12E+01	3
806.1552	88 226		RABI	1.60E+03 Y	0.12E+01	3
807.8496	20 47		CA	4.5360 D	0.69E+01	2
809.7676	53 132		I	2.28400 H	0.29E+01	3

810.7915	27	58	CO	70.8600 D	0.99E+02	1
811.8157	63	156	EU	15.1900 D	0.10E+02	2
812.2759	53	132	I	2.28400 H	0.56E+01	2
815.7825	57	140	LA	1.6782 D	0.24E+02	2
818.0310	47	110	AGM	249.7600 D	0.73E+01	3
818.5602	55	136	CS	13.1600 D	0.10E+03	2
818.7432	49	116	INM	54.15000 M	0.12E+02	2
822.7761	52	131	TEM	1.2500 D	0.61E+01	2
823.5009	41	98	NBM	51.30000 M	0.24E+01	3
827.8310	35	82	BR	1.4708 D	0.24E+02	2
831.6401	56	141	BA	18.27000 M	0.15E+01	3
833.5569	41	98	NBM	51.30000 M	0.10E+02	2
834.8430	25	54	MN	312.3000 D	0.10E+03	1
834.8587	36	88	KR	2.84000 H	0.13E+02	2
835.6032	89	228	AC	6.13000 H	0.17E+01	2
835.6033	90	232	THAC	1.40E+10 Y	0.17E+01	3
835.7230	36	89	KR	3.16000 M	0.11E+01	3
836.8210	53	135	I	6.55000 H	0.67E+01	2
840.2693	56	142	BA	10.60000 M	0.35E+01	2
841.5850	63	152	EUM	9.32000 H	0.15E+02	1
843.7573	12	27	MG	9.46200 M	0.73E+02	1
844.3140	39	92	Y	3.54000 H	0.13E+01	2
845.5031	36	87	KR	1.27183 H	0.73E+01	2
846.7640	27	56	CO	77.3500 D	0.10E+03	1

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
846.8121	25	56	MN	2.57850 H	0.99E+02	2
847.0613	53	134	I	52.60000 M	0.95E+02	2
852.2351	52	131	TEM	1.2500 D	0.21E+02	1
856.2646	53	133	I	20.80000 H	0.12E+01	3
856.4606	51	126	SB	12.4000 D	0.18E+02	2
857.3149	53	134	I	52.60000 M	0.70E+01	2
860.5640	81	208	TL	3.05300 M	0.13E+02	2
860.5641	90	232	THTL	1.40E+10 Y	0.45E+01	2
861.6028	57	142	LA	1.54167 H	0.18E+01	2
863.9741	27	58	CO	70.8600 D	0.69E+00	3
867.1006	63	156	EU	15.1900 D	0.14E+01	2
867.2463	36	89	KR	3.16000 M	0.59E+01	2
867.3900	63	152	EU	13.5100 Y	0.42E+01	2
867.8306	57	140	LA	1.6782 D	0.56E+01	2
871.1190	41	94	NB	2.00E+04 Y	0.10E+03	1
871.7288	55	138	CS	32.20000 M	0.51E+01	2
873.2299	63	154	EU	8.5880 Y	0.11E+02	2
874.8088	76	185	OS	93.6000 D	0.66E+01	2
875.3145	53	133	I	20.80000 H	0.45E+01	2
875.8558	44	105	RU	4.44000 H	0.25E+01	2
876.1182	56	141	BA	18.27000 M	0.34E+01	3
877.2304	53	132	I	2.28400 H	0.11E+01	3
877.4238	42	101	MO	14.60000 M	0.34E+01	2
879.3671	65	160	TB	72.3000 D	0.30E+02	1
880.2637	76	185	OS	93.6000 D	0.50E+01	2
881.6857	35	84	BR	31.80000 M	0.41E+02	2
884.1265	53	134	I	52.60000 M	0.65E+02	1
884.6850	47	110	AGM	249.7600 D	0.73E+02	2
889.2770	21	46	SC	83.7900 D	0.10E+03	1
894.9255	57	142	LA	1.54167 H	0.85E+01	2
894.9811	56	142	BA	10.60000 M	0.13E+02	2
898.0420	39	88	Y	106.6300 D	0.94E+02	2
898.0646	37	88	RB	17.80000 M	0.15E+02	2
904.4658	36	89	KR	3.16000 M	0.71E+01	2

909.6913	41	98	NBM	51.30000	M	0.10E+01	3
909.9943	52	131	TEM	1.2500	D	0.33E+01	3
911.1572	89	228	AC	6.13000	H	0.29E+02	1
911.1573	90	232	THAC	1.40E+10	Y	0.29E+02	1
918.7400	39	94	Y	18.70000	M	0.56E+02	1
919.5476	57	140	LA	1.6782	D	0.27E+01	3
920.5714	52	131	TEM	1.2500	D	0.12E+01	3
925.1893	57	140	LA	1.6782	D	0.71E+01	2
925.7709	38	91	SR	9.52000	H	0.38E+01	2
928.6381	22	51	TI	5.76000	M	0.69E+01	3
933.8470	48	115	CDM	44.6000	D	0.20E+01	1
934.0389	83	214	BI	19.90000	M	0.32E+01	2
934.0390	88	226	RABI	1.60E+03	Y	0.32E+01	3
934.3082	42	101	MO	14.60000	M	0.34E+01	2
934.5264	39	92	Y	3.54000	H	0.14E+02	1
934.5265	41	92	NBM	10.1500	D	0.99E+02	1
937.4930	47	110	AGM	249.7600	D	0.34E+02	2
941.8035	36	90	KR	32.32000	S	0.12E+01	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
944.3153	63	156	EU	15.1900	D	0.14E+01	2
947.1816	39	93	Y	10.25000	H	0.19E+01	2
947.8013	53	134	I	52.60000	M	0.40E+01	2
947.8834	37	89	RB	15.20000	M	0.92E+01	2
948.5482	52	131	TE	25.00000	M	0.23E+01	3
948.8912	56	142	BA	10.60000	M	0.10E+02	2
953.3985	38	92	SR	2.71000	H	0.35E+01	2
953.9274	51	126	SB	12.4000	D	0.15E+01	3
954.1294	39	95	Y	10.30000	M	0.19E+02	1
954.6213	53	132	I	2.28400	H	0.18E+02	2
960.5191	63	156	EU	15.1900	D	0.16E+01	2
962.2975	65	160	TB	72.3000	D	0.98E+01	2
963.3601	63	152	EUM	9.32000	H	0.12E+02	2
964.1102	63	152	EU	13.5100	Y	0.14E+02	2
964.6375	89	228	AC	6.13000	H	0.58E+01	2
964.6376	90	232	THAC	1.40E+10	Y	0.58E+01	2
966.1546	65	160	TB	72.3000	D	0.25E+02	2
968.2010	51	124	SB	60.2000	D	0.19E+01	3
968.9707	89	228	AC	6.13000	H	0.17E+02	2
968.9708	90	232	THAC	1.40E+10	Y	0.17E+02	2
969.4630	44	105	RU	4.44000	H	0.21E+01	2
972.6321	53	135	I	6.55000	H	0.12E+01	2
974.7084	53	134	I	52.60000	M	0.48E+01	2
977.4763	27	56	CO	77.3500	D	0.14E+01	3
983.5012	21	48	SC	1.8208	D	0.10E+03	2
985.8127	36	88	KR	2.84000	H	0.13E+01	2
989.1292	51	126	SB	12.4000	D	0.68E+01	2
993.0955	41	98	NBM	51.30000	M	0.11E+01	3
996.3293	63	154	EU	8.5880	Y	0.10E+02	2
996.4038	41	98	NBM	51.30000	M	0.20E+01	3
997.2487	52	131	TE	25.00000	M	0.33E+01	3
1000.9460	56	142	BA	10.60000	M	0.91E+01	2
1000.9970	91	234	PAM	4.47E+09	Y	0.84E+00	1
1001.7018	73	182	TA	115.0000	D	0.20E+01	3
1002.8687	65	160	TB	72.3000	D	0.10E+01	2
1004.7747	63	154	EU	8.5880	Y	0.18E+02	2
1007.5900	35	82	BR	1.4708	D	0.13E+01	3
1009.7675	55	138	CS	32.20000	M	0.30E+02	2
1011.2596	42	101	MO	14.60000	M	0.23E+01	2
1011.4744	57	142	LA	1.54167	H	0.39E+01	2

1012.5336	42	101	MO	14.60000	M	0.13E+02	1
1014.4288	12	27	MG	9.46200	M	0.29E+02	2
1016.0457	35	84	BR	31.80000	M	0.66E+01	2
1021.1875	40	97	ZR	16.90000	H	0.13E+01	3
1023.9477	41	98	NBM	51.30000	M	0.10E+01	3
1024.2842	38	91	SR	9.52000	H	0.33E+02	1
1024.7150	41	97	NB	1.20167	H	0.11E+01	3
1032.0773	37	89	RB	15.20000	M	0.58E+02	1
1034.7261	51	126	SB	12.4000	D	0.10E+01	3
1037.4961	21	48	SC	1.8208	D	0.98E+02	2
1037.8440	27	56	CO	77.3500	D	0.14E+02	2
1038.5920	55	134	CS	2.0652	Y	0.99E+00	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
1038.7544	53	135	I	6.55000	H	0.79E+01	2
1039.3496	29	66	CU	5.10000	M	0.74E+01	1
1040.1323	53	134	I	52.60000	M	0.19E+01	3
1043.7206	57	142	LA	1.54167	H	0.27E+01	2
1044.0770	35	82	BR	1.4708	D	0.28E+02	2
1045.1310	51	124	SB	60.2000	D	0.19E+01	3
1047.5819	56	131	BA	11.8000	D	0.12E+01	3
1048.0934	55	136	CS	13.1600	D	0.80E+02	1
1048.5574	39	95	Y	10.30000	M	0.10E+01	2
1050.3599	45	106	RH	1.0200	Y	0.15E+01	2
1059.7098	52	131	TEM	1.2500	D	0.15E+01	3
1065.1561	63	156	EU	15.1900	D	0.52E+01	2
1072.5729	53	134	I	52.60000	M	0.15E+02	2
1076.6874	37	86	RB	18.6400	D	0.88E+01	1
1078.5168	56	142	BA	10.60000	M	0.11E+02	2
1079.2030	63	156	EU	15.1900	D	0.48E+01	2
1085.8420	63	152	EU	13.5100	Y	0.10E+02	2
1089.7670	63	152	EU	13.5100	Y	0.17E+01	3
1093.7137	56	142	BA	10.60000	M	0.26E+01	2
1097.2858	49	116	INM	54.15000	M	0.56E+02	2
1099.2510	26	59	FE	44.5100	D	0.56E+02	1
1101.5291	53	135	I	6.55000	H	0.16E+01	2
1107.9684	36	89	KR	3.16000	M	0.29E+01	2
1112.0870	63	152	EU	13.5100	Y	0.14E+02	2
1114.2732	54	138	XE	14.08000	M	0.15E+01	3
1115.1121	65	160	TB	72.3000	D	0.15E+01	2
1115.5179	28	65	NI	2.52000	H	0.15E+02	2
1115.5460	30	65	ZN	244.2600	D	0.51E+02	1
1116.7964	36	89	KR	3.16000	M	0.17E+01	3
1118.7194	36	90	KR	32.32000	S	0.36E+02	1
1120.2727	83	214	BI	19.90000	M	0.15E+02	2
1120.2737	88	226	RABI	1.60E+03	Y	0.15E+02	2
1120.5450	21	46	SC	83.7900	D	0.10E+03	2
1121.3010	73	182	TA	115.0000	D	0.35E+02	2
1123.9688	53	135	I	6.55000	H	0.36E+01	2
1125.4750	52	131	TEM	1.2500	D	0.11E+02	2
1129.6609	13	26	AL	7.20E+05	Y	0.25E+01	3
1131.5233	53	135	I	6.55000	H	0.23E+02	2
1136.1755	53	132	I	2.28400	H	0.30E+01	3
1136.2476	53	134	I	52.60000	M	0.92E+01	2
1138.9000	39	94	Y	18.70000	M	0.60E+01	2
1141.4043	36	88	KR	2.84000	H	0.13E+01	2
1142.4244	38	92	SR	2.71000	H	0.28E+01	2
1143.6133	53	132	I	2.28400	H	0.14E+01	3
1146.9641	52	131	TE	25.00000	M	0.50E+01	3
1147.2708	55	138	CS	32.20000	M	0.12E+01	3

1147.9438	40	97	ZR	16.90000	H	0.26E+01	1
1148.8224	52	131	TEM	1.2500	D	0.15E+01	3
1153.7537	63	156	EU	15.1900	D	0.12E+02	2
1155.1825	83	214	BI	19.90000	M	0.17E+01	2
1155.1835	88	226	RABI	1.60E+03	Y	0.17E+01	3
1157.4932	53	130	I	12.36000	H	0.11E+02	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1160.2694	57	142	LA	1.54167	H	0.18E+01 2
1161.0574	42	101	MO	14.60000	M	0.40E+01 2
1167.9443	55	134	CS	2.0652	Y	0.18E+01 3
1168.9194	41	98	NBM	51.30000	M	0.18E+02 2
1173.2380	27	60	CO	5.2719	Y	0.10E+03 2
1173.2606	53	132	I	2.28400	H	0.11E+01 3
1175.0990	27	56	CO	77.3500	D	0.23E+01 3
1175.4850	36	87	KR	1.27183	H	0.11E+01 3
1177.9409	65	160	TB	72.3000	D	0.15E+02 2
1189.0500	73	182	TA	115.0000	D	0.17E+02 2
1197.3574	56	141	BA	18.27000	M	0.46E+01 3
1199.9012	65	160	TB	72.3000	D	0.23E+01 2
1202.3353	56	142	BA	10.60000	M	0.62E+01 2
1204.1162	56	142	BA	10.60000	M	0.16E+02 2
1204.9567	39	91	Y	58.5100	D	0.30E+00 1
1206.6047	52	131	TEM	1.2500	D	0.97E+01 2
1212.7563	51	126	SB	12.4000	D	0.23E+01 3
1212.8492	21	48	SC	1.8208	D	0.24E+01 3
1212.9700	63	152	EU	13.5100	Y	0.14E+01 3
1213.0242	33	76	AS	1.0967	D	0.14E+01 2
1213.4058	35	84	BR	31.80000	M	0.25E+01 2
1216.1370	33	76	AS	1.0967	D	0.34E+01 2
1221.4080	73	182	TA	115.0000	D	0.27E+02 1
1228.6716	33	76	AS	1.0967	D	0.12E+01 3
1230.3926	41	98	NBM	51.30000	M	0.15E+01 3
1230.6866	63	156	EU	15.1900	D	0.88E+01 2
1231.0160	73	182	TA	115.0000	D	0.12E+02 2
1233.2196	57	142	LA	1.54167	H	0.18E+01 2
1235.4193	55	136	CS	13.1600	D	0.20E+02 2
1236.4042	53	133	I	20.80000	H	0.15E+01 3
1238.1073	83	214	BI	19.90000	M	0.59E+01 2
1238.1083	88	226	RABI	1.60E+03	Y	0.59E+01 2
1238.2870	27	56	CO	77.3500	D	0.67E+02 2
1242.4569	63	156	EU	15.1900	D	0.66E+01 2
1248.2798	37	89	RB	15.20000	M	0.43E+02 2
1250.7506	36	88	KR	2.84000	H	0.11E+01 2
1251.1622	42	101	MO	14.60000	M	0.46E+01 2
1257.4180	73	182	TA	115.0000	D	0.15E+01 3
1257.8702	41	98	NBM	51.30000	M	0.11E+01 3
1260.4200	53	135	I	6.55000	H	0.29E+02 1
1266.1678	14	31	SI	2.62167	H	0.70E-01 1
1271.8596	65	160	TB	72.3000	D	0.75E+01 2
1273.9202	36	89	KR	3.16000	M	0.14E+01 3
1274.5420	11	22	NA	2.6032	Y	0.10E+03 1
1274.5435	63	154	EU	8.5880	Y	0.35E+02 1
1276.1277	40	97	ZR	16.90000	H	0.97E+00 3
1277.4596	63	156	EU	15.1900	D	0.32E+01 2
1280.8546	38	91	SR	9.52000	H	0.93E+00 3
1280.9519	83	214	BI	19.90000	M	0.15E+01 2
1280.9529	88	226	RABI	1.60E+03	Y	0.15E+01 3
1283.3882	55	139	CS	9.27000	M	0.77E+01 1
1289.1560	73	182	TA	115.0000	D	0.14E+01 3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1290.5994	48	115	CDM	44.6000 D	0.89E+00	2
1290.7915	53	132	I	2.28400 H	0.11E+01	3
1291.5959	26	59	FE	44.5100 D	0.44E+02	2
1293.5864	49	116	INM	54.15000 M	0.84E+02	1
1293.6400	18	41	AR	1.82667 H	0.99E+02	1
1295.3553	53	132	I	2.28400 H	0.20E+01	3
1297.0575	20	47	CA	4.5360 D	0.75E+02	1
1298.2097	53	133	I	20.80000 H	0.23E+01	3
1299.1520	63	152	EU	13.5100 Y	0.16E+01	3
1304.0348	42	101	MO	14.60000 M	0.28E+01	2
1312.0463	21	48	SC	1.8208 D	0.10E+03	1
1312.1444	65	160	TB	72.3000 D	0.29E+01	2
1317.4730	35	82	BR	1.4708 D	0.27E+02	2
1324.1309	39	95	Y	10.30000 M	0.53E+01	2
1324.5039	36	89	KR	3.16000 M	0.30E+01	2
1325.5120	51	124	SB	60.2000 D	0.16E+01	3
1332.5020	27	60	CO	5.2719 Y	0.10E+03	1
1335.5881	41	98	NBM	51.30000 M	0.13E+01	3
1343.5464	55	138	CS	32.20000 M	0.11E+01	3
1345.0065	54	139	XE	39.68000 S	0.11E+01	3
1345.7827	29	64	CU	12.70100 H	0.47E+00	1
1355.1771	51	124	SB	60.2000 D	0.10E+01	3
1356.8438	8	19	O	26.91000 S	0.50E+02	1
1360.2061	27	56	CO	77.3500 D	0.43E+01	2
1362.6510	40	97	ZR	16.90000 H	0.13E+01	3
1363.0129	57	142	LA	1.54167 H	0.21E+01	2
1365.1844	55	134	CS	2.0652 Y	0.30E+01	3
1366.4442	63	156	EU	15.1900 D	0.17E+01	2
1368.1639	51	124	SB	60.2000 D	0.27E+01	3
1368.6331	11	24	NA	14.96544 H	0.10E+03	2
1369.4159	36	88	KR	2.84000 H	0.15E+01	2
1372.0812	53	132	I	2.28400 H	0.25E+01	3
1377.6586	83	214	BI	19.90000 M	0.40E+01	2
1377.6595	88	226	RABI	1.60E+03 Y	0.40E+01	3
1379.9893	56	142	BA	10.60000 M	0.39E+01	2
1382.4690	37	88	RB	17.80000 M	0.78E+00	2
1384.0562	38	92	SR	2.71000 H	0.90E+02	1
1384.3000	47	110	AGM	249.7600 D	0.24E+02	2
1398.5646	53	132	I	2.28400 H	0.71E+01	2
1401.4832	83	214	BI	19.90000 M	0.14E+01	3
1401.4841	88	226	RABI	1.60E+03 Y	0.14E+01	3
1405.4224	39	92	Y	3.54000 H	0.48E+01	2
1407.9697	83	214	BI	19.90000 M	0.25E+01	2
1407.9707	88	226	RABI	1.60E+03 Y	0.25E+01	3
1408.0220	63	152	EU	13.5100 Y	0.21E+02	2
1413.5056	38	91	SR	9.52000 H	0.98E+00	3
1423.7694	36	90	KR	32.32000 S	0.27E+01	2
1432.2975	41	98	NBM	51.30000 M	0.54E+01	2
1434.0820	23	52	V	3.75000 M	0.10E+03	1
1435.7979	55	138	CS	32.20000 M	0.76E+02	1
1436.5630	51	124	SB	60.2000 D	0.13E+01	3
1436.6366	41	98	NBM	51.30000 M	0.25E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1442.5428	53	132	I	2.28400 H	0.14E+01	3
1444.0852	8	19	O	26.91000 S	0.26E+01	3
1455.2560	53	134	I	52.60000 M	0.23E+01	3
1457.5729	53	135	I	6.55000 H	0.86E+01	2

1459.1932	89	228	AC	6.13000	H	0.11E+01	2
1459.1942	90	232	THAC	1.40E+10	Y	0.11E+01	3
1460.8300	19	40	K	1.26E+09	Y	0.11E+02	1
1463.6989	35	84	BR	31.80000	M	0.17E+01	2
1472.9863	36	89	KR	3.16000	M	0.68E+01	2
1474.8800	35	82	BR	1.4708	D	0.16E+02	2
1475.7880	47	110	AGM	249.7600	D	0.40E+01	3
1481.8999	28	65	NI	2.52000	H	0.24E+02	1
1489.1600	59	144	PR	17.29000	M	0.28E+00	2
1496.0311	89	228	AC	6.13000	H	0.10E+01	2
1496.0321	90	232	THAC	1.40E+10	Y	0.10E+01	3
1501.1827	36	89	KR	3.16000	M	0.13E+01	3
1502.7657	53	135	I	6.55000	H	0.11E+01	2
1505.0400	47	110	AGM	249.7600	D	0.13E+02	2
1507.6787	49	116	INM	54.15000	M	0.10E+02	2
1509.2189	83	214	BI	19.90000	M	0.22E+01	2
1509.2198	88	226	RABI	1.60E+03	Y	0.22E+01	3
1511.7538	41	98	NBM	51.30000	M	0.54E+01	2
1518.4169	36	88	KR	2.84000	H	0.22E+01	2
1524.6650	19	42	K	12.35900	H	0.18E+02	1
1529.7651	36	88	KR	2.84000	H	0.11E+02	2
1530.3679	36	89	KR	3.16000	M	0.33E+01	2
1532.5131	42	101	MO	14.60000	M	0.60E+01	2
1533.8975	36	89	KR	3.16000	M	0.51E+01	2
1537.8191	36	90	KR	32.32000	S	0.90E+01	2
1538.2642	37	89	RB	15.20000	M	0.26E+01	2
1541.0262	41	98	NBM	51.30000	M	0.21E+01	3
1545.9703	57	142	LA	1.54167	H	0.30E+01	2
1546.1930	41	98	NBM	51.30000	M	0.42E+01	2
1552.1633	36	90	KR	32.32000	S	0.20E+01	2
1553.9707	8	19	O	26.91000	S	0.14E+01	3
1562.3030	47	110	AGM	249.7600	D	0.10E+01	3
1566.3959	53	135	I	6.55000	H	0.13E+01	2
1575.4614	59	142	PR	19.13000	H	0.37E+01	1
1588.2271	89	228	AC	6.13000	H	0.36E+01	2
1588.2280	90	232	THAC	1.40E+10	Y	0.36E+01	2
1593.0000	63	154	EU	8.5880	Y	0.10E+01	3
1596.5431	57	140	LA	1.6782	D	0.95E+02	1
1596.5818	63	154	EU	8.5880	Y	0.18E+01	3
1613.7889	53	134	I	52.60000	M	0.43E+01	2
1618.3866	39	95	Y	10.30000	M	0.17E+01	2
1620.7350	83	212	BI	2.5229	D	0.15E+01	2
1620.7360	90	232	THBI	1.40E+10	Y	0.15E+01	2
1630.4746	89	228	AC	6.13000	H	0.19E+01	2
1630.4756	90	232	THAC	1.40E+10	Y	0.19E+01	3
1633.6021	9	20	F	11.03000	S	0.10E+03	1
1642.6902	17	38	CL	37.24000	M	0.31E+02	2
1646.0009	52	131	TEM	1.2500	D	0.12E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
1658.1976	36	90	KR	32.32000	S	0.12E+01 2
1661.2577	83	214	BI	19.90000	M	0.11E+01 3
1661.2587	88	226	RABI	1.60E+03	Y	0.11E+01 3
1670.4485	54	139	XE	39.68000	S	0.10E+01 3
1671.4000	39	94	Y	18.70000	M	0.25E+01 2
1674.7526	27	58	CO	70.8600	D	0.52E+00 3
1678.0824	53	135	I	6.55000	H	0.95E+01 2
1682.1993	56	141	BA	18.27000	M	0.13E+01 3
1690.9800	51	124	SB	60.2000	D	0.47E+02 2
1693.9564	36	89	KR	3.16000	M	0.44E+01 2

1701.7430	41	98	NBM	51.30000	M	0.93E+01	2
1706.4868	53	135	I	6.55000	H	0.41E+01	2
1723.0354	57	142	LA	1.54167	H	0.15E+01	2
1729.5803	83	214	BI	19.90000	M	0.30E+01	2
1729.5813	88	226	RABI	1.60E+03	Y	0.30E+01	3
1740.6395	36	87	KR	1.27183	H	0.20E+01	3
1741.3845	35	84	BR	31.80000	M	0.16E+01	2
1741.4354	53	134	I	52.60000	M	0.27E+01	3
1750.5034	40	97	ZR	16.90000	H	0.13E+01	3
1752.8938	49	116	INM	54.15000	M	0.25E+01	3
1756.5225	57	142	LA	1.54167	H	0.30E+01	2
1764.4901	83	214	BI	19.90000	M	0.16E+02	2
1764.4911	88	226	RABI	1.60E+03	Y	0.16E+02	2
1768.3940	54	138	XE	14.08000	M	0.17E+02	2
1771.3500	27	56	CO	77.3500	D	0.16E+02	2
1778.9878	13	28	AL	2.24060	M	0.10E+03	1
1779.9926	36	90	KR	32.32000	S	0.62E+01	2
1791.2241	53	135	I	6.55000	H	0.77E+01	2
1805.9575	39	95	Y	10.30000	M	0.15E+01	2
1806.8589	53	134	I	52.60000	M	0.55E+01	2
1808.6484	13	26	AL	7.20E+05	Y	0.10E+03	1
1810.7985	25	56	MN	2.57850	H	0.27E+02	1
1836.0630	39	88	Y	106.6300	D	0.99E+02	1
1836.0770	37	88	RB	17.80000	M	0.22E+02	1
1847.4147	83	214	BI	19.90000	M	0.21E+01	2
1847.4156	88	226	RABI	1.60E+03	Y	0.21E+01	3
1850.8787	54	138	XE	14.08000	M	0.14E+01	3
1876.9659	63	156	EU	15.1900	D	0.17E+01	2
1877.3927	35	84	BR	31.80000	M	0.11E+01	3
1885.4548	41	98	NBM	51.30000	M	0.28E+01	3
1887.7219	52	131	TEM	1.2500	D	0.14E+01	3
1897.7200	35	84	BR	31.80000	M	0.13E+02	1
1901.4495	57	142	LA	1.54167	H	0.79E+01	2
1903.5444	36	89	KR	3.16000	M	0.10E+01	3
1917.8220	39	93	Y	10.25000	H	0.14E+01	2
1921.0560	53	132	I	2.28400	H	0.12E+01	3
1937.6345	63	156	EU	15.1900	D	0.21E+01	2
1940.3234	39	95	Y	10.30000	M	0.28E+01	2
1945.5189	41	98	NBM	51.30000	M	0.14E+01	3
1965.9502	63	156	EU	15.1900	D	0.41E+01	2
1980.5590	41	98	NBM	51.30000	M	0.33E+01	2
2001.0494	52	131	TEM	1.2500	D	0.20E+01	3

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
2002.3453	53	132	I	2.28400	H	0.11E+01	3
2004.7804	54	138	XE	14.08000	M	0.54E+01	2
2007.7014	37	89	RB	15.20000	M	0.24E+01	2
2011.9063	36	87	KR	1.27183	H	0.29E+01	3
2012.4221	36	89	KR	3.16000	M	0.16E+01	3
2015.1790	27	56	CO	77.3500	D	0.30E+01	3
2015.9421	54	138	XE	14.08000	M	0.12E+02	2
2026.6188	63	156	EU	15.1900	D	0.35E+01	2
2029.6968	35	84	BR	31.80000	M	0.20E+01	2
2029.8834	36	88	KR	2.84000	H	0.45E+01	2
2032.1851	42	101	MO	14.60000	M	0.69E+01	2
2034.7590	27	56	CO	77.3500	D	0.78E+01	2
2035.4558	36	88	KR	2.84000	H	0.37E+01	2
2041.2540	42	101	MO	14.60000	M	0.21E+01	2
2055.1870	57	142	LA	1.54167	H	0.27E+01	2
2079.2937	54	138	XE	14.08000	M	0.14E+01	3

2090.9419	51	124	SB	60.2000	D	0.55E+01	2
2097.7800	63	156	EU	15.1900	D	0.42E+01	2
2112.3198	49	116	INM	54.15000	M	0.16E+02	2
2113.1863	25	56	MN	2.57850	H	0.14E+02	2
2118.5254	83	214	BI	19.90000	M	0.12E+01	3
2118.5264	88	226	RABI	1.60E+03	Y	0.12E+01	3
2127.5254	36	90	KR	32.32000	S	0.13E+01	2
2140.6001	39	94	Y	18.70000	M	0.95E+00	3
2167.6802	17	38	CL	37.24000	M	0.42E+02	1
2175.9556	39	95	Y	10.30000	M	0.82E+01	2
2180.9458	63	156	EU	15.1900	D	0.24E+01	2
2185.6621	59	144	PR	17.29000	M	0.70E+00	1
2186.7642	63	156	EU	15.1900	D	0.39E+01	2
2187.2170	57	142	LA	1.54167	H	0.53E+01	2
2195.8037	36	88	KR	2.84000	H	0.13E+02	2
2196.1489	37	89	RB	15.20000	M	0.13E+02	2
2200.5249	35	84	BR	31.80000	M	0.11E+01	3
2204.0906	83	214	BI	19.90000	M	0.50E+01	2
2204.0916	88	226	RABI	1.60E+03	Y	0.50E+01	2
2217.8428	55	138	CS	32.20000	M	0.15E+02	2
2231.7898	36	88	KR	2.84000	H	0.34E+01	2
2252.3279	54	138	XE	14.08000	M	0.23E+01	3
2269.9299	63	156	EU	15.1900	D	0.11E+01	2
2296.0435	39	95	Y	10.30000	M	0.14E+01	2
2392.1375	36	88	KR	2.84000	H	0.35E+02	1
2397.7681	57	142	LA	1.54167	H	0.15E+02	2
2408.6570	53	135	I	6.55000	H	0.95E+00	2
2447.6750	83	214	BI	19.90000	M	0.16E+01	2
2447.6760	88	226	RABI	1.60E+03	Y	0.16E+01	3
2484.2527	35	84	BR	31.80000	M	0.66E+01	2
2521.7209	57	140	LA	1.6782	D	0.34E+01	2
2522.9517	25	56	MN	2.57850	H	0.99E+00	3
2542.6946	57	142	LA	1.54167	H	0.10E+02	1
2554.9182	36	87	KR	1.27183	H	0.92E+01	2
2558.0820	36	87	KR	1.27183	H	0.39E+01	3
2570.3223	37	89	RB	15.20000	M	0.99E+01	2

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
2598.4600	27	56	CO	77.3500	D	0.17E+02	2
2614.5330	81	208	TL	3.05300	M	0.10E+03	1
2614.5339	90	232	THTL	1.40E+10	Y	0.36E+02	1
2632.2083	39	95	Y	10.30000	M	0.51E+01	2
2639.4424	55	138	CS	32.20000	M	0.76E+01	2
2657.5811	25	56	MN	2.57850	H	0.65E+00	3
2666.8113	57	142	LA	1.54167	H	0.17E+01	2
2677.9158	37	88	RB	17.80000	M	0.20E+01	2
2707.3914	37	89	RB	15.20000	M	0.20E+01	2
2754.0300	11	24	NA	14.96544	H	0.10E+03	1
2824.2688	35	84	BR	31.80000	M	0.11E+01	3
2866.3772	36	89	KR	3.16000	M	0.17E+01	3
2971.9805	57	142	LA	1.54167	H	0.30E+01	2

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This listing was generated using the VAXGAP PRLIB command [2].

MASTER

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
4	7	BE	53.2000 D	477.6050	1.04E+01	1
8	19	O	26.91000 S	109.8945	2.54E+00	3
				197.1420	9.59E+01	2
				1356.8438	5.03E+01	1
				1444.0852	2.64E+00	3
				1553.9707	1.39E+00	3
9	20	F	11.03000 S	1633.6021	1.00E+02	1
11	22	NA	2.6032 Y	1274.5420	9.99E+01	1
11	24	NA	14.96544 H	1368.6331	1.00E+02	2
				2754.0300	9.99E+01	1
12	27	MG	9.46200 M	170.6772	7.89E-01	3
				843.7573	7.30E+01	1
				1014.4288	2.91E+01	2
13	26	AL	7.20E+05 Y	1129.6609	2.47E+00	3
				1808.6484	9.98E+01	1
13	28	AL	2.24060 M	1778.9878	1.00E+02	1
14	31	SI	2.62167 H	1266.1678	7.00E-02	1
17	38	CL	37.24000 M	1642.6902	3.10E+01	2
				2167.6802	4.20E+01	1
18	41	AR	1.82667 H	1293.6400	9.92E+01	1
19	42	K	12.35900 H	312.7460	3.20E-01	3
				1524.6650	1.79E+01	1
19	40	K	1.26E+09 Y	1460.8300	1.07E+01	1
20	47	CA	4.5360 D	489.2168	6.74E+00	2
				807.8496	6.89E+00	2
				1297.0575	7.49E+01	1
21	47	SC	3.3510 D	159.3815	6.80E+01	1
21	48	SC	1.8208 D	175.3571	7.47E+00	2
				983.5012	1.00E+02	2
				1037.4961	9.75E+01	2
				1212.8492	2.38E+00	3
				1312.0463	1.00E+02	1
21	46	SC	83.7900 D	889.2770	1.00E+02	1

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
21	46	SC	83.7900 D	1120.5450	1.00E+02	2
22	51	TI	5.76000 M	320.0841	9.30E+01	1
				608.5581	1.18E+00	3
				928.6381	6.88E+00	3
23	52	V	3.75000 M	1434.0820	1.00E+02	1
24	51	CR	27.7060 D	320.0842	9.85E+00	1
25	54	MN	312.3000 D	834.8430	1.00E+02	1
25	56	MN	2.57850 H	846.8121	9.89E+01	2
				1810.7985	2.72E+01	1
				2113.1863	1.43E+01	2
				2522.9517	9.90E-01	3
				2657.5811	6.53E-01	3
26	59	FE	44.5100 D	142.6520	9.80E-01	3
				192.3490	2.95E+00	2
				1099.2510	5.61E+01	1
				1291.5959	4.36E+01	2
27	57	CO	271.7900 D	122.0614	8.57E+01	1
				136.4743	1.07E+01	2
27	58	CO	70.8600 D	810.7915	9.94E+01	1
				863.9741	6.90E-01	3
				1674.7526	5.19E-01	3
27	56	CO	77.3500 D	846.7640	9.99E+01	1
				977.4763	1.40E+00	3
				1037.8440	1.41E+01	2
				1175.0990	2.26E+00	3
				1238.2870	6.69E+01	2
				1360.2061	4.29E+00	2
				1771.3500	1.55E+01	2
				2015.1790	3.03E+00	3
				2034.7590	7.78E+00	2
				2598.4600	1.67E+01	2
27	60	CO	5.2719 Y	1173.2380	9.99E+01	2
				1332.5020	1.00E+02	1
28	65	NI	2.52000 H	366.3223	4.61E+00	2
				1115.5179	1.48E+01	2
				1481.8999	2.35E+01	1
29	66	CU	5.10000 M	1039.3496	7.40E+00	1
29	64	CU	12.70100 H	1345.7827	4.70E-01	1
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
30	69	ZNM	13.76000 H	438.6340	9.48E+01	1
30	65	ZN	244.2600 D	1115.5460	5.08E+01	1

32	75	GE	1.37967	H	198.5959	1.17E+00	2
					264.6556	1.13E+01	1
33	76	AS	1.0967	D	559.0797	4.50E+01	1
					563.2683	1.20E+00	3
					657.0624	6.17E+00	2
					1213.0242	1.43E+00	2
					1216.1370	3.42E+00	2
					1228.6716	1.15E+00	3
34	75	SE	119.6400	D	66.0599	1.14E+00	3
					96.7337	3.48E+00	3
					121.1192	1.73E+01	2
					136.0017	5.90E+01	2
					198.5960	1.47E+00	3
					264.6557	5.91E+01	1
					279.5381	2.52E+01	2
					303.9236	1.34E+00	3
					400.6568	1.16E+01	2
35	82	BR	1.4708	D	221.4590	2.27E+00	3
					554.3500	7.06E+01	2
					606.3300	1.25E+00	3
					619.1100	4.33E+01	2
					698.3680	2.84E+01	2
					776.5160	8.34E+01	1
					827.8310	2.41E+01	2
					1007.5900	1.27E+00	3
					1044.0770	2.75E+01	2
					1317.4730	2.70E+01	2
					1474.8800	1.64E+01	2
35	83	BR	2.39000	H	520.4613	6.22E-02	2
					529.6505	1.30E+00	1
35	84	BR	31.80000	M	605.0319	1.72E+00	2
					736.8399	1.27E+00	3
					802.3930	5.90E+00	2
					881.6857	4.10E+01	2
					1016.0457	6.59E+00	2
					1213.4058	2.54E+00	2
					1463.6989	1.72E+00	2
					1741.3845	1.60E+00	2
					1877.3927	1.11E+00	3
					1897.7200	1.34E+01	1
					2029.6968	2.05E+00	2
Z	A	ID	HALF LIFE		ENERGY	BR	I-CODE
35	84	BR	31.80000	M	2200.5249	1.15E+00	3
					2484.2527	6.56E+00	2
					2824.2688	1.11E+00	3
36	90	KR	32.32000	S	121.7190	3.62E+01	2
					234.4322	2.46E+00	2
					242.1779	9.23E+00	2
					249.3230	1.27E+00	2
					433.4497	1.21E+00	2
					492.6179	1.12E+00	3
					539.4855	2.86E+01	2

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			554.3762	4.71E+00	2	
			619.0703	1.01E+00	3	
			731.2928	1.38E+00	2	
			941.8035	1.24E+00	2	
			1118.7194	3.62E+01	1	
			1423.7694	2.73E+00	2	
			1537.8191	8.98E+00	2	
			1552.1633	2.04E+00	2	
			1658.1976	1.23E+00	2	
			1779.9926	6.23E+00	2	
			2127.5254	1.28E+00	2	
36	85	KRM	4.48000 H	151.1809	7.51E+01	1
				304.8568	1.37E+01	2
36	88	KR	2.84000 H	165.9245	3.10E+00	2
				196.3389	2.60E+01	2
				362.2630	2.25E+00	2
				834.8587	1.30E+01	2
				985.8127	1.32E+00	2
				1141.4043	1.28E+00	2
				1250.7506	1.12E+00	2
				1369.4159	1.48E+00	2
				1518.4169	2.15E+00	2
				1529.7651	1.09E+01	2
				2029.8834	4.53E+00	2
				2035.4558	3.74E+00	2
				2195.8037	1.32E+01	2
				2231.7898	3.39E+00	2
				2392.1375	3.46E+01	1
36	89	KR	3.16000 M	197.2817	1.81E+00	3
				220.9741	1.99E+01	2
				345.1641	1.17E+00	3
				356.1947	4.12E+00	2
				369.4584	1.37E+00	3
				411.5917	2.55E+00	2
				497.7242	7.74E+00	2
				577.1678	5.61E+00	2
				585.9959	1.64E+01	1
				696.3801	1.77E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
36	89	KR	3.16000 M	738.5132	4.18E+00	2
				776.6127	1.11E+00	3
				835.7230	1.10E+00	3
				867.2463	5.89E+00	2
				904.4658	7.14E+00	2
				1107.9684	2.90E+00	2
				1116.7964	1.65E+00	3
				1273.9202	1.35E+00	3
				1324.5039	3.05E+00	2
				1472.9863	6.85E+00	2
				1501.1827	1.31E+00	3
				1530.3679	3.30E+00	2
				1533.8975	5.09E+00	2
				1693.9564	4.36E+00	2
				1903.5444	1.03E+00	3
				2012.4221	1.55E+00	3

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			2866.3772	1.73E+00	3	
36	87 KR	1.27183 H	402.6372	4.96E+01	1	
			673.9084	1.89E+00	3	
			845.5031	7.34E+00	2	
			1175.4850	1.11E+00	3	
			1740.6395	2.04E+00	3	
			2011.9063	2.88E+00	3	
			2554.9182	9.23E+00	2	
			2558.0820	3.92E+00	3	
36	85 KR	10.7200 Y	514.0090	4.34E-01	1	
37	89 RB	15.20000 M	272.6467	1.41E+00	3	
			657.8970	9.98E+00	2	
			947.8834	9.22E+00	2	
			1032.0773	5.80E+01	1	
			1248.2798	4.26E+01	2	
			1538.2642	2.55E+00	2	
			2007.7014	2.38E+00	2	
			2196.1489	1.33E+01	2	
			2570.3223	9.86E+00	2	
			2707.3914	2.03E+00	2	
37	88 RB	17.80000 M	898.0646	1.47E+01	2	
			1382.4690	7.80E-01	2	
			1836.0770	2.24E+01	1	
			2677.9158	2.05E+00	2	
37	86 RB	18.6400 D	1076.6874	8.78E+00	1	
38	92 SR	2.71000 H	241.6350	3.00E+00	2	
			430.6625	3.30E+00	2	
			953.3985	3.50E+00	2	
			1142.4244	2.80E+00	2	
			1384.0562	9.00E+01	1	
38	91 SR	9.52000 H	274.5627	1.03E+00	3	
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
38	91 SR	9.52000 H	555.5648	6.15E+01	2	
			620.0663	1.77E+00	3	
			652.8076	1.10E+01	2	
			749.7239	2.36E+01	2	
			925.7709	3.84E+00	2	
			1024.2842	3.34E+01	1	
			1280.8546	9.32E-01	3	
			1413.5056	9.79E-01	3	
38	85 SR	64.8490 D	514.0091	9.93E+01	1	
39	90 YM	3.19000 H	202.4712	9.66E+01	1	
			479.4911	9.07E+01	2	
39	93 Y	10.25000 H	266.9072	6.80E+00	1	
			947.1816	1.95E+00	2	
			1917.8220	1.40E+00	2	
39	94 Y	18.70000 M	381.6000	2.02E+00	2	

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				550.9000	4.93E+00	2
				752.6000	1.40E+00	3
				918.7400	5.60E+01	1
				1138.9000	5.99E+00	2
				1671.4000	2.46E+00	2
				2140.6001	9.52E-01	3
39	95	Y	10.30000 M	432.3586	2.00E+00	2
				954.1294	1.90E+01	1
				1048.5574	1.03E+00	2
				1324.1309	5.26E+00	2
				1618.3866	1.73E+00	2
				1805.9575	1.48E+00	2
				1940.3234	2.76E+00	2
				2175.9556	8.19E+00	2
				2296.0435	1.44E+00	2
				2632.2083	5.07E+00	2
39	92	Y	3.54000 H	448.5198	2.28E+00	2
				561.1139	2.39E+00	2
				844.3140	1.25E+00	2
				934.5264	1.39E+01	1
				1405.4224	4.80E+00	2
39	91	YM	49.71000 M	555.5649	9.49E+01	1
39	88	Y	106.6300 D	898.0420	9.41E+01	2
				1836.0630	9.94E+01	1
39	91	Y	58.5100 D	1204.9567	3.00E-01	1
40	97	ZR	16.90000 H	254.2669	1.25E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
40	97	ZR	16.90000 H	355.4615	2.27E+00	3
				507.6987	5.05E+00	2
				602.5672	1.39E+00	3
				703.7614	9.28E-01	3
				743.3182	9.28E+01	2
				1021.1875	1.35E+00	3
				1147.9438	2.64E+00	1
				1276.1277	9.74E-01	3
				1362.6510	1.35E+00	3
				1750.5034	1.35E+00	3
40	95	ZR	63.9800 D	724.1990	4.42E+01	2
				756.7290	5.45E+01	1
41	93	NBM	16.1300 Y	30.4000	5.18E-04	1
41	98	NBM	51.30000 M	172.9045	3.07E+00	2
				335.3655	1.07E+01	2
				434.3734	1.21E+00	3
				644.9802	5.64E+00	2
				713.9437	8.65E+00	2
				722.6986	7.07E+01	2
				787.3228	9.30E+01	1
				791.6619	7.63E+00	2
				823.5009	2.42E+00	3

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			833.5569	1.02E+01	2
			909.6913	1.02E+00	3
			993.0955	1.12E+00	3
			996.4038	2.05E+00	3
			1023.9477	1.02E+00	3
			1168.9194	1.80E+01	2
			1230.3926	1.49E+00	3
			1257.8702	1.12E+00	3
			1335.5881	1.30E+00	3
			1432.2975	5.36E+00	2
			1436.6366	2.51E+00	3
			1511.7538	5.39E+00	2
			1541.0262	2.14E+00	3
			1546.1930	4.18E+00	2
			1701.7430	9.30E+00	2
			1885.4548	2.79E+00	3
			1945.5189	1.39E+00	3
			1980.5590	3.35E+00	2
41	95 NBM	3.6100 D	204.1136	2.28E+00	3
			235.6800	2.53E+01	1
41	97 NB	1.20167 H	658.2213	9.83E+01	1
			1024.7150	1.08E+00	3
41	94 NB	2.00E+04 Y	702.6450	9.98E+01	2
Z	A	ID	HALF LIFE	ENERGY	BR
					I-CODE
41	94 NB	2.00E+04 Y	871.1190	9.99E+01	1
41	95 NB	34.9750 D	765.8070	9.98E+01	1
41	92 NBM	10.1500 D	934.5265	9.90E+01	1
42	101 MO	14.60000 M	80.9601	3.84E+00	2
			191.9430	1.88E+01	2
			195.9997	2.86E+00	2
			505.9655	1.18E+01	2
			589.6543	5.64E+00	2
			590.9282	1.64E+01	2
			695.6788	7.20E+00	2
			713.1110	3.38E+00	2
			877.4238	3.40E+00	2
			934.3082	3.40E+00	2
			1011.2596	2.26E+00	2
			1012.5336	1.28E+01	1
			1161.0574	3.97E+00	2
			1251.1622	4.61E+00	2
			1304.0348	2.78E+00	2
			1532.5131	5.96E+00	2
			2032.1851	6.94E+00	2
			2041.2540	2.11E+00	2
42	99 MO	2.7470 D	140.4740	9.10E+01	1
			181.0688	6.09E+00	3
			366.4236	1.19E+00	3
			739.5078	1.23E+01	2
			777.9188	4.37E+00	3

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43	101	TC	14.20000 M	127.2200	2.86E+00	3
				184.0948	1.68E+00	3
				306.8311	8.80E+01	1
				531.4449	1.02E+00	3
				545.0455	5.99E+00	3
43	99	TCM	6.00700 H	140.5110	8.90E+01	1
44	105	RU	4.44000 H	129.5966	5.60E+00	2
				149.1725	1.74E+00	2
				262.8453	6.49E+00	2
				316.4894	1.10E+01	2
				393.4020	3.73E+00	2
				413.4927	2.22E+00	2
				469.3541	1.73E+01	2
				499.2531	2.03E+00	2
				656.2463	2.03E+00	2
				676.3369	1.55E+01	2
				724.2661	4.67E+01	1
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
44	105	RU	4.44000 H	875.8558	2.47E+00	2
				969.4630	2.08E+00	2
44	103	RU	39.2550 D	497.0539	8.95E+01	1
				610.2985	5.64E+00	3
45	105	RHM	45.00000 S	129.5967	2.00E+01	1
45	105	RH	1.4733 D	306.2778	5.13E+00	2
				319.2204	1.90E+01	1
45	106	RH	1.0200 Y	621.9170	9.81E+00	1
				1050.3599	1.53E+00	2
46	109	PD	13.70000 H	88.0341	3.61E+00	1
47	108	AGM	127.0000 Y	79.1310	7.62E+00	2
				433.9360	9.05E+01	2
				614.2810	8.98E+01	2
				722.9290	9.08E+01	1
47	110	AGM	249.7600 D	446.8110	3.75E+00	3
				620.3600	2.81E+00	3
				657.7620	9.46E+01	1
				677.6230	1.04E+01	2
				687.0150	6.43E+00	3
				706.6820	1.64E+01	2
				744.2770	4.71E+00	3
				763.9440	2.23E+01	2
				818.0310	7.31E+00	3
				884.6850	7.27E+01	2
				937.4930	3.44E+01	2
				1384.3000	2.43E+01	2
				1475.7880	4.02E+00	3
				1505.0400	1.30E+01	2
				1562.3030	1.03E+00	3
48	109	CD	1.2666 Y	88.0342	3.65E+00	1

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48	115	CD	2.2275 D	260.9080	1.94E+00	3
				336.2585	5.01E+01	2
				492.3620	8.03E+00	2
				527.9100	2.75E+01	1
48	115	CDM	44.6000 D	933.8470	2.00E+00	1
				1290.5994	8.90E-01	2
49	116	INM	54.15000 M	138.3717	3.29E+00	2
				355.4156	8.18E-01	3
				416.9160	2.92E+01	2
				463.3292	8.27E-01	3
				818.7432	1.15E+01	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
49	116	INM	54.15000 M	1097.2858	5.62E+01	2
				1293.5864	8.44E+01	1
				1507.6787	9.96E+00	2
				1752.8938	2.46E+00	3
				2112.3198	1.56E+01	2
49	115	INM	4.48600 H	336.2585	4.58E+01	1
50	117	SNM	13.6100 D	156.0217	2.11E+00	3
				158.5603	8.64E+01	1
50	113	SN	115.0900 D	255.0702	1.90E+00	3
				391.6898	6.49E+01	1
51	127	SB	3.8500 D	61.4268	1.38E+00	2
				252.7457	8.15E+00	2
				290.9805	1.94E+00	2
				412.1878	3.67E+00	2
				445.7084	4.16E+00	2
				473.6144	2.48E+01	2
				543.7256	2.82E+00	2
				604.0521	4.27E+00	2
				685.7275	3.53E+01	1
				698.4531	3.49E+00	2
				722.5526	1.80E+00	2
				783.9791	1.45E+01	2
51	125	SB	2.7590 Y	176.3161	6.90E+00	2
				380.4155	1.51E+00	3
				427.8752	2.94E+01	1
				463.3670	1.04E+01	2
				600.5002	1.78E+01	2
				606.6332	5.00E+00	2
				635.8897	1.13E+01	2
				671.3815	1.81E+00	3
51	126	SB	12.4000 D	278.5582	2.20E+00	3
				296.8904	4.90E+00	2
				414.6096	8.46E+01	2
				554.7978	1.80E+00	3
				573.1299	6.70E+00	2
				592.9862	7.50E+00	2
				656.3478	2.20E+00	3
				666.3698	9.97E+01	1

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674.6799	3.70E+00	2
694.9048	9.97E+01	2
696.8638	3.20E+01	2
720.4111	5.38E+01	2
856.4606	1.75E+01	2
953.9274	1.50E+00	3
989.1292	6.80E+00	2
1034.7261	1.00E+00	3

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
51	126	SB	12.4000 D	1212.7563	2.30E+00	3
51	122	SB	2.7000 D	564.0900	7.06E+01	1
				692.7900	3.70E+00	3
51	124	SB	60.2000 D	602.7300	9.78E+01	1
				645.8550	7.38E+00	2
				709.3248	1.35E+00	3
				713.7810	2.28E+00	3
				722.7860	1.09E+01	2
				968.2010	1.87E+00	3
				1045.1310	1.87E+00	3
				1325.5120	1.59E+00	3
				1355.1771	1.05E+00	3
				1368.1639	2.66E+00	3
				1436.5630	1.25E+00	3
				1690.9800	4.71E+01	2
				2090.9419	5.49E+00	2
52	129	TE	1.16000 H	27.7908	1.63E+01	2
				459.5202	7.70E+00	1
				487.3109	1.42E+00	3
52	127	TEM	109.0000 D	57.6091	5.10E-01	1
				658.8791	1.26E-02	3
52	131	TEM	1.2500 D	81.1304	4.06E+00	2
				102.0643	7.93E+00	2
				149.7167	5.07E+00	2
				200.6369	7.54E+00	2
				240.9340	7.58E+00	2
				278.5703	1.78E+00	3
				334.2768	9.55E+00	2
				365.0518	1.20E+00	3
				452.3300	1.49E+00	3
				462.9409	1.82E+00	3
				586.2961	1.97E+00	3
				665.1075	4.33E+00	2
				713.1304	1.43E+00	3
				744.2170	1.59E+00	3
				773.6761	3.81E+01	2
				782.4791	7.77E+00	2
				793.7713	1.38E+01	2
				822.7761	6.11E+00	2
				852.2351	2.06E+01	1
				909.9943	3.29E+00	3
				920.5714	1.20E+00	3
				1059.7098	1.55E+00	3
				1125.4750	1.14E+01	2

1148.8224	1.51E+00	3
1206.6047	9.74E+00	2
1646.0009	1.24E+00	3

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
52	131	TEM	1.2500 D	1887.7219	1.35E+00	3
				2001.0494	2.01E+00	3
52	132	TE	3.2583 D	111.8601	1.85E+00	3
				116.4001	1.94E+00	3
				228.2601	8.82E+01	1
52	131	TE	25.00000 M	149.7166	6.89E+01	1
				452.3299	1.82E+01	2
				492.6671	4.84E+00	3
				602.0459	4.20E+00	3
				654.2997	1.53E+00	3
				948.5482	2.26E+00	3
				997.2487	3.34E+00	3
				1146.9641	4.96E+00	3
52	123	TE	119.7000 D	158.9887	8.40E+01	1
52	127	TE	9.35000 H	360.3179	1.35E-01	2
				417.9268	1.00E+00	1
52	129	TEM	33.6000 D	695.8412	2.99E+00	1
				729.5334	6.97E-01	2
53	129	I	1.57E+07 Y	39.5710	7.46E+00	1
53	131	I	8.0210 D	80.1845	2.63E+00	3
				284.2989	6.20E+00	3
				364.4832	8.16E+01	1
				636.9747	7.12E+00	3
				722.8918	1.78E+00	3
53	134	I	52.60000 M	135.4063	4.10E+00	2
				235.4974	2.19E+00	3
				405.4623	7.35E+00	2
				433.3716	4.20E+00	2
				458.8935	1.34E+00	3
				488.9096	1.43E+00	3
				514.4314	2.21E+00	3
				540.8681	7.63E+00	2
				595.3820	1.12E+01	2
				621.8187	1.06E+01	2
				627.9756	2.20E+00	3
				677.3566	7.82E+00	2
				730.7876	1.81E+00	3
				766.7329	4.10E+00	2
				847.0613	9.54E+01	2
				857.3149	6.96E+00	2
				884.1265	6.49E+01	1
				947.8013	4.01E+00	2
				974.7084	4.77E+00	2
				1040.1323	1.91E+00	3

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
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53	134	I	52.60000 M	1072.5729	1.50E+01	2
				1136.2476	9.16E+00	2
				1455.2560	2.29E+00	3
				1613.7889	4.29E+00	2
				1741.4354	2.67E+00	3
				1806.8589	5.53E+00	2
53	135	I	6.55000 H	220.5121	1.75E+00	2
				288.4619	3.09E+00	2
				417.6665	3.52E+00	2
				526.5628	1.33E+01	2
				546.5641	7.13E+00	2
				836.8210	6.67E+00	2
				972.6321	1.20E+00	2
				1038.7544	7.93E+00	2
				1101.5291	1.60E+00	2
				1123.9688	3.61E+00	2
				1131.5233	2.25E+01	2
				1260.4200	2.86E+01	1
				1457.5729	8.65E+00	2
				1502.7657	1.07E+00	2
				1566.3959	1.29E+00	2
				1678.0824	9.53E+00	2
				1706.4868	4.09E+00	2
				1791.2241	7.70E+00	2
				2408.6570	9.53E-01	2
53	132	I	2.28400 H	262.7488	1.44E+00	3
				505.9070	5.02E+00	2
				522.6762	1.61E+01	2
				547.0200	1.25E+00	3
				621.1804	1.58E+00	3
				630.2711	1.38E+01	2
				650.5872	2.66E+00	3
				667.7339	9.87E+01	2
				669.8646	4.93E+00	2
				671.6200	5.23E+00	2
				726.8862	5.33E+00	3
				728.7039	1.09E+00	3
				772.6824	7.62E+01	1
				780.1202	1.23E+00	3
				809.7676	2.86E+00	3
				812.2759	5.63E+00	2
				877.2304	1.08E+00	3
				954.6213	1.81E+01	2
				1136.1755	3.02E+00	3
				1143.6133	1.38E+00	3
				1173.2606	1.09E+00	3
				1290.7915	1.13E+00	3
				1295.3553	1.97E+00	3
				1372.0812	2.47E+00	3
				1398.5646	7.11E+00	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
53	132	I	2.28400 H	1442.5428	1.42E+00	3
				1921.0560	1.18E+00	3
				2002.3453	1.09E+00	3
53	130	I	12.36000 H	418.0133	3.42E+01	2

				536.1009	9.90E+01	1
				539.1068	1.40E+00	3
				586.1083	1.69E+00	3
				668.5634	9.61E+01	2
				686.0191	1.07E+00	3
				739.4824	8.23E+01	2
				1157.4932	1.13E+01	2
53	128	I	24.99000 M	442.9172	1.58E+01	1
				526.5750	1.50E+00	3
53	133	I	20.80000 H	529.8521	8.63E+01	1
				706.5551	1.49E+00	3
				856.2646	1.23E+00	3
				875.3145	4.47E+00	2
				1236.4042	1.49E+00	3
				1298.2097	2.33E+00	3
54	133	XE	5.2440 D	80.9894	3.80E+01	1
54	138	XE	14.08000 M	153.9039	5.95E+00	2
				242.6559	3.50E+00	2
				258.4458	3.15E+01	1
				396.5595	6.30E+00	2
				401.4551	2.17E+00	3
				434.6144	2.03E+01	2
				1114.2732	1.47E+00	3
				1768.3940	1.67E+01	2
				1850.8787	1.42E+00	3
				2004.7804	5.36E+00	2
				2015.9421	1.23E+01	2
				2079.2937	1.44E+00	3
				2252.3279	2.29E+00	3
54	131	XEM	11.9000 D	163.9316	1.92E+00	1
54	139	XE	39.68000 S	174.9815	1.85E+01	2
				218.6504	5.20E+01	1
				225.4392	2.70E+00	3
				289.8163	8.53E+00	2
				296.6051	2.02E+01	2
				393.6316	6.24E+00	2
				491.4924	1.34E+00	3
				613.1157	5.10E+00	3
				723.9975	1.67E+00	3
				732.5092	1.63E+00	3
				788.0963	3.13E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
54	139	XE	39.68000 S	1345.0065	1.06E+00	3
				1670.4485	1.04E+00	3
54	133	XEM	2.1880 D	233.2071	1.03E+01	1
54	135	XE	9.10400 H	249.7924	9.01E+01	1
				608.1845	2.90E+00	3
54	137	XE	3.81800 M	455.4591	3.12E+01	1

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54	135	XEM	15.65000 M	526.5629	8.12E+01	1
55	136	CS	13.1600 D	66.9373	1.25E+01	2
				86.3575	6.31E+00	2
				153.2948	7.47E+00	2
				163.9794	4.61E+00	2
				176.6428	1.36E+01	2
				273.6848	1.27E+01	2
				340.6219	4.85E+01	2
				818.5602	9.97E+01	2
				1048.0934	7.97E+01	1
				1235.4193	1.98E+01	2
55	138	CS	32.20000 M	138.0396	1.49E+00	3
				227.7152	1.51E+00	3
				408.9480	4.66E+00	2
				462.7822	3.08E+01	2
				546.9872	1.08E+01	2
				871.7288	5.12E+00	2
				1009.7675	2.98E+01	2
				1147.2708	1.24E+00	3
				1343.5464	1.14E+00	3
				1435.7979	7.63E+01	1
				2217.8428	1.52E+01	2
				2639.4424	7.63E+00	2
55	134	CS	2.0652 Y	475.3573	1.50E+00	3
				563.2370	8.38E+00	3
				569.3207	1.54E+01	2
				604.7101	9.76E+01	2
				795.8674	8.55E+01	1
				801.9511	8.70E+00	3
				1038.5920	9.91E-01	3
				1167.9443	1.79E+00	3
				1365.1844	3.02E+00	3
55	139	CS	9.27000 M	627.3832	1.65E+00	2
				1283.3882	7.70E+00	1
55	137	CS	30.2500 Y	661.6600	8.52E+01	1
56	133	BA	10.5700 Y	53.1480	2.20E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
56	133	BA	10.5700 Y	79.6117	2.63E+00	3
				80.9895	3.41E+01	2
				276.3877	7.17E+00	2
				302.8513	1.83E+01	2
				355.9992	6.20E+01	1
				383.8406	8.93E+00	2
56	142	BA	10.60000 M	77.5714	1.11E+01	2
				231.5658	1.18E+01	2
				255.2269	2.06E+01	1
				309.1371	2.62E+00	2
				363.8492	4.57E+00	2
				425.0786	5.66E+00	2
				840.2693	3.50E+00	2
				894.9811	1.27E+01	2

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				948.8912	1.03E+01	2
				1000.9460	9.06E+00	2
				1078.5168	1.08E+01	2
				1093.7137	2.55E+00	2
				1202.3353	6.18E+00	2
				1204.1162	1.58E+01	2
				1379.9893	3.93E+00	2
56	131	BA	11.8000 D	123.7774	2.90E+01	2
				133.5819	2.19E+00	3
				216.0480	1.99E+01	2
				239.6122	2.41E+00	3
				249.4167	2.81E+00	3
				373.1938	1.33E+01	2
				403.9879	1.29E+00	3
				486.4539	1.89E+00	3
				496.2583	4.38E+01	1
				584.9670	1.23E+00	3
				620.0352	1.57E+00	3
				1047.5819	1.19E+00	3
56	140	BA	12.7650 D	162.7047	6.20E+00	2
				304.8671	4.32E+00	2
				423.7198	3.12E+00	2
				437.5849	1.92E+00	2
				537.3096	2.40E+01	1
56	139	BA	1.41000 H	165.8530	2.20E+01	1
56	141	BA	18.27000 M	190.3143	4.60E+01	1
				276.9071	2.33E+01	2
				304.1778	2.52E+01	2
				343.6760	1.42E+01	2
				389.8273	1.32E+00	3
				457.5394	4.78E+00	2
				462.1221	4.78E+00	2
				467.2209	5.47E+00	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
56	141	BA	18.27000 M	625.1650	3.27E+00	3
				647.8530	5.61E+00	2
				739.0282	4.28E+00	3
				831.6401	1.52E+00	3
				876.1182	3.40E+00	3
				1197.3574	4.60E+00	3
				1682.1993	1.34E+00	3
57	140	LA	1.6782 D	328.7576	2.05E+01	2
				432.5231	2.87E+00	3
				487.0262	4.38E+01	2
				751.6608	4.42E+00	2
				815.7825	2.37E+01	2
				867.8306	5.61E+00	2
				919.5476	2.68E+00	3
				925.1893	7.06E+00	2
				1596.5431	9.54E+01	1
				2521.7209	3.43E+00	2
57	142	LA	1.54167 H	641.2542	4.74E+01	2

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			861.6028	1.80E+00	2	
			894.9255	8.48E+00	2	
			1011.4744	3.93E+00	2	
			1043.7206	2.75E+00	2	
			1160.2694	1.75E+00	2	
			1233.2196	1.85E+00	2	
			1363.0129	2.13E+00	2	
			1545.9703	2.99E+00	2	
			1723.0354	1.52E+00	2	
			1756.5225	2.99E+00	2	
			1901.4495	7.87E+00	2	
			2055.1870	2.65E+00	2	
			2187.2170	5.26E+00	2	
			2397.7681	1.48E+01	2	
			2542.6946	1.01E+01	1	
			2666.8113	1.71E+00	2	
			2971.9805	2.99E+00	2	
58	143	CE	1.3750 D	57.3817	1.18E+01	2
				231.5753	2.02E+00	3
				293.2735	4.20E+01	1
				350.6550	3.36E+00	3
				490.3829	1.97E+00	3
				664.5760	5.25E+00	2
				721.9574	5.12E+00	2
58	144	CE	285.0000 D	80.1034	1.55E+00	2
				133.5386	1.12E+01	1
58	141	CE	32.5000 D	145.4404	4.85E+01	1
58	139	CE	137.6400 D	165.8531	7.99E+01	1
59	144	PRM	7.20000 M	59.0315	7.94E-02	1
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
59	144	PR	17.29000 M	696.5100	1.34E+00	2
				1489.1600	2.79E-01	2
				2185.6621	7.00E-01	1
59	142	PR	19.13000 H	1575.4614	3.70E+00	1
60	147	ND	10.9800 D	91.1040	2.81E+01	2
				319.4140	1.91E+00	3
				439.9097	1.17E+00	3
				531.0134	1.27E+01	1
61	147	PM	2.6234 Y	121.2579	2.85E-03	1
62	153	SM	1.9458 D	69.6734	5.32E+00	2
				103.1806	2.83E+01	1
63	155	EU	4.8500 Y	60.0153	1.14E+00	3
				86.5423	3.26E+01	2
				105.3129	2.23E+01	1
63	156	EU	15.1900 D	88.9854	8.87E+00	2
				599.5115	2.26E+00	2
				646.2847	6.96E+00	1

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				723.4995	5.91E+00	2
				811.8157	1.02E+01	2
				867.1006	1.38E+00	2
				944.3153	1.37E+00	2
				960.5191	1.59E+00	2
				1065.1561	5.16E+00	2
				1079.2030	4.79E+00	2
				1153.7537	1.22E+01	2
				1230.6866	8.77E+00	2
				1242.4569	6.63E+00	2
				1277.4596	3.15E+00	2
				1366.4442	1.72E+00	2
				1876.9659	1.69E+00	2
				1937.6345	2.10E+00	2
				1965.9502	4.12E+00	2
				2026.6188	3.47E+00	2
				2097.7800	4.19E+00	2
				2180.9458	2.39E+00	2
				2186.7642	3.88E+00	2
				2269.9299	1.10E+00	2
63	152	EUM	9.32000 H	121.7758	7.21E+00	2
				344.2859	2.44E+00	2
				841.5850	1.46E+01	1
				963.3601	1.20E+01	2
63	152	EU	13.5100 Y	121.7824	2.84E+01	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
63	152	EU	13.5100 Y	244.6989	7.53E+00	2
				344.2811	2.66E+01	1
				411.1260	2.24E+00	3
				443.9034	3.12E+00	3
				778.9030	1.30E+01	2
				867.3900	4.21E+00	2
				964.1102	1.45E+01	2
				1085.8420	1.01E+01	2
				1089.7670	1.73E+00	3
				1112.0870	1.35E+01	2
				1212.9700	1.41E+00	3
				1299.1520	1.63E+00	3
				1408.0220	2.09E+01	2
63	154	EU	8.5880 Y	123.1001	4.05E+01	2
				247.9678	6.60E+00	2
				591.8112	4.84E+00	2
				692.4855	1.69E+00	3
				723.3563	1.97E+01	2
				756.8083	4.34E+00	2
				873.2299	1.14E+01	2
				996.3293	1.03E+01	2
				1004.7747	1.79E+01	2
				1274.5435	3.55E+01	1
				1593.0000	1.03E+00	3
				1596.5818	1.83E+00	3
64	153	GD	241.6000 D	69.6734	2.30E+00	3
				97.4316	2.76E+01	1
				103.1807	1.96E+01	2

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65	160 TB	72.3000 D	86.7879	1.32E+01	2	
			197.0338	5.15E+00	2	
			215.6448	3.95E+00	2	
			298.5756	2.69E+01	2	
			392.4948	1.33E+00	2	
			765.2646	2.00E+00	2	
			879.3671	2.98E+01	1	
			962.2975	9.84E+00	2	
			966.1546	2.50E+01	2	
			1002.8687	1.02E+00	2	
			1115.1121	1.53E+00	2	
			1177.9409	1.52E+01	2	
			1199.9012	2.32E+00	2	
			1271.8596	7.49E+00	2	
			1312.1444	2.92E+00	2	
66	165 DY	2.33400 H	94.7035	3.58E+00	1	
68	171 ER	7.52000 H	111.6609	2.05E+01	2	
			116.6894	2.30E+00	3	
			124.0523	9.10E+00	2	
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
68	171 ER	7.52000 H	295.9393	2.89E+01	2	
			308.3306	6.44E+01	1	
69	170 TM	128.6000 D	84.2551	3.26E+00	1	
70	169 YB	32.0220 D	63.1208	4.38E+01	2	
			93.6151	2.66E+00	3	
			109.7802	1.74E+01	2	
			118.1901	1.88E+00	3	
			130.5239	1.11E+01	2	
			177.2144	2.15E+01	2	
			197.9581	3.49E+01	1	
			261.0788	1.90E+00	3	
			307.7382	1.08E+01	2	
70	175 YB	4.1900 D	113.8060	1.91E+00	2	
			282.5220	3.06E+00	2	
			396.3278	6.50E+00	1	
71	177 LU	6.7100 D	112.9489	6.40E+00	2	
			208.3629	1.10E+01	1	
72	175 HF	70.0000 D	89.3561	2.35E+00	3	
			343.3964	8.70E+01	1	
			432.7523	1.57E+00	3	
72	181 HF	42.3900 D	132.9411	4.33E+01	2	
			136.1687	5.81E+00	3	
			345.8287	1.51E+01	2	
			481.9971	8.05E+01	1	
73	182 TA	115.0000 D	65.7207	2.77E+00	3	
			67.7500	4.12E+01	2	
			84.6808	2.65E+00	3	
			100.1065	1.40E+01	2	
			113.6723	1.92E+00	3	

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				152.4308	7.18E+00	2
				156.3874	2.73E+00	3
				179.3948	3.14E+00	3
				198.3530	1.52E+00	3
				222.1099	7.59E+00	2
				229.3220	3.63E+00	3
				264.0755	3.63E+00	3
				1001.7018	2.00E+00	3
				1121.3010	3.48E+01	2
				1189.0500	1.65E+01	2
				1221.4080	2.73E+01	1
				1231.0160	1.16E+01	2
				1257.4180	1.52E+00	3
				1289.1560	1.40E+00	3
73	183	TA	5.1000 D	84.7132	1.27E+00	3
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
73	183	TA	5.1000 D	99.0808	6.48E+00	2
				107.9332	1.08E+01	2
				144.1246	2.47E+00	3
				161.1445	1.17E+01	2
				162.3250	4.82E+00	2
				209.8695	4.55E+00	2
				244.2652	8.67E+00	2
				246.0609	2.80E+01	1
				291.7270	3.80E+00	2
				313.1553	6.94E+00	2
				353.9939	1.14E+01	2
74	187	W	23.90000 H	71.9834	1.08E+01	2
				134.2277	8.56E+00	2
				479.5337	2.11E+01	1
				551.5169	4.92E+00	2
				618.3354	6.07E+00	2
				625.4727	1.05E+00	2
				685.7441	2.64E+01	2
				772.8931	3.98E+00	2
75	188	RE	16.98000 H	155.0641	1.49E+01	1
				478.0130	1.04E+00	3
				633.0767	1.25E+00	3
76	191	OS	15.4000 D	129.4341	2.57E+01	1
76	185	OS	93.6000 D	592.0648	1.33E+00	3
				646.1100	8.10E+01	1
				717.4179	4.12E+00	2
				874.8088	6.61E+00	2
				880.2637	5.00E+00	2
77	192	IR	73.8300 D	205.7955	3.32E+00	3
				295.9582	2.87E+01	2
				308.4568	2.98E+01	2
				316.5080	8.30E+01	1
				468.0715	4.78E+01	2
				484.5779	3.17E+00	3
				588.5851	4.48E+00	3
				604.4146	8.09E+00	3

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				612.4657	5.28E+00	3
77	194	IR	19.15000 H	293.5511	2.52E+00	2
				328.4583	1.30E+01	1
				645.1631	1.16E+00	3
78	197	PT	18.30000 H	77.3432	1.71E+01	2
				191.3619	3.71E+00	1
79	198	AU	2.6943 D	411.8044	9.56E+01	1
80	197	HG	2.6710 D	77.3433	1.88E+01	1
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
80	197	HG	2.6710 D	191.3620	5.80E-01	3
80	203	HG	46.5950 D	279.1967	8.15E+01	1
81	208	TL	3.05300 M	277.2830	6.40E+00	2
				583.1910	8.51E+01	2
				763.0576	1.89E+00	3
				860.5640	1.25E+01	2
				2614.5330	9.98E+01	1
82	210	PB	22.3000 Y	46.5200	4.06E+00	1
82	214	PB	26.80000 M	53.1716	1.12E+00	3
				241.9192	7.41E+00	2
				295.0908	1.87E+01	2
				351.8664	3.58E+01	1
				785.8274	1.05E+00	3
82	212	PB	10.64000 H	238.6320	4.35E+01	1
				300.0336	3.25E+00	3
83	214	BI	19.90000 M	609.3111	4.61E+01	1
				665.4420	1.56E+00	2
				768.3499	4.89E+00	2
				806.1550	1.23E+00	3
				934.0389	3.16E+00	2
				1120.2727	1.50E+01	2
				1155.1825	1.69E+00	2
				1238.1073	5.92E+00	2
				1280.9519	1.47E+00	2
				1377.6586	4.02E+00	2
				1401.4832	1.39E+00	3
				1407.9697	2.48E+00	2
				1509.2189	2.19E+00	2
				1661.2577	1.15E+00	3
				1729.5803	3.05E+00	2
				1764.4901	1.59E+01	2
				1847.4147	2.12E+00	2
				2118.5254	1.21E+00	3
				2204.0906	4.99E+00	2
				2447.6750	1.55E+00	2
83	212	BI	2.5229 D	727.2466	6.64E+00	1
				785.5095	1.10E+00	2
				1620.7350	1.49E+00	2

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88	226	RAPB	1.60E+03 Y	53.1717	1.12E+00	3
				186.1111	3.29E+00	3
				241.9193	7.41E+00	2
				295.0909	1.87E+01	2

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
88	226	RAPB	1.60E+03 Y	351.8665	3.58E+01	1
				785.8275	1.05E+00	3
88	226	RA	1.60E+03 Y	186.1109	3.29E+00	1
88	226	RABI	1.60E+03 Y	186.1111	3.29E+00	3
				609.3112	4.61E+01	1
				665.4421	1.56E+00	3
				768.3500	4.89E+00	2
				806.1552	1.23E+00	3
				934.0390	3.16E+00	3
				1120.2737	1.50E+01	2
				1155.1835	1.69E+00	3
				1238.1083	5.92E+00	2
				1280.9529	1.47E+00	3
				1377.6595	4.02E+00	3
				1401.4841	1.39E+00	3
				1407.9707	2.48E+00	3
				1509.2198	2.19E+00	3
				1661.2587	1.15E+00	3
				1729.5813	3.05E+00	3
				1764.4911	1.59E+01	2
				1847.4156	2.12E+00	3
				2118.5264	1.21E+00	3
				2204.0916	4.99E+00	2
				2447.6760	1.55E+00	3
88	224	RA	3.6600 D	240.9870	4.05E+00	1
89	228	AC	6.13000 H	99.5475	1.34E+00	2
				129.0348	2.93E+00	2
				209.3852	4.12E+00	2
				270.2561	3.77E+00	2
				328.0698	3.46E+00	2
				338.4199	1.24E+01	2
				409.6246	2.20E+00	2
				463.1049	4.56E+00	2
				562.6522	1.01E+00	2
				581.5247	1.50E+00	2
				755.2773	1.32E+00	2
				772.2775	1.09E+00	2
				794.7914	4.59E+00	2
				835.6032	1.71E+00	2
				911.1572	2.87E+01	1
				964.6375	5.77E+00	2
				968.9707	1.74E+01	2
				1459.1932	1.06E+00	2
				1496.0311	1.05E+00	2
				1588.2271	3.59E+00	2
				1630.4746	1.95E+00	2
90	232	TH	1.40E+10 Y	58.9921	1.90E-01	1

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
90	232	THPB	1.40E+10 Y	58.9922	1.90E-01	4
90	232	THPB	1.40E+10 Y	74.8137	1.06E+01	8
				77.1073	1.77E+01	8
				87.1902	6.27E+00	8
				238.6321	4.35E+01	1
				300.0337	3.25E+00	3
90	232	THBI	1.40E+10 Y	58.9923	1.90E-01	3
				727.2467	6.64E+00	1
				785.5096	1.10E+00	2
				1620.7360	1.49E+00	2
90	232	THAC	1.40E+10 Y	58.9924	1.90E-01	3
				89.9547	3.42E+00	8
				93.3500	5.56E+00	8
				99.5476	1.34E+00	2
				105.3616	2.01E+00	8
				129.0349	2.93E+00	2
				209.3853	4.12E+00	2
				270.2562	3.77E+00	2
				328.0699	3.46E+00	2
				338.4200	1.24E+01	2
				409.6247	2.20E+00	2
				463.1050	4.56E+00	2
				562.6523	1.01E+00	3
				581.5248	1.50E+00	3
				755.2774	1.32E+00	3
				772.2776	1.09E+00	3
				794.7916	4.59E+00	2
				835.6033	1.71E+00	3
				911.1573	2.87E+01	1
				964.6376	5.77E+00	2
				968.9708	1.74E+01	2
				1459.1942	1.06E+00	3
				1496.0321	1.05E+00	3
				1588.2280	3.59E+00	2
				1630.4756	1.95E+00	3
90	232	THTL	1.40E+10 Y	58.9925	1.90E-01	3
				72.8035	7.68E-01	9
				74.9693	1.29E+00	8
				84.7893	4.56E-01	9
				277.2831	2.30E+00	2
				583.1911	3.06E+01	2
				860.5641	4.50E+00	2
				2614.5339	3.59E+01	1
90	232	THRA	1.40E+10 Y	58.9926	1.90E-01	3
				240.9871	4.05E+00	1
90	232	THTH	1.40E+10 Y	58.9927	1.90E-01	2
90	232	THTH	1.40E+10 Y	84.2571	1.22E+00	1
				131.4969	1.27E-01	2
				166.4294	1.07E-01	3

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			215.7539	2.60E-01	2	
90	234 TH	4.47E+09 Y	63.2878	3.81E+00	1	
			92.5640	5.41E+00	2	
90	228 TH	1.9130 Y	84.2570	1.22E+00	1	
			131.4968	1.27E-01	2	
			166.4293	1.07E-01	3	
			215.7538	2.60E-01	2	
91	233 PA	27.0000 D	75.3429	1.32E+00	3	
			86.6519	1.97E+00	3	
			300.1750	6.63E+00	2	
			312.0117	3.86E+01	1	
			340.5896	4.50E+00	2	
			398.6635	1.41E+00	3	
			415.9324	1.74E+00	3	
91	234 PAM	4.47E+09 Y	258.1807	8.10E-02	2	
			766.4124	2.96E-01	2	
			1000.9970	8.39E-01	1	
92	234 U	2.46E+05 Y	53.2306	1.23E-01	1	
92	232 U	69.8000 Y	57.8137	2.00E-01	1	
			129.0350	6.82E-02	2	
92	235 U	7.04E+08 Y	109.1784	1.54E+00	3	
			143.7680	1.10E+01	1	
			163.3570	5.08E+00	3	
			185.7220	5.72E+01	2	
			202.1060	1.08E+00	3	
			205.3180	5.01E+00	3	
93	239 NP	2.3550 D	61.4618	1.29E+00	3	
			106.1272	2.72E+01	2	
			209.7554	3.42E+00	2	
			228.1865	1.13E+01	2	
			277.6017	1.44E+01	1	
			315.8825	1.60E+00	3	
			334.3136	2.07E+00	3	
94	239 PU	2.41E+04 Y	129.2960	6.31E-03	2	
			144.2010	3.04E-04	3	
			203.5500	5.69E-04	3	
			332.8450	4.94E-04	3	
			345.0130	5.56E-04	3	
			375.0540	1.55E-03	3	
			380.1910	3.05E-04	3	
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
94	239	PU	2.41E+04 Y	382.6980	2.59E-04	3
				413.7130	1.47E-03	1
95	241	AM	432.7000 Y	59.5364	3.59E+01	1

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A.8 Isotope Library GE\$ISOTOPE\$LIB:ENVLIB.LIB, Sorted by Energy

This listing was generated using the VAXGAP PRLIB command [2].

ENVLIB

PAGE 1

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
53.1480	56	133	BA	10.5700 Y	0.22E+01	3
53.1716	82	214	PB	26.80000 M	0.11E+01	3
53.1717	88	226	RAPB	1.60E+03 Y	0.11E+01	3
53.2306	92	234	U	2.46E+05 Y	0.12E+00	1
57.8137	92	232	U	69.8000 Y	0.20E+00	1
58.9921	90	232	TH	1.40E+10 Y	0.19E+00	1
58.9922	90	232	THPB	1.40E+10 Y	0.19E+00	4
58.9923	90	232	THBI	1.40E+10 Y	0.19E+00	3
58.9924	90	232	THAC	1.40E+10 Y	0.19E+00	3
58.9925	90	232	THTL	1.40E+10 Y	0.19E+00	3
58.9926	90	232	THRA	1.40E+10 Y	0.19E+00	3
58.9927	90	232	THTH	1.40E+10 Y	0.19E+00	2
59.5364	95	241	AM	432.7000 Y	0.36E+02	1
60.0153	63	155	EU	4.8500 Y	0.11E+01	3
63.2878	90	234	TH	4.47E+09 Y	0.38E+01	1
65.7207	73	182	TA	115.0000 D	0.28E+01	3
67.7500	73	182	TA	115.0000 D	0.41E+02	2
74.8137	88	226	RAPB	1.60E+03 Y	0.65E+01	8
74.8138	90	232	THPB	1.40E+10 Y	0.11E+02	8
74.9693	90	232	THTL	1.40E+10 Y	0.13E+01	8
77.1073	88	226	RAPB	1.60E+03 Y	0.11E+02	8
77.1074	90	232	THPB	1.40E+10 Y	0.18E+02	8
79.1310	47	108	AGM	127.0000 Y	0.76E+01	2
79.6117	56	133	BA	10.5700 Y	0.26E+01	3
80.1034	58	144	CE	285.0000 D	0.15E+01	2
80.1035	58	144	CEPR	285.0000 D	0.15E+01	2
80.9894	56	133	BA	10.5700 Y	0.34E+02	2
84.2570	90	228	TH	1.9130 Y	0.12E+01	1
84.2571	90	232	THTH	1.40E+10 Y	0.12E+01	1
84.6808	73	182	TA	115.0000 D	0.27E+01	3
86.5423	63	155	EU	4.8500 Y	0.33E+02	2
87.1902	88	226	RAPB	1.60E+03 Y	0.39E+01	8
87.1903	90	232	THPB	1.40E+10 Y	0.63E+01	8
89.9547	90	232	THAC	1.40E+10 Y	0.34E+01	8
92.5640	90	234	TH	4.47E+09 Y	0.54E+01	2
93.3500	90	232	THAC	1.40E+10 Y	0.56E+01	8
99.5475	89	228	AC	6.13000 H	0.13E+01	2
99.5476	90	232	THAC	1.40E+10 Y	0.13E+01	2
100.1065	73	182	TA	115.0000 D	0.14E+02	2
105.3129	63	155	EU	4.8500 Y	0.22E+02	1
105.3616	90	232	THAC	1.40E+10 Y	0.20E+01	8
109.1784	92	235	U	7.04E+08 Y	0.15E+01	3
113.6723	73	182	TA	115.0000 D	0.19E+01	3
120.9115	92	234	U	2.46E+05 Y	0.34E+01	2
121.7824	63	152	EU	13.5100 Y	0.28E+02	2
122.0614	27	57	CO	271.7900 D	0.86E+02	1
123.1001	63	154	EU	8.5880 Y	0.40E+02	2
129.0348	89	228	AC	6.13000 H	0.29E+01	2
129.0349	90	232	THAC	1.40E+10 Y	0.29E+01	2

129.0350	92 232 U	69.8000 Y	0.68E-01	2
129.2960	94 239 PU	2.41E+04 Y	0.63E-02	1
131.4968	90 228 TH	1.9130 Y	0.13E+00	2

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ENERGY	Z A NUCLIDE	HALF LIFE	BR	I-CODE
131.4969	90 232 THTH	1.40E+10 Y	0.13E+00	2
132.9411	72 181 HF	42.3900 D	0.43E+02	2
133.5386	58 144 CE	285.0000 D	0.11E+02	1
133.5387	58 144 CEPR	285.0000 D	0.11E+02	2
136.1687	72 181 HF	42.3900 D	0.58E+01	3
136.4743	27 57 CO	271.7900 D	0.11E+02	2
142.6520	26 59 FE	44.5100 D	0.98E+00	3
143.7680	92 235 U	7.04E+08 Y	0.11E+02	1
144.2010	94 239 PU	2.41E+04 Y	0.30E-03	3
145.4404	58 141 CE	32.5000 D	0.49E+02	1
152.4308	73 182 TA	115.0000 D	0.72E+01	2
156.3874	73 182 TA	115.0000 D	0.27E+01	3
163.3570	92 235 U	7.04E+08 Y	0.51E+01	3
166.4293	90 228 TH	1.9130 Y	0.11E+00	3
166.4294	90 232 THTH	1.40E+10 Y	0.11E+00	3
176.3161	51 125 SB	2.7590 Y	0.69E+01	2
179.3948	73 182 TA	115.0000 D	0.31E+01	3
185.7220	92 235 U	7.04E+08 Y	0.57E+02	2
186.1109	88 226 RA	1.60E+03 Y	0.33E+01	1
186.1111	88 226 RAPB	1.60E+03 Y	0.33E+01	3
186.1111	88 226 RABI	1.60E+03 Y	0.33E+01	3
192.3490	26 59 FE	44.5100 D	0.30E+01	2
198.3530	73 182 TA	115.0000 D	0.15E+01	3
202.1060	92 235 U	7.04E+08 Y	0.11E+01	3
203.5500	94 239 PU	2.41E+04 Y	0.57E-03	3
205.3180	92 235 U	7.04E+08 Y	0.50E+01	3
209.3852	89 228 AC	6.13000 H	0.41E+01	2
209.3853	90 232 THAC	1.40E+10 Y	0.41E+01	2
215.7538	90 228 TH	1.9130 Y	0.26E+00	2
215.7539	90 232 THTH	1.40E+10 Y	0.26E+00	2
222.1099	73 182 TA	115.0000 D	0.76E+01	2
229.3220	73 182 TA	115.0000 D	0.36E+01	3
238.6320	82 212 PB	10.64000 H	0.44E+02	1
238.6321	90 232 THPB	1.40E+10 Y	0.44E+02	1
240.9870	88 224 RA	3.6600 D	0.41E+01	1
240.9871	90 232 THRA	1.40E+10 Y	0.41E+01	1
241.9192	82 214 PB	26.80000 M	0.74E+01	2
241.9193	88 226 RAPB	1.60E+03 Y	0.74E+01	2
244.6989	63 152 EU	13.5100 Y	0.75E+01	2
247.9678	63 154 EU	8.5880 Y	0.66E+01	2
258.1807	91 234 PAM	4.47E+09 Y	0.81E-01	2
264.0755	73 182 TA	115.0000 D	0.36E+01	3
270.2561	89 228 AC	6.13000 H	0.38E+01	2
270.2562	90 232 THAC	1.40E+10 Y	0.38E+01	2
276.3877	56 133 BA	10.5700 Y	0.72E+01	2
277.2830	81 208 TL	3.05300 M	0.64E+01	2
277.2831	90 232 THTL	1.40E+10 Y	0.23E+01	2
279.1967	80 203 HG	46.5950 D	0.81E+02	1
295.0908	82 214 PB	26.80000 M	0.19E+02	2
295.0909	88 226 RAPB	1.60E+03 Y	0.19E+02	2
300.0336	82 212 PB	10.64000 H	0.33E+01	3
300.0337	90 232 THPB	1.40E+10 Y	0.33E+01	3

ENERGY	Z A NUCLIDE	HALF LIFE	BR	I-CODE
302.8513	56 133 BA	10.5700 Y	0.18E+02	2

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320.0842	24	51	CR	27.7060	D	0.99E+01	1
328.0698	89	228	AC	6.13000	H	0.35E+01	2
328.0699	90	232	THAC	1.40E+10	Y	0.35E+01	2
332.8450	94	239	PU	2.41E+04	Y	0.49E-03	3
338.4199	89	228	AC	6.13000	H	0.12E+02	2
338.4200	90	232	THAC	1.40E+10	Y	0.12E+02	2
344.2811	63	152	EU	13.5100	Y	0.27E+02	1
345.0130	94	239	PU	2.41E+04	Y	0.56E-03	3
345.8287	72	181	HF	42.3900	D	0.15E+02	2
351.8664	82	214	PB	26.80000	M	0.36E+02	1
351.8665	88	226	RAPB	1.60E+03	Y	0.36E+02	1
355.9992	56	133	BA	10.5700	Y	0.62E+02	1
375.0540	94	239	PU	2.41E+04	Y	0.16E-02	3
380.1910	94	239	PU	2.41E+04	Y	0.30E-03	3
380.4155	51	125	SB	2.7590	Y	0.15E+01	3
382.6980	94	239	PU	2.41E+04	Y	0.26E-03	3
383.8406	56	133	BA	10.5700	Y	0.89E+01	2
409.6246	89	228	AC	6.13000	H	0.22E+01	2
409.6247	90	232	THAC	1.40E+10	Y	0.22E+01	2
411.1260	63	152	EU	13.5100	Y	0.22E+01	3
413.7130	94	239	PU	2.41E+04	Y	0.15E-02	3
427.8752	51	125	SB	2.7590	Y	0.29E+02	1
433.9360	47	108	AGM	127.0000	Y	0.90E+02	2
443.9034	63	152	EU	13.5100	Y	0.31E+01	3
446.8110	47	110	AGM	249.7600	D	0.37E+01	3
463.1049	89	228	AC	6.13000	H	0.46E+01	2
463.1050	90	232	THAC	1.40E+10	Y	0.46E+01	2
463.3670	51	125	SB	2.7590	Y	0.10E+02	2
475.3573	55	134	CS	2.0652	Y	0.15E+01	3
477.6050	4	7	BE	53.2000	D	0.10E+02	1
481.9971	72	181	HF	42.3900	D	0.81E+02	1
497.0539	44	103	RU	39.2550	D	0.90E+02	1
562.6522	89	228	AC	6.13000	H	0.10E+01	2
562.6523	90	232	THAC	1.40E+10	Y	0.10E+01	3
563.2370	55	134	CS	2.0652	Y	0.84E+01	3
569.3207	55	134	CS	2.0652	Y	0.15E+02	2
581.5247	89	228	AC	6.13000	H	0.15E+01	2
581.5248	90	232	THAC	1.40E+10	Y	0.15E+01	3
583.1910	81	208	TL	3.05300	M	0.85E+02	2
583.1911	90	232	THTL	1.40E+10	Y	0.31E+02	2
591.8112	63	154	EU	8.5880	Y	0.48E+01	2
600.5002	51	125	SB	2.7590	Y	0.18E+02	2
602.7300	51	124	SB	60.2000	D	0.98E+02	1
604.7101	55	134	CS	2.0652	Y	0.98E+02	2
606.6332	51	125	SB	2.7590	Y	0.50E+01	2
609.3111	83	214	BI	19.90000	M	0.46E+02	1
609.3112	88	226	RABI	1.60E+03	Y	0.46E+02	1
610.2985	44	103	RU	39.2550	D	0.56E+01	3
614.2810	47	108	AGM	127.0000	Y	0.90E+02	1
620.3600	47	110	AGM	249.7600	D	0.28E+01	3
621.9170	45	106	RURH	1.0200	Y	0.98E+01	1
ENERGY Z A NUCLIDE HALF LIFE BR I-CODE							
635.8897	51	125	SB	2.7590	Y	0.11E+02	2
645.8550	51	124	SB	60.2000	D	0.74E+01	2
657.7620	47	110	AGM	249.7600	D	0.95E+02	1
661.6600	55	137	CS	30.2500	Y	0.85E+02	1
665.4420	83	214	BI	19.90000	M	0.16E+01	2
665.4421	88	226	RABI	1.60E+03	Y	0.16E+01	3
671.3815	51	125	SB	2.7590	Y	0.18E+01	3

677.6230	47	110	AGM	249.7600	D	0.10E+02	2
687.0150	47	110	AGM	249.7600	D	0.64E+01	3
692.4855	63	154	EU	8.5880	Y	0.17E+01	3
696.5100	59	144	PR	17.29000	M	0.13E+01	2
696.5101	58	144	CEPR	285.0000	D	0.13E+01	2
702.6450	41	94	NB	2.00E+04	Y	0.10E+03	2
706.6820	47	110	AGM	249.7600	D	0.16E+02	2
709.3248	51	124	SB	60.2000	D	0.13E+01	3
713.7810	51	124	SB	60.2000	D	0.23E+01	3
722.7860	51	124	SB	60.2000	D	0.11E+02	2
722.9290	47	108	AGM	127.0000	Y	0.91E+02	2
723.3563	63	154	EU	8.5880	Y	0.20E+02	2
724.1990	40	95	ZR	63.9800	D	0.44E+02	2
724.1991	40	95	ZRNB	63.9800	D	0.44E+02	2
727.2466	83	212	BI	2.5229	D	0.66E+01	1
727.2467	90	232	THBI	1.40E+10	Y	0.66E+01	1
744.2770	47	110	AGM	249.7600	D	0.47E+01	3
755.2773	89	228	AC	6.13000	H	0.13E+01	2
755.2774	90	232	THAC	1.40E+10	Y	0.13E+01	3
756.7290	40	95	ZR	63.9800	D	0.55E+02	1
756.7291	40	95	ZRNB	63.9800	D	0.55E+02	2
756.8083	63	154	EU	8.5880	Y	0.43E+01	2
763.0576	81	208	TL	3.05300	M	0.19E+01	3
763.9440	47	110	AGM	249.7600	D	0.22E+02	2
765.8070	41	95	NB	34.9750	D	0.10E+03	1
765.8071	40	95	ZRNB	63.9800	D	0.22E+03	1
766.4124	91	234	PAM	4.47E+09	Y	0.30E+00	2
768.3499	83	214	BI	19.90000	M	0.49E+01	2
768.3500	88	226	RABI	1.60E+03	Y	0.49E+01	2
772.2775	89	228	AC	6.13000	H	0.11E+01	2
772.2776	90	232	THAC	1.40E+10	Y	0.11E+01	3
778.9030	63	152	EU	13.5100	Y	0.13E+02	2
785.5095	83	212	BI	2.5229	D	0.11E+01	2
785.5096	90	232	THBI	1.40E+10	Y	0.11E+01	2
785.8274	82	214	PB	26.80000	M	0.10E+01	3
785.8275	88	226	RAPB	1.60E+03	Y	0.10E+01	3
794.7914	89	228	AC	6.13000	H	0.46E+01	2
794.7916	90	232	THAC	1.40E+10	Y	0.46E+01	2
795.8674	55	134	CS	2.0652	Y	0.86E+02	1
801.9511	55	134	CS	2.0652	Y	0.87E+01	3
806.1550	83	214	BI	19.90000	M	0.12E+01	3
806.1552	88	226	RABI	1.60E+03	Y	0.12E+01	3
810.7915	27	58	CO	70.8600	D	0.99E+02	1
818.0310	47	110	AGM	249.7600	D	0.73E+01	3
834.8430	25	54	MN	312.3000	D	0.10E+03	1

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
835.6032	89	228	AC	6.13000	H	0.17E+01	2
835.6033	90	232	THAC	1.40E+10	Y	0.17E+01	3
860.5640	81	208	TL	3.05300	M	0.13E+02	2
860.5641	90	232	THTL	1.40E+10	Y	0.45E+01	2
863.9741	27	58	CO	70.8600	D	0.69E+00	3
867.3900	63	152	EU	13.5100	Y	0.42E+01	2
871.1190	41	94	NB	2.00E+04	Y	0.10E+03	1
873.2299	63	154	EU	8.5880	Y	0.11E+02	2
884.6850	47	110	AGM	249.7600	D	0.73E+02	2
889.2770	21	46	SC	83.7900	D	0.10E+03	1
911.1572	89	228	AC	6.13000	H	0.29E+02	1
911.1573	90	232	THAC	1.40E+10	Y	0.29E+02	1
934.0389	83	214	BI	19.90000	M	0.32E+01	2

934.0390	88	226	RABI	1.60E+03	Y	0.32E+01	3
937.4930	47	110	AGM	249.7600	D	0.34E+02	2
964.1102	63	152	EU	13.5100	Y	0.14E+02	2
964.6375	89	228	AC	6.13000	H	0.58E+01	2
964.6376	90	232	THAC	1.40E+10	Y	0.58E+01	2
968.2010	51	124	SB	60.2000	D	0.19E+01	3
968.9707	89	228	AC	6.13000	H	0.17E+02	2
968.9708	90	232	THAC	1.40E+10	Y	0.17E+02	2
996.3293	63	154	EU	8.5880	Y	0.10E+02	2
1000.9970	91	234	PAM	4.47E+09	Y	0.84E+00	1
1001.7018	73	182	TA	115.0000	D	0.20E+01	3
1004.7747	63	154	EU	8.5880	Y	0.18E+02	2
1038.5920	55	134	CS	2.0652	Y	0.99E+00	3
1045.1310	51	124	SB	60.2000	D	0.19E+01	3
1050.3599	45	106	RURH	2.9800	Y	0.15E+01	2
1085.8420	63	152	EU	13.5100	Y	0.10E+02	2
1089.7670	63	152	EU	13.5100	Y	0.17E+01	3
1099.2510	26	59	FE	44.5100	D	0.56E+02	1
1112.0870	63	152	EU	13.5100	Y	0.14E+02	2
1115.5460	30	65	ZN	244.2600	D	0.51E+02	1
1120.2727	83	214	BI	19.90000	M	0.15E+02	2
1120.2737	88	226	RABI	1.60E+03	Y	0.15E+02	2
1120.5450	21	46	SC	83.7900	D	0.10E+03	2
1121.3010	73	182	TA	115.0000	D	0.35E+02	2
1129.6609	13	26	AL	7.20E+05	Y	0.25E+01	3
1155.1825	83	214	BI	19.90000	M	0.17E+01	2
1155.1835	88	226	RABI	1.60E+03	Y	0.17E+01	3
1167.9443	55	134	CS	2.0652	Y	0.18E+01	3
1173.2380	27	60	CO	5.2719	Y	0.10E+03	2
1189.0500	73	182	TA	115.0000	D	0.17E+02	2
1212.9700	63	152	EU	13.5100	Y	0.14E+01	3
1221.4080	73	182	TA	115.0000	D	0.27E+02	1
1231.0160	73	182	TA	115.0000	D	0.12E+02	2
1238.1073	83	214	BI	19.90000	M	0.59E+01	2
1238.1083	88	226	RABI	1.60E+03	Y	0.59E+01	2
1257.4180	73	182	TA	115.0000	D	0.15E+01	3
1274.5420	11	22	NA	2.6032	Y	0.10E+03	1
1274.5435	63	154	EU	8.5880	Y	0.35E+02	1
1280.9519	83	214	BI	19.90000	M	0.15E+01	2

ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE	
1280.9529	88	226	RABI	1.60E+03	Y	0.15E+01	3
1289.1560	73	182	TA	115.0000	D	0.14E+01	3
1291.5959	26	59	FE	44.5100	D	0.44E+02	2
1299.1520	63	152	EU	13.5100	Y	0.16E+01	3
1325.5120	51	124	SB	60.2000	D	0.16E+01	3
1332.5020	27	60	CO	5.2719	Y	0.10E+03	1
1355.1771	51	124	SB	60.2000	D	0.10E+01	3
1365.1844	55	134	CS	2.0652	Y	0.30E+01	3
1368.1639	51	124	SB	60.2000	D	0.27E+01	3
1377.6586	83	214	BI	19.90000	M	0.40E+01	2
1377.6595	88	226	RABI	1.60E+03	Y	0.40E+01	3
1384.3000	47	110	AGM	249.7600	D	0.24E+02	2
1401.4832	83	214	BI	19.90000	M	0.14E+01	3
1401.4841	88	226	RABI	1.60E+03	Y	0.14E+01	3
1407.9697	83	214	BI	19.90000	M	0.25E+01	2
1407.9707	88	226	RABI	1.60E+03	Y	0.25E+01	3
1408.0220	63	152	EU	13.5100	Y	0.21E+02	2
1436.5630	51	124	SB	60.2000	D	0.13E+01	3
1459.1932	89	228	AC	6.13000	H	0.11E+01	2

1459.1942	90	232	THAC	1.40E+10	Y	0.11E+01	3
1460.8300	19	40	K	1.26E+09	Y	0.11E+02	1
1475.7880	47	110	AGM	249.7600	D	0.40E+01	3
1489.1600	59	144	PR	17.29000	M	0.28E+00	2
1489.1610	58	144	CEPR	285.0000	D	0.28E+00	3
1496.0311	89	228	AC	6.13000	H	0.10E+01	2
1496.0321	90	232	THAC	1.40E+10	Y	0.10E+01	3
1505.0400	47	110	AGM	249.7600	D	0.13E+02	2
1509.2189	83	214	BI	19.90000	M	0.22E+01	2
1509.2198	88	226	RABI	1.60E+03	Y	0.22E+01	3
1562.3030	47	110	AGM	249.7600	D	0.10E+01	3
1588.2271	89	228	AC	6.13000	H	0.36E+01	2
1588.2280	90	232	THAC	1.40E+10	Y	0.36E+01	2
1593.0000	63	154	EU	8.5880	Y	0.10E+01	3
1596.5818	63	154	EU	8.5880	Y	0.18E+01	3
1620.7350	83	212	BI	2.5229	D	0.15E+01	2
1620.7360	90	232	THBI	1.40E+10	Y	0.15E+01	2
1630.4746	89	228	AC	6.13000	H	0.19E+01	2
1630.4756	90	232	THAC	1.40E+10	Y	0.19E+01	3
1661.2577	83	214	BI	19.90000	M	0.11E+01	3
1661.2587	88	226	RABI	1.60E+03	Y	0.11E+01	3
1674.7526	27	58	CO	70.8600	D	0.52E+00	3
1690.9800	51	124	SB	60.2000	D	0.47E+02	2
1729.5803	83	214	BI	19.90000	M	0.30E+01	2
1729.5813	88	226	RABI	1.60E+03	Y	0.30E+01	3
1764.4901	83	214	BI	19.90000	M	0.16E+02	2
1764.4911	88	226	RABI	1.60E+03	Y	0.16E+02	2
1808.6484	13	26	AL	7.20E+05	Y	0.10E+03	1
1847.4147	83	214	BI	19.90000	M	0.21E+01	2
1847.4156	88	226	RABI	1.60E+03	Y	0.21E+01	3
2090.9419	51	124	SB	60.2000	D	0.55E+01	2
2118.5254	83	214	BI	19.90000	M	0.12E+01	3
2118.5264	88	226	RABI	1.60E+03	Y	0.12E+01	3

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ENERGY	Z	A	NUCLIDE	HALF LIFE	BR	I-CODE
2185.6621	59	144	PR	17.29000	M	0.70E+00
2185.6631	58	144	CEPR	285.0000	D	0.70E+00
2204.0906	83	214	BI	19.90000	M	0.50E+01
2204.0916	88	226	RABI	1.60E+03	Y	0.50E+01
2223.5000	2	23	QCWA	1.00E+10	Y	0.10E+03
2447.6750	83	214	BI	19.90000	M	0.16E+01
2447.6760	88	226	RABI	1.60E+03	Y	0.16E+01
2614.5330	81	208	TL	3.05300	M	0.10E+03
2614.5339	90	232	THTL	1.40E+10	Y	0.36E+02

A.9 Isotope Library GE\$ISOTOPE\$LIB:ENVLIB.LIB, Sorted by Nuclide

This listing was generated using the VAXGAP PRLIB command [2].

ENVLIB

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
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2	23	QCWA	1.00E+10	Y	2223.5000	1.00E+02	1
4	7	BE	53.2000	D	477.6050	1.04E+01	1
11	22	NA	2.6032	Y	1274.5420	9.99E+01	1
13	26	AL	7.20E+05	Y	1129.6609	2.47E+00	3
					1808.6484	9.98E+01	1
19	40	K	1.26E+09	Y	1460.8300	1.07E+01	1
21	46	SC	83.7900	D	889.2770	1.00E+02	1
					1120.5450	1.00E+02	2
24	51	CR	27.7060	D	320.0842	9.85E+00	1
25	54	MN	312.3000	D	834.8430	1.00E+02	1
26	59	FE	44.5100	D	142.6520	9.80E-01	3
					192.3490	2.95E+00	2
					1099.2510	5.61E+01	1
					1291.5959	4.36E+01	2
27	57	CO	271.7900	D	122.0614	8.57E+01	1
					136.4743	1.07E+01	2
27	58	CO	70.8600	D	810.7915	9.94E+01	1
					863.9741	6.90E-01	3
					1674.7526	5.19E-01	3
27	60	CO	5.2719	Y	1173.2380	9.99E+01	2
					1332.5020	1.00E+02	1
30	65	ZN	244.2600	D	1115.5460	5.08E+01	1
40	95	ZR	63.9800	D	724.1990	4.42E+01	2
					756.7290	5.45E+01	1
40	95	ZRNB	63.9800	D	724.1991	4.42E+01	2
					756.7291	5.45E+01	2
					765.8071	2.20E+02	1
41	94	NB	2.00E+04	Y	702.6450	9.98E+01	2
					871.1190	9.99E+01	1
41	95	NB	34.9750	D	765.8070	9.98E+01	1
44	103	RU	39.2550	D	497.0539	8.95E+01	1
Z	A	ID	HALF LIFE		ENERGY	BR	I-CODE
44	103	RU	39.2550	D	610.2985	5.64E+00	3
45	106	RURH	1.0200	Y	621.9170	9.81E+00	1
					1050.3599	1.53E+00	2
47	108	AGM	127.0000	Y	79.1310	7.62E+00	2
					433.9360	9.05E+01	2
					614.2810	8.98E+01	1
					722.9290	9.08E+01	2

PAGE 2

47	110 AGM	249.7600 D	446.8110	3.75E+00	3
			620.3600	2.81E+00	3
			657.7620	9.46E+01	1
			677.6230	1.04E+01	2
			687.0150	6.43E+00	3
			706.6820	1.64E+01	2
			744.2770	4.71E+00	3
			763.9440	2.23E+01	2
			818.0310	7.31E+00	3
			884.6850	7.27E+01	2
			937.4930	3.44E+01	2
			1384.3000	2.43E+01	2
			1475.7880	4.02E+00	3
			1505.0400	1.30E+01	2
			1562.3030	1.03E+00	3

51	125 SB	2.7590 Y	176.3161	6.90E+00	2
			380.4155	1.51E+00	3
			427.8752	2.94E+01	1
			463.3670	1.04E+01	2
			600.5002	1.78E+01	2
			606.6332	5.00E+00	2
			635.8897	1.13E+01	2
			671.3815	1.81E+00	3

51	124 SB	60.2000 D	602.7300	9.78E+01	1
			645.8550	7.38E+00	2
			709.3248	1.35E+00	3
			713.7810	2.28E+00	3
			722.7860	1.09E+01	2
			968.2010	1.87E+00	3
			1045.1310	1.87E+00	3
			1325.5120	1.59E+00	3
			1355.1771	1.05E+00	3
			1368.1639	2.66E+00	3
			1436.5630	1.25E+00	3
			1690.9800	4.71E+01	2
			2090.9419	5.49E+00	2

55	134 CS	2.0652 Y	475.3573	1.50E+00	3
			563.2370	8.38E+00	3
			569.3207	1.54E+01	2

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
55	134	CS	2.0652 Y	604.7101	9.76E+01	2
				795.8674	8.55E+01	1
				801.9511	8.70E+00	3
				1038.5920	9.91E-01	3
				1167.9443	1.79E+00	3
				1365.1844	3.02E+00	3

55	137	CS	30.2500 Y	661.6600	8.52E+01	1
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56	133	BA	10.5700 Y	53.1480	2.20E+00	3
				79.6117	2.63E+00	3
				80.9894	3.41E+01	2
				276.3877	7.17E+00	2
				302.8513	1.83E+01	2
				355.9992	6.20E+01	1

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				383.8406	8.93E+00	2
58	144	CE	285.0000 D	80.1034	1.55E+00	2
				133.5386	1.12E+01	1
58	144	CEPR	285.0000 D	80.1035	1.55E+00	2
				133.5387	1.12E+01	2
				696.5101	1.34E+00	2
				1489.1610	2.79E-01	3
				2185.6631	7.00E-01	1
58	141	CE	32.5000 D	145.4404	4.85E+01	1
59	144	PR	17.29000 M	696.5100	1.34E+00	2
				1489.1600	2.79E-01	2
				2185.6621	7.00E-01	1
63	155	EU	4.8500 Y	60.0153	1.14E+00	3
				86.5423	3.26E+01	2
				105.3129	2.23E+01	1
63	152	EU	13.5100 Y	121.7824	2.84E+01	2
				244.6989	7.53E+00	2
				344.2811	2.66E+01	1
				411.1260	2.24E+00	3
				443.9034	3.12E+00	3
				778.9030	1.30E+01	2
				867.3900	4.21E+00	2
				964.1102	1.45E+01	2
				1085.8420	1.01E+01	2
				1089.7670	1.73E+00	3
				1112.0870	1.35E+01	2
				1212.9700	1.41E+00	3
				1299.1520	1.63E+00	3
				1408.0220	2.09E+01	2
63	154	EU	8.5880 Y	123.1001	4.05E+01	2
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
63	154	EU	8.5880 Y	247.9678	6.60E+00	2
				591.8112	4.84E+00	2
				692.4855	1.69E+00	3
				723.3563	1.97E+01	2
				756.8083	4.34E+00	2
				873.2299	1.14E+01	2
				996.3293	1.03E+01	2
				1004.7747	1.79E+01	2
				1274.5435	3.55E+01	1
				1593.0000	1.03E+00	3
				1596.5818	1.83E+00	3
72	181	HF	42.3900 D	132.9411	4.33E+01	2
				136.1687	5.81E+00	3
				345.8287	1.51E+01	2
				481.9971	8.05E+01	1
73	182	TA	115.0000 D	65.7207	2.77E+00	3
				67.7500	4.12E+01	2
				84.6808	2.65E+00	3

			100.1065	1.40E+01	2	
			113.6723	1.92E+00	3	
			152.4308	7.18E+00	2	
			156.3874	2.73E+00	3	
			179.3948	3.14E+00	3	
			198.3530	1.52E+00	3	
			222.1099	7.59E+00	2	
			229.3220	3.63E+00	3	
			264.0755	3.63E+00	3	
			1001.7018	2.00E+00	3	
			1121.3010	3.48E+01	2	
			1189.0500	1.65E+01	2	
			1221.4080	2.73E+01	1	
			1231.0160	1.16E+01	2	
			1257.4180	1.52E+00	3	
			1289.1560	1.40E+00	3	
80	203	HG	46.5950 D	279.1967	8.15E+01	1
81	208	TL	3.05300 M	277.2830	6.40E+00	2
				583.1910	8.51E+01	2
				763.0576	1.89E+00	3
				860.5640	1.25E+01	2
				2614.5330	9.98E+01	1
82	214	PB	26.80000 M	53.1716	1.12E+00	3
				241.9192	7.41E+00	2
				295.0908	1.87E+01	2
				351.8664	3.58E+01	1
				785.8274	1.05E+00	3
82	212	PB	10.64000 H	238.6320	4.35E+01	1
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
82	212	PB	10.64000 H	300.0336	3.25E+00	3
83	214	BI	19.90000 M	609.3111	4.61E+01	1
				665.4420	1.56E+00	2
				768.3499	4.89E+00	2
				806.1550	1.23E+00	3
				934.0389	3.16E+00	2
				1120.2727	1.50E+01	2
				1155.1825	1.69E+00	2
				1238.1073	5.92E+00	2
				1280.9519	1.47E+00	2
				1377.6586	4.02E+00	2
				1401.4832	1.39E+00	3
				1407.9697	2.48E+00	2
				1509.2189	2.19E+00	2
				1661.2577	1.15E+00	3
				1729.5803	3.05E+00	2
				1764.4901	1.59E+01	2
				1847.4147	2.12E+00	2
				2118.5254	1.21E+00	3
				2204.0906	4.99E+00	2
				2447.6750	1.55E+00	2
83	212	BI	2.5229 D	727.2466	6.64E+00	1
				785.5095	1.10E+00	2

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			1620.7350	1.49E+00	2
88	226	RAPB	1.60E+03 Y	53.1717	1.12E+00
				74.8137	6.52E+00
				77.1073	1.10E+01
				87.1902	3.88E+00
				186.1111	3.29E+00
				241.9193	7.41E+00
				295.0909	1.87E+01
				351.8665	3.58E+01
				785.8275	1.05E+00
88	226	RA	1.60E+03 Y	186.1109	3.29E+00
88	226	RABI	1.60E+03 Y	186.1111	3.29E+00
				609.3112	4.61E+01
				665.4421	1.56E+00
				768.3500	4.89E+00
				806.1552	1.23E+00
				934.0390	3.16E+00
				1120.2737	1.50E+01
				1155.1835	1.69E+00
				1238.1083	5.92E+00
				1280.9529	1.47E+00
				1377.6595	4.02E+00
				1401.4841	1.39E+00
				1407.9707	2.48E+00

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
88	226	RABI	1.60E+03 Y	1509.2198	2.19E+00	3
				1661.2587	1.15E+00	3
				1729.5813	3.05E+00	3
				1764.4911	1.59E+01	2
				1847.4156	2.12E+00	3
				2118.5264	1.21E+00	3
				2204.0916	4.99E+00	2
				2447.6760	1.55E+00	3
88	224	RA	3.6600 D	240.9870	4.05E+00	1
89	228	AC	6.13000 H	99.5475	1.34E+00	2
				129.0348	2.93E+00	2
				209.3852	4.12E+00	2
				270.2561	3.77E+00	2
				328.0698	3.46E+00	2
				338.4199	1.24E+01	2
				409.6246	2.20E+00	2
				463.1049	4.56E+00	2
				562.6522	1.01E+00	2
				581.5247	1.50E+00	2
				755.2773	1.32E+00	2
				772.2775	1.09E+00	2
				794.7914	4.59E+00	2
				835.6032	1.71E+00	2
				911.1572	2.87E+01	1
				964.6375	5.77E+00	2
				968.9707	1.74E+01	2
				1459.1932	1.06E+00	2
				1496.0311	1.05E+00	2

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				1588.2271	3.59E+00	2
				1630.4746	1.95E+00	2
90	232	TH	1.40E+10 Y	58.9921	1.90E-01	1
90	232	THPB	1.40E+10 Y	58.9922	1.90E-01	4
				74.8138	1.06E+01	8
				77.1074	1.77E+01	8
				87.1903	6.27E+00	8
				238.6321	4.35E+01	1
				300.0337	3.25E+00	3
90	232	THBI	1.40E+10 Y	58.9923	1.90E-01	3
				727.2467	6.64E+00	1
				785.5096	1.10E+00	2
				1620.7360	1.49E+00	2
90	232	THAC	1.40E+10 Y	58.9924	1.90E-01	3
				89.9547	3.42E+00	8
				93.3500	5.56E+00	8
				99.5476	1.34E+00	2
				105.3616	2.01E+00	8
Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
90	232	THAC	1.40E+10 Y	129.0349	2.93E+00	2
				209.3853	4.12E+00	2
				270.2562	3.77E+00	2
				328.0699	3.46E+00	2
				338.4200	1.24E+01	2
				409.6247	2.20E+00	2
				463.1050	4.56E+00	2
				562.6523	1.01E+00	3
				581.5248	1.50E+00	3
				755.2774	1.32E+00	3
				772.2776	1.09E+00	3
				794.7916	4.59E+00	2
				835.6033	1.71E+00	3
				911.1573	2.87E+01	1
				964.6376	5.77E+00	2
				968.9708	1.74E+01	2
				1459.1942	1.06E+00	3
				1496.0321	1.05E+00	3
				1588.2280	3.59E+00	2
				1630.4756	1.95E+00	3
90	232	THTL	1.40E+10 Y	58.9925	1.90E-01	3
				74.9693	1.29E+00	8
				277.2831	2.30E+00	2
				583.1911	3.06E+01	2
				860.5641	4.50E+00	2
				2614.5339	3.59E+01	1
90	232	THRA	1.40E+10 Y	58.9926	1.90E-01	3
				240.9871	4.05E+00	1
90	232	THTH	1.40E+10 Y	58.9927	1.90E-01	2
				84.2571	1.22E+00	1
				131.4969	1.27E-01	2
				166.4294	1.07E-01	3

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			215.7539	2.60E-01	2
90	234 TH	4.47E+09 Y	63.2878	3.81E+00	1
			92.5640	5.41E+00	2
90	228 TH	1.9130 Y	84.2570	1.22E+00	1
			131.4968	1.27E-01	2
			166.4293	1.07E-01	3
			215.7538	2.60E-01	2
91	234 PAM	4.47E+09 Y	258.1807	8.10E-02	2
			766.4124	2.96E-01	2
			1000.9970	8.39E-01	1
92	234 U	2.46E+05 Y	53.2306	1.23E-01	1
			120.9115	3.42E-02	2
92	232 U	69.8000 Y	57.8137	2.00E-01	1
Z	A	ID	HALF LIFE	ENERGY	BR
					I-CODE
92	232 U	69.8000 Y	129.0350	6.82E-02	2
92	235 U	7.04E+08 Y	109.1784	1.54E+00	3
			143.7680	1.10E+01	1
			163.3570	5.08E+00	3
			185.7220	5.72E+01	2
			202.1060	1.08E+00	3
			205.3180	5.01E+00	3
94	239 PU	2.41E+04 Y	129.2960	6.31E-03	1
			144.2010	3.04E-04	3
			203.5500	5.69E-04	3
			332.8450	4.94E-04	3
			345.0130	5.56E-04	3
			375.0540	1.55E-03	3
			380.1910	3.05E-04	3
			382.6980	2.59E-04	3
			413.7130	1.47E-03	3
95	241 AM	432.7000 Y	59.5364	3.59E+01	1

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A.10 Limit Library GE\$LIMIT\$LIB:ENVLIM.LIB

This listing was generated using the "P" (for print) option of MAKE_LIM [11].

LISTING FILE FOR THE LIMIT LIBRARY ENVLIM
GENERATED ON 6-JUL-94 AT 14:27:46

The current limit library documentation file is
ge\$limit\$lib:ENVLIM.doc, revision date/time = 6-JUL-1994 14:27:46.28

The associated limit library file is
 ge\$limit\$lib:ENVLIM.lib, revision date/time = 19-NOV-1993 12:30:01.51

The associated isotope library file is
 ge\$isotope\$lib:ENVLIB.lib, revision date/time = 31-JAN-1994 15:51:52.79

Entry	Nuclide	Energy	ICODE	Half-life	Branching ratio	Isomer?
1	2-QCWA- 23	2223.5000	1	1.00E+10 Y	100.000	N
2	4-BE - 7	477.6050	1	53.2000 D	10.430	N
3	11-NA - 22	1274.5420	1	2.6032 Y	99.930	N
4	13-AL - 26	1808.6484	1	7.20E+05 Y	99.760	N
5	19- K - 40	1460.8300	1	1.26E+09 Y	10.670	N
6	21-SC - 46	889.2770	1	83.7900 D	99.980	N
7	21-SC - 46	1120.5450	2	83.7900 D	99.990	N
8	24-CR - 51	320.0842	1	27.7060 D	9.850	N
9	25-MN - 54	834.8430	1	312.3000 D	99.980	N
10	26-FE - 59	1099.2510	1	44.5100 D	56.100	N
11	26-FE - 59	1291.5959	2	44.5100 D	43.600	N
12	27-CO - 58	810.7915	1	70.8600 D	99.440	N
13	27-CO - 60	1173.2380	2	5.2719 Y	99.890	N
14	27-CO - 60	1332.5020	1	5.2719 Y	99.980	N
15	30-ZN - 65	1115.5460	1	244.2600 D	50.750	N
16	40-ZR - 95	724.1990	2	63.9800 D	44.150	N
17	40-ZR - 95	756.7290	1	63.9800 D	54.500	N
18	41-NB - 94	702.6450	2	2.00E+04 Y	99.790	N
19	41-NB - 94	871.1190	1	2.00E+04 Y	99.860	N

20	41-NB	- 95	765.8070	1	34.9750 D	99.810	N
21	44-RU	-103	497.0539	1	39.2550 D	89.500	N
22	45-RURH-106		621.9170	1	1.0200 Y	9.812	N
23	45-RURH-106		1050.3599	2	2.9800 Y	1.526	N
24	47-AGM	-108	433.9360	2	127.0000 Y	90.480	N
25	47-AGM	-108	614.2810	1	127.0000 Y	89.850	N
26	47-AGM	-108	722.9290	2	127.0000 Y	90.840	N
27	47-AGM	-110	657.7620	1	249.7600 D	94.640	N
28	47-AGM	-110	884.6850	2	249.7600 D	72.680	N
29	47-AGM	-110	1384.3000	2	249.7600 D	24.290	N
30	51-SB	-124	602.7300	1	60.2000 D	97.800	N
31	51-SB	-124	1690.9800	2	60.2000 D	47.120	N
32	51-SB	-125	427.8752	1	2.7590 Y	29.400	N
33	51-SB	-125	600.5002	2	2.7590 Y	17.800	N
34	51-SB	-125	635.8897	2	2.7590 Y	11.300	N
35	55-CS	-134	569.3207	2	2.0652 Y	15.390	N
36	55-CS	-134	604.7101	2	2.0652 Y	97.630	N
37	55-CS	-134	795.8674	1	2.0652 Y	85.520	N
38	55-CS	-134	801.9511	3	2.0652 Y	8.700	N
39	55-CS	-137	661.6600	1	30.2500 Y	85.200	N
40	58-CE	-141	145.4404	1	32.5000 D	48.500	N
41	58-CE	-144	133.5386	1	285.0000 D	11.200	N
42	59-PR	-144	696.5100	2	17.2900 M	1.340	N
43	59-PR	-144	1489.1600	2	17.2900 M	0.279	N

44	59-PR	-144	2185.6621	1	17.2900 M	0.700	N
45	63-EU	-152	121.7824	2	13.5100 Y	28.370	N
46	63-EU	-152	344.2811	1	13.5100 Y	26.570	N
47	63-EU	-152	964.1102	2	13.5100 Y	14.460	N
48	63-EU	-152	1112.0870	2	13.5100 Y	13.540	N
49	63-EU	-152	1408.0220	2	13.5100 Y	20.850	N
50	63-EU	-154	123.1001	2	8.5880 Y	40.460	N
51	63-EU	-154	873.2299	2	8.5880 Y	11.450	N
52	63-EU	-154	1004.7747	2	8.5880 Y	17.880	N
53	63-EU	-154	1274.5435	1	8.5880 Y	35.490	N
54	63-EU	-155	86.5423	2	4.8500 Y	32.600	N
55	63-EU	-155	105.3129	1	4.8500 Y	22.300	N
56	72-HF	-181	481.9971	1	42.3900 D	80.520	N
57	73-TA	-182	67.7500	2	115.0000 D	41.200	N
58	73-TA	-182	1121.3010	2	115.0000 D	34.750	N
59	73-TA	-182	1189.0500	2	115.0000 D	16.510	N
60	73-TA	-182	1221.4080	1	115.0000 D	27.330	N
61	80-HG	-203	279.1967	1	46.5950 D	81.480	N
62	81-TL	-208	583.1910	2	3.0530 M	85.100	N
63	81-TL	-208	860.5640	2	3.0530 M	12.520	N
64	81-TL	-208	2614.5330	1	3.0530 M	99.830	N
65	82-PB	-212	238.6320	1	10.6400 H	43.500	N
66	82-PB	-212	300.0336	3	10.6400 H	3.250	N
67	82-PB	-214	295.0908	2	26.8000 M	18.700	N

68	82-PB	-214	351.8664	1	26.8000 M	35.800	N
69	83-BI	-212	727.2466	1	2.5229 D	6.640	N
70	83-BI	-212	1620.7350	2	2.5229 D	1.490	N
71	83-BI	-214	609.3111	1	19.9000 M	46.090	N
72	83-BI	-214	1120.2727	2	19.9000 M	15.040	N
73	83-BI	-214	1764.4901	2	19.9000 M	15.920	N
74	88-RA	-224	240.9870	1	3.6600 D	4.050	N
75	88-RA	-226	186.1109	1	1.60E+03 Y	3.290	N
76	89-AC	-228	338.4199	2	6.1300 H	12.440	N
77	89-AC	-228	911.1572	1	6.1300 H	28.730	N
78	89-AC	-228	968.9707	2	6.1300 H	17.420	N
79	90-TH	-228	84.2570	1	1.9130 Y	1.220	N
80	90-TH	-228	215.7538	2	1.9130 Y	0.260	N
81	90-TH	-234	63.2878	1	4.47E+09 Y	3.812	N
82	90-TH	-234	92.5640	2	4.47E+09 Y	5.413	N
83	91-PAM	-234	1000.9970	1	4.47E+09 Y	0.839	N
84	92- U	-232	57.8137	1	69.8000 Y	0.200	N
85	92- U	-234	53.2306	1	2.46E+05 Y	0.123	N
86	92- U	-235	109.1784	3	7.04E+08 Y	1.540	N
87	92- U	-235	143.7680	1	7.04E+08 Y	10.960	N
88	92- U	-235	163.3570	3	7.04E+08 Y	5.080	N
89	92- U	-235	185.7220	2	7.04E+08 Y	57.200	N
90	92- U	-235	205.3180	3	7.04E+08 Y	5.010	N
91	94-PU	-239	129.2960	1	2.41E+04 Y	0.006	N

92	94-PU	-239	375.0540	3	2.41E+04 Y	0.002	N
93	94-PU	-239	413.7130	3	2.41E+04 Y	0.001	N
94	95-AM	-241	59.5364	1	432.7000 Y	35.900	N

A.11 Interference Library GE\$INTERF\$LIB:ENVINTLIB.LIB

This listing was generated using the VAXGAP EDINTFER command [2].

CONTAMINATED LINES:					CLEAN LINES:				
ENERGY	Z	ELE	A	ISOMER	ENERGY	Z	ELE	A	ISOMER
53.23	92	U	234	NO	351.87	88	RAPB	226	NO
59.54	95	AM	241	NO	105.31	63	EU	155	NO
99.85	94	PU	238	NO	911.16	90	THAC	232	NO
105.31	63	EU	155	NO	911.16	90	THAC	232	NO
129.30	94	PU	239	NO	911.16	90	THAC	232	NO
133.54	58	CE	144	NO	482.00	72	HF	181	NO
133.54	58	CEPR	144	NO	482.00	72	HF	181	NO
240.99	90	THRA	232	NO	351.87	88	RAPB	226	NO
345.01	94	PU	239	NO	1408.02	63	EU	152	NO
345.01	94	PU	239	NO	482.00	72	HF	181	NO
463.37	51	SB	125	NO	911.16	90	THAC	232	NO
563.24	55	CS	134	NO	911.16	90	THAC	232	NO
722.79	51	SB	124	NO	614.28	47	AGM	108	YES
722.79	51	SB	124	NO	1004.78	63	EU	154	NO
722.93	47	AGM	108	YES	1004.78	63	EU	154	NO
724.20	40	ZR	95	NO	1004.78	63	EU	154	NO
724.20	40	ZR	95	NO	602.73	51	SB	124	NO
756.73	40	ZR	95	NO	1004.78	63	EU	154	NO
763.94	47	AGM	110	YES	2614.53	90	THTL	232	NO
765.81	40	ZRNB	95	NO	1001.00	91	PA	234	NO
795.87	55	CS	134	NO	911.16	90	THAC	232	NO
834.84	25	MN	54	NO	911.16	90	THAC	232	NO
964.11	63	EU	152	NO	911.16	90	THAC	232	NO
1120.55	21	SC	46	NO	609.31	88	RABI	226	NO
1120.55	21	SC	46	NO	1221.41	73	TA	182	NO
1274.54	11	NA	22	NO	1004.78	63	EU	154	NO
1408.02	63	EU	152	NO	609.31	88	RABI	226	NO

A.12 Isotope Library GE\$ISOTOPE\$LIB:EU_CALIBRATION.LIB

This listing was generated using the VAXGAP PRLIB command [2].

EU_CALIBRATION

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Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
63	152	EU	13.5100 Y	121.7824	2.84E+01	2
				344.2811	2.66E+01	1
				778.9030	1.30E+01	2
				1112.0870	1.35E+01	2
				1408.0220	2.09E+01	2

A.13 Isotope Library GE\$ISOTOPE\$LIB:TH_CALIBRATION.LIB

This listing was generated using the VAXGAP PRLIB command [2].

TH_CALIBRATION

PAGE 1

Z	A	ID	HALF LIFE	ENERGY	BR	I-CODE
90	228	TH	69.8013 Y	238.6320	4.35E+01	2
				583.1910	3.06E+01	2
				860.5640	4.50E+00	3
				1620.7350	1.50E+00	4
				2614.5330	3.59E+01	1

Appendix B. Sample Output Files from GC and GIDXC

The following sample listings are mentioned in the body of this document. All form feeds within the listings have been preserved as hard page breaks in the interest of faithfully representing the output the user should expect to receive.

B.1 Output from PEQE, Europium-152 Calibration of a Pulsed Detector System

EU-152 CALIBRATION 2-AUG-1994 08:35:46.20

DETECTOR SYSTEM: A1 SPECTRUM ID: EU\$SAVE:A1480208190.DGE

ZERO=-44.3586

ENERGY= 0.0106+ 0.19557(X)+ 9.58223E-10(X)**2

WIDTH= 2.888+ 1.0895E-03(X)

ERROR MATRIX: 1.448068E-04 1.115938E-10 2.437551E-18 -1.081320E-07 1.405342E-11 -1.594117E-14

CHANNEL	ENERGY	CAL. ENG	D-ENG	WIDTH
667.018	121.783	121.787	-0.004	3.34
1804.565	344.274	344.264	0.010	4.90
4026.760	778.872	778.879	-0.007	7.48
5730.490	1112.092	1112.099	-0.007	9.21
7243.430	1408.024	1408.009	0.015	10.49

LOW PULSER WIDTH: 2.44

LOW PULSER ENERGY EQUIVALENT: 147.576

HIGH PULSER ENERGY EQUIVALENT: 1414.745

ANALYSIS OF CALIBRATION LINES USING NEW PULSER EQUIVALENTS

CENTROID	WIDTH	ENERGY	AREA	FLAGS	MICROCURRES	%ERROR	NET MICROCURRIES	%ERROR
667.02	3.3	121.79	15587.	0	2.053E+01	0.9		
1804.56	4.9	344.26	16313.	0	2.294E+01	1.0		
4026.78	7.4	778.88	3754.	0	2.429E+01	1.8		
5730.49	9.2	1112.10	2895.	0	2.496E+01	2.1		
7243.42	10.6	1408.01	3647.	0	2.564E+01	2.0		
							EU 152 2.311E+01	0.9

CALIBRATION NUCLIDE DATA

NUCLIDE	DATE	TIME	ENERGY	WIDTH	uCURIES	% ERROR	FLAG	NET uCURIES	% ERROR
EU 152	070594	0919	121.79	3.4	2.0658E+01	1.5	0		
	070794	1116	121.79	3.4	2.0410E+01	1.0	0		
	071194	0850	121.79	3.4	2.0619E+01	1.4	0		
	071894	1611	121.79	3.4	2.3313E+01	0.8	0		
	080194	1700	121.79	3.4	2.0745E+01	0.9	0		
	080294	0835	121.79	3.3	2.0533E+01	0.9	0		
	070594	0919	344.25	4.9	2.3153E+01	0.9	0		
	070794	1116	344.25	4.8	2.3038E+01	0.6	0		
	071194	0850	344.25	4.9	2.2954E+01	0.6	0		
	071894	1611	344.25	4.9	2.5262E+01	1.0	0		
	080194	1700	344.25	5.0	2.3153E+01	1.2	0		
	080294	0835	344.25	4.9	2.2944E+01	1.0	0		
	070594	0919	778.90	7.3	2.4169E+01	1.7	0		
	070794	1116	778.90	7.3	2.4408E+01	1.6	0		
	071194	0850	778.89	7.6	2.4161E+01	1.4	0		
	071894	1611	778.89	7.2	2.5961E+01	1.3	0		
	080194	1700	778.89	7.6	2.4921E+01	2.0	0		
	080294	0835	778.88	7.4	2.4291E+01	1.8	0		
	070594	0919	1112.07	9.4	2.5513E+01	2.6	0		
	070794	1116	1112.08	9.3	2.5319E+01	1.7	0		
	071194	0850	1112.09	9.3	2.5024E+01	1.6	0		
	071894	1611	1112.08	9.2	2.5469E+01	1.7	0		
	080194	1700	1112.07	9.3	2.6033E+01	2.0	0		
	080294	0835	1112.10	9.2	2.4958E+01	2.1	0		
	070594	0919	1408.02	10.5	2.5417E+01	1.9	0		
	070794	1116	1408.02	10.8	2.6161E+01	1.5	0		
	071194	0850	1408.01	10.5	2.5445E+01	1.8	0		
	071894	1611	1408.03	10.5	2.6874E+01	1.3	0		
	080194	1700	1408.03	10.6	2.5824E+01	1.8	0		
	080294	0835	1408.01	10.6	2.5636E+01	2.0	0		
	070594	0919						2.3259E+01	0.8
	070794	1116						2.3038E+01	0.6
	071194	0850						2.2954E+01	0.6
	071894	1611						2.5421E+01	0.8
	080194	1700						2.3153E+01	1.2
	080294	0835						2.3112E+01	0.9

SPECTROMETER CALIBRATION DATA

DATE	TIME	ZERO	GAIN	LOW PULSER EQ.	HIGH PULSER EQ.
070594	0919	-37.33	0.195	147.59	1414.84
070794	1116	-39.64	0.196	147.60	1414.89
071194	0850	-41.91	0.196	147.58	1414.84
071894	1611	-47.17	0.196	147.77	1415.07
080194	1700	-47.09	0.196	147.70	1414.95
080294	0835	-44.36	0.196	147.58	1414.74

B.2 A Sample Europium-152 Calibration History Listing From PEQEH

QUALITY CONTROL DATA SHEET

DETECTOR: A1

FOR PERIOD
010194 TO 060194

NUCLIDE	DATE	ENERGY	WIDTH	AREA	UCURIE	%ERR
EU 152	042794	121.79	3.39	73643	1.66E+01	1.00
	050594		3.39	94582	1.76E+01	0.60
	050594		3.39	11061	1.74E+01	1.26
	052594		3.36	5445	5.71E+00	2.09
	052594		3.43	19793	5.69E+00	1.46
	060194		3.30	9335	2.30E+01	1.17
AVERAGES:			3.38	35643	1.43E+01	
STD DEV:			0.04	38412	7.06E+00	
EU 152	042794	344.25	4.96	48242	1.16E+01	0.67
	050594		4.98	61749	1.22E+01	0.75
	050594		4.91	7304	1.22E+01	1.87
	052594		5.00	5796	6.49E+00	1.36
	052594		4.90	20896	6.42E+00	0.72
	060194		4.90	9711	2.56E+01#	1.52
AVERAGES:			4.94	25617	1.24E+01	
STD DEV:			0.04	23753	7.00E+00	
EU 152	042794	778.89	7.34	9986	1.11E+01	1.36
	050594		7.54	13112	1.20E+01	1.38

	050594		7.47	1555	1.20E+01	2.79
	052594		7.14*	1264	6.52E+00	3.07
	052594		7.43	4716	6.67E+00	2.35
	060194		7.32	2102	2.55E+01#	2.59
<hr/>						
	AVERAGES:		7.37	5456	1.23E+01	
	STD DEV:		0.14	4974	6.95E+00	
<hr/>						
EU 152	042794	1112.11	9.01	7622	1.12E+01	1.56
	050594		9.07	9777	1.19E+01	1.72
	050594		9.68	1138	1.17E+01	3.30
	052594		9.19	993	6.82E+00	3.44
	052594		9.47	3732	7.03E+00	1.80
	060194		9.11	1656	2.68E+01#	3.15
<hr/>						
	AVERAGES:		9.26	4153	1.26E+01	
	STD DEV:		0.26	3719	7.33E+00	
<hr/>						
EU 152	042794	1408.01	10.70	9484	1.14E+01	1.11
	050594		10.94	12056	1.20E+01	1.12
	050594		10.21	1391	1.17E+01	2.86
	052594		10.47	1214	6.80E+00	3.04
	052594		10.75	4503	6.92E+00	1.61
	060194		10.49	2076	2.74E+01#	2.31
<hr/>						
	AVERAGES:		10.59	5121	1.27E+01	
	STD DEV:		0.26	4604	7.57E+00	

QUALITY CONTROL DATA SHEET

DETECTOR: A1

FOR PERIOD
010194 TO 060194

NUCLIDE	DATE	NET_UCURIE	%ERROR
EU 152	042794	1.156E+01	0.56
	050594	1.214E+01	0.57
	050594	1.207E+01	1.33
	052594	6.535E+00	1.14
	052594	6.429E+00	0.69
	060194	2.589E+01*	1.14
AVERAGE:		1.24E+01	
STD DEV:		7.11E+00	

QUALITY CONTROL DATA SHEET

DETECTOR: A1

FOR PERIOD
010194 TO 060194

DATE	ENERGY ZERO	ENERGY_B	WIDTH_A	LOW PEQ	HIGH PEQ	COMMENTS
042794	-17.362	0.194	2.877	147.40	1414.46	
050594	-17.049	0.194	2.862	145.54	1412.78	
050594	-17.576	0.194	2.945	145.56	1412.82	
052594	-19.606	0.195	2.901	147.63	1414.78	
052594	-19.887	0.195	2.832	147.64	1414.82	
060194	-40.947#	0.196	2.791	147.60	1414.82	
AVERAGES	-22.071	0.195	2.868	146.90	1414.08	
STD DEV	9.325	0.001	0.054	1.04	1.00	

NOTE:

- 1.) * Indicates a lower control limit (warning) value that is out of statistical agreement with QA results:
 - > 3 std. dev. for "Energy zero", "Width_A" and "Energy_B" values.
 - > 5 std. dev. for "Net Ucuries" and "Pulser" values.
- 2.) # Indicates and upper control limit (action) value that is out of statistical agreement with QA results:
 - > 4 std. dev. for "Energy zero", "Width_A" and "Energy_B" values.
 - > 6 std. dev. for "Net Ucuries" and "Pulser" values.
- 3.) The QA results = (average value - current value/std.dev.).
- 4.) Due to the extremely small variances between these measured values, it was necessary to set the control limit criteria above the usual two and three standard deviation criteria.

B.3 Summary Report for a Set of Spectra

*****SWEPP BARREL MONITOR GAMMA-RAY SPECTROMETERY SUMMARY REPORT V. 01.00 - FINAL REPORT - GENERATED 3-AUG-94*****

SAMPLE NAME: Barrel 023277 : #4

SAMPLE ID(S): A1460613110 A2460613110 A3460613110 A4460613110

SAMPLE COLLECTION (DATE/TIME): 60694/1311

SAMPLE COUNTED (DATE/TIME): 60694/1311

SAMPLE QUANTITY: 6.30000E+04 QUANTITY UNITS: G

OPERATOR: _____

APPROVED BY: _____

COMMENTS: _____

REAL COUNT TIME(S): 84.00 85.00 86.00 87.00
ATTENUATION TABLE USED: 02 02 02 02

GRAND WEIGHTED AVERAGE ISOTOPIC MASS RATIOS (%) FOR ALL DETECTORS

PU-241 to PU-239: (1.78 +/- 0.06)E-01
AM-241 to PU-239: (3.19 +/- 0.09)E-01
PU-238 to PU-239: (1.2 +/- 0.4)E-02

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 1 (AND POSSIBLY OTHERS)
(THE STANDARD SET CAN BE CALCULATED)

PU-241 to PU-239: (1.78 +/- 0.06)E-01 (OBSERVED BY DETECTOR(S) 1, 2, 3, 4)
AM-241 to PU-239: (3.19 +/- 0.09)E-01 (OBSERVED BY DETECTOR(S) 1, 2, 3, 4)
PU-240 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 1)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
PU-238 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 1)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
U -235 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 1)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
AM-241 to U -235: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 1)
BECAUSE THE SECOND LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 2 (AND POSSIBLY OTHERS)
(THE STANDARD SET CAN BE CALCULATED)

PU-240 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 2)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 2 (AND POSSIBLY OTHERS)
(ONLY A RESTRICTED SET CAN BE CALCULATED - EXCESSIVE URANIUM IS LIKELY PRESENT)

PU-238 to PU-239: (1.2 +/- 0.4)E-02 (OBSERVED BY DETECTOR(S) 2)

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 2 (AND POSSIBLY OTHERS)
(THE STANDARD SET CAN BE CALCULATED)

U -235 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 2)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
AM-241 to U -235: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 2)
BECAUSE THE SECOND LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 3 (AND POSSIBLY OTHERS)
(THE STANDARD SET CAN BE CALCULATED)

PU-240 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 3)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
PU-238 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 3)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
U -235 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 3)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
AM-241 to U -235: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 3)
BECAUSE THE SECOND LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ISOTOPIC MASS RATIOS (%) OBSERVED BY DETECTOR # 4 (AND POSSIBLY OTHERS)
(THE STANDARD SET CAN BE CALCULATED)

PU-240 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 4)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
PU-238 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 4)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
U -235 to PU-239: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 4)
BECAUSE THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY
AM-241 to U -235: RATIO NOT DETERMINABLE (OBSERVED BY DETECTOR(S) 4)
BECAUSE THE SECOND LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ACTIVITIES OBSERVED BY DETECTOR # 1 (AND POSSIBLY OTHERS): TRU RADIONUCLIDES AND OTHERS > 5% OF PU-239
RADIONUCLIDE SAMPLE ACTIVITY (uCi/G) % ERROR (1-SIGMA) OBSERVED BY DETECTOR(S)

92U 235	1.522E-05	59.33	1, 2, 3, 4
92U 233	1.379E-01	55.25	1, 2
94PU 241	2.406E+02	30.73	1
94PU 240	-5.217E+00	35.76	1, 2, 3, 4
94PU 239	7.858E+01	7.94	1
95AM 241	9.815E+00	15.97	1, 3

ACTIVITIES OBSERVED BY DETECTOR # 2 (AND POSSIBLY OTHERS): TRU RADIONUCLIDES AND OTHERS > 5% OF PU-239
RADIONUCLIDE SAMPLE ACTIVITY (uCi/G) % ERROR (1-SIGMA) OBSERVED BY DETECTOR(S)

94PU 241	4.776E+02	4.49	2, 3, 4
94PU 239	1.698E+02	0.54	2, 3
95AM 241	2.272E+01	5.50	2, 4

ACTIVITIES OBSERVED BY DETECTOR # 4 (AND POSSIBLY OTHERS): TRU RADIONUCLIDES AND OTHERS > 5% OF PU-239
RADIONUCLIDE SAMPLE ACTIVITY (uCi/G) % ERROR (1-SIGMA) OBSERVED BY DETECTOR(S)

94PU 239	1.195E+02	5.24	4
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B.4 PAN\$RATIOS File for the above Set of Spectra

; Mass Fractions and Ratios for Container 023277
; Generated 3-AUG-94 by BATCH_GIDXC_SUMMARY V. 01.00
;

PU_MASS_FRACTIONS

238	9.4744E-03	2.7541E-03
239	7.9412E-01	4.5056E-03
240	5.8210E-02	0.0000E+00
241	1.4117E-01	5.0249E-03
242	2.4000E-04	0.0000E+00

END

PU_MASS_RATIOS

238	1.1931E-02	3.4674E-03
-----	------------	------------

240	0.0000E+00	0.0000E+00
241	1.7777E-01	6.2467E-03
242	0.0000E+00	0.0000E+00

END

AM_PU_MASS_RATIOS

241	3.1857E-01	9.3321E-03
-----	------------	------------

END

U_PU_MASS_RATIOS

235	0.0000E+00	0.0000E+00
-----	------------	------------

END

AM_U_MASS_RATIOS

241	0.0000E+00	0.0000E+00
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END

B.5 Full Single Spectrum Output for a Spectrum from the above Set

*****SWEPP BARREL MONITOR GAMMA-RAY SPECTROMETRY SUMMARY REPORT V 01.00 - MASS RATIOS - GENERATED 3-AUG-94*****

SAMPLE NAME: Barrel 023277 : #4

SAMPLE ID: A1460613110 00000

SAMPLE COLLECTION (DATE/TIME): 60694/1311

SAMPLE COUNTED (DATE/TIME): 60694/1311

SAMPLE QUANTITY: 6.30000E+04 QUANTITY UNITS: G

ATTENUATION TABLE USED: 02

ANALYST: _____

APPROVED BY: _____

COMMENTS: _____

COMPUTED AREA FOR LINE AT: 778.9 IS NOT TRUE-POSITIVE

X-EFFECTIVE FOR EU-152 WILL BE SET TO ZERO

COMPUTED AREA FOR LINE AT: 163.4 IS NOT TRUE-POSITIVE

X- AND T-EFFECTIVE FOR U-235 WILL BE SET TO ZERO

FOR NUCLIDE PU-239:

X-EFFECTIVE = (8. +/- 3.)E+00 CM

T-EFFECTIVE = (1.7 +/- 0.3)E-01 CM

OBSERVED GAMMAS-PER-SECOND(129.30 Kev)= 3.0232E+10, MATRIX MU= 1.409E-01 CM-1, SELF MU= 3.818E+00 CM-1

OBSERVED GAMMAS-PER-SECOND(203.55 Kev)= 5.4430E+10, MATRIX MU= 1.199E-01 CM-1, SELF MU= 1.257E+00 CM-1
 OBSERVED GAMMAS-PER-SECOND(345.01 Kev)= 7.6962E+10, MATRIX MU= 9.902E-02 CM-1, SELF MU= 3.912E-01 CM-1
 OBSERVED GAMMAS-PER-SECOND(413.71 Kev)= 7.9925E+10, MATRIX MU= 9.228E-02 CM-1, SELF MU= 2.731E-01 CM-1
 AVERAGE STANDARD DEVIATION OF OBSERVED GAMMAS-PER-SECOND FROM THE PREDICTED VALUE = 1.70E+09

FOR NUCLIDE EU-152:

X-EFFECTIVE = 0 CM (I.E., NO CORRECTION)

T-EFFECTIVE = 0 CM (I.E., NO CORRECTION)

BECAUSE OF THE NON-TRUE-POSITIVE LINE AREA NOTED ABOVE

FOR NUCLIDE U-235:

X-EFFECTIVE = 0 CM (I.E., NO CORRECTION)

T-EFFECTIVE = 0 CM (I.E., NO CORRECTION)

BECAUSE OF THE NON-TRUE-POSITIVE LINE AREA NOTED ABOVE

ISOTOPIC MASS RATIOS (%)
 (THE STANDARD SET CAN BE CALCULATED)

PU-241 (148.54 keV) to PU-239 (144.20 keV): (1.93 +/- 0.17)E-01

AM-241 (146.55 keV) to PU-239 (144.20 keV): (2.9 +/- 1.0)E-01
 - USED IN THE FOLLOWING WEIGHTED AVERAGE

AM-241 (125.29 keV) to PU-239 (129.30 keV): (3.23 +/- 0.19)E-01
 - USED IN THE FOLLOWING WEIGHTED AVERAGE

AM-241 (wghtd aver) to PU-239 (wghtd aver): (3.21 +/- 0.19)E-01

PU-240 (160.31 keV) to PU-239 (161.48 keV): (RATIO NOT DETERMINABLE)
 - THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

PU-238 (152.72 keV) to PU-239 (144.20 keV): (RATIO NOT DETERMINABLE)
 - THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

U -235 (185.72 keV) to PU-239 (203.55 keV): (RATIO NOT DETERMINABLE)
 - THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

U -235 (185.72 keV) to PU-239 (129.30 keV): (RATIO NOT DETERMINABLE)
 - THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

U -235 (163.36 keV) to PU-239 (161.48 keV): (RATIO NOT DETERMINABLE)
 - THE FIRST LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

AM-241 (169.56 keV) to U -235 (163.36 keV): (RATIO NOT DETERMINABLE)
 - THE SECOND LINE USED HAS A NON-TRUE-POSITIVE ACTIVITY

ISOTOPIC MASS RATIOS (%)
(THE STANDARD SET CAN BE CALCULATED)

PU-238 (152.72 keV) to PU-241 (148.54 keV): (5. +/- 3.)E+00
- THE FIRST LINE USED WAS FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR
x,t corrected numerator gps= 0.3966E+10, error=0.2647E+10
exp(mu*x)=0.2988E+01, exp(smu*t)=0.1515E+01, INTCOR subtraction=0.0000E+00
uncorrected numerator gps= 0.8762E+09, error=0.5810E+09
x,t corrected denominator gps=0.5013E+12, error=0.4379E+11
exp(mu*x)=0.3021E+01, exp(smu*t)=0.1565E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.1060E+12, error=0.4997E+10

PU-241 (148.54 keV) to PU-239 (144.20 keV): (1.93 +/- 0.17)E-01
x,t corrected numerator gps= 0.5013E+12, error=0.4379E+11
exp(mu*x)=0.3021E+01, exp(smu*t)=0.1565E+01, INTCOR subtraction=0.0000E+00
uncorrected numerator gps= 0.1060E+12, error=0.4997E+10
x,t corrected denominator gps=0.1552E+12, error=0.1552E+11
exp(mu*x)=0.3060E+01, exp(smu*t)=0.1623E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.3124E+11, error=0.2195E+10

AM-241 (146.55 keV) to PU-239 (144.20 keV): (2.9 +/- 1.0)E-01
x,t corrected numerator gps= 0.6481E+11, error=0.2267E+11
exp(mu*x)=0.3039E+01, exp(smu*t)=0.1591E+01, INTCOR subtraction=0.8273E+10
uncorrected numerator gps= 0.1340E+11, error=0.1656E+10
x,t corrected denominator gps=0.1552E+12, error=0.1552E+11
exp(mu*x)=0.3060E+01, exp(smu*t)=0.1623E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.3124E+11, error=0.2195E+10

PU-240 (160.31 keV) to PU-239 (161.48 keV): (RATIO NOT DETERMINABLE)
- THE FIRST LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS
x,t corrected numerator gps= 0.4556E+11, error=0.1341E+11
exp(mu*x)=0.2936E+01, exp(smu*t)=0.1436E+01, INTCOR subtraction=0.1518E+11
uncorrected numerator gps= 0.1080E+11, error=0.1209E+10
x,t corrected denominator gps=0.1728E+12, error=0.2183E+11
exp(mu*x)=0.2928E+01, exp(smu*t)=0.1426E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.4139E+11, error=0.4047E+10

ISOTOPIC MASS RATIOS (%)
(ONLY A RESTRICTED SET CAN BE CALCULATED - EXCESSIVE URANIUM IS LIKELY PRESENT)

PU-240 (160.31 keV) to PU-239 (161.48 keV): (RATIO NOT DETERMINABLE)
- THE FIRST LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS
x,t corrected numerator gps= 0.4556E+11, error=0.1341E+11
exp(mu*x)=0.2936E+01, exp(smu*t)=0.1436E+01, INTCOR subtraction=0.1518E+11
uncorrected numerator gps= 0.1080E+11, error=0.1209E+10
x,t corrected denominator gps=0.1728E+12, error=0.2183E+11
exp(mu*x)=0.2928E+01, exp(smu*t)=0.1426E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.4139E+11, error=0.4047E+10

PU-241 (148.54 keV) to PU-239 (161.48 keV): (1.7 +/- 0.2)E-01

x,t corrected numerator gps= 0.5013E+12, error=0.4379E+11
 exp(mu*x)=0.3021E+01, exp(smu*t)=0.1565E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.1060E+12, error=0.4997E+10
 x,t corrected denominator gps=0.1728E+12, error=0.2183E+11
 exp(mu*x)=0.2928E+01, exp(smu*t)=0.1426E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.4139E+11, error=0.4047E+10

AM-241 (125.29 keV) to PU-239 (129.30 keV): (3.23 +/- 0.19)E-01

x,t corrected numerator gps= 0.3600E+11, error=0.2702E+10
 exp(mu*x)=0.3255E+01, exp(smu*t)=0.1877E+01, INTCOR subtraction=0.5185E+09
 uncorrected numerator gps= 0.5892E+10, error=0.2249E+09
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

U -235 (163.36 keV) to PU-239 (161.48 keV): (RATIO NOT DETERMINABLE)

- THE FIRST LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS

x,t corrected numerator gps= -0.2626E+06, error=0.3730E+06
 exp(mu*x)=0.2915E+01, exp(smu*t)=0.1409E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= -0.6391E+05, error=-0.9065E+05
 x,t corrected denominator gps=0.1728E+12, error=0.2183E+11
 exp(mu*x)=0.2928E+01, exp(smu*t)=0.1426E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.4139E+11, error=0.4047E+10

ISOTOPIC MASS RATIOS (%)

(ONLY A RESTRICTED SET CAN BE CALCULATED - EXCESSIVE AMERICIUM IS LIKELY PRESENT)

PU-240 (160.31 keV) to PU-239 (129.30 keV): (RATIO NOT DETERMINABLE)

- THE FIRST LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS

x,t corrected numerator gps= 0.4556E+11, error=0.1341E+11
 exp(mu*x)=0.2936E+01, exp(smu*t)=0.1436E+01, INTCOR subtraction=0.1518E+11
 uncorrected numerator gps= 0.1080E+11, error=0.1209E+10
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

PU-241 (148.54 keV) to PU-239 (129.30 keV): (1.64 +/- 0.11)E-01

x,t corrected numerator gps= 0.5013E+12, error=0.4379E+11
 exp(mu*x)=0.3021E+01, exp(smu*t)=0.1565E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.1060E+12, error=0.4997E+10
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

AM-241 (125.29 keV) to PU-239 (129.30 keV): (3.23 +/- 0.19)E-01

x,t corrected numerator gps= 0.3600E+11, error=0.2702E+10
 exp(mu*x)=0.3255E+01, exp(smu*t)=0.1877E+01, INTCOR subtraction=0.5185E+09
 uncorrected numerator gps= 0.5892E+10, error=0.2249E+09
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

U -235 (185.72 keV) to PU-239 (129.30 keV): (4. +/- 5.)E-01

- THE FIRST LINE USED WAS FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR

x,t corrected numerator gps= 0.2461E+05, error=0.2973E+05

exp(mu*x)=0.2785E+01, exp(smu*t)=0.1307E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.6760E+04, error=0.8147E+04
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

U -235 (185.72 keV) to PU-239 (203.55 keV): (4. +/- 5.)E-01
 - THE FIRST LINE USED WAS FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR
 x,t corrected numerator gps= 0.2461E+05, error=0.2973E+05
 exp(mu*x)=0.2785E+01, exp(smu*t)=0.1307E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.6760E+04, error=0.8147E+04
 x,t corrected denominator gps=0.1808E+12, error=0.1699E+11
 exp(mu*x)=0.2698E+01, exp(smu*t)=0.1232E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.5443E+11, error=0.1140E+10

ISOTOPIC MASS RATIOS (%)
 (THIS IS A TEST SET)

PU-238 (152.72 keV) to PU-239 (144.20 keV): (9. +/- 6.)E-03
 - THE FIRST LINE USED WAS FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR
 x,t corrected numerator gps= 0.3966E+10, error=0.2647E+10
 exp(mu*x)=0.2988E+01, exp(smu*t)=0.1515E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.8762E+09, error=0.5810E+09
 x,t corrected denominator gps=0.1552E+12, error=0.1552E+11
 exp(mu*x)=0.3060E+01, exp(smu*t)=0.1623E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3124E+11, error=0.2195E+10

PU-238 (152.72 keV) to PU-239 (129.30 keV): (8. +/- 5.)E-03
 - THE FIRST LINE USED WAS FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR
 x,t corrected numerator gps= 0.3966E+10, error=0.2647E+10
 exp(mu*x)=0.2988E+01, exp(smu*t)=0.1515E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.8762E+09, error=0.5810E+09
 x,t corrected denominator gps=0.1826E+12, error=0.1197E+11
 exp(mu*x)=0.3209E+01, exp(smu*t)=0.1882E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=0.3023E+11, error=0.6112E+09

AM-241 (165.92 keV) to U -235 (163.36 keV): (RATIO NOT DETERMINABLE)
 - THE SECOND LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS
 x,t corrected numerator gps= 0.4078E+11, error=0.7812E+11
 exp(mu*x)=0.2899E+01, exp(smu*t)=0.1388E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.1014E+11, error=0.1940E+11
 x,t corrected denominator gps=-.2626E+06, error=0.3730E+06
 exp(mu*x)=0.2915E+01, exp(smu*t)=0.1409E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=-.6391E+05, error=-.9065E+05

AM-241 (169.56 keV) to U -235 (163.36 keV): (RATIO NOT DETERMINABLE)
 - THE SECOND LINE USED HAS AN ACTIVITY BELOW DETECTION LIMITS
 x,t corrected numerator gps= 0.4621E+11, error=0.1044E+11
 exp(mu*x)=0.2876E+01, exp(smu*t)=0.1361E+01, INTCOR subtraction=0.0000E+00
 uncorrected numerator gps= 0.1181E+11, error=0.2478E+10
 x,t corrected denominator gps=-.2626E+06, error=0.3730E+06
 exp(mu*x)=0.2915E+01, exp(smu*t)=0.1409E+01, INTCOR subtraction=0.0000E+00
 uncorrected denominator gps=-.6391E+05, error=-.9065E+05

AM-241 (169.56 keV) to U -235 (185.72 keV): (1.2 +/- 1.4)E+02
 - BOTH LINES USED WERE FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR
 x,t corrected numerator gps= 0.4621E+11, error=0.1044E+11
 exp(mu*x)=0.2876E+01, exp(smu*t)=0.1361E+01, INTCOR subtraction=0.0000E+00

uncorrected numerator gps= 0.1181E+11, error=0.2478E+10
x,t corrected denominator gps=0.2461E+05, error=0.2973E+05
exp(mu*x)=0.2785E+01, exp(smu*t)=0.1307E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.6760E+04, error=0.8147E+04

AM-241 (125.29 keV) to U -235 (185.72 keV): (8. +/- 10.)E+01
- THE SECOND LINE USED WERE FIT BY LINEAR METHODS - THE RATIO MAY BE IN ERROR

x,t corrected numerator gps= 0.3600E+11, error=0.2702E+10
exp(mu*x)=0.3255E+01, exp(smu*t)=0.1877E+01, INTCOR subtraction=0.5185E+09
uncorrected numerator gps= 0.5892E+10, error=0.2249E+09
x,t corrected denominator gps=0.2461E+05, error=0.2973E+05
exp(mu*x)=0.2785E+01, exp(smu*t)=0.1307E+01, INTCOR subtraction=0.0000E+00
uncorrected denominator gps=0.6760E+04, error=0.8147E+04

3-AUG-94 14:43 *****GC SYSTEM__BATCH ANALYSIS__GIDXC*****

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*
* SAMPLE NAME: Barrel 023277 : #4
*
* SAMPLE ID: A1460613110 00000
*
* SAMPLE COLLECTION (DATE/TIME): 60694/1311 SOURCE-TO-DETECTOR DISTANCE(CM): 38.0
*
* SAMPLE COUNTED (DATE/TIME): 60694/1311 EFF. MULT. FACTOR: 1.0000
*
* DECAY TIME (HRS): 0.00 DET. DEAD TIME(%): 8.33
*
* COUNTING TIMES (REAL/LIVE SEC.): 84/77
*
* SAMPLE QUANTITY: 6.300E+04 RANDOM SUM CORRECTION/COUNT RATE: 1.000/8950.
*
* DETECTOR SYSTEM: A1 EFFICIENCY/LINEARITY TABLES: 1110/0
*
* LIBRARIES USED: SWEPP/SWEPPREQ/SWEPPIF
*
* PULSER CALIBRATED:
*   WIDTH= 2.791 + 1.123E-03 ENERGY= -8.454 + 0.196 + 4.931E-09
*   PULSER EQUIVALENTS= 147.604 1414.819 LOWER AND CONVOLUTED PULSER AREA: 3.6426E+03 3.6558E+03
*
*
* --BACKGROUNDS AVERAGED--
*
*A1453116270 A1451908120
*
*
*
*****

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CENTROID	D-C	WIDTH	ENERGY	D-E	AREA	%ERR	R-CHI	EFFICIENCY	PEAK CPS	COR CPS	COR GAM/SEC			
									TAG	FIT FLAG	BR(%)	T(1/2)HR	DECAY CORRECTION	INTENSITY CODE
151.025	0.000	3.4	21.081	0.000	1410.	34.73	10.3	1.000E+00	1.83E+01 7.56E-03 6.14E-03	1.93E+01 43.91 0 46.41 0	1.93E+01 6.74E-03	32.07		
346.780	0.062	3.4	59.366	0.012	3027.	3.74	1.5	1.000E+00	3.93E+01 3.84E-03 2.40E-03	4.15E+01 18.18 0 19.61 0	4.15E+01 2.85E-03	16.62		
526.318	0.063	3.3	94.478	0.012	2622.	3.89	1.1	1.000E+00	3.40E+01 -4.46E-04 -2.27E-03	3.60E+01 281.22 0 55.72 0	3.60E+01 -1.35E-03	65.97		
546.557	0.069	4.9**	98.437	0.013	11132.	2.90	2.2	1.000E+00	1.45E+02 7.04E-04 7.96E-04	1.53E+02 135.16 0 74.28 0	1.53E+02 7.70E-04	65.19		
559.079	0.174	3.6	100.886	0.034	1543.	8.59	1.7	8.083E-05	2.00E+01 -3.84E-04 4.32E-05	2.12E+01 154.25 0 931.19 0	2.62E+05 -9.15E-05	363.52		
							73TA	182 10	14.03	2.76E+03	1.0000E+00	2		
568.958	0.068	3.6	102.818	0.013	4843.	3.54	1.7	8.513E-05	6.29E+01	6.64E+01	7.80E+05			

									3.92E-04	157.18	0	1.60E-04	210.92	
									6.04E-05	668.70	0			
							95AM	241	10	0.02		1.0000E+00		5
							94PU	241	10	0.00	1.26E+05	1.0000E+00		2
574.560	0.109	3.7	103.914	0.021	2807.	5.11	1.7	8.753E-05	3.65E+01	3.85E+01	4.40E+05			
									-5.15E-05	1167.92	0	-3.54E-04	93.25	
									-4.84E-04	81.55	0			
							94PU	241	10	0.00	1.26E+05	1.0000E+00		2
							94PU	240	10	0.01	5.75E+07	1.0000E+00		2
							95AM	241	10	0.02	3.79E+06	1.0000E+00		5
610.885	0.252	4.9**	111.018	0.049	3945.	10.63	3.6	1.023E-04	5.12E+01	5.41E+01	5.29E+05			
									9.11E-04	118.68	0	2.19E-04	345.06	
									-4.40E-04	239.67	0			
627.604	0.346	6.1**	114.288	0.068	3321.	9.56	2.8	1.086E-04	4.31E+01	4.56E+01	4.19E+05			
									2.71E-04	272.56	0	-2.70E-05	1632.23	
									-1.91E-04	287.19	0			
							73TA	182	10	1.92	2.76E+03	1.0000E+00		3
635.378	0.529	6.1**	115.808	0.103	2434.	11.95	2.8	1.112E-04	3.16E+01	3.34E+01	3.00E+05			
									9.18E-04	82.45	0	4.01E-04	112.27	
									1.18E-04	474.03	0			
642.946	1.344	6.1**	117.288	0.263	792.	32.00	2.8	1.140E-04	1.03E+01	1.09E+01	9.53E+04			
									-2.68E-04	274.08	0	4.53E-04	99.44	
									8.89E-04	64.19	0			
665.926	0.000	3.9	121.782	0.000	12.	947.63	1.8	1.224E-04	1.53E-01	1.61E-01	1.31E+03			
									1.72E-04	399.33	0	4.83E-04	81.22	
									6.35E-04	75.37	0			
							63EU	152	11	28.37	1.18E+05	1.0000E+00		2
							91PADA231		11	1.18	2.87E+08	1.0000E+00		3
							89ACDA227		11	1.18	1.91E+05	1.0000E+00		3
683.078	0.067	3.6	125.137	0.013	2273.	3.82	1.0	1.288E-04	2.95E+01	3.12E+01	2.42E+05			
									7.46E-04	104.59	0	4.24E-05	1049.31	
									-2.97E-04	182.40	0			
							94PU	239	8	0.00	2.11E+08	1.0000E+00		4
							95AM	241	8	0.00	3.79E+06	1.0000E+00		5
703.540	0.034	3.5	129.139	0.007	18971.	2.02	2.5	1.361E-04	2.46E+02	2.60E+02	1.91E+06			
									3.97E-04	188.46	0	8.97E-04	47.22	
									1.13E-03	45.35	0			
							92 U	232	8	0.07	6.12E+05	1.0000E+00		2

							95AM	241	10	0.00	3.79E+06	1.0000E+00	1
802.088	0.087	3.7	148.412	0.017	2398.	4.71	1.4	1.668E-04	3.11E+01	3.29E+01	1.97E+05		
									-7.47E-04	74.16	0	2.62E-04	210.69
									8.65E-04	49.52	0		
							94PU	241	10	0.00	1.26E+05	1.0000E+00	1
824.113	0.000	4.1	152.720	0.000	103.	66.31	1.0	1.717E-04	1.33E+00	1.41E+00	8.21E+03		
									-3.62E-04	229.36	0	-1.16E-04	440.90
									3.47E-05	1872.49	0		
							94PU	238	9	0.00	7.69E+05	1.0000E+00	1
							73TA	182	9	7.18	2.76E+03	1.0000E+00	2
862.035	0.223	3.4	160.137	0.044	565.	11.19	1.1	1.784E-04	7.34E+00	7.75E+00	4.35E+04		
									2.56E-05	2815.37	0	-6.26E-04	71.43
									-1.04E-03	55.12	0		
							94PU	239	10	0.00	2.11E+08	1.0000E+00	5
							94PU	240	10	0.00	5.75E+07	1.0000E+00	1
							94PU	241	10	0.00	1.26E+05	1.0000E+00	3
867.874	0.182	3.4	161.279	0.036	665.	9.78	1.1	1.792E-04	8.64E+00	9.13E+00	5.09E+04		
									-1.53E-03	43.56	0	-1.38E-03	31.15
									-1.27E-03	44.15	0		
							94PU	239	10	0.00	2.11E+08	1.0000E+00	4
							95AM	241	10	0.00	3.79E+06	1.0000E+00	6
							94PU	240	10	0.00	5.75E+07	1.0000E+00	1
878.500	0.000	4.1	163.357	0.000	-43.	141.82	1.1	1.805E-04	-5.55E-01	-5.86E-01	-3.25E+03		
									-6.02E-04	92.61	0	-5.71E-05	588.78
									2.55E-04	165.56	0		
							92 U	235	11	5.08	6.17E+12	1.0000E+00	3
883.893	0.205	4.4	164.412	0.040	866.	9.72	1.1	1.811E-04	1.13E+01	1.19E+01	6.56E+04		
									5.31E-04	139.65	0	1.62E-04	271.15
									-3.67E-05	1480.70	0		
							92 U	233	8	0.01	1.40E+09	1.0000E+00	2
							94PUDA241	8	1.87	1.26E+05	1.0000E+00	3	
891.613	0.000	4.1	165.922	0.000	32.	191.38	1.1	1.816E-04	4.19E-01	4.42E-01	2.43E+03		
									6.40E-04	100.44	0	5.67E-04	62.18
									5.36E-04	78.72	0		
							95AM	241	11	0.00	3.79E+06	1.0000E+00	6
910.213	0.000	4.2	169.559	0.000	271.	20.99	1.0	1.832E-04	3.52E+00	3.72E+00	2.03E+04		
									-4.53E-04	123.10	0	-5.33E-04	61.62
									-5.75E-04	70.62	0		
							95AM	241	11	0.00	3.79E+06	1.0000E+00	6
918.737	0.185	4.4	171.226	0.036	863.	8.74	1.0	1.838E-04	1.12E+01	1.18E+01	6.44E+04		
									-4.83E-04	141.25	0	-1.39E-05	2883.60
									2.34E-04	212.03	0		
958.849	0.283	3.4	179.071	0.055	399.	16.97	1.1	1.854E-04	5.18E+00	5.47E+00	2.95E+04		
									-7.89E-04	79.59	0	-8.16E-04	41.34
									-8.26E-04	48.37	0		
							73TA	182	8	3.14	2.76E+03	1.0000E+00	3
992.853	0.000	4.2	185.722	0.000	53.	120.52	1.0	1.857E-04	6.85E-01	7.18E-01	3.87E+03		
									5.59E-03	13.58	0	4.73E-03	10.74
									4.13E-03	15.44	0		

							92 U 235	9	57.20	6.17E+12	1.0000E+00	1
							90THDA230	9	3.36	6.61E+08	1.0000E+00	3
1043.140	0.154	4.1	195.557	0.030	856.	7.68	1.0	1.853E-04	1.11E+01	1.17E+01	6.34E+04	
									2.83E-04	314.67	0	79.86
									7.93E-04	62.20	0	
1083.101	0.041	4.1	203.373	0.008	4157.	2.09	1.0	1.841E-04	5.40E+01	5.70E+01	3.10E+05	
									3.44E-04	174.75	0	302.90
									-8.69E-06	5231.61	0	
							94PU 239	8	0.00	2.11E+08	1.0000E+00	3
							95AM 241	8	0.00	3.79E+06	1.0000E+00	6
1093.048	0.000	4.3	205.318	0.000	92.	50.12	1.0	1.836E-04	1.19E+00	1.25E+00	6.83E+03	
									5.04E-04	105.82	0	156.35
									3.25E-05	1266.14	0	
							92 U 235	11	5.01	6.17E+12	1.0000E+00	3
1105.860	0.024	4.1	207.824	0.005	11843.	1.23	1.2	1.830E-04	1.54E+02	1.62E+02	8.87E+05	
									4.39E-04	138.54	0	85.96
									4.00E-04	109.42	0	
							95AM 241	8	0.00	3.79E+06	1.0000E+00	6
							94PUDA241	8	21.63	1.26E+05	1.0000E+00	2
							92 U 233	8	0.00	1.40E+09	1.0000E+00	3
1195.977	0.000	4.5	225.449	0.000	155.	32.06	1.0	1.767E-04	2.01E+00	2.13E+00	1.20E+04	
									5.19E-04	115.25	0	279.90
									-1.27E-04	391.51	0	
1258.074	0.555	4.1	237.594	0.109	160.	27.64	1.0	1.706E-04	2.08E+00	2.19E+00	1.28E+04	
									-4.33E-04	184.91	0	69.56
									-1.41E-03	64.19	0	
1348.384	0.267	4.9	255.257	0.052	603.	11.20	1.3	1.604E-04	7.83E+00	8.26E+00	5.15E+04	
									3.61E-04	166.47	0	292.40
									-3.05E-04	126.31	0	
							91PADA231	8	6.66	2.87E+08	1.0000E+00	2
							89ACDA227	8	6.67	1.91E+05	1.0000E+00	2
1392.141	0.381	3.6**	263.815	0.075	173.	21.35	1.0	1.557E-04	2.25E+00	2.38E+00	1.53E+04	
									1.04E-04	435.80	0	19692.55
									-5.67E-05	579.66	0	
							73TA 182	8	3.63	2.76E+03	1.0000E+00	3
1410.310	0.213	4.5	267.369	0.042	438.	9.74	1.0	1.539E-04	5.69E+00	6.00E+00	3.90E+04	
									-8.06E-05	832.93	0	356.35
									1.47E-04	256.93	0	
							94PUDA241	8	0.73	1.26E+05	1.0000E+00	1
1521.017	0.000	4.8	289.021	0.000	92.	39.33	1.0	1.437E-04	1.20E+00	1.26E+00	8.78E+03	
									-4.28E-04	119.53	0	360.88
									3.56E-04	104.89	0	
1562.604	0.228	4.5	297.155	0.045	361.	10.33	1.0	1.403E-04	4.69E+00	4.95E+00	3.53E+04	
									-3.57E-04	185.36	0	510.33
									2.88E-05	1288.25	0	
1577.958	0.000	4.9	300.158	0.000	140.	31.06	1.0	1.391E-04	1.82E+00	1.92E+00	1.38E+04	
									3.55E-04	161.01	0	343.17
									-9.97E-05	540.23	0	

1636.772	0.145	4.9	311.661	0.028	717.	6.00	1.0	1.344E-04	9.32E+00 -4.37E-04 4.98E-04	6.63 3.25 4.48	1.88E+10 1.68E+04 2.87E+08	1.0000E+00 1.0000E+00 1.0000E+00	2 3 2
									7.31E+04 1.58E-04				200.72
1660.085	0.353	2.0**	316.221	0.069	61.	35.01	1.0	1.326E-04	7.96E-01 3.45E-04 3.52E-04	8.40E-01 88.26 56.40	6.33E+03 3.50E-04		47.52
							92 U	233	8 0.01	1.40E+09	1.0000E+00		1
1682.066	0.000	5.0	320.520	0.000	343.	19.79	1.4	1.310E-04	4.45E+00 -6.60E-04 -4.44E-04	4.70E+00 92.44 109.78	3.59E+04 -5.28E-04		72.10
							92 U	233	9 0.00	1.40E+09	1.0000E+00		3
1698.025	0.244	4.2	323.641	0.048	303.	11.68	1.0	1.298E-04	3.94E+00 4.71E-04 1.21E-04	4.15E+00 95.40 281.04	3.20E+04 2.49E-04		108.99
							91PADA231	8	3.85	2.87E+08	1.0000E+00		2
							89ACDA227	8	3.86	1.91E+05	1.0000E+00		2
1743.838	0.093	5.2	332.602	0.018	3951.	3.67	2.0	1.265E-04	5.13E+01 -9.64E-05 7.47E-04	5.41E+01 530.99 55.21	4.28E+05 4.15E-04		77.38
							94PUDA241	8	1.21	1.26E+05	1.0000E+00		3
							95AM 241	8	0.00	3.79E+06	1.0000E+00		6
							94PU 239	8	0.00	2.11E+08	1.0000E+00		3
1759.381	0.130	6.6**	335.642	0.025	1372.	4.16	1.0	1.254E-04	1.78E+01 -1.11E-04 1.77E-04	1.88E+01 561.54 257.07	1.50E+05 7.69E-05		478.30
							95AM 241	8	0.00	3.79E+06	1.0000E+00		6
1788.123	0.207	4.8	341.263	0.040	400.	8.79	1.0	1.234E-04	5.19E+00 -6.73E-04 1.76E-04	5.47E+00 71.52 176.77	4.44E+04 -7.47E-05		366.99
							93NPPA237	8	4.50	1.88E+10	1.0000E+00		2
1806.330	0.049	5.0	344.824	0.010	3813.	2.09	1.2	1.222E-04	4.95E+01 8.55E-05 3.82E-04	5.22E+01 520.68 86.18	4.28E+05 2.77E-04		95.49
							94PU 239	8	0.00	2.11E+08	1.0000E+00		3
							63EU 152	8	26.57	1.18E+05	1.0000E+00		2
1919.199	0.161	4.9	366.900	0.032	553.	5.87	1.0	1.150E-04	7.18E+00 -6.49E-04 8.83E-05	7.57E+00 48.74 282.46	6.58E+04 -1.94E-04		130.45
1926.900	0.113	4.9	368.406	0.022	889.	4.35	1.0	1.145E-04	1.15E+01 6.71E-04 -3.15E-04	1.22E+01 54.28 75.88	1.06E+05 -1.79E-05		1790.50
							94PU 239	10	0.00	2.11E+08	1.0000E+00		4
							95AM 241	10	0.00	3.79E+06	1.0000E+00		6
1960.014	0.026	5.1	374.883	0.005	9688.	1.07	1.0	1.125E-04	1.26E+02 4.87E-04	1.33E+02 87.54	1.18E+06 9.17E-04		27.59

1986.195	0.070	5.2	380.004	0.014	1890.	2.82	1.1	1.110E-04	2.45E+01 4.04E-04 4.06E-04	1.15E-03 0.00	27.32 2.11E+08	0	1.0000E+00	3
							94PU	239	8					
							1.1	1.110E-04	2.59E+01 105.08 61.99	2.33E+05 4.05E-04	53.39			
							94PU	239	10	0.00	2.11E+08	3	1.0000E+00	3
							51SB	125	10	1.51	2.42E+04	3	1.0000E+00	3
1999.433	0.078	5.2	382.593	0.015	1570.	3.11	1.1	1.103E-04	2.04E+01 2.33E-04 -3.22E-04	2.15E+01 171.87 70.97	1.95E+05 -1.86E-04	106.85		
							94PU	239	10	0.00	2.11E+08	3	1.0000E+00	3
2051.385	0.062	6.4	392.754	0.012	3393.	2.01	1.0	1.074E-04	4.41E+01 5.01E-04 5.49E-04	4.65E+01 86.73 56.80	4.33E+05 5.33E-04	47.56		
							94PU	239	8	0.00	2.11E+08	4	1.0000E+00	4
2157.704	0.043	5.5	413.549	0.008	8723.	1.71	1.5	1.020E-04	1.13E+02 2.31E-03 1.22E-03	1.19E+02 19.54 23.06	1.17E+06 1.53E-03	22.53		
							94PU	239	8	0.00	2.11E+08	1	1.0000E+00	1
2203.274	0.110	5.3	422.462	0.022	691.	4.41	1.0	9.982E-05	8.97E+00 1.99E-04 4.51E-06	9.46E+00 189.49 5871.97	9.47E+04 6.88E-05	315.18		
							94PU	239	8	0.00	2.11E+08	4	1.0000E+00	4
2223.687	0.327	5.2	426.455	0.064	145.	12.92	1.0	9.887E-05	1.88E+00 2.22E-04 1.83E-04	1.98E+00 172.30 154.10	2.00E+04 1.97E-04	115.38		
2350.674	0.099	5.8	451.292	0.019	1077.	3.57	1.0	9.334E-05	1.40E+01 9.38E-04 9.73E-05	1.47E+01 45.10 263.69	1.58E+05 3.23E-04	81.50		
							94PU	239	8	0.00	2.11E+08	4	1.0000E+00	4
2706.160	0.000	6.1	520.823	0.000	8.	116.66	1.0	8.064E-05	1.08E-01 4.51E-04 8.11E-05	1.14E-01 81.16 279.17	1.41E+03 1.84E-04	104.95		
2799.121	0.000	6.2	539.006	0.000	25.	40.41	1.0	7.790E-05	3.20E-01 1.71E-04 9.66E-05	3.37E-01 203.96 279.83	4.33E+03 1.25E-04	171.56		
3024.740	0.608	4.8**	583.137	0.119	39.	26.40	1.1	7.197E-05	5.08E-01 9.89E-04 1.04E-03	5.34E-01 27.61 22.05	7.42E+03 1.02E-03	17.24		
							90THDA228	8	30.58	1.68E+04	1.0000E+00	2		
3100.112	1.020	7.9**	597.879	0.199	45.	26.51	1.2	7.018E-05	5.79E-01 2.43E-04 -4.02E-04	6.11E-01 183.91 92.30	8.70E+03 -1.39E-04	205.67		
3139.000	0.000	6.5	605.486	0.000	23.	36.55	1.0	6.930E-05	3.03E-01 -6.05E-04 -2.80E-04	3.20E-01 65.54 96.57	4.61E+03 -3.83E-04	58.31		
							55CS	134	9	97.63	1.81E+04	1.0000E+00	2	

3205.740	0.696	8.3**	618.540	0.136	62.	17.83	1.0	6.784E-05	8.01E-01 1.39E-05 4.33E-04	8.43E-01 2152.64 53.80	1.24E+04 2.74E-04	66.95	
3344.770	0.403	5.4**	645.735	0.079	62.	15.62	1.0	6.505E-05	8.06E-01 -1.54E-04 -1.84E-04	8.49E-01 151.73 126.37	1.31E+04 -1.69E-04	97.48	
3377.293	0.697	7.1	652.096	0.136	56.	19.89	1.0	6.443E-05	7.33E-01 1.30E-04 4.07E-04	7.72E-01 215.90 53.83	1.20E+04 3.02E-04	57.14	
3428.885	0.199	5.6	662.188	0.039	289.	7.46	1.2	6.347E-05	3.75E+00 8.99E-03 9.96E-03	3.94E+00 15.13 13.55	6.21E+04 9.48E-03	10.11	
3563.950	0.000	7.0	688.607	0.000	22.	42.80	1.0	6.114E-05	2.80E-01 -3.45E-04 3.52E-04	2.95E-01 96.34 72.48	4.83E+03 9.36E-05	254.53	
3599.011	0.000	7.0	695.465	0.000	9.	61.32	1.0	6.055E-05	1.22E-01 -1.45E-04 -9.84E-05	1.29E-01 184.40 240.46	2.12E+03 -1.19E-04	149.11	
3641.000	0.000	7.1	703.678	0.000	16.	37.45	1.0	5.987E-05	2.08E-01 -6.52E-06 -1.03E-04	2.19E-01 3752.71 166.19	3.66E+03 -7.14E-05	197.02	
3709.750	0.000	7.1	717.126	0.000	13.	54.46	1.0	5.880E-05	1.75E-01 1.01E-04 -3.79E-04	1.84E-01 303.92 62.92	3.13E+03 -1.98E-04	95.21	
3733.370	0.273	6.5	721.746	0.053	158.	8.94	1.0	5.844E-05	2.05E+00 -1.22E-04 1.23E-04	2.16E+00 167.28 129.17	3.69E+04 3.04E-05	412.96	
3797.750	0.000	7.2	734.340	0.000	4.	112.57	1.0	5.750E-05	5.32E-02 -3.90E-04 -3.15E-06	5.62E-02 55.47 5158.99	9.77E+02 -1.43E-04	91.81	
3909.800	0.000	7.4	756.257	0.000	7.	85.12	1.0	5.592E-05	9.31E-02 -1.45E-04 4.35E-04	9.78E-02 191.43 49.90	1.75E+03 2.15E-04	92.44	
3940.400	0.000	7.4	762.243	0.000	5.	103.31	1.0	5.551E-05	6.97E-02 1.01E-04 -1.02E-04	7.34E-02 289.34 184.17	1.32E+03 -4.29E-05	369.60	
3975.736	0.588	6.4	769.155	0.115	40.	18.84	1.0	5.504E-05	5.24E-01 -1.18E-04 7.98E-05	5.52E-01 169.00 184.43	1.00E+04 9.90E-06	1194.75	
									90THDA230 92UDA 234 88RADA226	8 8 8	4.89 4.89 4.89	1.0000E+00 1.0000E+00 1.0000E+00	2 2 2

4025.570	0.000	7.5	778.903	0.000	-1.	292.98	1.0	5.441E-05	-1.87E-02 6.88E-05 -4.30E-05	-1.97E-02 338.76 382.46	-3.62E+02 -5.85E-06	2295.79	
							63EU	152	9	12.97	1.18E+05	1.0000E+00	1
4308.500	0.000	7.8	834.247	0.000	9.	50.74	1.0	5.104E-05	1.16E-01 2.18E-04 2.61E-04	1.22E-01 105.39 64.58	2.38E+03 2.46E-04	55.26	
							25MN	54	9	99.98	7.50E+03	1.0000E+00	1
4374.555	0.525	3.1**	847.168	0.103	11.	34.88	1.0	5.032E-05	1.44E-01 1.80E-03 1.58E-03	1.50E-01 20.97 20.83	2.98E+03 1.68E-03	14.81	
5159.000	0.000	8.7	1000.618	0.000	11.	34.20	1.0	4.324E-05	1.39E-01 1.37E-04 -1.25E-04	1.46E-01 108.97 89.38	3.38E+03 -3.07E-05	291.54	
							92UPA	238	11	0.84	3.92E+13	1.0000E+00	1
5182.000	0.000	8.8	1005.118	0.000	10.	38.28	1.0	4.306E-05	1.23E-01 6.77E-05 2.43E-04	1.30E-01 225.61 49.36	3.02E+03 1.76E-04	53.55	
5212.000	0.000	8.8	1010.986	0.000	5.	124.62	1.0	4.283E-05	5.98E-02 -5.22E-04 -4.77E-04	6.34E-02 46.12 39.86	1.48E+03 -4.94E-04	30.18	
5295.000	0.000	8.9	1027.223	0.000	5.	101.02	1.0	4.219E-05	5.96E-02 2.08E-04 1.93E-04	6.25E-02 93.35 76.79	1.48E+03 1.98E-04	59.34	
5427.000	0.000	9.0	1053.045	0.000	5.	91.13	1.0	4.122E-05	6.60E-02 2.49E-04 -2.44E-04	6.96E-02 72.40 53.53	1.69E+03 -7.43E-05	223.42	
5691.000	0.000	9.3	1104.690	0.000	5.	87.39	1.0	3.938E-05	7.00E-02 -3.86E-04 -1.26E-04	7.39E-02 41.35 103.14	1.88E+03 -2.30E-04	43.84	
6559.308	0.000	10.3	1274.556	0.000	29.	24.04	1.0	3.432E-05	3.76E-01 4.27E-04 4.21E-04	3.96E-01 45.85 37.16	1.15E+04 4.23E-04	28.87	
							63EU	154	9	35.49	7.53E+04	1.0000E+00	1
							11NA	22	9	99.93	2.28E+04	1.0000E+00	1
7241.518	0.000	11.0	1408.022	0.000	-1.	883.36	1.0	3.116E-05	-7.39E-03 4.34E-04 5.20E-05	-7.96E-03 45.35 251.02	-2.55E+02 1.69E-04	73.69	
							63EU	152	9	20.85	1.18E+05	1.0000E+00	2
							90THDA	230	9	2.48	6.61E+08	1.0000E+00	3
							92UDA	234	9	2.48	2.16E+09	1.0000E+00	3
7297.259	2.804	5.5**	1418.927	0.549	3.	104.47	1.0	3.093E-05	4.38E-02 9.09E-06 8.14E-05	4.61E-02 1064.61 89.25	1.49E+03 5.53E-05	105.02	
7805.000	0.000	11.7	1518.264	0.000	6.	83.54	1.0	2.897E-05	8.19E-02 -4.85E-05 6.93E-05	8.62E-02 293.03 166.60	2.98E+03 2.24E-05	399.26	

34 LINES NOT TAGGED

25 TAGS REMOVED--NO ICODE 1 LINE

ISOTOPE		LIB ENG	LINE ENG	I-C	FLAGS	ISOTOPE SUMMARY				NET MICRO-CI/UNIT		NET %ERROR(1-SIGMA)
						OTHER TAGS		MICRO-CI/UNIT	%ERROR			
11NA	22	1274.54	1274.56	1	41	EU 154		2.383E-06	64.77	2.383E-06		64.77
25MN	54	834.84	834.25	1	9			1.023E-06	50.74	1.023E-06		50.74
40ZR	95	756.73	756.26	1	9	EU 154		1.377E-06	85.12	1.377E-06		85.12
55CS	137	661.66	662.19	1	40	AM 241		-6.476E-05	13.73	-6.476E-05		13.73
63EU	152	121.78	121.78	2	523			1.984E-06	947.63			
		344.28	344.82	2	520	PU 239		6.895E-04+	2.09			
		778.90	778.90	1	9			-1.197E-06	292.98			
		1408.02	1408.02	2	521			-5.252E-07	883.36			
63EU	154	756.81	756.26	2	9	ZR 95		1.729E-05	85.12			
		1004.77	1005.12	2	139			7.232E-06+	38.28			
		1274.54	1274.56	1	9	NA 22		1.394E-05+	24.04			
92 U	233	146.35	146.08	2	10	PU 239 AM 241		1.960E+00+	37.21	1.110E-05		20.36
		164.52	164.41	2	520	PUDA241		1.840E+00+	34.53			
		208.17	207.82	3	520	AM 241 PUDA241		5.420E+01+	30.21			
		317.13	316.22	1	8			8.838E-02+	43.48			
		320.54	320.52	3	521			1.328E+00+	32.40			
92 U	235	143.77	144.04	2	520	PU 239		1.854E-03+	36.07	9.097E-02		42.20
		163.36	163.36	3	523			-1.126E-04	145.67			
		185.72	185.72	1	9			1.056E-05	124.59			
		205.32	205.32	3	523			1.929E-04	58.58			
92UPA	238	1001.00	1000.62	1	11			1.727E-04+	34.20	1.056E-05		124.59
93NPPA237		300.17	300.16	2	9			8.931E-05+	31.06	1.727E-04		34.20
		312.01	311.66	1	8			8.131E-05+	6.00			
		340.59	341.26	2	520			4.221E-04+	8.79			
94PU	238	152.72	152.72	1	9			1.701E+00	74.65	8.143E-05		5.92
94PU	239	125.21	125.14	4	8	AM 241		8.917E+02+	38.25	1.701E+00		74.65
		129.30	129.14	2	136			7.838E+01+	37.72			
		144.20	144.04	3	136	U 235		6.669E+01+	36.07			
		146.09	146.08	4	10	U 233 AM 241		1.084E+02+	37.21			
		160.07	160.14	5	10	PU 240 PU 241		1.575E+03+	35.35			
		161.48	161.28	4	10	AM 241 PU 240		7.424E+01+	34.83			
		203.55	203.37	3	8	AM 241		7.764E+01+	30.52			
		332.85	332.60	3	8	PUDA241 AM 241		9.160E+01+	25.55			
		345.01	344.82	3	8	EU 152		7.997E+01+	25.02			
		368.51	368.41	4	10	AM 241		1.198E+02+	24.67			
		375.05	374.88	3	8			7.603E+01+	24.14			
		380.19	380.00	3	10			7.618E+01+	24.16			
		382.70	382.59	3	10			7.483E+01+	24.15			
		392.91	392.75	4	8			7.693E+01+	23.79			
		413.71	413.55	1	8			7.701E+01+	23.28			
		422.60	422.46	4	8			7.424E+01+	23.44			
		451.48	451.29	4	8			7.780E+01+	22.68			
94PU	240	104.23	103.91	2	522	PU 241 AM 241		1.258E+01+	39.34	7.858E+01		7.94
		160.31	160.14	1	42	PU 239 PU 241		-7.933E+00	43.91			
		160.31	161.28	1	42	PU 239 AM 241		-4.686E+00	59.20			

94PU 241	103.65	102.82	2	10	AM 241	1.551E+03+	39.32	-4.686E+00	59.20
	103.65	103.91	2	10	PU 240 AM 241	8.935E+02+	39.34		
	148.54	148.41	1	138		2.154E+02+	35.12		
	159.93	160.14	3	522	PU 239 PU 240	1.198E+03+	35.35		
94PUDA241	164.59	164.41	3	8	U 233	1.503E-03+	9.72	2.406E+02	30.73
	208.01	207.82	2	8	AM 241 U 233	1.760E-03+	1.23		
	267.54	267.37	1	8		2.290E-03+	9.74		
	332.36	332.60	3	520	AM 241 PU 239	1.514E-02+	3.67		
95AM 241	102.95	102.82	5	10	PU 241	8.215E+00+	39.32	1.766E-03	1.21
	102.95	103.91	5	10	PU 241 PU 240	4.733E+00+	39.34		
	125.29	125.14	5	40	PU 239	1.409E+01+	38.29		
	146.55	146.08	1	42	PU 239 U 233	1.070E+01+	49.02		
	161.70	161.28	6	522	PU 239 PU 240	1.014E+03+	34.83		
	165.92	165.92	6	11		1.749E+01	194.20		
	169.56	169.56	6	11		1.982E+01+	38.84		
	203.87	203.37	6	520	PU 239	1.525E+04+	30.52		
	208.01	207.82	6	520	PUDA241 U 233	1.571E+02+	30.21		
	332.36	332.60	6	520	PUDA241 PU 239	3.012E+02+	25.55		
	335.40	335.64	6	8		3.185E+01+	25.54		
	368.59	368.41	6	522	PU 239	4.880E+01+	24.67		
	662.43	662.19	6	8	CS 137	1.414E+01+	20.43		
	722.70	721.75	6	136		2.272E+01+	20.35	9.869E+00	16.01

*****SWEPP BARREL MONITOR GAMMA-RAY SPECTROMETERY SUMMARY REPORT V 01.00 - ACTIVITIES - GENERATED 3-AUG-94*****

SAMPLE NAME: Barrel 023277 : #4

SAMPLE ID: A1460613110 00000

SAMPLE COLLECTION (DATE/TIME): 60694/1311

SAMPLE COUNTED (DATE/TIME): 60694/1311

SAMPLE QUANTITY: 6.30000E+04 QUANTITY UNITS: G

ATTENUATION TABLE USED: 02

ANALYST: _____

APPROVED BY: _____

COMMENTS: _____

RADIONUCLIDE	SAMPLE ACTIVITY (uCi/G)	% ERROR (1-SIGMA)
11NA 22	2.383E-06	64.77
25MN 54	1.023E-06	50.74
40ZR 95	1.377E-06	85.12
55CS 137	-6.476E-05	13.73
63EU 152	-1.197E-06	292.98
63EU 154	1.110E-05	20.36
92U 235	1.056E-05	124.59
92U 233	9.097E-02	42.20
92UPA 238	1.727E-04	34.20
93NPPA237	8.143E-05	5.92
94PU 241	2.406E+02	30.73
94PU 240	-4.686E+00	59.20
94PU 239	7.858E+01	7.94
94PU 238	1.701E+00	74.65
94PUDA241	1.766E-03	1.21
95AM 241	9.869E+00	16.01

PU-239 MASS ASSUMING "POINT SOURCE": (8.0 +/- 0.6)E+01 Grams

B.6 XTP Plot from the above Single Spectrum Analysis

(The plot appears on the next page.)

A1460613110 Barrel 023277 : #4

CHANNEL

10⁴

10

2

600

700

800

900

1000

1100

Appendix C. VAX Workstation Fundamentals (Reference 6)

AN INFORMAL RML USER'S GUIDE TO VAX WORKSTATION FUNDAMENTALS
AND TRANSFERRING ASCII TEXT FILES, LOTUS 1-2-3 SPREADSHEETS, AND
WORDPERFECT DOCUMENTS
BETWEEN DOS AND VMS

D. A. Femec

August 19, 1994

Version 2.0

This is one of a series of informal user's guides describing routines and other computer capabilities developed by RML Software Development Section personnel and available on the RML computers. Please contact the respective author(s) with any questions about its content, suggestions for improvements to the software itself or this documentation, or to obtain an updated version.

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1. INTRODUCTION.

This guide presents the procedures for transferring ASCII text files, Lotus 1-2-3 spreadsheets, and WordPerfect documents between DOS and VMS using SoftPC, as well as some basics of using the VAX workstation's Motif windows environment. Lotus 1-2-3 spreadsheets and WordPerfect documents need no translation; the VMS versions are directly readable by the DOS-based programs, and vice versa. ASCII text files, on the other hand, must be translated. In either case, SoftPC can be used to transfer the files between the two environments. All of the translation and transfer operations described in this guide can be performed on the RML or GOPHER VAX workstation where SoftPC and the associated translation routines reside.

This latest version of this guide (2.0) incorporates changes brought about by the upgrade of SoftPC to version 4.0; while the SoftPC window now looks and behaves more like other Motif windows, the main change is in how you exit from SoftPC. The addition of proxy accounts on both the RML and GOPHER workstations has allowed the command for copying files to these workstations to be simplified. This revised guide also covers using the GOPHER workstation (located in the Data Management PC room) for SoftPC-based file transfers, as well as file transfers using DEC's PathWorks software (an updated version of PCSA), installed on some of the PCs in the RML offices area and elsewhere.

The VTODOS routine described in this guide was coded and in use prior to the approval of RML Procedure Unit-4 ("RML Unit Procedure for Documenting the Testing and Operational Validity of New Software Packages Written by the Software Development Section"), and so a "New Software Implementation Data Sheet" has not been prepared for it.

2. VAX WORKSTATION FUNDAMENTALS.

On the VAX workstation you will be using the mouse within the windows environment to restore, remove, and activate windows and to start application programs. Throughout this procedure I will explicitly state whether a single click or a double click is required. So, what do I mean by "restore," "remove," and "activate" a window? And by "single click," "double click," and "drag-and-click" the mouse?

2.1. Windows Fundamentals.

2.1.1. **Activate.** At present, after you log into the OPERATOR account on the RML or GOPHER VAX workstation, a number of windows are already present; one is activated, some have been restored. The most obvious window is labelled "DECTerm" and is where you can communicate with the workstation using DCL commands. This window has a green (for "go") border, meaning that it has been "activated" - that is, any keystrokes you make go to that window. Hidden behind the "DECTerm" window is the "Icon Box" window (simply "Icon Box" from here on). It has a red (for "stop" or "nogo") border, meaning that it is not "activated" - that is, your keystrokes do not go to this window. To activate a window, you only need to move the mouse cursor into the window and single click (you can read what I mean by "single click" in **Single click** below; in short it means to depress the left-hand button on the mouse once). The border color of the window will change from red to green, and the window will pop up to the front of the screen, hiding any other restored windows behind it.

2.1.2. **Restore (and where do I find the icon).** Both the "DECTerm" and "Icon Box" windows, since they are present as windows and not as icons, have been "restored." To restore a window is sort of like the poor

maiden (you - sorry, guys) kissing the frog (double clicking on an icon; see **Double clicks** below), and the frog (again, an icon) turning into a handsome prince (a window) - but in no way as romantic! Icons reside in the "Icon Box," waiting for you to double click on them to restore them. When you double click on an icon to restore it to a window, the window automatically comes up activated; when you restore a window it is probably because you want to use it. You can also restore a window by single clicking on the appropriate icon, and then clicking on the "Restore" item in the pop-up menu that will appear.

Icons are labelled with the corresponding window's label (or an abbreviated version of it). The "DECterm" window has an icon labelled "DECterm," while the "Session Manager" window has an icon labelled just "Manager." The "Session Manager" window has not been restored upon your logging into the OPERATOR account, and so its icon sits in the "Icon Box," waiting until you need it (and you will need it later on to start SoftPC for transferring files between VMS and DOS).

2.1.3. Remove. To remove a window is to return it to an icon in the "Icon Box" (the maiden has gotten fed up with her wart-ridden prince, and so changes him back into a frog). To do this you need to either double click on the title bar of the window (the title bar is where you find the name of the window) or single click on the square "button" that has a little raised square in the middle of it and is located to the right of the title bar. The window is removed from the screen, its icon appears in the "Icon Box," and another window becomes activated (it may not be the window you want to have activated, though, so you may have to activate the one you want).

Now, what do you think happens if you try to remove the "Icon Box?" It

is just another window, but where is its icon going to go? This icon will appear in the upper right-hand corner of the screen. To restore the "Icon Box" you will need to double click on its icon, or single click on the icon and then single click on the "Restore" pop-up menu item, just as discussed in **Restore (and where do I find the icon) above.**

2.2. Mouse Fundamentals.

2.2.1. Single clicks. On the VAX workstation, use the left-hand button on the mouse for single clicks. Within the windows environment, single clicks are mainly used to activate windows. A single click is also used to select (and also begin execution of) a displayed option. An item in a pop-up menu is a displayed option. Displayed options can also include function "buttons." For example, consider the square "button" with the little raised square in it, located to the right of the title bar in any window. (This "button" was mentioned above, remember?) A single click on this "button" removes the window from the screen and returns it to an icon in the "Icon Box."

2.2.2. Double clicks. A double click is two rapid clicks with very little time between them; use the same mouse button you use for single clicks, the left-hand button, when double clicking. Double clicks are used to restore a window from an icon or remove a window from the screen, returning it to an icon. For example, to restore the "DECTerm" window on a VAX workstation, you need to double click on the "DECTerm" icon in the "Icon Box." To remove a window from the workstation's screen, you can double click on the window's title bar (another method for removing windows is described in **Remove above**).

2.2.3. Drag-and-clicks. Drag-and-clicks are used to display so-

called pop-up menus and to select items from the menus. You may not even need to use the mouse, but first here is how to do a drag-and-click first with a mouse, and then how to do it without a mouse.

2.2.3.1. **Using the mouse.** Generally you use the same mouse button for all the other clicking you have done. To drag-and-click, you move the mouse cursor to the pop-up menu's label (for example, "Applications" in the "Session Manager" window), depress and hold down the appropriate button (in this case the left-hand button), move the mouse cursor until the desired menu item is highlighted, and then release the button to select (and also begin execution of) the item. If you move the mouse cursor off of the menu and then release the button, none of the menu items will be selected.

2.2.3.2. **Without using the mouse (almost).** In some cases, there is an almost mouse-free way to drag-and-click. For most windows, the labels of the available pop-up menus appear at the top of the window within the border. Note that there is a single letter underlined in each label; let's call the key corresponding to this letter the identifier key. If you hold down the "Alt" (or "Compose Character") key and then strike the identifier key, that pop-up menu appears. In some of the pop-up menus, each item also has a single letter underlined. Striking just the identifier key for the desired item selects (and also begins execution of) that item. You can also select a menu item by using the up- and down-arrow keys to highlight the appropriate item, then striking the return key. You can even move between multiple pop-up menus by using the left- and right-arrow keys.

But what if you do not want to select one of the displayed menu items? This is why I said "almost mouse-free." To exit the menu without choosing any of the displayed items, you need to single click with the mouse cursor out of

the menu. This is just as I described earlier in **Using the mouse**.

2.2.3.3. Combinations. This exception to "mouse-free" highlights a useful point, though; you can also use combinations of these two methods. You can single click on the desired pop-up menu's label, then strike the appropriate identifier key to select an item. Alternatively, you can hold down the "Alt" (or "Compose Character") key and strike the appropriate identifier key to display the desired menu, then single click on the desired menu item.

3. ASCII TEXT FILE TRANSLATIONS USING SOFTPC.

As part of SoftPC, one routine is provided for translating VMS ASCII text files to DOS ASCII text files, and another routine for doing the reverse. The DOS-to-VMS translation routine is straightforward to use. The VMS-to-DOS translation routine is complicated by the fact that VMS can format ASCII text files in a number of ways, and only those files that are in VFC (variable-record, fixed-control) format are properly handled by the SoftPC VMS-to-DOS translation routine. So you will be using a DCL routine that rewrites the VMS ASCII text file to a file with VFC format and then performs the SoftPC VMS-to-DOS translation on the VFC-formatted file.

If user OPERATOR is not currently logged onto the RML or GOPHER VAX workstation, log in. The "DECTerm" window you need will automatically appear on the screen, and will be activated. If OPERATOR is already logged on but the "DECTerm" window has been removed to an icon, double click on the "DECTerm" icon in the "Icon Box" to restore the "DECTerm" window. If the "DECTerm" window is not activated, activate it by moving the mouse cursor into the window and single clicking. If you do not even find a "DECTerm" window or

icon, start a "DECTerm" window by drag-and-clicking on the "Applications" menu of the "Session Manager" window to select either the "DECTerm" or "DECTerm (full-sized)" menu item (see **Drag-and-clicks** above).

3.1. DOS-To-VMS ASCII Text File Translations. First, you can assure yourself that the DOS ASCII text file is in the current workstation directory using the DCL "DIRECTORY" command. To do this, enter

DIR <DOS ASCII text file name>

at the DCL prompt (RML::> or GOPHER::>), depending on which workstation you are using) and then strike the return key. For example, suppose your DOS ASCII text file is named PCSTUFF.DOS; you would enter

DIR PCSTUFF.DOS

at the DCL prompt and then strike the return key. (Note that all I have done is to replace the angle-bracketed label with the appropriate file name. You will see this construct used throughout this guide: the general case with the blanks to be filled in, then a specific example with those blanks filled in.)

If the file is present, it will be in the resulting list; if there is more than one version of the file, all of the versions will be listed. If the file is not present, you will receive the DCL warning message "%DIRECT-W-NOFILES, no files found."

Now then, to translate a DOS ASCII text file to a VMS ASCII text file, enter

SOFTPC/DOS_TO_VMS <DOS ASCII text file name> <VMS ASCII text file name>

at the DCL prompt and then strike the return key. For example, to translate the DOS ASCII text file named PCSTUFF.DOS into a new VMS ASCII text file named VAXSTUFF.VMS, enter

SOFTPC/DOS_TO_VMS PCSTUFF.DOS VAXSTUFF.VMS

at the DCL prompt and then strike the return key. If, using this example, there is already a file named VAXSTUFF.VMS in the current directory, VAXSTUFF.VMS;3 for instance, the file created by this translation will have the next highest version number, 4 (this is just standard DCL).

No informational messages are printed unless the translation fails. How might the translation fail? If the DOS ASCII text file does not exist in the current directory, or if it is open and in use by another routine, you will get a message like "dostovms couldn't open input file : error 0" and the VMS ASCII text file will not be created.

This translation leaves the DOS ASCII text file intact, so if you do not need the file you will want to delete it after you have assured yourself that the VMS ASCII text file is usable. To do this, use the DCL "DELETE" command. To delete the DOS ASCII text file, enter

DEL/LOG <DOS ASCII text file name, including version number>

at the DCL prompt and then strike the return key. To delete the most recent version of the above DOS ASCII text file, enter

DEL/LOG PCSTUFF.DOS;

at the DCL prompt and then strike the return key.

If the deletion is successful, you will receive a DCL message such as "%DELETE-I-FILDEL, \$USER:[OPERATOR]PCSTUFF.DOS;3 deleted (3 blocks)." If the deletion is unsuccessful (and this could be for a number of reasons), try to make sense of the error message(s) you receive. If, for example, no version of the file PCSTUFF.DOS exists in the current directory, the two DCL messages you would receive are "DELETE-W-SEARCHFAIL, error searching for \$USER:[OPERATOR]PCSTUFF.DOS;" and "-RMS-E-FNF file not found."

Remember that not specifying a version number after the semicolon means

you are referring to the most recent version. If you want to delete a specific version, you need to immediately follow the semicolon with the correct version number, either absolute (e.g., 3 for version 3), or relative (e.g., -1 for the next to the most recent version).

3.2. VMS-To-DOS ASCII Text File Translations.

3.2.1. Getting the file to the RML or GOPHER VAX workstation.

Since you are going to be copying the DOS ASCII text file onto a floppy diskette using SoftPC, the file needs to reside in the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation. If it is not already there, you should start by copying the VMS ASCII text file to the \$USER:[OPERATOR] directory on the workstation. The DCL "COPY" command is used to do this. From the directory in which the file resides (this directory can even be on another VAX computer such as MAX, as long as it is connected to the appropriate VAX workstation via the Ethernet), enter

```
COPY/LOG <VMS ASCII text file name> RML::$USER:[OPERATOR]
```

if you will be using the RML VAX workstation, or, if you will be using the GOPHER VAX workstation, enter

```
COPY/LOG <VMS ASCII text file name> GOPHER::$USER:[OPERATOR]
```

at the appropriate VAX computer's DCL prompt and then strike the return key. The copy of the file will have the same name, and possibly the same version number, as the original file. To copy a file named VAXSTUFF.VMS from your directory on MAX to the RML VAX workstation, then, enter

```
COPY/LOG VAXSTUFF.VMS RML::$USER:[OPERATOR]
```

at the DCL prompt on MAX and then strike the return key.

If, in this example, the copy is successful, you will receive a DCL message such as "%COPY-S-COPIED, MAX::\$USER:[FEMEC]VAXSTUFF.VMS;12 copied to

RML::\$USER:[OPERATOR]VAXSTUFF.VMS;1 (15 records)." If the copy is not successful (and this could be for a number of reasons such as the file you are trying to copy does not exist, or the RML VAX workstation is down or unavailable for some other reason), try to figure out why and see what you can do about it.

Assure yourself that the appropriate VMS ASCII text file is in the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation with the DCL "DIRECTORY" command. To do this you enter

DIR <VMS ASCII text file name>

at the workstation's DCL prompt (RML::> or GOPHER::>), depending on which workstation you are using) and then strike the return key. For instance, you could enter

DIR VAXSTUFF.VMS

at the DCL prompt and then strike the return key. You should find the desired file in the resulting list.

3.2.2. Translating the VMS ASCII text file. To translate a VMS ASCII text file to a DOS ASCII text file enter

VTODOS <VMS ASCII text file name>

at the DCL prompt and then strike the return key. Following the above example of the DCL "DIRECTORY" command, then, you would enter

VTODOS VAXSTUFF.VMS

at the DCL prompt and then strike the return key. The following series of messages is displayed on your terminal as the translation takes place on the RML VAX workstation:

.
.
.
Reformatting the input file prior to submittal to VMSTODOS . . .

Input file successfully reformatted.

Executing VMSTODOS to generate DOS-formatted file . . .
(DOS-formatted file will have a .dos suffix.)

VMSTODOS successfully completed.

%DELETE-I-FILDEL, DKA300:[OPERATOR]VAXSTUFF.VMS;2 deleted (15 blocks)

Reformatted input file deleted.

RML::>

.
.
.
Does something seem funny about this example? The reformatted input file that was deleted was in the directory DKA300:[OPERATOR]; aren't we working in the directory \$USER:[OPERATOR]? Yes, we are. \$USER is a logical that points to the storage device DKA300 on the workstation; they are, in effect, one and the same thing on the RML VAX workstation. (On MAX, \$USER points to the storage device DUA1.) Here \$USER and DKA300 can be used interchangeably; what you see is just a matter of whether the routine or DCL command talks in terms of logicals or not. By the way, if the translation fails (and the file you are attempting to translate does exist), please contact me.

After the translation has successfully completed there will be a new file in the \$USER:[OPERATOR] directory with the same prefix as the VMS ASCII text file but with a DOS suffix (or extension). The DOS suffix serves to remind you that this is a DOS ASCII text file and not a VMS ASCII text file.

To assure yourself that the DOS ASCII text file from the above translation is present you could use the DCL "DIRECTORY" command as has been

explained above in **Getting the file to the RML or GOPHER VAX workstation**. You can also delete the VMS ASCII text file as explained above in **DOS-To-VMS Text File Translations**.

If you have a number of files to translate that all have the same prefix, you will want to rename each DOS ASCII text file after it is created by VTODOS. If you do not rename each one, subsequent translations will generate new versions of the file. This is fine for VMS, since you can distinguish between files on the basis of different version numbers. It is a disaster within DOS, though, because DOS knows nothing about version numbers, and so only the most recent version of the file will be known to SoftPC. Please refer to **A reminder about DOS file names** below for a description of how to rename each DOS ASCII text file and for length restrictions that apply to the names of all DOS files.

4. TRANSFERRING FILES BETWEEN DOS AND VMS USING SOFTPC.

4.1. Introductory Note. In the following discussion we will concern ourselves with transferring files between the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation and a diskette in the workstation's floppy diskette drive. Be aware, though, that you can also transfer files between the \$USER:[OPERATOR] directory and the SoftPC "hard disk." The only change to the following commands would be to replace A: (the floppy diskette drive name) with C: (the "hard disk" drive name). You can even access various directories within the "hard disk" using the standard DOS directory naming conventions. For example, to transfer files to or from the SoftPC "hard disk's" \BATCH directory, replace A: with C:\BATCH\ in the following appropriate examples.

4.2. Starting SoftPC. The RML or GOPHER VAX workstation can be used to

transfer files between a DOS-formatted, 3.5-inch, double-sided, high-density (DS/HD or 2S/HD) floppy diskette and the \$USER:[OPERATOR] directory user disk on the workstation. This is done using the SoftPC program, which emulates an IBM PC AT on the workstation. Again, these files can be ASCII text files, which require translation as discussed above in **ASCII TEXT FILE TRANSLATIONS**. They can also be Lotus 1-2-3 spreadsheets or WordPerfect documents, and, again, these do not need to be translated. (Some other files, such as WordPerfect keyboard files, are formatted differently in the VMS and DOS versions, and so cannot be copied between operating systems and successfully used.)

First you need to have SoftPC running. It may be that there is already an open "SoftPC" window or icon on the screen. If there is a "SoftPC" icon in the "Icon Box," restore the "SoftPC" window by double clicking on the icon. If there is a "SoftPC" window on the screen, activate it by single clicking on the window. If, perhaps even before you try to enter a DOS command, DOS sends you a "Divide overflow" message, you should reboot the PC emulator by holding down the "Alt" (or "Compose Character") and "Ctrl" keys and then striking the decimal point key on the numeric keypad (this is the same as using Alt-Ctrl-Del to reboot a PC). Do not have a diskette in the floppy diskette drive when you reboot the PC emulator.

If you do not find a "SoftPC" window or icon, first make sure there is not a diskette in the floppy diskette drive. Then start a "SoftPC" window by drag-and-clicking on the "Applications" menu of the "Session Manager" window to select the "SoftPC" menu item (see **Drag-and-clicks** above). First a "Working" window appears with the message "SoftPC Initializing" in it. This window disappears and one that will look like a PC being booted up soon

appears. You will need to activate the window once it appears on the screen; unlike most other windows, the "SoftPC" window does not automatically start as an activated window.

The RML or GOPHER VAX workstation will not let you start a second "SoftPC" window when another "SoftPC" window (or icon) already exists. SoftPC, as it is setup to start on the workstation, makes sure that it can access the workstation's floppy diskette drive. If a "SoftPC" window (or icon) already exists, the second "SoftPC" window cannot access the drive and an "Error" window will appear after the "Working" window. This "Error" window will contain the messages "SoftPC Configuration Problem" and "An error occurred processing the configuration file entry shown below. You may select Default to replace it with the system default value, or type a correct value and select Continue" followed by "Value required for DRIVE_FLOPPY_A_DEVICE_" in the lower half of the window. The problem is that two "SoftPC" windows cannot both have access to the floppy diskette drive at the same time. The window has three "buttons," "Continue" and "Default" and "Exit"; you should single click on "Exit" to abort the start of this second "SoftPC" window. Then, depending on the state of the first "SoftPC" window, restore or activate it, and continue with your work.

4.3. SoftPC Basics - Copying Files And Formatting Diskettes. SoftPC can be used to copy files between the RML or GOPHER VAX workstation's directory \$USER:[OPERATOR] and a DOS-formatted, 3.5-inch, double-sided, high-density (DS/HD or 2S/HD) floppy diskette inserted in the workstation's disk drive. This will be described in more detail in the sections that follow. Keep in mind that the workstation's floppy diskette drive is the A: drive within SoftPC, while the workstation's directory \$USER:[OPERATOR] is the E:

drive.

SoftPC can also be used to format DS/HD floppy diskettes using the DOS "FORMAT" command. To do this, enter

FORMAT A: /V

at the DOS prompt and strike the return key. The PC emulator will ask that you "Insert new diskette for drive A: and strike ENTER when ready." After you have placed the diskette to be formatted into the floppy diskette drive and struck the return key, the PC emulator will present a running display of the head and cylinder where formatting is taking place; the "Head" will alternate between zero and one, while the "Cylinder" location will be incremented by one up to seventy-nine. The light on the face of the drive should intermittently flash during the formatting. Once the entire diskette is formatted, this "Head: ... Cylinder: ..." display is replaced with the message "Format complete."

Because the /V qualifier was included in the "FORMAT" command, the PC emulator will now ask you to enter the "Volume label (11 characters, ENTER for none)." After you have entered a label for the diskette (11 characters is the maximum - you can use fewer), the PC emulator displays the total number of bytes on the diskette, the amount of space lost to bad blocks, and the number of remaining bytes available for files. Finally it asks you whether it should format another diskette; respond appropriately with a "Y" for "yes" or an "N" for "no" and then strike the return key. To eject the diskette from the drive, press in the button found on the face of the drive housing.

If your attempt to format a floppy diskette from the "SoftPC" window fails you can try one of three things: (1) try another diskette, (2) format the diskette on a PC, or (3) initialize the diskette from VMS and then attempt

to format the diskette from SoftPC. The third method requires a bit of explanation.

To initialize a diskette from VMS you need to be at the DCL prompt on the RML or GOPHER workstation. SoftPC cannot be running so that you can have access to the floppy diskette drive (if SoftPC is running, perform the steps described below in **Exiting From SoftPC**). To initialize a floppy diskette on the RML workstation, enter

INITIALIZE/DENSITY=DOUBLE DUA2: DOSDSK

at the DCL prompt. DUA2: is the device name for the floppy diskette drive on the RML workstation; on GOPHER the device name is DKA500:, so on GOPHER you would enter

INITIALIZE/DENSITY=DOUBLE DKA500: DOSDSK

at the DCL prompt. DOSDSK is just a dummy label; if you do not enter a label for the diskette, you will be asked for one. This label is strictly a VMS label and has nothing to do with the DOS label for the diskette.

This command should generate no messages whatsoever. Successful execution is signaled by your being returned to the DCL prompt. If any messages are displayed, the initialization has likely been unsuccessful, in which case it may be that you have a physically damaged diskette that should not be used. It might also be the case that you have been denied access to the floppy diskette drive because SoftPC is still running; as mentioned above, if SoftPC is running, you need to exit from it before attempting to enter the "INITIALIZE command.

4.4. Transferring DOS Files From VMS To DOS.

4.4.1. A reminder about DOS file names. There is one limitation you should be aware of at this point, and it arises from the DOS operating

system: the prefix of any DOS file can be no more than eight characters long, and the extension (or suffix) can be no more than three characters long. So, for example, JANUARY.DOS will work just fine as the name of a DOS file. In contrast, DOS will be unable to recognize a file with a name such as JANUARY_FEBRUARY.DOS, since "JANUARY_FEBRUARY" is longer than eight characters. Long file names are allowed by the VMS operating system (and are useful in keeping track of things), but not by DOS. If the name of your DOS file is too long, you should rename it before trying to copy it to the floppy diskette. This is accomplished using the DCL "RENAME" command. To rename a file, enter

REN/LOG <old too-long file name> <new shorter file name>

at the DCL prompt and then strike the return key. For the case of the file name JANUARY_FEBRUARY.DOS, you could enter

REN/LOG JANUARY_FEBRUARY.DOS JAN_FEB.DOS

at the DCL prompt, and then strike the return key, to get a file name with a short enough prefix.

4.4.2. Transferring the DOS file. You can first assure yourself that the DOS file is in the \$USER:[OPERATOR] directory using the DOS "DIR" command. Enter

DIR E:

at the DOS prompt (C:\>) and then strike the return key. You should find your DOS file in the resulting listing. In the case where there are lots of files in the \$USER:[OPERATOR] directory, you can make the listing more specific using wildcards, just as you can with the DCL "DIRECTORY" command; for example, enter

DIR E:*.<suffix common to all desired files>

at the DOS prompt and then strike the return key to generate a listing of all files in the \$USER:[OPERATOR] directory with a common suffix. Since you are looking for PCSTUFF.DOS in this example, the common suffix would be DOS, and so you could enter

DIR E:*.DOS

at the DOS prompt and then strike the return key. You can generate an even more specific list by entering

DIR E:<DOS file name>

at the DOS prompt and striking the return key. In this example, then, you would enter

DIR E:PCSTUFF.DOS

at the DOS prompt and strike the return key to see if PCSTUFF.DOS existed in the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation.

To copy a DOS file from the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation to the DOS-formatted diskette you have put in the floppy diskette drive, enter

COPY E:<DOS file name> A: /V

at the DOS prompt and then strike the return key (the /V qualifier directs DOS to verify the new file is a correct copy of the old file). Using this form of the DOS "COPY" command, the file created on the floppy diskette will have the same name as the original file. You could enter, for example,

COPY E:PCSTUFF.DOS A: /V

at the DOS prompt and then strike the return key. Alternately, you could specify a different name for the new file by entering

COPY E:<old DOS file name> A:<new DOS file name> /V

at the DOS prompt and striking the return key. Suppose you wanted to file on

the floppy diskette to be named PCJUNK.DOS; you would enter

COPY E:PCSTUFF.DOS A:PCJUNK.DOS /V

at the DOS prompt and strike the return key.

The first version of the "COPY" command is useful when you have a number of files to copy, all with either a common prefix or suffix so that you can specify them all with a wildcard. The copies on the floppy diskette will all have the name of the respective original file.

The light on the face of the floppy diskette drive should intermittently flash while the file is being copied. A successful copy of a single file generates the message "1 file(s) copied." The most likely reason for an unsuccessful copy is that PCSTUFF.DOS does not exist on the E: drive, in which case you would receive the messages "E:PCSTUFF.DOS File not found" and "0 file(s) copied" after having entered the DOS "COPY" command.

You can now assure yourself that the DOS file is on the floppy diskette by entering

DIR A:

at the DOS prompt and then striking the return key. You should find the file you just copied in the resulting listing. As explained above, you can also make the listing as specific as you desire. To eject the diskette from the floppy diskette drive, press in the button found on the face of the drive housing.

After you have copied your DOS files to the floppy diskette and are comfortable that you no longer need the DOS files that are in the directory \$USER:[OPERATOR] on the RML or GOPHER VAX workstation, please delete them (see DOS-To-VMS Text File Translations above for a description of how to do this).

4.5. Transferring DOS Files From DOS To VMS. As in Transferring the

DOS file above, assure yourself that the file you wish to transfer is on the DOS-formatted floppy diskette in the floppy diskette drive by entering

DIR A:

at the DOS prompt and then striking the return key. Again, you can make the directory listing as specific as you wish through the use of wildcards or specific file names.

To copy the file from the A: drive to the E: drive, enter

COPY A:<DOS file name> E: /V

at the DOS prompt and strike the return key. For example, to copy the file VAXSTUFF.DOS, enter

COPY A:VAXSTUFF.DOS E: /V

at the DOS prompt and strike the return key. The alternate form of the "COPY" command discussed above in **Transferring the DOS file** can be used here also.

Again, the light on the face of the floppy diskette drive should intermittently flash while the file is being copied. Also, the messages discussed in **Transferring the DOS file** apply here: "1 file(s) copied" would indicate that the copy was successful, while "A:VAXSTUFF.DOS File not found" followed by "0 file(s) copied" would say the DOS "COPY" command could not find the desired file. You can assure yourself that the file is in the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation by entering

DIR E:

at the DOS prompt and striking the return key. To eject the diskette from the floppy diskette drive, press in the button found on the face of the drive housing.

If this is a DOS ASCII text file, you will need to translate it to a VMS ASCII text file as described above in **DOS-To-VMS ASCII Text File Translations**.

The last thing you will likely need to do is move the file to the appropriate directory. You will want to use the DCL "COPY" command (see **Getting the file to the RML or GOPHER VAX workstation** above) to copy the file to another directory, and then use the DCL "DELETE" command to delete the file in the \$USER:[OPERATOR] directory on the RML or GOPHER VAX workstation (see **DOS-To-VMS ASCII Text File Translations** above).

4.6. Exiting From SoftPC. Once you are through using SoftPC, you can remove its window from the screen to an icon in the "Icon Box" (by double clicking on its title bar, for instance). You can also exit from SoftPC, and thereby get rid of the "SoftPC" window all together. To exit from SoftPC, move the mouse cursor into the "SoftPC" window, and drag-and-click to select the "Exit..." item from the "File" menu. A "Warning" window will appear with the messages "SoftPC Exit" and "This will end the current SoftPC session. Save your work before you exit SoftPC." in the upper half of the window. In the lower half of the window are two "buttons," "OK" and "Cancel"; you should single click on "OK" to terminate this "SoftPC" window. The "SoftPC" window will disappear, and there will not be a "SoftPC" icon in the "Icon Box."

5. TRANSFERRING FILES BETWEEN DOS AND VMS USING PATHWORKS.

5.1. Introductory Note. In the following discussion we will concern ourselves with transferring files between your directory on MAX and a diskette in the floppy diskette drive of a PC with the PathWorks software loaded on it. As an added bonus, the PathWorks utility SETHOST for creating a terminal session on MAX will be described.

One of the nice things about using PathWorks is that you do not need to translate ASCII text files; PathWorks performs the necessary translations for

you automatically. Also, all of the drives on the PC, both hard drives and floppy diskette drives, are available for you to use.

5.2. Starting PathWorks On Your PC. To start the PathWorks software on your PC, enter

STARTNET

at the DOS prompt and strike the return key. If you receive the message "Bad command or file name" (and PathWorks is installed on your PC), you may need to enter

CD \DECNET

at the DOS prompt and strike the return key, then reenter the "STARTNET" command. As PathWorks successfully starts, a series of messages akin to those displayed in the following sample session will be displayed on your PC's terminal (the messages will vary depending on the version of PathWorks and the interface card that are installed on your PC, the node name associated with your PC, and the date on which you execute the command). Any significant departure from the following series of messages will likely end with a message to the effect that the network was not successfully loaded; if this happens, please let me know.

Let's suppose, in the following sample session, that you find that you need to change the current directory to the DECNET directory before entering "STARTNET". (Within a sample session, and there will be others later on in this section, your entries will be in bold text -- the required carriage return after each entry will not be displayed -- while the computer's responses will be in regular text. Numbers in parentheses along the right margin refer to any explanatory notes that follow the sample session.)

C:\>STARTNET

Bad command or file name

(1)

C:\>CD \DECNET

C:\DECNET>STARTNET

(2)

PATHWORKS for DOS V4.0 Network Operating Environment
Created by NETSETUP.EXE V4.0.29 Configuration Utility

DECNET.OMO V4.0.17

DECNET.WIK V4.0.26

(C)Copyright 1986-1991 by Digital Equipment Corporation

SAVE V4.0.5 Digital Memory Mark Utility

Copyright (C) 1988-1991 by Digital Equipment Corporation

PCSA mark created

Network kernel version V4.0.07

Copyright (c) Digital Equipment Corporation. 1985, 1991. All Rights Reserved.

DEPCA Data Link, V4.0.7

Copyright (c) 1989, 1990 by Digital Equipment Corp.

Adapter: DEPCA, IRQ:5, I/O:0300, MEM:D0000, 64K mode, Buffers:32

(3)

Datalink installed successfully.

DECnet DNP Version V4.0.09

with NETBIOS Interface Support

DECnet Node Name 'PCDM' (1.5)

(4)

DECnet Started

LAST Transport Version V4.0.10

PATHWORKS Basic Lanman Redirector V4.0.3

Now attempting connection to the system file service:

\\MAX\PCSAV40

Device I: connected to \\MAX\PCSAV40

(5)

Setting Path and Environment Variables

LAD Version V4.0.12

Setting the date and time...

Time/Date serviced by node MAX

(6)

The current date is 02/04/92

The current time is 15:13:01.00

To complete workstation initialization enter the command:

(7)

LOGON server-name user-name [password or *]

C:\

(8)

- (1) The error message "Bad command or file name" may simply mean that DOS does not know to look in the DECNET directory for the program STARTNET (i.e., C:\DECNET is not included in the PATH statement in the PC's AUTOEXEC.BAT file). So change the current directory to the \DECNET directory using the command "CD \DECNET" and then reenter "STARTNET".
- (2) That the \DECNET directory even exists suggests that PathWorks is installed on your PC, and so the "STARTNET" command should work.
- (3) This line describes the interface card installed on your PC.
- (4) This line tells you the DECnet node name and address of your PC.
- (5) This line tells you that one directory you can connect to on MAX will be known to the PC as drive I:.
- (6) This line tells you that the "server," i.e., the VAX computer with which this PC can communicate, is node MAX (but then you sort of knew that already).
- (7) The workstation being referred to here is not the RML or GOPHER workstation, rather your PC is now sort of a workstation connected to MAX. In any of the following discussion, to prevent confusion, your PC will not be referred to as a workstation.
- (8) Having reached this point with these messages means that the DECnet network software has been successfully loaded and you should be able to perform the operations described below.

5.3. Transferring Files Between the PC and MAX. Files can be copied between your PC and MAX in two ways, and these two ways will be distinguished by the PathWorks utility you use to perform the file transfer: LOGON and NFT. Each of these will be discussed separately.

5.3.1. Using LOGON to transfer files. LOGON, the utility mentioned in the above sample session to be used to complete initialization, does not start a session on MAX that resembles your logging into MAX from a VT330; this is done with the SETHOST command (see **Using SETHOST To Create A Terminal Session On MAX** below). Instead, LOGON provides access to the files

in the root directory of your account on MAX that can be recognized by the DOS operating system. (Your root directory on MAX is the directory you find yourself in when immediately after logging into MAX. Also, to be recognized by the DOS operating system, a file on MAX must have no more than eight characters in front of the period and no more than three characters after it; also, the DOS operating system only recognizes the most recent version of any file. See **A reminder about DOS file names** above.)

Only two commands need to be entered to copy a file between your root directory on MAX and a hard drive or floppy diskette drive on your PC. The first command is "LOGON", and here you enter

LOGON MAX <your user name on MAX> *

at the DOS prompt and then strike the return key. Your user name on MAX is what you type in when logging into MAX and MAX asks for "Username:"; this is usually your last name. The * at the end of the command tells MAX to ask you for your password and hide from view what you enter in response. Once this command has been successfully executed, a DOS prompt appears with a different drive letter specified; this is "drive" corresponds to your root directory on MAX.

The second command copies the desired file; to copy a file from your root directory on MAX to a drive on the PC, assuming you have not switched to another drive after the above "LOGON" command, you enter

COPY <name of the file> <drive on your PC>:*. *

at the DOS prompt and then strike the return key (remember that *. * as part of the "TO" portion of the "COPY" command means use the same file name; you can also specify a different file name if you like). Since "COPY" commands are of the form COPY "FROM" "TO" you enter

COPY <drive on your PC>:<name of the file> *.*

at the DOS prompt and then strike the return key to copy a file from a drive on your PC to your root directory on MAX.

In the following sample session, the file ERDAT.DAT will be copied from a user's account on MAX to the PC's A: floppy diskette drive.

.
.
.

C:\>LOGON MAX FEMEC * (1)

C:\>echo off
Password: (2)
LANG Utility Program Version 1.0.04

English(US) version is set

M:\>DIR ERDAT.DAT (3)

Volume in drive M is MAX
Directory of M:\

ERDAT DAT 4136 11-20-91 9:07a
 1 file(s) 4136 bytes
 773947392 bytes free

M:\>COPY ERDAT.DAT A: (4)
 1 file(s) copied

M:\>DEL ERDAT.DAT (5)
 1 file(s) deleted

M:\

.
.
.

- (1) Here the user enters the "LOGON" command, and MAX responds by asking for the user's password.
- (2) Because your password does not appear as you type it in, there is nothing to appear in bold print after the "Password:" prompt; still, this is where you would enter the password for your account on MAX.

- (3) Just to make sure that the file ERDAT.DAT is present, you can enter the appropriate DOS "DIR" command as was done here. Doing so we find that the file does exist.
- (4) The DOS "COPY" command is now used to copy the file ERDAT.DAT to the PC's A: drive.
- (5) The user now deletes the file from the root directory on MAX using the DOS "DEL" command.

5.3.2. Using NFT to transfer files. NFT, which stands for Network File Transfer, also allows you to copy a file between your root directory on MAX and a hard drive or floppy diskette drive on your PC. Once the NFT utility is started, only three commands need to be entered to copy a file between your root directory on MAX and a hard drive or floppy diskette drive on your PC. To start NFT, enter

NFT

at the DOS prompt and then strike the return key. Once the utility is successfully started the DOS prompt is replaced by the NFT prompt, NFT>.

The first command within NFT is the "SET" command, and here you enter

SET MAX"<your user name on MAX> *"::

at the NFT prompt and then strike the return key. Again, your user name on MAX is what you type in when logging into MAX and MAX asks for "Username: "; this is usually your last name. The * near the end of the command, in this instance, tells MAX to ask you for your password when it is needed and hide from view what you enter in response. Once this command has been successfully executed, the NFT prompt reappears.

The second command copies the desired file; to copy a file from your root directory on MAX to a drive on the PC, assuming you have not switched to another drive after the above "SET" command, you enter

COPY MAX::<name of the file> <drive on your PC>:*.*

at the NFT prompt and then strike the return key (remember that *.* as part of the "TO" portion of the "COPY" command means use the same file name; you can also specify a different file name if you like). Since "COPY" commands are of the form COPY "FROM" "TO" you enter

COPY <drive on your PC>:<name of the file> MAX::*.*

at the NFT prompt and then strike the return key to copy a file from a drive on your PC to your root directory on MAX.

The last command within NFT that you need to use is "EXIT". To exit from NFT and return to the DOS prompt, enter

NFT

at the NFT prompt and then strike the return key.

In the following sample session, the file ERDATABASE.DAT will be copied from a user's account on MAX to the PC's A: floppy diskette drive as the file ERDAT.DAT. The main differences to note between this sample session and the prior sample session for LOGON are (1) how your root directory on MAX is referred to (MAX:: instead of M:), (2) the replies from the NFT "COPY" and "DEL" commands are not those you would expect from the corresponding DOS commands, nor are they exactly what you would expect from the corresponding VMS commands, but are specific to NFT and reflect that NFT does not have the file name limitations that LOGON does, and (3) NFT can access all versions of all files in your root directory on MAX (while the DOS filename limitations still exist for files on your PC).

.
.
.

C:\>NFT

NFT - Network File Transfer - v4.0.12

NFT>SET MAX"FEMEC *.*::

(1)

NFT>DIR MAX::ERDATABASE.DAT

(2)

```

Password for MAX/FEMEC/* ? (3)

Directory of: MAX"FEMEC password":DUA1:[FEMEC] (4)
ERDATABASE.DAT;2          15 20-NOV-1991 09:07:53
ERDATABASE.DAT;1          15 20-NOV-1991 08:35:21
NFT>COPY MAX::ERDATABASE.DAT A:ERDAT.DAT (5)
Password for MAX/FEMEC/* ? (6)
Copying file: MAX"FEMEC password":DUA1:[FEMEC]ERDATABASE.DAT;2 to
A:\ERDAT.DAT [4066 bytes at 10425 bytes/second]
NFT>DEL MAX::ERDATABASE.DAT (7)
Password for MAX/FEMEC/* ? (8)
Deleting file: MAX"FEMEC password":DUA1:[FEMEC]ERDATABASE.DAT
NFT>DIR MAX::ERDATABASE.DAT (9)
Password for MAX/FEMEC/* ?

Directory of: MAX"FEMEC password":DUA1:[FEMEC]
ERDATABASE.DAT;1          15 20-NOV-1991 08:35:21
NFT>EXIT (10)

```

C:\

.

- (1) Here the user enters the "SET" command, but MAX does not respond by asking for the users password.
- (2) Just to make sure that the file ERDATABASE.DAT is present, you can enter the appropriate NFT "DIR" command as was done here. Doing so we find that the file does exist.
- (3) Because your password does not appear as you type it in, there is nothing to appear in bold print after the "Password for ... ?" prompt; still, this is where you would enter the password for your account on MAX.
- (4) As noted above, all versions of all files in your root directory on MAX are accessible using NFT.
- (5) The NFT "COPY" command is now used to copy the most-recent version of the file ERDATABASE.DAT to the PC's A: drive as the file ERDAT.DAT; note that no version number needs to be specified for ERDATABASE.DAT.
- (6) NFT will ask for your password every time you attempt to access your root directory on MAX.
- (7) The user now deletes the most-current version of the file from the root directory on MAX using the NFT "DEL" command. Note that like the DOS "DEL" command, but unlike the VMS "DEL" command, the NFT "DEL" command does not require that a version be specified.

- (8) Yes, NFT will ask for your password every time you attempt to access your root directory on MAX.
- (9) So which version of ERDATABASE.DAT did NFT really delete? Reentering the NFT "DIR" command shows that NFT did delete the most current version.
- (10) Entering the NFT "EXIT" command returns the user to the DOS prompt.

5.4. Using SETHOST To Create A Terminal Session On MAX. SETHOST is a Pathworks utility that allows you to create a terminal session on MAX, much as if you were using a VT330 terminal. To start the SETHOST utility, enter

SETHOST MAX

at the DOS prompt and then strike the return key. A series of messages akin to the following will appear after the screen has been cleared of all other messages:

.
.
.

SETHOST V4.0.10
Copyright (c) 1985, 1991 by Digital Equipment Corporation

Press F3 to enter Set-Up to select a Session
Press F4 to switch sessions (or Shift Prev and Shift Next)
Press Ctrl F10 to exit or Ctrl F9 to go to MS-DOS

Connecting to Service 1: MAX via LAT...

Node MAX:: VAX/VMS V5.4-3

Username:

.
.
.

You now enter your user name, then, when asked for it, your password. From here on, until you log out, it is as if you are logged into MAX through a VT330; the PC's drives are not available to you for copying files. Once you

have logged out, the screen is again cleared and the following messages appear:

.
.
.

Press F3 to enter Set-Up to select a Session
Press Ctrl F10 to exit or Ctrl F9 to go to MS-DOS

Press Return or Enter to re-connect to MAX...

.
.
.

Striking control-F10 will return you to the DOS prompt from the SETHOST utility.

5.5. Stopping PathWorks On Your PC. Once you are finished using PathWorks you need to unload the DECnet network software. To do this, enter

STOPNET

at the DOS prompt and then strike the return key. A typical successful unloading proceeds as displayed in the following sample session.

.
.
.

C:\STOPNET

(1)

Saving current network connections
Creating: C:\DECNET\RELOAD.INI
Writing: use I: \\MAX\PCSAV40% */network/replace
Writing: use M: \\MAX\FEMEC\FEMEC */network/replace
Disconnecting network connections
Device I: disconnected from \\MAX\PCSAV40
Device M: disconnected from \\MAX\FEMEC\FEMEC
Unloading the network
MEMMAN V4.0.18 Digital Memory Information Utility
Copyright (C) 1988-1991 by Digital Equipment Corporation

Approximately 116160 bytes of memory will be released

OK to proceed? [No]: YES

(2)

Network Unloaded Successfully

C:\DECNET>

(3)

.
.
.

- (1) You may need to change the current directory to \DECNET by entering the command "CD \DECNET" at the DOS prompt before entering "STOPNET".
- (2) The default response to this query is "No" but you should usually say "YES" so as to release the DOS memory in use by the DECnet network software. If you do not release it, you may find you cannot run other PC-based programs without first rebooting your PC.
- (3) Control is returned to the DOS prompt with you in the \DECNET directory. You may want to change the current directory before doing other work on your PC.