SWEPP Gamma-Ray Spectrometer System Software Test Plan and Report

D. A. Femec

Published September 1994

**Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415-7111**

**Prepared for the
U.S. Department of Energy
Under DOE Idaho Field Office
Contract DE-AC07-761D01570**

MASTER

ms
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

9372AM

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

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 presents the test plan and report for the data acquisition and analysis software associated with the SGRS system.

CONTENTS

1. INTRODUCTION	1
1.1 Purpose	1
1.2 Scope	1
1.3 Definitions, Acronyms, and Abbreviations	1
1.4 Overview	2
1.5 Registered Trademarks and Copyrights	2
2. HARDWARE AND SOFTWARE REQUIREMENTS	3
2.1 Hardware	3
2.2 Software	3
2.2.1 Language and Tools	3
2.2.2 Necessary Files for Execution	3
3. GC USER INTERFACE TEST PLAN	5
3.1 Overview	5
3.2 Initialization of the User's Environment	5
3.2.1 DCL.GC_INIT.1	5
3.3 Starting GC	5
3.3.1 DCL.GC.1	5
3.3.2 DCL.BS.1	6
3.4 GC Help, Exit, and Unknown Commands	7
3.4.1 GC.HELP.1	7
3.4.2 GC.EXIT.1	10
3.4.3 GC.QUIT.1	10

3.4.4 GC.CONTROL-Z.1	11
3.4.5 GC.UNKNOWN.1	11
3.5 GC Data Acquisition Commands	12
3.5.1 GC.M.1	12
3.5.2 GC.M.2	12
3.5.3 GC.M.3	13
3.5.4 GC.M.4	13
3.5.5 GC.RI.1	13
3.5.6 GC.RT.1	13
3.5.7 GC.R.1	14
3.5.8 GC.SP.1	14
3.5.9 GC.SP.2	14
3.5.10 GC.S.1	15
3.5.11 GC.S.2	15
3.5.12 GC.S.3	16
3.5.13 GC.S.4	16
3.5.14 GC.S.5	16
3.5.15 GC.S.6	16
3.5.16 GC.S.7	17
3.5.17 GC.S.8	17
3.5.18 GC.BS.1a	17
3.5.19 GC.BS.1b	17
3.5.20 GC.BS.1c	18
3.5.21 GC.BS.1d	18
3.5.22 GC.BS.1e	18

3.5.23 GC.BS.1f	19
3.5.24 GC.STOP.1	19
3.5.25 GC.STOP.2	19
3.5.26 GC.STOP.3	20
3.5.27 GC.STOP.4	20
3.5.28 GC.BSTOP.1	20
3.6 Spectrum Storage and Analysis Commands	21
3.6.1 GC.D.1	21
3.6.2 GC.D.2	22
3.6.3 GC.D.3	22
3.6.4 GC.D.4	22
3.6.5 GC.D.5	22
3.6.6 GC.D.6	23
3.6.7 GC.D.7	23
3.6.8 GC.BD.1	23
3.6.9 GC.BD.2	24
3.6.10 GC.BD.3	24
3.6.11 GC.BD.4	24
3.6.12 GC.DA.1	24
3.6.13 GC.DA.2	25
3.6.14 GC.DA.3	25
3.6.15 GC.DA.4	25
3.6.16 GC.DA.5	26
3.6.17 GC.DA.6	26
3.6.18 GC.DA.7	26

3.6.19 GC.BDA.1	27
3.6.20 GC.BDA.2	27
3.6.21 GC.BDA.3	27
3.6.22 GC.BDA.4	28
3.6.23 GC.BKG.1	28
3.6.24 GC.BKG.2	28
3.6.25 GC.BKG.3	29
3.6.26 GC.BKG.4	29
3.6.27 GC.A.1	29
3.6.28 GC.A.2	29
3.6.29 GC.A.3	30
3.6.30 GC.BA.1	30
3.6.31 GC.BA.2	30
3.6.32 GC.BA.3	31
3.6.33 GC.BA.4	31
3.6.34 GC.BA.5	31
3.6.35 GC.BA.6	32
3.6.36 GC.FBA.1	32
3.6.37 GC.FBA.2	32
3.6.38 GC.FBA.3	33
3.6.39 GC.FBA.4	33
3.6.40 GC.FBA.5	33
3.6.41 GC.FBA.6	34
3.7 Detector Calibration Commands	34
3.7.1 GC.CBE.1	34

3.7.2 GC.CBE.2	34
3.7.3 GC.PEQE.1	35
3.7.4 GC.PEQE.2	35
3.7.5 GC.PEQEH.1	35
3.7.6 GC.PEQEH.2a	36
3.7.7 GC.PEQEH.2b	36
3.7.8 GC.PEQEH.2c	36
3.7.9 GC.PEQEH.2d	37
3.7.10 GC.CBT.1	37
3.7.11 GC.CBT.2	37
3.7.12 GC.PEQT.1	38
3.7.13 GC.PEQT.2	38
3.7.14 GC.PEQTH.1	38
3.7.15 GC.PEQTH.2a	38
3.7.16 GC.PEQTH.2b	39
3.7.17 GC.PEQTH.2c	39
3.7.18 GC.PEQTH.2d	39
3.8 Spectrum Display Commands	40
3.8.1 GC.DAS.1	40
3.8.2 GC.DAS.2	40
3.9 Batch Job- and Queue-Related Commands	40
3.9.1 GC.TYPELOG.1	40
3.9.2 GC.PRINTLOG.1	41
3.9.3 GC.SHOWQUE.1	42

4. GIDXC	43
4.1 Overview	43
4.2 GIDXC as a Command at the DCL Prompt	43
4.2.1 DCL.GIDXC.1	43
4.2.2 DCL.GIDXC.2	43
4.2.3 DCL.GIDXC.3	43
5. TEST RESULTS	45
5.1 Test Result Annotations	45
5.1.1 Annotation to test GC.HELP.1	45
5.1.2 Annotation to test GC.BS.1f	45
6. REFERENCES	46
APPENDIXES	A-1
Appendix A. Summaries of Test Cases for GC and GIDXC	A-1
A.1 Summary of Test Case Results of September 22, 1994 for GC.	A-1
A.2 Summary of Test Case Results of September 22, 1994 for GIDXC	A-7
A.3 Blank Summary of Test Cases for GC	A-8
A.4 Blank Summary of Test Cases for GIDXC	A-13
Appendix B. Sample Output Files from GC and GIDXC	B-1
B.1 Output from PEQE, Europium-152 Calibration of a Pulsed Detector System	B-1
B.2 A Sample Europium-152 Calibration History Listing From PEQEH	B-3

B.3 Summary Report for a Set of Spectra	B-6
B.4 PAN\$RATIOS File for the above Set of Spectra	B-8
B.5 Full Single Spectrum Output for a Spectrum from the above Set	B-9
B.6 XTP Plot from the above Single Spectrum Analysis	B-26

FIGURES

Figure 1. Directory Structures Related to Core VAXGAP Routines and to GC and GIDXC.	4
Figure 2. GC's Main Screen on Startup from the GC Command.	6
Figure 3. GC's Main Screen on Startup from the BS Command.	7
Figure 4. Starting Data Acquisition Using BS;.	8
Figure 5. GC Help Screen #1.	8
Figure 6. GC Help Screen #2.	9
Figure 7. GC Help Screen #3.	9
Figure 8. GC Help Screen #4.	10
Figure 9. Confirmatory Message from EXIT;.	11
Figure 10. Spectral Analysis Parameter Display.	15
Figure 11. Stopping Data Acquisition Using BSTOP;.	21
Figure 12. Portions of a Typical BATCH_GIDXC_ANALYSIS.LOG File.	41
Figure 13. SHOWQUEUE;-Generated Display.	42

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 the test plan and report for 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 [3] and user's guide are also available [4]; a familiarity with the latter document is essential for understanding and conducting the tests described herein. 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 the isotopic ratio from the analysis results [5]. Further development of the code responsible for isotopic ratio calculations, and possibly modifications to this test plan, will occur as additional drum and box content codes [6] 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 specifies the test plan for GC and GIDXC and reports the results of the tests on version 1.00 of the software. The intended audience includes developers and validation and verification analysts; the users of GC and GIDXC may also find this document of interest in its description of some of the error-handling capabilities of the programs.

1.2 Scope

This document presents a detailed test plan and report for GC and GIDXC. While the error-handling capabilities are extensively tested through this plan, these tests cannot claim to be exhaustive, treating all possible errors and combinations of errors. No contingency planning is included as part of this report since the SGRS is a standalone system.

1.3 Definitions, Acronyms, and Abbreviations

As noted above, a familiarity with Reference 4 is essential for understanding and conducting the tests described herein. 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 test plan for GC, while Section 4 describes the test plan for GIDXC. Section 5 presents the results of the tests for GC and GIDXC, conducted on September 22, 1994 by D. A. Schultz and W. Serrano of the SGRS support staff. Section 6 lists the appropriate references for this document. Summaries of the test cases are presented in Appendix A; the first copies detail the actual test results, while the second copies are blank for future use. Appendix B, taken from Reference 4, contains some sample of the hardcopy output generated by GC and GIDXC.

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 of Reference 3 or 4. 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>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	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	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 TEST PLAN

3.1 Overview

GC provides the interface between the user and the detector systems and turntable. It also allows the user to perform diagnostic measurements on the detector systems and spectral analyses using GIDXC. The test plan for GC will parallel the presentation of commands in Reference 4; refer to this same reference for more detailed information on each of the commands and on the GC main screen. The nomenclature for the various test cases is <program or command language name>.<command (without semicolon)>.<sequential test number for the respective command>. For example, for the first test case of entering the command GC_INIT from the DCL prompt, the test case would be DCL.GC_INIT.1; or, for the third test case of entering the M; (M for monitor) command within GC, the test case would be GC.M.3. All tests of GC commands are to be performed from within GC.

3.2 Initialization of the User's Environment

3.2.1 DCL.GC_INIT.1

3.2.1.1 Purpose. This test addresses the generation of the necessary program communication files.

3.2.1.2 Input Description. Enter the command GC_INIT (including the underscore) at the DCL prompt.^b

3.2.1.3 Expected Results. The message "User's root directory successfully prepared for executing GC" appears and the user is returned to the DCL prompt. The following thirteen files now exist in the user's root directory: 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. (To see that these files now exist, enter the command DIR SYS\$LOGIN at the DCL prompt to obtain a listing of all files in the user's root directory.)

3.2.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.3 Starting GC

3.3.1 DCL.GC.1

3.3.1.1 Purpose. This test addresses starting the GC user interface using the GC command at the DCL prompt.

3.3.1.2 Input Description. Enter the command GC at the DCL prompt.

3.3.1.3 Expected Results. A screen, the GC main screen, similar to that presented in Figure

b. Throughout this document entering a command implies striking the return key after typing in the command. Also, commands to be entered will appear in bold text.

2 appears.

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: 0
MESSAGES:						ANALYZE AT 30000
CMD>						

Figure 2. GC's Main Screen on Startup from the GC Command.

3.3.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.3.2 DCL.BS.1

3.3.2.1 Purpose. This test addresses starting the GC user interface using the BS command at the DCL prompt. (Further BS-related tests within GC will be presented in Sections 3.5.18-3.5.23.)

3.3.2.2 Input Description. Enter the command **BS 000000** at the DCL prompt. Enter **1.1** in response to the first query, **01** in response to the second query, and **TEST CASE** in response to the third query.

3.3.2.3 Expected Results. The GC main screen, similar to that presented in Figure 3, appears and three queries requesting more information about the container being examined are presented to the user. The first query, "ENTER THE WEIGHT IN KILOGRAMS," is included in Figure 3; the other two queries are "ENTER THE CONTENT CODE" and "ENTER ANY COMMENTS".

The status for all detector systems changes to "ON", their real and live times change to 0 and then start increasing, their intervals change to 36,000, and the parameter value associated with "MONITOR PU REGION?" changes to "Y". The value associated with "CONTAINER:" changes to "000000". If the value associated with "ON COUNT?" is "Y", the value associated with "ROTATING?" changes to "Y" and the turntable starts rotating. The "ACQUIRE" light on the appropriate AIMS turns on. The messages "DATA COLLECTION STARTED ON ADC A1 A2 A3 A4", "ESTIMATED COUNT LENGTH TO REACH TRIGGER LEVEL NOT CALCULABLE", and "THE PRESENCE OF A LEAD LINER

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
<p>MESSAGES:</p> <p>ENTER THE WEIGHT IN KILOGRAMS CMD></p>						

Figure 3. GC's Main Screen on Startup from the BS Command.

"CANNOT YET BE RELIABLY DETERMINED" appear below the "MESSAGES:" label (see Figure 4). Shortly after the acquisitions have started, the second message changes to "ESTIMATED COUNT LENGTH TO REACH TRIGGER LEVEL = " followed by some integer number followed by "SEC", where the integer number will change with time (rapidly at first, then more slowly as the acquisition progresses).^c

3.3.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.4 GC Help, Exit, and Unknown Commands

3.4.1 GC.HELP.1

3.4.1.1 Purpose. This test addresses the HELP; command within GC.

3.4.1.2 Input Description. Enter the command **HELP;** at the GC "CMD>" prompt, then strike the return key each time the message "Press the 'Return' key to continue." appears at the bottom of the screen.

c. It is also possible, though not required for passing this test, that after enough time the third message will change and begin with either "LEAD LINER LIKELY NOT PRESENT" or "LEAD LINER LIKELY PRESENT." This change occurs only after enough counts have been accumulated in a certain region of the gamma-ray spectrum, and this may not happen for a long time depending on what is being observed by the detectors.

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>		000000
LIVE--->	0	0	0	0		ROTATING? <u>Y</u>
REAL--->	0	0	0	0		ON COUNT? <u>Y</u>
INTERVAL	36000	36000	36000	36000		MONITOR PU
ID----->						REGION? <u>Y</u>
						COUNTS IN PU REGION: 0
						ANALYZE AT 35000
<p>MESSAGES:</p> <p>DATA COLLECTION STARTED ON ADC A1 A2 A3 A4</p> <p>ESTIMATED COUNT LENGTH TO REACH ANALYSIS TRIGGER LEVEL NOT CALCULABLE</p> <p>THE PRESENCE OF A LEAD LINER CANNOT YET BE RELIABLY DETERMINED</p> <p>CMD>BS;001246,3600</p>						

Figure 4. Starting Data Acquisition Using BS;.

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 5. GC Help Screen #1.

3.4.1.3 Expected Results. The GC main screen disappears and the help screens depicted in

Figures 5 through 8 appear prior to each successive striking of the return key. After the striking the return key the fourth time the GC main screen reappears.

```

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 6. GC Help Screen #2.

```

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 7. GC Help Screen #3.

3.4.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

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 8. GC Help Screen #4.

3.4.2 GC.EXIT.1

3.4.2.1 Purpose. This test addresses exiting from GC using the EXIT; command.

3.4.2.2 Input Description. Enter the command EXIT; at the GC "CMD>" prompt. Then, if requested to do so, enter EXIT; again.

3.4.2.3 Expected Results. If no acquisitions are in progress, the user should be returned to the DCL prompt after entering EXIT; the first time. If acquisitions are in progress, the messages "THERE ARE COUNTS IN PROGRESS - EXITING NOW WILL PREVENT AUTOMATIC PROCESSING" and "REPEAT THE COMMAND TO CONFIRM EXITING AT THIS TIME" will appear, as depicted in Figure 9, after entering EXIT; the first time. The user should be returned to the DCL prompt after entering EXIT; the second time.

3.4.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.4.3 GC.QUIT.1

3.4.3.1 Purpose. This test addresses exiting from GC using the QUIT; command.

3.4.3.2 Input Description. Enter the command QUIT; at the GC "CMD>" prompt. Then, if requested to do so, enter QUIT; again.

3.4.3.3 Expected Results. If no acquisitions are in progress, the user should be returned to the DCL prompt after entering QUIT; the first time. If acquisitions are in progress, the messages "THERE ARE COUNTS IN PROGRESS - EXITING NOW WILL PREVENT AUTOMATIC PROCESSING" and "REPEAT THE COMMAND TO CONFIRM EXITING AT THIS TIME" will appear after entering QUIT; the first time (the screen will be similar to that in Figure 9 but with "EXIT" replaced with "QUIT" at the "CMD>" prompt). The user should be returned to the DCL prompt after entering QUIT; the second time.

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 9. Confirmatory Message from EXIT;.

3.4.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.4.4 GC.CONTROL-Z.1

3.4.4.1 Purpose. This test addresses exiting from GC by striking control-z.^d

3.4.4.2 Input Description. Strike control-z at the GC "CMD>" prompt. Then, if requested to do so, strike control-z again.

3.4.4.3 Expected Results. If no acquisitions are in progress, the user should be returned to the DCL prompt after striking control-z the first time. If acquisitions are in progress, the messages "THERE ARE COUNTS IN PROGRESS - EXITING NOW WILL PREVENT AUTOMATIC PROCESSING" and "REPEAT THE COMMAND TO CONFIRM EXITING AT THIS TIME" will appear after striking control-z the first time (the screen will be similar to that in Figure 9 but there will be nothing after the "CMD>" prompt). The user should be returned to the DCL prompt after striking control-z again.

3.4.4.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.4.5 GC.UNKNOWN.1

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

3.4.5.1 Purpose. This test addresses GC's response to an unknown command being entered within GC.

3.4.5.2 Input Description. Enter the command UNKNOWN; at the GC "CMD>" prompt.

3.4.5.3 Expected Results. The message "BAD OR UNKNOWN COMMAND--UNKNOWN;" appears above the "CMD>" prompt.

3.4.5.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5 GC Data Acquisition Commands

3.5.1 GC.M.1

3.5.1.1 Purpose. This test addresses using the M; command within GC for toggling^e whether the region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed is monitored during a data acquisition started using BS; or S;.

3.5.1.2 Input Description. A data acquisition should not be taking place while performing this test. Enter the command M; at the GC "CMD>" prompt.

3.5.1.3 Expected Results. The parameter value associated with "MONITOR PU REGION?" should remain unchanged. This command has no effect unless data acquisition is occurring.

3.5.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.2 GC.M.2

3.5.2.1 Purpose. This test addresses using the M; command within GC for toggling^f whether the region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed is monitored during a data acquisition started using BS; or S;.

3.5.2.2 Input Description. A data acquisition needs to be taking place while performing this test. Enter the command M; at the GC "CMD>" prompt. Enter the command again.^g

3.5.2.3 Expected Results. The parameter value associated with "MONITOR PU REGION?" changes to "N" if it is displayed as "Y" prior to the command M; being entered; it changes to "Y" if it is displayed as "N" prior to the command being entered (in this latter case, if the value associated with "ANALYZE AT" is not 30,000 prior to the command being entered, it will be reset to this value).

e. 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.

f. 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.

g. In testing toggles, the user will repeat the command to ensure that the toggle works in both directions. The user should observe the results after each entry of the command, not just after having entered the command twice.

3.5.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.3 GC.M.3

3.5.3.1 Purpose. This test addresses using the M; command within GC for toggling whether the region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed is monitored during a data acquisition started using BS; or S; and changing the analysis trigger level (i.e., the count limit).

3.5.3.2 Input Description. A data acquisition needs to be taking place while performing this test. If the parameter value associated with "MONITOR PU REGION?" is displayed as "Y", enter the command M; at the GC "CMD>" prompt to set it to "N". Enter the command M;35000 at the GC "CMD>" prompt.

3.5.3.3 Expected Results. The parameter value associated with "MONITOR PU REGION?" changes from "N" to "Y" and the value associated with "ANALYZE AT" changes from 30,000 to 35,000.

3.5.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.4 GC.M.4

3.5.4.1 Purpose. This test addresses using an M; command within GC, as in test GC.M.3, with an invalid analysis trigger level.

3.5.4.2 Input Description. A data acquisition needs to be taking place while performing this test. If the parameter value associated with "MONITOR PU REGION?" is displayed as "Y", enter the command M; at the GC "CMD>" prompt to set it to "N". Enter the command M;A at the GC "CMD>" prompt.

3.5.4.3 Expected Results. The messages "INCOMPLETE COMMAND - COUNT LIMIT INVALID" and "BAD OR UNKNOWN COMMAND--'M;A'" appear above the "CMD>" prompt and no changes are made to the associated parameter values (i.e., to "MONITOR PU REGION?" and "ANALYZE AT").

3.5.4.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.5 GC.RI.1

3.5.5.1 Purpose. This test addresses using the RI; command within GC to initialize communications with the turntable controller.

3.5.5.2 Input Description. Enter the command RI; at the GC "CMD>" prompt.

3.5.5.3 Expected Results. No messages are displayed on the GC screen, and no parameter values change.

3.5.5.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.6 GC.RT.1

3.5.6.1 Purpose. This test addresses using the RT; command within GC to toggle whether turntable rotation should occur during data acquisition.

3.5.6.2 Input Description. Enter the command RT; at the GC "CMD>" prompt. Enter the command again.

3.5.6.3 Expected Results. The parameter value associated with "ON COUNT?" (found below "ROTATING?") changes to "N" if it is displayed as "Y" prior to the command RT; being entered; it changes to "Y" if it is displayed as "N" prior to the command being entered.

3.5.6.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.7 GC.R.1

3.5.7.1 Purpose. This test addresses using the R; command within GC to toggle whether the turntable is currently rotating.

3.5.7.2 Input Description. Enter the command R; at the GC "CMD>" prompt. Enter the command again.

3.5.7.3 Expected Results. The parameter value associated with "ROTATING?" changes to "N" if it is displayed as "Y" prior to the command R; being entered, and turntable rotation stops; it changes to "Y" if it is displayed as "N" prior to the command being entered, and turntable rotation starts.

3.5.7.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.8 GC.SP.1

3.5.8.1 Purpose. This test addresses using the SP; command within GC to display the current spectral analysis parameters for a single detector system.

3.5.8.2 Input Description. Enter the command SP;A1 at the GC "CMD>" prompt. Make some changes to the fields, then strike control-z to return to GC's main screen.

3.5.8.3 Expected Results. A text screen akin to that presented in Figure 10 appears upon the user entering the command, changes entered in the third column appear in the second column, and GC's main screen reappears after the user strikes control-z.

3.5.8.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.9 GC.SP.2

3.5.9.1 Purpose. This test addresses using the SP; command within GC to display the current spectral analysis parameters for an unknown single detector system.

3.5.9.2 Input Description. Enter the command SP;A5 at the GC "CMD>" prompt.

3.5.9.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'SP;A5'" are displayed above the "CMD>" prompt.

"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 10. Spectral Analysis Parameter Display.

3.5.9.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.10 GC.S.1

3.5.10.1 Purpose. This test addresses using the S; command within GC to start an acquisition on a single detector system.

3.5.10.2 Input Description. With no acquisitions taking place, enter the command S;A1,1000 at the GC "CMD>" prompt.

3.5.10.3 Expected Results. The status for detector system A1 changes to "ON", its real and live times change to 0 and then start increasing, and its interval changes to 1,000. The "ACQUIRE" light on the appropriate AIM turns on. The message "DATA COLLECTION STARTED ON ADC A1" appears below the "MESSAGES:" label.

3.5.10.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.11 GC.S.2

3.5.11.1 Purpose. This test addresses attempting to improperly use the S; command within GC to start an acquisition on a single detector system on which an acquisition is currently in progress.

3.5.11.2 Input Description. With an acquisition taking place on detector system A1, enter the command S;A1,1000 at the GC "CMD>" prompt.

3.5.11.3 Expected Results. The message "UNABLE TO START DATA COLLECTION ON ADC A1" appears below the "MESSAGES:" label. The current acquisition continues uninterrupted.

3.5.11.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.12 GC.S.3

3.5.12.1 Purpose. This test addresses using the S; command within GC to start an acquisition on multiple detector systems.

3.5.12.2 Input Description. With no acquisitions taking place, enter the command S;A1-A3,1500 at the GC "CMD>" prompt.

3.5.12.3 Expected Results. The status for detector systems A1, A2, and A3 changes to "ON", their real and live times change to 0 and then start increasing, and their intervals change to 1,500. The "ACQUIRE" light on the appropriate AIMs turns on. The message "DATA COLLECTION STARTED ON ADC A1 A2 A3" appears below the "MESSAGES:" label.

3.5.12.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.13 GC.S.4

3.5.13.1 Purpose. This test addresses attempting to improperly use the S; command within GC to start an acquisition on multiple detector systems on which an acquisition is currently in progress.

3.5.13.2 Input Description. With an acquisition taking place on detector systems A1, A2, and A3, enter the command S;A1-A3,1000 at the GC "CMD>" prompt.

3.5.13.3 Expected Results. The message "UNABLE TO START DATA COLLECTION ON ADC A1" appears below the "MESSAGES:" label. The current acquisition continues uninterrupted.

3.5.13.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.14 GC.S.5

3.5.14.1 Purpose. This test addresses using an S; command within GC to attempt to start an acquisition on an unknown single detector systems.

3.5.14.2 Input Description. With no acquisitions taking place, enter the command S;A5,1000 at the GC "CMD>" prompt.

3.5.14.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'S;A5,1000'" are displayed above the "CMD>" prompt.

3.5.14.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.15 GC.S.6

3.5.15.1 Purpose. This test addresses using an incorrectly formatted S; command within GC to attempt to start an acquisition on multiple detector systems.

3.5.15.2 Input Description. Enter the command S;A1,A2,A3,1500 at the GC "CMD>" prompt.

3.5.15.3 Expected Results. The messages "INCOMPLETE COMMAND - COUNT TIME MISSING OR BAD" and "BAD OR UNKNOWN COMMAND--'S;A1,A2,A3,1500'" appear above the "CMD>" prompt.

3.5.15.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.16 GC.S.7

3.5.16.1 Purpose. This test addresses using an S; command with an invalid count time within GC to attempt to start an acquisition on a single detector system.

3.5.16.2 Input Description. Enter the command S;A1,ABC at the GC "CMD>" prompt.

3.5.16.3 Expected Results. The messages "INCOMPLETE COMMAND - COUNT TIME MISSING OR BAD" and "BAD OR UNKNOWN COMMAND--'S;A1,ABC'" appear above the "CMD>" prompt.

3.5.16.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.17 GC.S.8

3.5.17.1 Purpose. This test addresses using an S; command with an invalid count time within GC to attempt to start an acquisition on multiple detector systems.

3.5.17.2 Input Description. Enter the command S;A1-A3,ABC at the GC "CMD>" prompt.

3.5.17.3 Expected Results. The messages "INCOMPLETE COMMAND - COUNT TIME MISSING OR BAD" and "BAD OR UNKNOWN COMMAND--'S;A1-A3,ABC'" appear above the "CMD>" prompt.

3.5.17.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.18 GC.BS.1a

3.5.18.1 Purpose. This test addresses using the BS; command within GC to start an acquisition on all of the detector systems. There are six parts to this test; the remaining parts follow and should be conducted in order immediately after this test.

3.5.18.2 Input Description. With no acquisitions taking place, enter the command BS;000000 at the GC "CMD>" prompt.

3.5.18.3 Expected Results. The GC main screen, similar to that presented in Figure 3, appears and the query, "ENTER THE WEIGHT IN KILOGRAMS," as included in Figure 3, appears above the "CMD>" prompt.

3.5.18.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.19 GC.BS.1b

3.5.19.1 Purpose. This test addresses entering an incorrect response to the first query generated

after using the BS; command within GC. This is the second part of a six-part test, all parts of which should be performed in immediate succession.

3.5.19.2 Input Description. After performing test GC.BS.1, in response to the query "ENTER THE WEIGHT IN KILOGRAMS", enter ABC at the GC "CMD>" prompt.

3.5.19.3 Expected Results. The message "INVALID WEIGHT - ENTER A POSITIVE NUMBER" appears above the original query (i.e., above "ENTER THE WEIGHT IN KILOGRAMS").

3.5.19.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.20 GC.BS.1c

3.5.20.1 Purpose. This test addresses entering a correct response to the first query generated after using the BS; command within GC. This is the third part of a six-part test, all parts of which should be performed in immediate succession.

3.5.20.2 Input Description. After performing test GC.BS.2, in response to the query "ENTER THE WEIGHT IN KILOGRAMS", enter 1.1 at the GC "CMD>" prompt.

3.5.20.3 Expected Results. The query "ENTER THE CONTENT CODE" appears above the "CMD>" prompt.

3.5.20.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.21 GC.BS.1d

3.5.21.1 Purpose. This test addresses entering an incorrect response to the second query generated after using the BS; command within GC. This is the fourth part of a six-part test, all parts of which should be performed in immediate succession.

3.5.21.2 Input Description. After performing test GC.BS.3, in response to the query "ENTER THE CONTENT CODE", enter CODE 1 at the GC "CMD>" prompt.

3.5.21.3 Expected Results. The message "INVALID CONTENT CODE" appears above the original query (i.e., above "ENTER THE CONTENT CODE").

3.5.21.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.22 GC.BS.1e

3.5.22.1 Purpose. This test addresses entering a correct response to the first query generated after using the BS; command within GC. This is the fifth part of a six-part test, all parts of which should be performed in immediate succession.

3.5.22.2 Input Description. After performing test GC.BS.4, in response to the query "ENTER THE CONTENT CODE", enter 1 at the GC "CMD>" prompt.

3.5.22.3 Expected Results. The query "ENTER ANY COMMENTS" appears above the "CMD>" prompt.

3.5.22.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.23 GC.BS.1f

3.5.23.1 Purpose. This test addresses entering a response to the third (and final) query generated after using the BS; command within GC. This is the final part of a six-part test, all parts of which should be performed in immediate succession.

3.5.23.2 Input Description. After performing test GC.BS.5, in response to the query "ENTER ANY COMMENT", enter TEST CASE at the GC "CMD>" prompt.

3.5.23.3 Expected Results. The status for all detector systems changes to "ON", their real and live times change to 0 and then start increasing, their intervals change to 36,000, and the value associated with "CONTAINER:" changes to "000000". If the value associated with "ON COUNT?" is "Y", the value associated with "ROTATING?" changes to "Y" and the turntable starts rotating. The "ACQUIRE" light on the appropriate AIMs turns off. The messages "DATA COLLECTION STARTED ON ADC A1 A2 A3 A4", "ESTIMATED COUNT LENGTH TO REACH TRIGGER LEVEL NOT CALCULABLE", and "THE PRESENCE OF A LEAD LINER CANNOT YET BE RELIABLY DETERMINED" appear below the "MESSAGES:" label (see Figure 4). Shortly after the acquisitions have started, the second message changes to "ESTIMATED COUNT LENGTH TO REACH TRIGGER LEVEL =" followed by some integer number followed by "SEC", where the integer number will change with time (rapidly at first, then more slowly as the acquisition progresses).

3.5.23.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.24 GC.STOP.1

3.5.24.1 Purpose. This test addresses using the STOP; command within GC to stop an acquisition on a single detector system.

3.5.24.2 Input Description. With an acquisition taking place only on detector system A1, enter the command STOP;A1 at the GC "CMD>" prompt.

3.5.24.3 Expected Results. The status for detector system A1 changes to "OFF". The "ACQUIRE" light on the appropriate AIM turns off. The message "DATA COLLECTION STOPPED ON ADC A1" appears below the "MESSAGES:" label.

3.5.24.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.25 GC.STOP.2

3.5.25.1 Purpose. This test addresses using the STOP; command within GC to stop an acquisition on multiple detector systems.

3.5.25.2 Input Description. With acquisitions taking place on only detector systems A1, A2, and A3, enter the command STOP;A1-A3 at the GC "CMD>" prompt.

3.5.25.3 Expected Results. The status for detector systems A1, A2, and A3 changes to "OFF". The "ACQUIRE" light on the appropriate AIMs turns off. The message "DATA COLLECTION STOPPED ON ADC A1 A2 A3" appears below the "MESSAGES:" label.

3.5.25.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.26 GC.STOP.3

3.5.26.1 Purpose. This test addresses using a STOP; command within GC to attempt to stop an acquisition on an unknown detector system.

3.5.26.2 Input Description. With an acquisition taking place on any of the detector systems, enter the command STOP;A5 at the GC "CMD>" prompt.

3.5.26.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'STOP;A5'" are displayed above the "CMD>" prompt.

3.5.26.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.27 GC.STOP.4

3.5.27.1 Purpose. This test addresses using an incorrectly formatted STOP; command within GC to attempt to stop an acquisition on multiple detector systems.

3.5.27.2 Input Description. With acquisitions taking place on at least detector systems A1, A2, and A3, enter the command STOP;A1,A2,A3 at the GC "CMD>" prompt.

3.5.27.3 Expected Results. The status for detector system A1 only changes to "OFF". The "ACQUIRE" light on the appropriate AIM turns off. The message "DATA COLLECTION STOPPED ON ADC A1" appears below the "MESSAGES:" label. The acquisitions on detector system A2 and A3 continue uninterrupted.

3.5.27.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.5.28 GC.BSTOP.1

3.5.28.1 Purpose. This test addresses using the BSTOP; command within GC to stop an acquisition on all of the detector systems.

3.5.28.2 Input Description. With acquisitions having been started on all detector systems using the BS; command, enter the command BSTOP; at the GC "CMD>" prompt.

3.5.28.3 Expected Results. The status for all detector systems changes to "OFF". If the value associated with "ON COUNT?" is "Y", the value associated with "ROTATING?" changes to "N" and the turntable stops rotating. The "ACQUIRE" light on the appropriate AIMs turns on. The 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", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label (see Figure 11).^h

h. It is also possible, though not required for passing this test, that output will be generated at the system laser printer within a few minutes after the BSTOP; command has been issued. The reason output is not required for passing this test is that whether the actual analyses are successful and output is generated

SWEPP GAMMA-RAY BARREL COUNTING SYSTEM

DETECTOR	A1	A2	A3	A4		CONTAINER:
STATUS-->	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>	<u>OFF</u>		001246
LIVE--->	<u>1158</u>	<u>1158</u>	<u>1156</u>	<u>1156</u>		ROTATING? <u>N</u>
REAL--->	<u>1158</u>	<u>1158</u>	<u>1158</u>	<u>1158</u>		ON COUNT? <u>Y</u>
INTERVAL	<u>36000</u>	<u>36000</u>	<u>36000</u>	<u>36000</u>		MONITOR PU
ID----->	<u>A1480213480</u>	<u>A1480213480</u>	<u>A1480213480</u>	<u>A1480213480</u>		REGION? <u>Y</u>
						COUNTS IN
						PU REGION:
						159
						ANALYZE AT
						35000

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 11. Stopping Data Acquisition Using BSTOP;.

Note: if the acquisitions have not been started using the BS; command, the message that will appear above the "MESSAGES:" label will be similar to that displayed as part of test GC.STOP.2 (Section 3.5.25); the test should then be performed starting with an acquisition started using the BS; command.

3.5.28.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6 Spectrum Storage and Analysis Commands

3.6.1 GC.D.1

3.6.1.1 Purpose. This test addresses using an incomplete D; command within GC to attempt to save spectral data, currently stored in an AIM, from a single detector system.

3.6.1.2 Input Description. Enter the command **D;A1** at the GC "CMD>" prompt.

3.6.1.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'D;<det>,<weight>,<content code>,<comments>' ", "OR 'BD;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'D;A1'".

3.6.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

is generated depends in part on what is being observed by the detectors.

3.6.2 GC.D.2

3.6.2.1 Purpose. This test addresses using a D; command within GC to attempt to save spectral data, currently stored in an AIM, from an unknown detector system.

3.6.2.2 Input Description. Enter the command **D;A5,1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.2.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'D;A5,1.1,01,TEST CASE'" appear above the "CMD>" prompt.

3.6.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.3 GC.D.3

3.6.3.1 Purpose. This test addresses using a D; command with an invalid weight within GC to attempt to save spectral data, currently stored in an AIM, from a single detector system.

3.6.3.2 Input Description. Enter the command **D;A1,ABC,01,TEST CASE** at the GC "CMD>" prompt.

3.6.3.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'D;<det>,<weight>,<content code>,<comments>' ", "OR 'BD;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'D;A1,ABC,01,TEST CASE'".

3.6.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.4 GC.D.4

3.6.4.1 Purpose. This test addresses using a D; command with an invalid content code within GC to attempt to save spectral data, currently stored in an AIM, from a single detector system.

3.6.4.2 Input Description. Enter the command **D;A1,1.1,ABC,TEST CASE** at the GC "CMD>" prompt.

3.6.4.3 Expected Results. The following messages appear above the "CMD>" prompt: "INVALID CONTENT CODE" and "BAD OR UNKNOWN COMMAND--'D;A1,1.1,ABC,TEST CASE'".

3.6.4.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.5 GC.D.5

3.6.5.1 Purpose. This test addresses using the D; command within GC to save spectral data, currently stored in an AIM, from a single detector system.

3.6.5.2 Input Description. Enter the command **D;A1,1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.5.3 Expected Results. The message "DATA READ AND SAVED TO FILE FROM ADC A1" appears below the "MESSAGES:" label, the "ID" is updated for detector system A1, and any ongoing

acquisitions continue uninterrupted. A file with the new "ID" preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector system's analysis parameters.

3.6.5.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.6 GC.D.6

3.6.6.1 Purpose. This test addresses using an incorrectly formatted D; command within GC to save spectral data, currently stored in AIMs, from multiple detector systems.

3.6.6.2 Input Description. Enter the command **D;A1,A2,A3,1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.6.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'D;<det>,<weight>,<content code>,<comments>' ", "OR 'BD;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'D;A1,A2,A3,1.1,01,TEST CASE'".

3.6.6.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.7 GC.D.7

3.6.7.1 Purpose. This test addresses using the D; command within GC to save spectral data, currently stored in AIMs, from multiple detector systems.

3.6.7.2 Input Description. Enter the command **D;A1-A3,1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.7.3 Expected Results. The message "DATA READ AND SAVED TO FILE FROM ADC A1 A2 A3" appears below the "MESSAGES:" label, the "ID" is updated for detector systems A1, A2, and A3, and any ongoing acquisitions continue uninterrupted. Files with the new "ID"s preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector systems' analysis parameters.

3.6.7.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.8 GC.BD.1

3.6.8.1 Purpose. This test addresses using an incomplete BD; command within GC to attempt to save spectral data, currently stored in AIMs, from all detector systems.

3.6.8.2 Input Description. Enter the command **BD;A1** at the GC "CMD>" prompt.

3.6.8.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'D;<det>,<weight>,<content code>,<comments>' ", "OR 'BD;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'D;A1-A4,A1'".ⁱ

i. Note that GC has translated the BD; command into the corresponding D; command. This will be apparent in other test cases as well. GC also translates BDA; commands into the corresponding DA; commands.

3.6.8.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.9 GC.BD.2

3.6.9.1 Purpose. This test addresses using a BD; command with an invalid weight within GC to attempt to save spectral data, currently stored in AIMs, from all detector systems.

3.6.9.2 Input Description. Enter the command **BD;ABC,01,TEST CASE** at the GC "CMD>" prompt.

3.6.9.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'D;<det>,<weight>,<content code>,<comments>' ", "OR 'BD;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'D;A1-A4,ABC,01,TEST CASE'".

3.6.9.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.10 GC.BD.3

3.6.10.1 Purpose. This test addresses using a BD; command with an invalid content code within GC to attempt to save spectral data, currently stored in AIMs, from all detector systems.

3.6.10.2 Input Description. Enter the command **BD;1.1,ABC,TEST CASE** at the GC "CMD>" prompt.

3.6.10.3 Expected Results. The following messages appear above the "CMD>" prompt: "INVALID CONTENT CODE" and "BAD OR UNKNOWN COMMAND--'D;A1-A4,1.1,ABC,TEST CASE'".

3.6.10.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.11 GC.BD.4

3.6.11.1 Purpose. This test addresses using the BD; command within GC to save spectral data, currently stored in AIMs, from all detector systems.

3.6.11.2 Input Description. Enter the command **BD;1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.11.3 Expected Results. The message "DATA READ AND SAVED TO FILE FROM ADC A1 A2 A3 A4" appears below the "MESSAGES:" label, the "ID" is updated for all detector systems, and any ongoing acquisitions continue uninterrupted. Files with the new "ID"s preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector systems' analysis parameters.

3.6.11.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.12 GC.DA.1

3.6.12.1 Purpose. This test addresses using an incomplete DA; command within GC to attempt to save and analyze spectral data, currently stored in an AIM, from a single detector system.

3.6.12.2 Input Description. Enter the command **DA;A1** at the GC "CMD>" prompt.

3.6.12.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'DA;<det>,<weight>,<content code>,<comments>' ", "OR 'BDA;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'DA;A1'".

3.6.12.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.13 GC.DA.2

3.6.13.1 Purpose. This test addresses using a DA; command within GC to attempt to save and analyze spectral data, currently stored in an AIM, from an unknown detector system.

3.6.13.2 Input Description. Enter the command **DA;A5,1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.13.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'DA;A5,1.1,01,TEST CASE'" appear above the "CMD>" prompt.

3.6.13.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.14 GC.DA.3

3.6.14.1 Purpose. This test addresses using a DA; command with an invalid weight within GC to attempt to save and analyze spectral data, currently stored in an AIM, from a single detector system.

3.6.14.2 Input Description. Enter the command **DA;A1,ABC,01,TEST CASE** at the GC "CMD>" prompt.

3.6.14.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'DA;<det>,<weight>,<content code>,<comments>' ", "OR 'BDA;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'DA;A1,ABC,01,TEST CASE'".

3.6.14.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.15 GC.DA.4

3.6.15.1 Purpose. This test addresses using a DA; command with an invalid content code within GC to attempt to save and analyze spectral data, currently stored in an AIM, from a single detector system.

3.6.15.2 Input Description. Enter the command **DA;A1,1.1,ABC,TEST CASE** at the GC "CMD>" prompt.

3.6.15.3 Expected Results. The following messages appear above the "CMD>" prompt: "INVALID CONTENT CODE" and "BAD OR UNKNOWN COMMAND--'DA;A1,1.1,ABC,TEST CASE'".

3.6.15.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.16 GC.DA.5

3.6.16.1 Purpose. This test addresses using the DA; command within GC to save and analyze spectral data, currently stored in an AIM, from a single detector system.

3.6.16.2 Input Description. Enter the command DA;A1,1.1,01,TEST CASE at the GC "CMD>" prompt.

3.6.16.3 Expected Results. The message "DATA READ AND SAVED TO FILE FROM ADC A1" appears only briefly below the "MESSAGES:" label and then is replaced by the messages "SPAWNING BATCH ANALYSIS FOR ADC A1", "PRINTED OUTPUT FROM THESE ANALYSES SHOULD APPEAR IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS", the "ID" is updated for detector system A1, and any ongoing acquisitions continue uninterrupted.^j A file with the new "ID" preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector system's analysis parameters.

3.6.16.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.17 GC.DA.6

3.6.17.1 Purpose. This test addresses using an improperly formatted DA; command within GC to save and analyze spectral data, currently stored in AIMS, from multiple detector systems.

3.6.17.2 Input Description. Enter the command DA;A1,A2,A3,1.1,01,TEST CASE at the GC "CMD>" prompt.

3.6.17.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'DA;<det>,<weight>,<content code>,<comments>'". "OR 'BDA;<weight>,<content code>,<comments>'". and "BAD OR UNKNOWN COMMAND--'DA;A1,A2,A3,1.1,01,TEST CASE'".

3.6.17.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.18 GC.DA.7

3.6.18.1 Purpose. This test addresses using the DA; command within GC to save and analyze spectral data, currently stored in AIMS, from multiple detector systems.

3.6.18.2 Input Description. Enter the command DA;A1-A3,1.1,01,TEST CASE at the GC "CMD>" prompt.

3.6.18.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR ADC A1 A2" and "DATA READ AND SAVED TO FILE FROM ADC A1 A2" appear only briefly below the

j. It is also possible, though not required for passing this test, that output will be generated at the system laser printer within a few minutes after the DA; command has been issued. The reason output is not required for passing this test is that whether the actual analyses are successful and output is generated depends in part on what is being observed by the detectors. This is also true for the BDA; command.

"MESSAGES:" label and then are replaced by the messages "SPAWNING BATCH ANALYSIS FOR ADC A1 A2 A3", "PRINTED OUTPUT FROM THESE ANALYSES SHOULD APPEAR IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS", the "ID" is updated for detector systems A1, A2, and A3, and any ongoing acquisitions continue uninterrupted. Files with the new "ID"s preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector systems' analysis parameters.

3.6.18.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.19 GC.BDA.1

3.6.19.1 Purpose. This test addresses using an incomplete BDA; command within GC to attempt to save and analyze spectral data, currently stored in AIMs, from all detector systems.

3.6.19.2 Input Description. Enter the command BDA;A1 at the GC "CMD>" prompt.

3.6.19.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'DA;<det>,<weight>,<content code>,<comments>' ", "OR 'BDA;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'DA;A1-A4,A1'".

3.6.19.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.20 GC.BDA.2

3.6.20.1 Purpose. This test addresses using a BDA; command with an invalid weight within GC to attempt to save and analyze spectral data, currently stored in AIMs, from all detector systems.

3.6.20.2 Input Description. Enter the command BDA;ABC,01,TEST CASE at the GC "CMD>" prompt.

3.6.20.3 Expected Results. The following messages appear above the "CMD>" prompt: "ERROR!! FORMAT IS 'DA;<det>,<weight>,<content code>,<comments>' ", "OR 'BDA;<weight>,<content code>,<comments>' ", and "BAD OR UNKNOWN COMMAND--'DA;A1-A4,ABC,01,TEST CASE'".

3.6.20.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.21 GC.BDA.3

3.6.21.1 Purpose. This test addresses using a BDA; command with an invalid content code within GC to attempt to save and analyze spectral data, currently stored in AIMs, from all detector systems.

3.6.21.2 Input Description. Enter the command BDA;1.1,ABC,TEST CASE at the GC "CMD>" prompt.

3.6.21.3 Expected Results. The following messages appear above the "CMD>" prompt: "INVALID CONTENT CODE" and "BAD OR UNKNOWN COMMAND--'DA;A1-A4,1.1,ABC,TEST CASE'".

3.6.21.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.22 GC.BDA.4

3.6.22.1 Purpose. This test addresses using the BDA; command within GC to save and analyze spectral data, currently stored in AIMS, from all detector systems.

3.6.22.2 Input Description. Enter the command **BDA;1.1,01,TEST CASE** at the GC "CMD>" prompt.

3.6.22.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR ADC A1 A2 A3" and "DATA READ AND SAVED TO FILE FROM ADC A1 A2 A3" appear only briefly below the "MESSAGES:" label and then are replaced by the messages "SPAWNING BATCH ANALYSIS FOR ADC A1 A2 A3 A4", "PRINTED OUTPUT FROM THESE ANALYSES SHOULD APPEAR IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS", the "ID" is updated for all detector systems, and any ongoing acquisitions continue uninterrupted. Files with the new "ID"s preceding the ".DGE" suffix will be created in the save directory specified in the appropriate detector systems' analysis parameters.

3.6.22.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.23 GC.BKG.1

3.6.23.1 Purpose. This test addresses using the BKG; command within GC to save as a background spectrum an acquisition on a single detector system.

3.6.23.2 Input Description. Enter the command **BKG;A1** at the GC "CMD>" prompt.

3.6.23.3 Expected Results. The message "BACKGROUND DATA READ FROM ADC A1 AND SAVED TO FILE" appears below the "MESSAGES:" label and the "ID" is updated for detector system A1. An ongoing acquisition continues uninterrupted. A file with the new "ID" preceding the ".DGE" suffix will be created in the save directory BK\$SAVE. (N.B.: unless this file contains a valid background spectrum, it should be deleted after this test is completed.)

3.6.23.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.24 GC.BKG.2

3.6.24.1 Purpose. This test addresses using the BKG; command within GC to save as background spectra an acquisition on multiple detector systems.

3.6.24.2 Input Description. Enter the command **BKG;A1-A3** at the GC "CMD>" prompt.

3.6.24.3 Expected Results. The message "BACKGROUND DATA READ AND SAVED TO FILE FROM ADC A1 A2 A3" appears below the "MESSAGES:" label and the "ID" is updated for detector systems A1, A2, and A3. Any ongoing acquisitions continue uninterrupted. Files with the new "ID"s preceding the ".DGE" suffix will be created in the save directory BK\$SAVE. (N.B.: unless these files contain valid background spectra, they should be deleted after this test is completed.)

3.6.24.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.25 GC.BKG.3

3.6.25.1 Purpose. This test addresses using a BKG; command within GC to attempt to save as a background spectrum an acquisition on an unknown detector system.

3.6.25.2 Input Description. Enter the command **BKG;A5** at the GC "CMD>" prompt.

3.6.25.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'BKG;A5'" are displayed above the "CMD>" prompt.

3.6.25.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.26 GC.BKG.4

3.6.26.1 Purpose. This test addresses using an incorrectly formatted BKG; command within GC to attempt to save as background spectra an acquisition on multiple detector systems.

3.6.26.2 Input Description. Enter the command **BKG;A1,A2,A3** at the GC "CMD>" prompt.

3.6.26.3 Expected Results. The message "BACKGROUND DATA READ FROM ADC A1 AND SAVED TO FILE" appears below the "MESSAGES:" label and the "ID" is updated for detector system A1. An ongoing acquisition continues uninterrupted. A file with the new "ID" preceding the ".DGE" suffix will be created in the save directory BK\$SAVE. (*N.B.: unless this file contains a valid background spectrum, it should be deleted after this test is completed.*) None of this occurs for detector systems A2 and A3.

3.6.26.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.27 GC.A.1

3.6.27.1 Purpose. This test addresses using an A; command within GC to attempt to submit an unknown saved spectrum for a full single-spectrum analysis.

3.6.27.2 Input Description. Enter the command **A;A1123456789** at the GC "CMD>" prompt.

3.6.27.3 Expected Results. The messages "THE SPECIFIED SPECTRUM 'A1123456789' IS INVALID" and "BAD OR UNKNOWN COMMAND--'A;A1123456789'" appear above the "CMD>" prompt.

3.6.27.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.28 GC.A.2

3.6.28.1 Purpose. This test addresses using an A; command within GC to attempt to submit an improperly identified saved spectrum for a full single-spectrum analysis.

3.6.28.2 Input Description. Enter the command **A;A146061311** at the GC "CMD>" prompt.

3.6.28.3 Expected Results. The messages "THE SPECIFIED SPECTRUM NAME 'A146061311' IS NOT 11 CHARACTERS LONG" and "BAD OR UNKNOWN COMMAND--'A;A146061311'" appear above the "CMD>" prompt.

3.6.28.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.29 GC.A.3

3.6.29.1 Purpose. This test addresses using an A; command within GC to submit a single saved spectrum for a full single-spectrum analysis.

3.6.29.2 Input Description. Enter the command A;A1460613110 at the GC "CMD>" prompt.

3.6.29.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR SPECTRUM A1460613110 - LOOK FOR OUTPUT IN A FEW MINU" ("MINU" is truncated to "MINUTES" because of a lack of space on the screen), and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output practically identical^k in its analysis results to that presented in Appendixes B.5 and B.6 should appear at the system printer.

3.6.29.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.30 GC.BA.1

3.6.30.1 Purpose. This test addresses using a BA; command within GC to attempt to submit an unknown saved spectrum for analysis with only a summary report being generated.

3.6.30.2 Input Description. Enter the command BA;A1123456789 at the GC "CMD>" prompt.

3.6.30.3 Expected Results. The messages "THE SPECIFIED SPECTRUM 'A1123456789' IS INVALID" and "BAD OR UNKNOWN COMMAND--'BA;A1123456789'" appear above the "CMD>" prompt.

3.6.30.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.31 GC.BA.2

3.6.31.1 Purpose. This test addresses using a BA; command within GC to attempt to submit an unknown set of saved spectrum for analysis with only a summary report being generated.

k. By "practically identical" it is meant that the numerical results should be identical with variations in only the last two digits presented being generally acceptable (such variations are likely due to computer-related round-off errors); larger variations will require further explanations to be acceptable (for example, different background spectra were used in analyzing the sample spectra, or the efficiency curve has been changed [1, 2]). This definition also assumes that the spectrum file's contents, as reflected partially in header information at the start of the output, have not been changed. The date the output was generated will likely be different.

3.6.31.2 Input Description. Enter the command BA;A1123456789,A2123456789,A3123456789,A4123456789 at the GC "CMD>" prompt.

3.6.31.3 Expected Results. The messages "THE SPECIFIED SPECTRUM 'A1123456789' IS INVALID" and "BAD OR UNKNOWN COMMAND - -"BA;A1123456789,A2123456789,A3123456789,A4123456789" appear above the "CMD>" prompt.

3.6.31.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.32 GC.BA.3

3.6.32.1 Purpose. This test addresses using a BA; command within GC to attempt to submit an improperly identified saved spectrum for analysis with only a summary report being generated.

3.6.32.2 Input Description. Enter the command BA;A146061311 at the GC "CMD>" prompt.

3.6.32.3 Expected Results. The messages "THE SPECIFIED SPECTRUM NAME 'A146061311' IS INVALID" and "BAD OR UNKNOWN COMMAND--"BA;A146061311" appear above the "CMD>" prompt.

3.6.32.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.33 GC.BA.4

3.6.33.1 Purpose. This test addresses using a BA; command within GC to submit a set of saved spectrum for analysis with only a summary report being generated.

3.6.33.2 Input Description. Enter the command BA;A1460613110,A2460613110,A3460613110,A4460613110 at the GC "CMD>" prompt.

3.6.33.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output detailing results for spectra A1460613110, A2460613110, A3460613110, and A4460613110 and practically identical in its analysis results to that presented in Appendix B.3 should appear at the system printer.

3.6.33.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.34 GC.BA.5

3.6.34.1 Purpose. This test addresses using an improperly abbreviated BA; command within GC to attempt to submit a set of saved spectrum for analysis with only a summary report being generated.

3.6.34.2 Input Description. Enter the command BA;A1460613110,A2-A4 at the GC "CMD>" prompt.

3.6.34.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:"

label. In a few minutes output detailing results only for spectra A1460613110 and A2460613110 should appear at the system printer.

3.6.34.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.35 GC.BA.6

3.6.35.1 Purpose. This test addresses using an abbreviated BA; command within GC to submit a set of saved spectrum for analysis with only a summary report being generated.

3.6.35.2 Input Description. Enter the command **BA;A1460613110,A2,A3,A4** at the GC "CMD>" prompt.

3.6.35.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output detailing results for spectra A1460613110, A2460613110, A3460613110, and A4460613110 and practically identical in its analysis results to that presented in Appendix B.3 should appear at the system printer.

3.6.35.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.36 GC.FBA.1

3.6.36.1 Purpose. This test addresses using an FBA; command within GC to attempt to submit an unknown saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.36.2 Input Description. Enter the command **FBA;A1123456789** at the GC "CMD>" prompt.

3.6.36.3 Expected Results. The messages "THE SPECIFIED SPECTRUM 'A1123456789' IS INVALID" and "BAD OR UNKNOWN COMMAND--'FBA;A1123456789'" appear above the "CMD>" prompt.

3.6.36.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.37 GC.FBA.2

3.6.37.1 Purpose. This test addresses using an FBA; command within GC to attempt to submit an unknown set of saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.37.2 Input Description. Enter the command **FBA;A1123456789,A2123456789,A3123456789,A4123456789** at the GC "CMD>" prompt.

3.6.37.3 Expected Results. The messages "THE SPECIFIED SPECTRUM 'A1123456789' IS INVALID" and "BAD OR UNKNOWN COMMAND--'FBA;A1123456789,A2123456789,A3123456789,A4123456789'" appear above the "CMD>" prompt.

3.6.37.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.38 GC.FBA.3

3.6.38.1 Purpose. This test addresses using an FBA; command within GC to attempt to submit an improperly identified saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.38.2 Input Description. Enter the command **FBA;A146061311** at the GC "CMD>" prompt.

3.6.38.3 Expected Results. The messages "THE SPECIFIED SPECTRUM NAME 'A146061311' IS INVALID" and "BAD OR UNKNOWN COMMAND--"FBA;A146061311" appear above the "CMD>" prompt.

3.6.38.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.39 GC.FBA.4

3.6.39.1 Purpose. This test addresses using a FBA; command within GC to submit a set of saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.39.2 Input Description. Enter the command **FBA;A1460613110,A2460613110,A3460613110,A4460613110** at the GC "CMD>" prompt.

3.6.39.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output detailing summary results for spectra A1460613110, A2460613110, A3460613110, and A4460613110 and practically identical in its analysis results to that presented in Appendix B.3, along with full single-spectrum analyses for all four spectra (the output for spectrum A1460613110 should be practically identical to that presented in Appendixes B.5 and B.6), should appear at the system printer.

3.6.39.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.40 GC.FBA.5

3.6.40.1 Purpose. This test addresses using an improperly abbreviated FBA; command within GC to attempt to submit a set of saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.40.2 Input Description. Enter the command **FBA;A1460613110,A2-A4** at the GC "CMD>" prompt.

3.6.40.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output detailing results only for spectra A1460613110 and A2460613110 should

appear at the system printer.

3.6.40.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.6.41 GC.FBA.6

3.6.41.1 Purpose. This test addresses using an abbreviated FBA; command within GC to submit a set of saved spectrum for analysis with full single-spectrum output for all the spectra specified and a summary report being generated.

3.6.41.2 Input Description. Enter the command **FBA;A1460613110,A2,A3,A4** at the GC "CMD>" prompt.

3.6.41.3 Expected Results. The messages "SPAWNING BATCH ANALYSIS FOR THESE SPECTRA - LOOK FOR OUTPUT IN A FEW MINUTES", and "IF NONE IS FOUND, CHECK THE [OPERATOR]BATCH_GIDXC_ANALYSIS.LOG FILE FOR ERRORS" appear below the "MESSAGES:" label. In a few minutes output detailing summary results for spectra A1460613110, A2460613110, A3460613110, and A4460613110 and practically identical in its analysis results to that presented in Appendix B.3, along with full single-spectrum analyses for all four spectra (the output for spectrum A1460613110 should be practically identical to that presented in Appendixes B.5 and B.6), should appear at the system printer.

3.6.41.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7 Detector Calibration Commands

3.7.1 GC.CBE.1

3.7.1.1 Purpose. This test addresses using a CBE; command within GC to attempt to perform an energy- and width-calibration on a europium-152 calibration spectrum currently stored in the AIM associated with an unknown non-pulsed detector system.

3.7.1.2 Input Description. Enter the command **CBE;A5** at the GC "CMD>" prompt.

3.7.1.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'CBE;A5'" are displayed above the "CMD>" prompt.

3.7.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.2 GC.CBE.2

3.7.2.1 Purpose. This test addresses using the CBE; command within GC to perform an energy- and width-calibration on a europium-152 calibration spectrum currently stored in the AIM associated with a non-pulsed detector system.

3.7.2.2 Input Description. Enter the command **CBE;A1** at the GC "CMD>" prompt.

3.7.2.3 Expected Results. The GC main screen disappears and the message "PERFORMING

NONPULSERED EUROPIUM CALIBRATION FOR A1" appears at the top of the screen.^l

3.7.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.3 GC.PEQE.1

3.7.3.1 Purpose. This test addresses using a PEQE; command within GC to attempt to perform an energy- and width-calibration on a europium-152 calibration spectrum currently stored in the AIM associated with an unknown pulsered detector system.

3.7.3.2 Input Description. Enter the command PEQE;A5 at the GC "CMD>" prompt.

3.7.3.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'PEQE;A5'" are displayed above the "CMD>" prompt.

3.7.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.4 GC.PEQE.2

3.7.4.1 Purpose. This test addresses using the PEQE; command within GC to perform an energy- and width-calibration on a europium-152 calibration spectrum currently stored in the AIM associated with a pulsered detector system.

3.7.4.2 Input Description. Enter the command PEQE;A1 at the GC "CMD>" prompt.

3.7.4.3 Expected Results. The GC main screen disappears and the message "PERFORMING PULSERED EUROPIUM CALIBRATION FOR A1" appears at the top of the screen.^m

3.7.4.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.5 GC.PEQEH.1

3.7.5.1 Purpose. This test addresses using a PEQEH; command within GC to attempt to generate a europium-152 calibration history for an unknown pulsered detector system.

3.7.5.2 Input Description. Enter the command PEQEH;A5 at the GC "CMD>" prompt.

3.7.5.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and

l. It is also possible, though not required for passing this test, that other messages will appear and that output will be generated at the system laser printer within a few minutes after the CBE; command has been issued. The reason output is not required for passing this test is that whether the actual calibration is successful and output is generated depends in part on what is being observed by the detectors. This is true for commands PEQE, CBT, and PEQT as well.

m. If output is generated by this command, it should appear similar in format to the sample presented in Appendix B.1; the numerical values will vary with detector age and condition and depending on settings within the various electronic components associated with the detector. As noted in an earlier footnote, output being generated from a calibration is not a pass/fail criterion.

"BAD OR UNKNOWN COMMAND--'PEQEH;A5'" are displayed above the "CMD>" prompt.

3.7.5.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.6 GC.PEQEH.2a

3.7.6.1 Purpose. This test addresses using the PEQEH; command within GC to generate a europium-152 calibration history for a pulsered detector system. There are four parts to this test; the remaining parts follow and should be conducted in order immediately after this test. This part tests entering an improperly formatted date.

3.7.6.2 Input Description. Enter the command PEQEH;A1 at the GC "CMD>" prompt. The GC main screen disappears, the message "GENERATING PULSERED EUROPIUM CALIBRATION HISTORY FOR A1" appears at the top of the screen, and a query reading "Enter starting date of report (MMDDYY):" also appears. Enter 010194. A second query reading "Enter ending date of report (MMDDYY):" then appears. Enter 60194.

3.7.6.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because a leading zero before the "6" is missing) and the second query reappears.

3.7.6.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.7 GC.PEQEH.2b

3.7.7.1 Purpose. This test continues addressing using the PEQEH; command within GC to generate a europium-152 calibration history for a pulsered detector system. This is the second part of a four-part test, all parts of which should be performed in immediate succession. This part tests entering an invalid date.

3.7.7.2 Input Description. The second query reads "Enter ending date of report (MMDDYY):" then appears. Enter AABBC.

3.7.7.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because AABBC is not a valid integer MMDDYY date) and the second query reappears yet again.

3.7.7.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.8 GC.PEQEH.2c

3.7.8.1 Purpose. This test continues addressing using the PEQEH; command within GC to generate a europium-152 calibration history for a pulsered detector system. This is the third part of a four-part test, all parts of which should be performed in immediate succession. This part tests entering an invalid ending date (one that is earlier than the starting date).

3.7.8.2 Input Description. The second query reads "Enter ending date of report (MMDDYY):" then appears. Enter 010193.

3.7.8.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because 010193 is chronologically before 010194) and the second query reappears yet

again.

3.7.8.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.9 GC.PEQEH.2d

3.7.9.1 Purpose. This test continues addressing using the PEQEH; command within GC to generate a europium-152 calibration history for a pulsered detector system. This is the final part of a four-part test, all parts of which should be performed in immediate succession.

3.7.9.2 Input Description. The second query reads "Enter ending date of report (MMDDYY):" then appears. Enter 060194.

3.7.9.3 Expected Results. The GC main screen reappears and output practically identical to that presented in Appendix B.2 should be generated at the system printer.

3.7.9.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.10 GC.CBT.1

3.7.10.1 Purpose. This test addresses using a CBT; command within GC to attempt to perform an energy- and width-calibration on a thorium-228 calibration spectrum currently stored in the AIM associated with an unknown non-pulsered detector system.

3.7.10.2 Input Description. Enter the command CBT;A5 at the GC "CMD>" prompt.

3.7.10.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'CBT;A5'" are displayed above the "CMD>" prompt.

3.7.10.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.11 GC.CBT.2

3.7.11.1 Purpose. This test addresses using the CBT; command within GC to perform an energy- and width-calibration on a thorium-228 calibration spectrum currently stored in the AIM associated with a non-pulsered detector system.

3.7.11.2 Input Description. Enter the command CBT;A1 at the GC "CMD>" prompt.

3.7.11.3 Expected Results. The GC main screen disappears and the message "PERFORMING NONPULSERED THORIUM CALIBRATION FOR A1" appears at the top of the screen."

3.7.11.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

n. It is also possible, though not required for passing this test, that other messages will appear and that output will be generated at the system laser printer within a few minutes after the CBE; command has been issued. The reason output is not required for passing this test is that whether the actual calibration is successful and output is generated depends in part on what is in front of the detectors. This is true for commands PEQE, CBT, and PEQT as well.

3.7.12 GC.PEQT.1

3.7.12.1 Purpose. This test addresses using a PEQT; command within GC to attempt to perform an energy- and width-calibration on a thorium-228 calibration spectrum currently stored in the AIM associated with an unknown pulsered detector system.

3.7.12.2 Input Description. Enter the command PEQT;A5 at the GC "CMD>" prompt.

3.7.12.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'PEQT;A5'" are displayed above the "CMD>" prompt.

3.7.12.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.13 GC.PEQT.2

3.7.13.1 Purpose. This test addresses using the PEQT; command within GC to perform an energy- and width-calibration on a thorium-228 calibration spectrum currently stored in the AIM associated with a pulsered detector system.

3.7.13.2 Input Description. Enter the command PEQT;A1 at the GC "CMD>" prompt.

3.7.13.3 Expected Results. The GC main screen disappears and the message "PERFORMING PULSERED THORIUM CALIBRATION FOR A1" appears at the top of the screen.^o

3.7.13.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.14 GC.PEQTH.1

3.7.14.1 Purpose. This test addresses using a PEQTH; command within GC to attempt to generate a thorium-228 calibration history for an unknown pulsered detector system.

3.7.14.2 Input Description. Enter the command PEQTH;A5 at the GC "CMD>" prompt.

3.7.14.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'PEQTH;A5'" are displayed above the "CMD>" prompt.

3.7.14.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.15 GC.PEQTH.2a

3.7.15.1 Purpose. This test addresses using the PEQTH; command within GC to generate a thorium-228 calibration history for a pulsered detector system. There are four parts to this test; the remaining parts follow and should be conducted in order immediately after this test. This part tests entering an incorrectly formatted date.

o. If output is generated by this command, it should appear similar in format to the sample presented in Appendix B.1; the numerical values will vary with detector age and condition and depending on settings within the various electronic components associated with the detector. As noted in an earlier footnote, output being generated from a calibration is not a pass/fail criterion.

3.7.15.2 Input Description. Enter the command **PEQTH;A1** at the GC "CMD>" prompt. The GC main screen disappears, the message "GENERATING PULSERED THORIUM CALIBRATION HISTORY FOR A1" appears at the top of the screen, and a query reading "Enter starting date of report (MMDDYY):" also appears. Enter **010194**. A second query reading "Enter ending date of report (MMDDYY):" then appears. Enter **60194**.

3.7.15.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because a leading zero before the "6" is missing) and the second query reappears.

3.7.15.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.16 GC.PEQTH.2b

3.7.16.1 Purpose. This test continues addressing using the **PEQTH;** command within GC to generate a thorium-228 calibration history for a pulsered detector system. This is the second part of a four-part test, all parts of which should be performed in immediate succession. This part tests entering an invalid date.

3.7.16.2 Input Description. The second query reads "Enter ending date of report (MMDDYY):" then appears. Enter **AABBCC**.

3.7.16.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because **AABBCC** is not a valid integer **MMDDYY** date) and the second query reappears yet again.

3.7.16.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.17 GC.PEQTH.2c

3.7.17.1 Purpose. This test continues addressing using the **PEQTH;** command within GC to generate a thorium-228 calibration history for a pulsered detector system. This is the third part of a four-part test, all parts of which should be performed in immediate succession. This part tests entering an invalid ending date (one that is earlier than the starting date).

3.7.17.2 Input Description. The second query reads "Enter ending date of report (MMDDYY):" then appears. Enter **010193**.

3.7.17.3 Expected Results. The message "BAD INPUT--PLEASE REENTER" appears below the second query (because **010193** is chronologically before **010194**) and the second query reappears yet again.

3.7.17.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.7.18 GC.PEQTH.2d

3.7.18.1 Purpose. This test continues addressing using the **PEQTH;** command within GC to generate a thorium-228 calibration history for a pulsered detector system. This is the final part of a four-part test, all parts of which should be performed in immediate succession.

3.7.18.2 Input Description. The second query reads "Enter ending date of report

(MMDDYY):" then appears. Enter 060194.

3.7.18.3 Expected Results. Execution of GC is aborted with an error message that begins with "%FOR-F-FILNOTFOU" as of September 22, 1994 because no thorium-228 calibration data has been acquired for detector system A1.

3.7.18.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.8 Spectrum Display Commands

3.8.1 GC.DAS.1

3.8.1.1 Purpose. This test addresses using a DAS; command within GC to attempt to display the spectral data currently stored in the AIM associated with an unknown detector system.

3.8.1.2 Input Description. Enter the command DAS;A5 at the GC "CMD>" prompt.

3.8.1.3 Expected Results. The messages "UNKNOWN DETECTOR NUMBER: '5'" and "BAD OR UNKNOWN COMMAND--'DAS;A5'" are displayed above the "CMD>" prompt.

3.8.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.8.2 GC.DAS.2

3.8.2.1 Purpose. This test addresses using the DAS; command within GC to display the spectral data currently stored in the AIM associated with a detector system. This test should be conducted from an X-windowing terminal equipped with a mouse, not a text-only terminal such as a VT330.

3.8.2.2 Input Description. Enter the command DAS;A1 at the GC "CMD>" prompt. Then click on the "QUIT" button in the upper left-hand corner of the new window that appears [2].

3.8.2.3 Expected Results. After entering the DAS; command, the DAS window appears with the spectral data contained in the AIM associated with detector system A1. Upon clicking on the "QUIT" button the DAS window disappears and control is returned to the GC main screen.

3.8.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.9 Batch Job- and Queue-Related Commands

3.9.1 GC.TYPELOG.1

3.9.1.1 Purpose. This test addresses using the TYPELOG; command within GC to display on the screen the contents of the most-recent BATCH_GIDXC_ANALYSIS.LOG file.

3.9.1.2 Input Description. Enter the command TYPELOG; at the GC "CMD>" prompt. After the contents of the log file scroll by, in response to the message "Press the 'Return' key to continue." appears, strike the return key.

3.9.1.3 Expected Results. The GC main screen disappears and the contents of the log file

scroll by on the screen after the TYPELOG; command has been entered. After all of the contents have been displayed, and the return key has been struck, the GC main screen reappears. (Portions of a typical log file are presented in Figure 12; ellipses mark areas where some of the file has been omitted.)

3.9.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

```
$!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:BATC_H_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$exe:batch_gidxc_summary
Job S0000009E (queue SYS$PRINT, entry 607) holding
$ !
$ ! Exit
$ !
$EXIT
```

Figure 12. Portions of a Typical BATCH_GIDXC_ANALYSIS.LOG File.

3.9.2 GC.PRINTLOG.1

3.9.2.1 Purpose. This test addresses using the PRINTLOG; command within GC to send a copy of the most-recent BATCH_GIDXC_ANALYSIS log file to the system printer.

3.9.2.2 Input Description. Enter the command PRINTLOG; at the GC "CMD>" prompt.

3.9.2.3 Expected Results. The GC main screen blinks and the log file is printed on the system printer.

3.9.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

3.9.3 GC.SHOWQUEUE.1

3.9.3.1 Purpose. This test addresses using the SHOWQUEUE; command within GC to display the status of the computer's batch and print queues.

3.9.3.2 Input Description. Enter the command SHOWQUEUE; at the GC "CMD>" prompt. After the status display scrolls by, in response to the message "Press the 'Return' key to continue." appears, strike the return key.

3.9.3.3 Expected Results. The GC main screen disappears and the status of the computer's batch and print queues scrolls by on the screen after the SHOWQUEUE; command has been entered. After the status display is complete, and the return key has been struck, the GC main screen reappears. (A typical display, generated by SHOWQUEUE; shortly after an FBA; command was entered, is presented in Figure 13.)

3.9.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

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

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

Terminal queue SYS\$PRINT, idle, on SWP::LN2200:, mounted form LASER80
(stock=DEFAULT)

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

Figure 13. SHOWQUEUE;-Generated Display.

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 barrel measurement. In the latter case, a summary report can be generated, along with a PAN\$RATIOS file that contains certain isotopic ratios for use by the SWEPP Assay System (SAS) [9]. GIDXC is part of a number of GC commands, and it can also be used as a command at the DCL prompt; this testing is concerned with the latter implementation. When used as a command at the DCL prompt, GIDXC generates only full single-spectrum analysis output, no matter how many spectra are specified; it is functionally equivalent to the GC A; command. As noted earlier, the nomenclature for the various test cases is <program or command language name>.<command (without semicolon)>.<sequential test number for the respective command>.

4.2 GIDXC as a Command at the DCL Prompt

4.2.1 DCL.GIDXC.1

4.2.1.1 Purpose. This test addresses using a GIDXC command from the DCL prompt to submit an unknown saved spectrum for a full single-spectrum analysis.

4.2.1.2 Input Description. Enter the command **GIDXC A1123456789** at the DCL prompt.

4.2.1.3 Expected Results. The message "SPECTRUM A1123456789 NOT FOUND" appears.

4.2.1.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

4.2.2 DCL.GIDXC.2

4.2.2.1 Purpose. This test addresses using the GIDXC command from the DCL prompt to submit a single saved spectrum for a full single-spectrum analysis.

4.2.2.2 Input Description. Enter the command **GIDXC A1460613110** at the GC "CMD>" prompt.

4.2.2.3 Expected Results. After up to a few minutes, a message akin to "Job S0000006B (queue SYS\$PRINT, entry 374) started on SYS\$PRINT" appears (the identifier following "Job" and the number following "entry" will likely be different). This signals the start of the analysis output being printed. A while later a message akin to "Job S0000006B (queue SYS\$PRINT, entry 374) completed" appears, signaling that printing is completed.

4.2.2.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

4.2.3 DCL.GIDXC.3

4.2.3.1 Purpose. This test addresses using the GIDXC command from the DCL prompt to submit multiple saved spectra for full single-spectrum analysis.

4.2.3.2 Input Description. Enter the command **GIDXC A1460613110 A2460613110**

A3460613110 at the GC "CMD>" prompt.

4.2.3.3 Expected Results. After up to a few minutes, a message akin to "Job S0000006B (queue SYS\$PRINT, entry 374) started on SYS\$PRINT" appears (the identifier following "Job" and the number following "entry" will likely be different). This signals the start of the analysis output being printed for the first spectrum specified. (A while later a message akin to "Job S0000006B (queue SYS\$PRINT, entry 374) completed" appears, signaling that printing is completed.)

For the second and third spectra, messages appear that read "GAUSS-ERROR FIT REGION FOR PEAK AT 8064.0 IS TOO LARGE. GREATER THAN 300 CHANNELS" and no output is generated.

4.2.3.4 Pass/Fail Criterion. The test passes if the expected results are obtained.

5. TEST RESULTS

The above tests were performed on September 22, 1994 by D. A. Schultz and W. Serrano of the SGRS support staff. Taking into account the annotations that appear as footnotes to Appendix A.1, all tests passed as recorded in Appendixes A.1 and A.2. For completeness, those annotations are included here.

5.1 Test Result Annotations

5.1.1 Annotation to test GC.HELP.1 (Section 3.4.1)

On the first attempt of this test, blank screens were displayed for help screens 3 and 4. Once the VMS file protection settings were corrected for the files containing help screens 3 and 4 ("world" protection was changed from RE to RWE), these help screens were properly displayed and the test passed.

5.1.2 Annotation to test GC.BS.1f (Section 3.5.23)

On the first attempt of this test, the analysis trigger level was set to zero as the acquisition was started. As a result, because the region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed was being monitored, the acquisition terminated almost immediately. The trigger level was set to zero because of the action of test GC.M.4 (see Section 3.5.4) in which an invalid trigger level is purposely entered. After an invalid trigger level is specified, GC does not assume the default value but rather assumes that the user will reenter the M; command properly, providing a valid trigger level. After the command M; was entered, all six parts of this test were repeated and yielded the expected results.

6. REFERENCES

1. E. W. Killian and J. K. Hartwell, *VAXGAP: A Code for the Routine Analysis of Gamma-Ray Pulse-Height Spectra on a VAX Computer*, EGG-2533, May 1988.
2. E. W. Killian and D. A. Femec, *Operator's Guide for VAXGAP, a Gamma-Ray Spectrum Analysis Package*, EGG-2672, August 1992.
3. D. A. Femec and E. W. Killian, *SWEPP Gamma-Ray Spectrometer System Software Design Description*, EGG-NRE-11451, August 1994.
4. D. A. Femec, *SWEPP Gamma-Ray Spectrometer System Software User's Guide*, EGG-NRE-11452, August 1994.
5. W. Serrano, *Relative Isotopic Mass Ratio Gamma Measurements*, RWMC-EDF-658, June 28, 1994.
6. W. Serrano, *Drum Matrix Mass Attenuation Coefficients*, RWMC-EDF-722, March 14, 1994.
7. "Installation Instructions for Slo-Syn SS2000D6 Packaged Drive," The Superior Electric Company, 1992.
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. Summaries of Test Cases for GC and GIDXC

A.1 Summary of Test Case Results of September 22, 1994 for GC.

Section	Test Case	Description	Pass/Fail	Page
Initialization of the User's Environment				
3.2.1	DCL.GC_INIT.1	Generation of necessary program communication files	Pass	5
Starting GC				
3.3.1	DCL.GC.1	Starting GC using GC at DCL command prompt	Pass	5
3.3.2	DCL.BS.1	Starting GC using BS at DCL command prompt	Pass	6
GC Help, Exit, and Unknown Commands				
3.4.1	GC.HELP.1	Displaying help screens	Pass ^a	7
3.4.2	GC.EXIT.1	Exiting GC using EXIT;	Pass	10
3.4.3	GC.QUIT.1	Exiting GC using QUIT;	Pass	10
3.4.4	GC.CONTROL-Z.1	Exiting GC using control-z	Pass	11
3.4.5	GC.UNKNOWN.1	Unknown command handling	Pass	11
GC Data Acquisition Commands				
3.5.1	GC.M.1	Count limit analysis trigger toggle with no ongoing acquisition	Pass	12
3.5.2	GC.M.2	Same as .1, but with an ongoing acquisition	Pass	12
3.5.3	GC.M.3	Resetting analysis trigger level	Pass	13
3.5.4	GC.M.4	Same as .1, but with an invalid value	Pass	13
3.5.5	GC.RI.1	Initialize turntable communications	Pass	13
3.5.6	GC.RT.1	Rotate-on-acquisition toggle	Pass	13
3.5.7	GC.R.1	Manual rotation toggle	Pass	14

a. On the first attempt of this test, blank screens were displayed for help screens 3 and 4. Once the VMS file protection settings were corrected for the files containing help screens 3 and 4 ("world" protection was changed from RE to RWE), these help screens were properly displayed and the test passed.

3.5.8	GC.SP.1	Analysis parameters display	Pass	14
3.5.9	GC.SP.2	Same as .1, but for an unknown detector system	Pass	14
3.5.10	GC.S.1	Generic start of acquisition on one detector system	Pass	15
3.5.11	GC.S.2	Same as .1, but with an acquisition already started	Pass	15
3.5.12	GC.S.3	Generic start of acquisition on multiple detector systems	Pass	16
3.5.13	GC.S.4	Same as .3, but with acquisitions already started	Pass	16
3.5.14	GC.S.5	Same as .1, but on an unknown detector	Pass	16
3.5.15	GC.S.6	Same as .3, but incorrectly formatted	Pass	16
3.5.16	GC.S.7	Same as .1, but with an invalid count time	Pass	17
3.5.17	GC.S.8	Same as .3, but with an invalid count time	Pass	17
3.5.18	GC.BS.1a	Bar code start of acquisition on all detector systems: command with bar code identifier	Pass	17
3.5.19	GC.BS.1b	Continuation of .1: invalid weight	Pass	17
3.5.20	GC.BS.1c	Continuation of .1: valid weight	Pass	18
3.5.21	GC.BS.1d	Continuation of .1: invalid content code	Pass	18
3.5.22	GC.BS.1e	Continuation of .1: valid content code	Pass	18
3.5.23	GC.BS.1f	Completion of .1: comments	Pass ^b	19
3.5.24	GC.STOP.1	Stop acquisition on one detector system	Pass	19
3.5.25	GC.STOP.2	Same as .1, but with multiple detector systems	Pass	19
3.5.26	GC.STOP.3	Same as .1, but with an unknown detector system	Pass	20
3.5.27	GC.STOP.4	Same as .2, but incorrectly formatted	Pass	20

b. On the first attempt of this test, the analysis trigger level was set to zero as the acquisition was started. As a result, because the region of the gamma-ray spectrum where a number of peaks from plutonium isotopes are observed was being monitored, the acquisition terminated almost immediately. The trigger level was set to zero because of the action of test GC.M.4 (see Section 3.5.4) in which an invalid trigger level is purposely entered. After an invalid trigger level is specified, GC does not assume the default value but rather assumes that the user will reenter the M; command properly, providing a valid trigger level. After the command M; was entered, all six parts of this test were repeated and yielded the expected results.

3.5.28	GC.BSTOP.1	Stop acquisition on all detector systems	Pass	20
Spectrum Storage and Analysis Commands				
3.6.1	GC.D.1	Save spectrum from one detector system, but command incomplete	Pass	21
3.6.2	GC.D.2	Same as .1, but complete with an unknown detector system	Pass	22
3.6.3	GC.D.3	Same as .2, but with only an invalid weight	Pass	22
3.6.4	GC.D.4	Same as .2, but with only an invalid content code	Pass	22
3.6.5	GC.D.5	Same as .2, but with all values valid	Pass	22
3.6.6	GC.D.6	Save spectra from multiple detector systems, but incorrectly formatted	Pass	23
3.6.7	GC.D.7	Same as .6, but correctly formatted	Pass	23
3.6.8	GC.BD.1	Save spectra from all detector systems, but command incomplete	Pass	23
3.6.9	GC.BD.2	Same as .1, but complete with an invalid weight	Pass	24
3.6.10	GC.BD.3	Same as .2, but with only an invalid content code	Pass	24
3.6.11	GC.BD.4	Same as .2, but with all values valid	Pass	24
3.6.12	GC.DA.1	Save and analyze spectrum from one detector system, but command incomplete	Pass	24
3.6.13	GC.DA.2	Same as .1, but complete with an unknown detector system	Pass	25
3.6.14	GC.DA.3	Same as .2, but with only an invalid weight	Pass	25
3.6.15	GC.DA.4	Same as .2, but with only an invalid content code	Pass	25
3.6.16	GC.DA.5	Same as .2, but with all values valid	Pass	26
3.6.17	GC.DA.6	Save spectra from multiple detector systems, but incorrectly formatted	Pass	26
3.6.18	GC.DA.7	Same as .6, but correctly formatted	Pass	26
3.6.19	GC.BDA.1	Save and analyze spectra from all detector systems, but command incomplete	Pass	27
3.6.20	GC.BDA.2	Same as .1, but complete with an invalid weight	Pass	27

3.6.21	GC.BDA.3	Same as .2, but with only an invalid content code	Pass	27
3.6.22	GC.BDA.4	Same as .2, but with all values valid	Pass	28
3.6.23	GC.BKG.1	Save a background spectrum from one detector system	Pass	28
3.6.24	GC.BKG.2	Save background spectra from multiple detector systems	Pass	28
3.6.25	GC.BKG.3	Same as .1, but with an unknown detector system	Pass	29
3.6.26	GC.BKG.4	Same as .2, but incorrectly formatted	Pass	29
3.6.27	GC.A.1	Full single-spectrum analysis of a saved spectrum, but with an unknown spectrum	Pass	29
3.6.28	GC.A.2	Same as .1, but with spectrum improperly identified	Pass	29
3.6.29	GC.A.3	Same as .1, but with spectrum properly identified	Pass	30
3.6.30	GC.BA.1	Summary report-only analysis of a saved spectrum, but with an unknown spectrum	Pass	30
3.6.31	GC.BA.2	Same as .1, but with a set of unknown spectra	Pass	30
3.6.32	GC.BA.3	Same as .1, but with spectrum improperly identified	Pass	31
3.6.33	GC.BA.4	Same as .2, but with known spectra	Pass	31
3.6.34	GC.BA.5	Same as .4, but with improper abbreviations	Pass	31
3.6.35	GC.BA.6	Same as .4, but with proper abbreviations	Pass	32
3.6.36	GC.FBA.1	Full single-spectrum and summary report analysis of a saved spectrum, but with an unknown spectrum	Pass	32
3.6.37	GC.FBA.2	Same as .1, but with a set of unknown spectra	Pass	32
3.6.38	GC.FBA.3	Same as .1, but with spectrum improperly identified	Pass	33
3.6.39	GC.FBA.4	Same as .2, but with known spectra	Pass	33
3.6.40	GC.FBA.5	Same as .4, but with improper abbreviations	Pass	33
3.6.41	GC.FBA.6	Same as .4, but with proper abbreviations	Pass	34

Detector Calibration Commands				
3.7.1	GC.CBE.1	Eu-152 calibration, non-pulsered detector system, but with an unknown detector system	Pass	34
3.7.2	GC.CBE.2	Same as .1, but with a known detector system	Pass	34
3.7.3	GC.PEQE.1	Eu-152 calibration, pulsered detector system, but with an unknown detector system	Pass	35
3.7.4	GC.PEQE.2	Same as .1, but with a known detector system	Pass	35
3.7.5	GC.PEQEH.1	Eu-152 calibration history, pulsered detector system, but with an unknown detector	Pass	35
3.7.6	GC.PEQEH.2a	Same as .2, but with a known detector system and an improperly formatted ending date	Pass	36
3.7.7	GC.PEQEH.2b	Continuation of .1: invalid date	Pass	36
3.7.8	GC.PEQEH.2c	Continuation of .1: valid date but an invalid ending date	Pass	36
3.7.9	GC.PEQEH.2d	Continuation of .1: valid ending date	Pass	37
3.7.10	GC.CBT.1	Th-228 calibration, non-pulsered detector system, but with an unknown detector system	Pass	37
3.7.11	GC.CBT.2	Same as .1, but with a known detector system	Pass	37
3.7.12	GC.PEQT.1	Th-228 calibration, pulsered detector system, but with an unknown detector system	Pass	38
3.7.13	GC.PEQT.2	Same as .1, but with a known detector system	Pass	38
3.7.14	GC.PEQTH.1	Th-228 calibration history, pulsered detector system, but with an unknown detector	Pass	38
3.7.15	GC.PEQTH.2a	Same as .2, but with a known detector system and an improperly formatted ending date	Pass	38
3.7.16	GC.PEQTH.2b	Continuation of .1: invalid date	Pass	39
3.7.17	GC.PEQTH.2c	Continuation of .1: valid date but an invalid ending date	Pass	39
3.7.18	GC.PEQTH.2d	Continuation of .1: valid ending date	Pass	39
Spectrum Display Commands				

3.8.1	GC.DAS.1	Generate DAS display of detector system data, but with an unknown detector system	Pass	40
3.8.2	GC.DAS.2	Same as .1, but with a known detector system	Pass	40
Batch Job- and Queue-Related Commands				
3.9.1	GC.TYPELOG.1	List of screen contents of GIDXC batch analysis log file	Pass	40
3.9.2	GC.PRINTLOG.1	Print contents of GIDXC batch analysis log file	Pass	41
3.9.3	GC.SHOWQUEUE.1	Show status of all batch and print queues	Pass	42

A.2 Summary of Test Case Results of September 22, 1994 for GIDXC

Section	Test Case	Description	Pass/Fail	Page
GIDXC as a Command at the DCL Prompt				
4.2.1	DCL.GIDXC.1	Full single-spectrum analysis, but with an unknown spectrum	Pass	43
4.2.2	DCL.GIDXC.2	Same as .1, but with a known spectrum	Pass	43
4.2.3	DCL.GIDXC.3	Same as .1, but with multiple spectra	Pass	43

A.3 Blank Summary of Test Cases for GC

Section	Test Case	Description	Pass/Fail	Page
Initialization of the User's Environment				
3.2.1	DCL.GC_INIT.1	Generation of necessary program communication files		5
Starting GC				
3.3.1	DCL.GC.1	Starting GC using GC at DCL command prompt		5
3.3.2	DCL.BS.1	Starting GC using BS at DCL command prompt		6
GC Help, Exit, and Unknown Commands				
3.4.1	GC.HELP.1	Displaying help screens		7
3.4.2	GC.EXIT.1	Exiting GC using EXIT;		10
3.4.3	GC.QUIT.1	Exiting GC using QUIT;		10
3.4.4	GC.CONTROL-Z.1	Exiting GC using control-z		11
3.4.5	GC.UNKNOWN.1	Unknown command handling		11
GC Data Acquisition Commands				
3.5.1	GC.M.1	Count limit analysis trigger toggle with no ongoing acquisition		12
3.5.2	GC.M.2	Same as .1, but with an ongoing acquisition		12
3.5.3	GC.M.3	Resetting analysis trigger level		13
3.5.4	GC.M.4	Same as .1, but with an invalid value		13
3.5.5	GC.RI.1	Initialize turntable communications		13
3.5.6	GC.RT.1	Rotate-on-acquisition toggle		13
3.5.7	GC.R.1	Manual rotation toggle		14
3.5.8	GC.SP.1	Analysis parameters display		14
3.5.9	GC.SP.2	Same as .1, but for an unknown detector system		14
3.5.10	GC.S.1	Generic start of acquisition on one detector system		15
3.5.11	GC.S.2	Same as .1, but with an acquisition already started		15

3.5.12	GC.S.3	Generic start of acquisition on multiple detector systems		16
3.5.13	GC.S.4	Same as .3, but with acquisitions already started		16
3.5.14	GC.S.5	Same as .1, but on an unknown detector		16
3.5.15	GC.S.6	Same as .3, but incorrectly formatted		16
3.5.16	GC.S.7	Same as .1, but with an invalid count time		17
3.5.17	GC.S.8	Same as .3, but with an invalid count time		17
3.5.18	GC.BS.1a	Bar code start of acquisition on all detector systems: command with bar code identifier		17
3.5.19	GC.BS.1b	Continuation of .1: invalid weight		17
3.5.20	GC.BS.1c	Continuation of .1: valid weight		18
3.5.21	GC.BS.1d	Continuation of .1: invalid content code		18
3.5.22	GC.BS.1e	Continuation of .1: valid content code		18
3.5.23	GC.BS.1f	Completion of .1: comments		19
3.5.24	GC.STOP.1	Stop acquisition on one detector system		19
3.5.25	GC.STOP.2	Same as .1, but with multiple detector systems		19
3.5.26	GC.STOP.3	Same as .1, but with an unknown detector system		20
3.5.27	GC.STOP.4	Same as .2, but incorrectly formatted		20
3.5.28	GC.BSTOP.1	Stop acquisition on all detector systems		20
Spectrum Storage and Analysis Commands				
3.6.1	GC.D.1	Save spectrum from one detector system, but command incomplete		21
3.6.2	GC.D.2	Same as .1, but complete with an unknown detector system		22
3.6.3	GC.D.3	Same as .2, but with only an invalid weight		22
3.6.4	GC.D.4	Same as .2, but with only an invalid content code		22
3.6.5	GC.D.5	Same as .2, but with all values valid		22
3.6.6	GC.D.6	Save spectra from multiple detector systems, but incorrectly formatted		23
3.6.7	GC.D.7	Same as .6, but correctly formatted		23

3.6.8	GC.BD.1	Save spectra from all detector systems, but command incomplete	23
3.6.9	GC.BD.2	Same as .1, but complete with an invalid weight	24
3.6.10	GC.BD.3	Same as .2, but with only an invalid content code	24
3.6.11	GC.BD.4	Same as .2, but with all values valid	24
3.6.12	GC.DA.1	Save and analyze spectrum from one detector system, but command incomplete	24
3.6.13	GC.DA.2	Same as .1, but complete with an unknown detector system	25
3.6.14	GC.DA.3	Same as .2, but with only an invalid weight	25
3.6.15	GC.DA.4	Same as .2, but with only an invalid content code	25
3.6.16	GC.DA.5	Same as .2, but with all values valid	26
3.6.17	GC.DA.6	Save spectra from multiple detector systems, but incorrectly formatted	26
3.6.18	GC.DA.7	Same as .6, but correctly formatted	26
3.6.19	GC.BDA.1	Save and analyze spectra from all detector systems, but command incomplete	27
3.6.20	GC.BDA.2	Same as .1, but complete with an invalid weight	27
3.6.21	GC.BDA.3	Same as .2, but with only an invalid content code	27
3.6.22	GC.BDA.4	Same as .2, but with all values valid	28
3.6.23	GC.BKG.1	Save a background spectrum from one detector system	28
3.6.24	GC.BKG.2	Save background spectra from multiple detector systems	28
3.6.25	GC.BKG.3	Same as .1, but with an unknown detector system	29
3.6.26	GC.BKG.4	Same as .2, but incorrectly formatted	29
3.6.27	GC.A.1	Full single-spectrum analysis of a saved spectrum, but with an unknown spectrum	29
3.6.28	GC.A.2	Same as .1, but with spectrum improperly identified	29

3.6.29	GC.A.3	Same as .1, but with spectrum properly identified	30
3.6.30	GC.BA.1	Summary report-only analysis of a saved spectrum, but with an unknown spectrum	30
3.6.31	GC.BA.2	Same as .1, but with a set of unknown spectra	30
3.6.32	GC.BA.3	Same as .1, but with spectrum improperly identified	31
3.6.33	GC.BA.4	Same as .2, but with known spectra	31
3.6.34	GC.BA.5	Same as .4, but with improper abbreviations	31
3.6.35	GC.BA.6	Same as .4, but with proper abbreviations	32
3.6.36	GC.FBA.1	Full single-spectrum and summary report analysis of a saved spectrum, but with an unknown spectrum	32
3.6.37	GC.FBA.2	Same as .1, but with a set of unknown spectra	32
3.6.38	GC.FBA.3	Same as .1, but with spectrum improperly identified	33
3.6.39	GC.FBA.4	Same as .2, but with known spectra	33
3.6.40	GC.FBA.5	Same as .4, but with improper abbreviations	33
3.6.41	GC.FBA.6	Same as .4, but with proper abbreviations	34
Detector Calibration Commands			
3.7.1	GC.CBE.1	Eu-152 calibration, non-pulsered detector system, but with an unknown detector system	34
3.7.2	GC.CBE.2	Same as .1, but with a known detector system	34
3.7.3	GC.PEQE.1	Eu-152 calibration, pulsered detector system, but with an unknown detector system	35
3.7.4	GC.PEQE.2	Same as .1, but with a known detector system	35
3.7.5	GC.PEQEH.1	Eu-152 calibration history, pulsered detector system, but with an unknown detector	35
3.7.6	GC.PEQEH.2a	Same as .2, but with a known detector system and an improperly formatted ending date	36

3.7.7	GC.PEQEH.2b	Continuation of .1: invalid date		36
3.7.8	GC.PEQEH.2c	Continuation of .1: valid date but an invalid ending date		36
3.7.9	GC.PEQEH.2d	Continuation of .1: valid ending date		37
3.7.10	GC.CBT.1	Th-228 calibration, non-pulsered detector system, but with an unknown detector system		37
3.7.11	GC.CBT.2	Same as .1, but with a known detector system		37
3.7.12	GC.PEQT.1	Th-228 calibration, pulsered detector system, but with an unknown detector system		38
3.7.13	GC.PEQT.2	Same as .1, but with a known detector system		38
3.7.14	GC.PEQTH.1	Th-228 calibration history, pulsered detector system, but with an unknown detector		38
3.7.15	GC.PEQTH.2a	Same as .2, but with a known detector system and an improperly formatted ending date		38
3.7.16	GC.PEQTH.2b	Continuation of .1: invalid date		39
3.7.17	GC.PEQTH.2c	Continuation of .1: valid date but an invalid ending date		39
3.7.18	GC.PEQTH.2d	Continuation of .1: valid ending date		39
Spectrum Display Commands				
3.8.1	GC.DAS.1	Generate DAS display of detector system data, but with an unknown detector system		40
3.8.2	GC.DAS.2	Same as .1, but with a known detector system		40
Batch Job- and Queue-Related Commands				
3.9.1	GC.TYPELOG.1	List of screen contents of GIDXC batch analysis log file		40
3.9.2	GC.PRINTLOG.1	Print contents of GIDXC batch analysis log file		41
3.9.3	GC.SHOWQUE.1	Show status of all batch and print queues		42

A.4 Blank Summary of Test Cases for GIDXC

Section	Test Case	Description	Pass/Fail	Page
GIDXC as a Command at the DCL Prompt				
4.2.1	DCL.GIDXC.1	Full single-spectrum analysis, but with an unknown spectrum		43
4.2.2	DCL.GIDXC.2	Same as .1, but with a known spectrum		43
4.2.3	DCL.GIDXC.3	Same as .1, but with multiple spectra		43

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
AVERAGES:			7.37	5456	1.23E+01	
STD DEV:			0.14	4974	6.95E+00	
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
AVERAGES:			9.26	4153	1.26E+01	
STD DEV:			0.26	3719	7.33E+00	
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
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 an 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	

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
-----	------------	------------

END

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

*****SWEPP BARREL MONITOR GAMMA-RAY SPECTROMETERY 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 (wgthd aver) to PU-239 (wgthd 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= -.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= -.6391E+05, error=-.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*****

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

PULSER EQUIVALENTS= 147.604 1414.819

ENERGY= -8.454 + 0.196 + 4.931E-09

LOWER AND CONVOLUTED PULSER AREA: 3.6426E+03 3.6558E+03

--BACKGROUNDS AVERAGED--

*A1453116270 A1451908120

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	3.79E+06	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
							91PADA	231	11	1.18	2.87E+08	1.0000E+00	3
							89ACDA	227	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
							94PU	239	8	0.01	2.11E+08	1.0000E+00	2
779.745	0.121	3.5	144.043	0.024	1113.	7.03	1.1	1.608E-04	1.45E+01	1.53E+01	9.49E+		

						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	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	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	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	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	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	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	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	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	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	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	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	-5.40E-04	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	1.20E-04	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	2.08E-04	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	4.13E-04	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	1.36E-04	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	-8.62E-04	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	-1.11E-04	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	-1.35E-06	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	9.22E-05	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	8.35E-05	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	-6.33E-05	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	1.14E-04	343.17
										-9.97E-05	540.23 0		

								93NPPA237	9	6.63	1.88E+10	1.0000E+00	2
								90THDA228	9	3.25	1.68E+04	1.0000E+00	3
								91PADA231	9	4.48	2.87E+08	1.0000E+00	2
1636.772	0.145	4.9	311.661	0.028	717.	6.00	1.0	1.344E-04	9.32E+00	9.83E+00	7.31E+04		
									-4.37E-04	108.58	0	1.58E-04	200.72
									4.98E-04	71.97	0		
							93NPPA237	8	38.63	1.88E+10	1.0000E+00	1	
1660.085	0.353	2.0**	316.221	0.069	61.	35.01	1.0	1.326E-04	7.96E-01	8.40E-01	6.33E+03		
									3.45E-04	88.26	0	3.50E-04	47.52
									3.52E-04	56.40	0		
							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	4.70E+00	3.59E+04		
									-6.60E-04	92.44	0	-5.28E-04	72.10
									-4.44E-04	109.78	0		
							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	4.15E+00	3.20E+04		
									4.71E-04	95.40	0	2.49E-04	108.99
									1.21E-04	281.04	0		
							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	5.41E+01	4.28E+05		
									-9.64E-05	530.99	0	4.15E-04	77.38
									7.47E-04	55.21	0		
							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	1.88E+01	1.50E+05		
									-1.11E-04	561.54	0	7.69E-05	478.30
									1.77E-04	257.07	0		
							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	5.47E+00	4.44E+04		
									-6.73E-04	71.52	0	-7.47E-05	366.99
									1.76E-04	176.77	0		
							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	5.22E+01	4.28E+05		
									8.55E-05	520.68	0	2.77E-04	95.49
									3.82E-04	86.18	0		
							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	7.57E+00	6.58E+04		
									-6.49E-04	48.74	0	-1.94E-04	130.45
									8.83E-05	282.46	0		
1926.900	0.113	4.9	368.406	0.022	889.	4.35	1.0	1.145E-04	1.15E+01	1.22E+01	1.06E+05		
									6.71E-04	54.28	0	-1.79E-05	1790.50
									-3.15E-04	75.88	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
1960.014	0.026	5.1	374.883	0.005	9688.	1.07	1.0	1.125E-04	1.26E+02	1.33E+02	1.18E+06		
									4.87E-04	87.54	0	9.17E-04	27.59

								94PU	239	8	1.15E-03 0.00	27.32 0 2.11E+08	1.0000E+00	3
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	2.59E+01 105.08 0 61.99 0	2.33E+05 4.05E-04	53.39
								94PU	239	10	0.00	2.11E+08	1.0000E+00	3
								51SB	125	10	1.51	2.42E+04	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 0 70.97 0	1.95E+05 -1.86E-04	106.85
								94PU	239	10	0.00	2.11E+08	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 0 56.80 0	4.33E+05 5.33E-04	47.56
								94PU	239	8	0.00	2.11E+08	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 0 23.06 0	1.17E+06 1.53E-03	22.53
								94PU	239	8	0.00	2.11E+08	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 0 5871.97 0	9.47E+04 6.88E-05	315.18
								94PU	239	8	0.00	2.11E+08	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 0 154.10 0	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 0 263.69 0	1.58E+05 3.23E-04	81.50
								94PU	239	8	0.00	2.11E+08	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 0 279.17 0	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 0 279.83 0	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 0 22.05 0	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 0 92.30 0	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 0 96.57 0	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 0 53.80 0	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 0 126.37 0	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 0 53.83 0	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 0 13.55 0	6.21E+04 9.48E-03	10.11
							95AM 241 8	0.00	3.79E+06	1.0000E+00		6
							55CS 137 8	85.20	2.65E+05	1.0000E+00		1
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 0 72.48 0	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 0 240.46 0	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 0 166.19 0	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 0 62.92 0	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 0 129.17 0	3.69E+04 3.04E-05	412.96
							95AM 241 8	0.00	3.79E+06	1.0000E+00		6
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 0 5158.99 0	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 0 49.90 0	1.75E+03 2.15E-04	92.44
							40ZR 95 9	54.50	1.54E+03	1.0000E+00		1
							40ZRN 95 9	54.50	1.54E+03	1.0000E+00		2
							63EU 154 9	4.34	7.53E+04	1.0000E+00		2
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 0 184.17 0	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 0 184.43 0	1.00E+04 9.90E-06	1194.75
							90THDA230 8	4.89	6.61E+08	1.0000E+00		2
							92UDA 234 8	4.89	2.16E+09	1.0000E+00		2
							88RADA226 8	4.89	1.40E+07	1.0000E+00		2

4025.570	0.000	7.5	778.903	0.000	-1.	292.98	1.0	5.441E-05	-1.87E-02	-1.97E-02	-3.62E+02			
									6.88E-05	338.76	0	-5.85E-06	2295.79	
							63EU	152	9	-4.30E-05	382.46	0		
									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	1.22E-01	2.38E+03			
									2.18E-04	105.39	0	2.46E-04	55.26	
									2.61E-04	64.58	0			
							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	1.50E-01	2.98E+03			
									1.80E-03	20.97	0	1.68E-03	14.81	
									1.58E-03	20.83	0			
5159.000	0.000	8.7	1000.618	0.000	11.	34.20	1.0	4.324E-05	1.39E-01	1.46E-01	3.38E+03			
									1.37E-04	108.97	0	-3.07E-05	291.54	
									-1.25E-04	89.38	0			
							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	1.30E-01	3.02E+03			
									6.77E-05	225.61	0	1.76E-04	53.55	
									2.43E-04	49.36	0			
							63EU	154	11	17.88	7.53E+04		1.0000E+00	2
5212.000	0.000	8.8	1010.986	0.000	5.	124.62	1.0	4.283E-05	5.98E-02	6.34E-02	1.48E+03			
									-5.22E-04	46.12	0	-4.94E-04	30.18	
									-4.77E-04	39.86	0			
5295.000	0.000	8.9	1027.223	0.000	5.	101.02	1.0	4.219E-05	5.96E-02	6.25E-02	1.48E+03			
									2.08E-04	93.35	0	1.98E-04	59.34	
									1.93E-04	76.79	0			
5427.000	0.000	9.0	1053.045	0.000	5.	91.13	1.0	4.122E-05	6.60E-02	6.96E-02	1.69E+03			
									2.49E-04	72.40	0	-7.43E-05	223.42	
									-2.44E-04	53.53	0			
5691.000	0.000	9.3	1104.690	0.000	5.	87.39	1.0	3.938E-05	7.00E-02	7.39E-02	1.88E+03			
									-3.86E-04	41.35	0	-2.30E-04	43.84	
									-1.26E-04	103.14	0			
6559.308	0.000	10.3	1274.556	0.000	29.	24.04	1.0	3.432E-05	3.76E-01	3.96E-01	1.15E+04			
									4.27E-04	45.85	0	4.23E-04	28.87	
									4.21E-04	37.16	0			
							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	-7.96E-03	-2.55E+02			
									4.34E-04	45.35	0	1.69E-04	73.69	
									5.20E-05	251.02	0			
							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	4.61E-02	1.49E+03			
									9.09E-06	1064.61	0	5.53E-05	105.02	
									8.14E-05	89.25	0			
7805.000	0.000	11.7	1518.264	0.000	6.	83.54	1.0	2.897E-05	8.19E-02	8.62E-02	2.98E+03			
									-4.85E-05	293.03	0	2.24E-05	399.26	
									6.93E-05	166.60	0			

34 LINES NOT TAGGED

25 TAGS REMOVED--NO ICODE 1 LINE

ISOTOPE		LIB ENG	LINE ENG	I-C	FLAGS	ISOTOPE SUMMARY		OTHER TAGS		MICRO-CI/UNIT	%ERROR	NET MICRO-CI/UNIT	NET %ERROR(1-SIGMA)
11NA	22	1274.54	1274.56	1	41	EU	154			2.383E-06	64.77		
25MN	54	834.84	834.25	1	9					1.023E-06	50.74	2.383E-06	64.77
40ZR	95	756.73	756.26	1	9	EU	154			1.377E-06	85.12	1.023E-06	50.74
55CS	137	661.66	662.19	1	40	AM	241			-6.476E-05	13.73	1.377E-06	85.12
63EU	152	121.78	121.78	2	523					1.984E-06	947.63	-6.476E-05	13.73
		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	-1.197E-06	292.98
		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