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START

0041457

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P. O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 Fax No. (510) 235-0438

RECORD COPY

OCT 1992
RECEIVED
OSM DMO

October 5, 1992

SENT BY FEDERAL EXPRESS

Ref. TMA/Norcal N2-09-203-7090

Mr. John Bourgeault
Westinghouse Hanford Company
2355 Stevens Drive
Richland, WA 99352

Dear Mr. Bourgeault:

Enclosed on the Summary Data Section are the gamma scan results for the soil samples from SAF#92-311, sodium dichromate Barrel 100-IV-4 Location, we received 28 September 1992. The QA/QC results are also given in the Summary Data Section. The samples were processed on the rush basis. The Summary Data Including QC's and appendices are found in pages 1 through 93.

Please call if you have any questions concerning this data.

Sincerely,

D. P. Kharkar

Dinkar P. Kharkar, Ph.D.
Manager, Nuclear Programs

DPK/jv

Enclosures: Sections 1 and 2
Appendices

JAN 1995
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EDMC

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SECTION 1 Case Narrative

TMA

SDG 7090 Contact Dinkar P. Kharkar	Client Westinghouse Hanford Contract MBH-SVV-069262

CASE NARRATIVE

1.0 GENERAL

The result of the soil samples from Location 100-IV-4, SAF#92-311, sodium dichromate (TMA/Norcal Group 7090) are reported herein. TMA/Norcal Group 7090 is comprised of the three samples listed on the Chain-of-Custody documents and is identified as Sample 1 through 3.

1.1 CHAINS-OF-CUSTODY

This report includes data from samples delivered under Chain-of-Custody documents Field Logbook No. WHC-N-205-19.

1.2 SAMPLE VOLUME

1000 mL bottles of sample were received for the analyses.

1.3 MISSING SAMPLES

All samples were accounted for in an undamaged condition.

1.4 HOLDING TIMES

The collections were made on 9/24/92 and the sample processing was initiated within 180 days of collection.

2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control, a blank, and a replicate. All original analyses were performed with QC samples 7090-4, 5, and 6.

The QC samples were prepared and labelled by the quality control officer. Copies of The QC notebook pages are included in the data package.

2.1 LABORATORY CONTROL SAMPLES

LCS recoveries and the MDA's for the gamma nuclides used in the spike were good.

2.2 BLANKS

MDA's for the gamma nuclides meet the RDL requirement.

SDG 7090	Client Westinghouse Hanford
Contact Dinkar P. Kharkar	Contract MBH-SVV-069262

CASE NARRATIVE

2.3 REPLICATES

Results were satisfactory for the replicate analysis. The MDA's of gamma nuclides in the replicate sample were higher due to the small aliquot available for gamma analysis. The MDA's of gamma nuclides in the original sample were below RDL.

3.0 ANALYTICAL NOTES

3.1 Gamma Scan Analyses: Gamma scan analysis did not find positive concentrations of gamma nuclides. The MDA's for ^{59}Fe in samples 7090-2 and 3 were higher than the RDL because of the high Compton background contributed by thorium in the sample.

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SECTION 2 Summary Data Including QC's

9513354.1022

TMA NORCAL
REPORTING GROUP 7090

SDG 7090	Client Westinghouse Hanford
Contact Dinkar Kharkar	Contract MBH-SVV-069262

SUMMARY DATA SECTION

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Lab id	TMAN
Protocol	WHC-HEIS
Version	Ver 1.0
Form	DVD-TOC
Version	2.17
Report date	10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

ABOUT THE DATA SUMMARY SECTION

The Data Summary Section of a Data Package has all data, in several useful orders, necessary for first level, routine review of the data package for a Sample Delivery Group (SDG). This section follows the Data Package Narrative, which has an overview of the data package and a discussion of special problems. It is followed by the Raw Data Section, which has full details.

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample Summary Reports (variously titled LAB, SAMPLE, DEPARTMENT and QC SUMMARY to reflect the sort order) show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches (lab groupings reflecting how work was organized) relevant to the reported SDG with information necessary to check the completeness and consistency of the SDG.

WORK SUMMARY

The Work Summary Report shows all samples and work done on them relevant to the reported SDG.

REAGENT BLANKS

The Reagent Blank Reports, one for each Reagent Blank relevant to the SDG, show all results and primary supporting information for the blanks.

LAB CONTROL SAMPLES

The Lab Control Sample Reports, one for each Lab Control Sample relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

ABOUT THE DATA SUMMARY SECTION

REPLICATES

The Replicate Reports, one for each Replicate and Original sample pair relevant to the SDG, show all results, differences and primary supporting information for these QC samples.

MATRIX SPIKES

The Matrix Spike Reports, one for each Spiked and Original sample pair relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

DATA SHEETS

The Data Sheet Reports, one for each client sample in the SDG, show all results and primary supporting information for these samples.

RESULT SUMMARIES

The Result Summary Reports, one for each test used in the SDG, show all results and QC for one parameter on one page. (A test is a short code for the method used to do certain work to the client's specification.)

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show performance data for each method on one page.

REPORT GUIDES

The Report Guides, one for each of the above groups of reports, have documentation on how to read the associated reports.

9513354.1025

Westinghouse Hanford Company	CHAIN OF CUSTODY 003032

Custody Form Initiator L.GUERRA /R. ARNOLD

Company Contact K.N. POOL / C.E. HEIDEN Telephone 376-2640

Project Designation/Sampling Locations SAF#92-311 Collection Date 9-24-92

SODIUM DICHROMATE BARREL. LOCATION 100-IU-4

Ice Chest No. SMC-273 Field Logbook No. WHC-N-205-19

Bill of Lading/Airbill No. 752 156 7906 Offsite Property No.

Method of Shipment SAMPLE DOUBLE-BAGGED PLACED IN WET ICE. AIR FRIEGHT.

Shipped to TMA / RICHMOND CA 94804

Possible Sample Hazards/Remarks UNKNOWN

SEE SAMPLES ANALYSIS REQUEST FOR INDIVIDUAL CONTAINERS AND ANALYSIS.

Sample Identification

B01924 (3) BOTTLES

B01926 (3) BOTTLES

B01927 (3) BOTTLES

PRIORITY TURNAROUND

9-25-92

9-25-92

☐ Field Transfer of Custody

CHAIN OF POSSESSION		(Sign and Print Names)
Relinquished by: L.GUERRA	Received by: Kermit Blum	Date/Time: 9-28-92 0800 *
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time: 0 1:20
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments: * Received @ TMA / NorCal 9-26-92 ; opened 9-28 92 KB

A-6000-407 (12/90)

9513354.1026

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

COC # 03032

Collector L.GUERRA / R. ARNOLD Date 9-24-92

Company Contact K.N.POOL / C.E. HEIDEN Telephone (509) 376-2640

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested	
B01924	S	9-24-92	10:05	(1) 250ml (G) Cr+6	(SW-846 7179)
				(1) 250ml (G) ICP/GFAA METALS	(CLP)
				(1) 1000ml (G) GAMMA SPEC.	(RC-30)
B01926			10:21	(1) 250ml (G) Cr+6	(SW-846 7179)
				(1) 250ml (G) ICP/GFAA METALS	(CLP)
				(1) 1000ml (G) GAMMA SPEC.	(RC-30)
B01927			10:21	(1) 250ml (G) Cr+6	(SW-846 7179)
				(1) 250ml (G) ICP/GFAA METALS	(CLP)
				(1) 1000ml (G) GAMMA SPEC.	(RC-30)
TOTAL	BOTTLES		(9)		

9-25-92

*Type of Sample

A = Air	L = Liquid	SE = Sediment	T = Tissue	X = Other
DL = Drum Liquids	O = Oil	SL = Sludge	W = Water	
DS = Drum Solids	S = Soil	SO = Solid	WI = Wipe	

Field Information SAF#92-311 SODIUM DICHROMATE BARREL. LOCATION 100IU-4

Special Handling and/or Storage SAMPLES TO BE KEPT COOLED TO 4°C PRIOR TO ANALYSIS.

Possible Sample Hazards NON-DETECTABLE WITH FIELD INSTRUTMENT.

A-6000-406 (06/91)

9513354.1027

TMA NORCAL

REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

SAMPLE SUMMARY

Client Westinghouse Hanford
Contract MBH-SVV-069262

CLIENT SAMPLE ID	MATRIX	CHAIN OF CUSTODY	COLLECTED	RECEIVED	SAMPLE WT/VOL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID	QC BATCH
B01924	SOIL	003032	09/24/92	09/28/92		N209203-01	7090-001	7090
B01926	SOIL	003032	09/24/92	09/28/92		N209203-02	7090-002	7090
B01927	SOIL	003032	09/24/92	09/28/92		N209203-03	7090-003	7090
Reagent Blank	SOIL					N209203-05	7090-005	7090
Lab Control Sample	SOIL					N209203-04	7090-004	7090
Replicate (N209203-01)	SOIL		09/24/92			N209203-06	7090-006	7090

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-CS
Version 2.17
Report date 10/05/92

TMA NORCAL

REPORTING GROUP 7090

QC SUMMARY

SDG 7090
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	COLLECTED	RECEIVED	SAMPLE WT/VOL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7090	003032	B01924	SOIL	09/24/92	09/28/92		N209203-01	7090-001
		B01926	SOIL	09/24/92	09/28/92		N209203-02	7090-002
		B01927	SOIL	09/24/92	09/28/92		N209203-03	7090-003
		Reagent Blank	SOIL				N209203-05	7090-005
		Lab Control Sample	SOIL				N209203-04	7090-004
		Replicate (N209203-01)	SOIL	09/24/92			N209203-06	7090-006

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-QS
Version 2.17
Report date 10/05/92

9513354.1029

TMA NORCAL

REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

PREPARATION BATCH SUMMARY

Client Westinghouse Hanford
Contract MBH-SVV-069262

TEST	MATRIX	METHOD	PREPARATION BATCH	PLANCHETS ANALYZED CLIENT	BLANK	LCS	REP/ORIG	MS/ORIG	QUALI-FIERS	FIRST REVIEW	BY	SECOND REVIEW	BY
Gamma Spectroscopy													
GAM	SOIL	Gamma Scan	2713-120	3	1	1	1/1			10/02/92	DPK	10/02/92	NJV

Replicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.
Blank and LCS planchets are those in the same preparation batch as some Client, Replicate or Spike sample.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-PBS
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

DATA SHEET

N209203-01

B01924

SDG	7090	Client	Westinghouse Hanford
Contact	Dinker Kherkar	Contract	MBM-SVV-069262
Lab sample id	N209203-01	Client sample id	B01924
Dept sample id	7090-001	Matrix	SOIL
Received	09/28/92	Collected	09/24/92
		Chain of custody id	003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	0.31	0.21				GAM
Iron 59		U		0.037	0.050	U	GAM
Chromium 51	14392-02-0	U		0.16		U	GAM
Cobalt 60	10198-40-0	U		0.026	0.050	U	GAM
Zinc 65	17982-39-3	U		0.035		U	GAM
Ruthenium 106	13967-48-1	U		0.17		U	GAM
Cesium 134	17967-70-9	U		0.025		U	GAM
Cesium 137	10045-97-3	U		0.018	0.050	U	GAM
Europium 152	14683-23-9	U		0.044	0.10	U	GAM
Europium 154	15585-10-1	U		0.029	0.10	U	GAM
Radium 226	13982-67-7	0.12	0.041		0.10		GAM
Thorium 228	14274-82-9	0.12	0.025				GAM
Thorium 232	7440-29-1	0.086	0.079				GAM

SUMMARY DATA REPORT

Lab id	TMAN
Protocol	WHC-HEIS
Version	Ver 1.0
Form	DVD-DS
Version	2.17
Report date	10/05/92

N209203-02

TMA NORCAL
REPORTING GROUP 7090

DATA SHEET

801926

SDG 7090
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-02
Dept sample id 7090-002
Received 09/28/92
Client sample id 801926
Matrix SOIL
Collected 09/24/92
Chain of custody id 003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	14	0.93				GAM
Iron 59		U		0.13	0.050	U	GAM
Chromium 51	14392-02-0	U		0.26		U	GAM
Cobalt 60	10198-40-0	U		0.065	0.050	U	GAM
Zinc 65	17982-39-3	U		0.11		U	GAM
Ruthenium 106	13967-48-1	U		0.30		U	GAM
Cesium 134	17967-70-9	U		0.034		U	GAM
Cesium 137	10045-97-3	U		0.038	0.050	U	GAM
Europium 152	14683-23-9	U		0.069	0.10	U	GAM
Europium 154	15585-10-1	U		0.051	0.10	U	GAM
Radium 226	13982-67-7	0.41	0.068		0.10		GAM
Thorium 228	14274-82-9	0.61	0.045				GAM
Thorium 232	7440-29-1	0.64	0.16				GAM

SUMMARY DATA REPORT

Lab id TMAN
Protocol UHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

DATA SHEET

N209203-03

B01927

SDG 7090
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-03
Dept sample id 7090-003
Received 09/28/92
Client sample id B01927
Matrix SOIL
Collected 09/24/92
Chain of custody id 003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	14	0.86				GAM
Iron 59		U		0.11	0.050	U	GAM
Chromium 51	14392-02-0	U		0.31		U	GAM
Cobalt 60	10198-40-0	U		0.042	0.050	U	GAM
Zinc 65	17982-39-3	U		0.097		U	GAM
Ruthenium 106	13967-48-1	U		0.30		U	GAM
Cesium 134	17967-70-9	U		0.041		U	GAM
Cesium 137	10045-97-3	U		0.037	0.050	U	GAM
Europium 152	14683-23-9	U		0.083	0.10	U	GAM
Europium 154	15585-10-1	U		0.055	0.10	U	GAM
Radium 226	13982-67-7	0.46	0.072		0.10		GAM
Thorium 228	14274-82-9	0.63	0.057				GAM
Thorium 232	7440-29-1	0.68	0.16				GAM

SUMMARY DATA REPORT

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

9513354.1033

TMA NORCAL

REPORTING GROUP 7090

WORK SUMMARY

SDG 7090
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

CLIENT SAMPLE ID / MATRIX / CUSTODY	LAB SAMPLE ID / COLLECTED / RECEIVED	PLANCHET	TEST	SUF-FIX	ANALYZED	METHOD	REFERENCE
B01924 / SOIL / 003032	N209203-01 / 09/24/92 / 09/28/92	7090-001	GAM		10/01/92	Gamma Scan	
B01926 / SOIL / 003032	N209203-02 / 09/24/92 / 09/28/92	7090-002	GAM		10/01/92	Gamma Scan	
B01927 / SOIL / 003032	N209203-03 / 09/24/92 / 09/28/92	7090-003	GAM		10/01/92	Gamma Scan	
Reagent Blank / SOIL	N209203-05	7090-005	GAM		10/02/92	Gamma Scan	
Lab Control Sample / SOIL	N209203-04	7090-004	GAM		10/02/92	Gamma Scan	
Replicate (N209203-01) / SOIL / 003032	N209203-06 / 09/24/92 / 09/28/92	7090-006	GAM		10/01/92	Gamma Scan	

COUNTS OF TESTS BY SAMPLE TYPE

TEST	CLIENT	BLANK	LCS	REP	SPIKE	TOTALS
GAM	3	1	1	1		6
TOTALS	3	1	1	1	0	6

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-CWS
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

N209203-05

REAGENT BLANK

Reagent Blank

SDG 7090
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-05
Dept sample id 7090-005
Matrix SOIL
Material

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	U		0.26		U	GAM
Iron 59		U		0.039	0.050	U	GAM
Chromium 51	14392-02-0	U		0.11		U	GAM
Cobalt 60	10198-40-0	U		0.019	0.050	U	GAM
Zinc 65	17982-39-3	U		0.031		U	GAM
Ruthenium 106	13967-48-1	U		0.13		U	GAM
Cesium 134	17967-70-9	U		0.015		U	GAM
Cesium 137	10045-97-3	U		0.016	0.050	U	GAM
Europium 152	14683-23-9	U		0.029	0.10	U	GAM
Europium 154	15585-10-1	U		0.019	0.10	U	GAM
Radium 226	13982-67-7	U		0.039	0.10	U	GAM
Thorium 228	14274-82-9	U		0.027		U	GAM
Thorium 232	7440-29-1	U		0.067		U	GAM

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

9513354.1035

N209203-04

TMA NORCAL

REPORTING GROUP 7090

LAB CONTROL SAMPLE

LAB CONTROL SAMPLE

SDG 7090
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-04
Dept sample id 7090-004

Matrix SOIL
Material

PARAMETER	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST	ADDED pCi/G	2σ ERR pCi/G	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
GAMMA SCAN ANALYTES											
Potassium 40	U		0.20		U	GAM					
Iron 59	U		0.048	0.050	U	GAM					
Chromium 51	U		0.11		U	GAM					
Cobalt 60	0.17	0.037		0.050		GAM	0.189	0.008	90	64-136	
Zinc 65	U		0.033		U	GAM					
Ruthenium 106	U		0.18		U	GAM					
Cesium 134	U		0.028		U	GAM					
Cesium 137	0.12	0.029		0.050		GAM	0.133	0.005	90	61-139	
Europium 152	U		0.044	0.10	U	GAM					
Europium 154	U		0.029	0.10	U	GAM					
Radium 226	U		0.040	0.10	U	GAM					
Thorium 228	U		0.030		U	GAM					
Thorium 232	U		0.12		U	GAM					

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-LCS
Version 2.17
Report date 10/05/92

N209203-06

TMA NORCAL

REPORTING GROUP 7090

REPLICATE

B01924

SDG 7090
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

REPLICATE		ORIGINAL			
Lab sample id	N209203-06	Lab sample id	N209203-01	Client sample id	B01924
Dept sample id	7090-006	Dept sample id	7090-001	Matrix	SOIL
		Received	09/28/92	Collected	09/24/92
				Chain of custody id	003032

PARAMETER	REPLICATE pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST	ORIGINAL pCi/G	2σ ERR (COUNT)	MDA pCi/G	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
GAMMA SCAN ANALYTES												
Potassium 40	U		1.6		U	GAM	0.31	0.21			135	310
Iron 59	U		0.32	0.050	U	GAM	U		0.037	U	-	
Chromium 51	U		0.62		U	GAM	U		0.16	U	-	
Cobalt 60	U		0.12	0.050	U	GAM	U		0.026	U	-	
Zinc 65	U		0.20		U	GAM	U		0.035	U	-	
Ruthenium 106	U		0.70		U	GAM	U		0.17	U	-	
Cesium 134	U		0.11		U	GAM	U		0.025	U	-	
Cesium 137	U		0.094	0.050	U	GAM	U		0.018	U	-	
Europium 152	U		0.13	0.10	U	GAM	U		0.044	U	-	
Europium 154	U		0.089	0.10	U	GAM	U		0.029	U	-	
Radium 226	U		0.17	0.10	U	GAM	0.12	0.041			34	187
Thorium 228	0.12	0.090				GAM	0.12	0.025			0	121
Thorium 232	U		0.34		U	GAM	0.086	0.079			119	289

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-REP
Version 2.17
Report date 10/05/92

9513354.1037

N209203-01

TMA NORCAL
REPORTING GROUP 7090

DATA SHEET

B01924

SDG 7090
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-01
Dept sample id 7090-001
Received 09/28/92
Client sample id B01924
Matrix SOIL
Collected 09/24/92
Chain of custody id 003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	0.31	0.21				GAM
Iron 59		U		0.037	0.050	U	GAM
Chromium 51	14392-02-0	U		0.16		U	GAM
Cobalt 60	10198-40-0	U		0.026	0.050	U	GAM
Zinc 65	17982-39-3	U		0.035		U	GAM
Ruthenium 106	13967-48-1	U		0.17		U	GAM
Cesium 134	17967-70-9	U		0.025		U	GAM
Cesium 137	10045-97-3	U		0.018	0.050	U	GAM
Europium 152	14683-23-9	U		0.044	0.10	U	GAM
Europium 154	15585-10-1	U		0.029	0.10	U	GAM
Radium 226	13982-67-7	0.12	0.041		0.10		GAM
Thorium 228	14274-82-9	0.12	0.025				GAM
Thorium 232	7440-29-1	0.086	0.079				GAM

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

N209203-02

TMA NORCAL
REPORTING GROUP 7090

DATA SHEET

B01926

SDG 7090
Contact Dinkar Kharkar

Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-02
Dept sample id 7090-002
Received 09/28/92

Client sample id B01926
Matrix SOIL
Collected 09/24/92
Chain of custody id 003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	14	0.93				GAM
Iron 59		U		0.13	0.050	U	GAM
Chromium 51	14392-02-0	U		0.26		U	GAM
Cobalt 60	10198-40-0	U		0.045	0.050	U	GAM
Zinc 65	17982-39-3	U		0.11		U	GAM
Ruthenium 106	13967-48-1	U		0.30		U	GAM
Cesium 134	17967-70-9	U		0.034		U	GAM
Cesium 137	10045-97-3	U		0.038	0.050	U	GAM
Europium 152	14683-23-9	U		0.069	0.10	U	GAM
Europium 154	15585-10-1	U		0.051	0.10	U	GAM
Radium 226	13982-67-7	0.41	0.068		0.10		GAM
Thorium 228	14274-82-9	0.61	0.045				GAM
Thorium 232	7440-29-1	0.64	0.16				GAM

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

TMA NORCAL

REPORTING GROUP 7090

DATA SHEET

N209203-03

B01927

SDG 7090
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N209203-03
Dept sample id 7090-003
Received 09/28/92
Client sample id B01927
Matrix SOIL
Collected 09/24/92
Chain of custody id 003032

PARAMETER	CAS NO	RESULT pCi/G	2σ ERR (COUNT)	MDA pCi/G	RDL pCi/G	QUALI-FIERS	TEST
GAMMA SCAN ANALYTES							
Potassium 40	13966-00-2	14	0.86				GAM
Iron 59		U		0.11	0.050	U	GAM
Chromium 51	14392-02-0	U		0.31		U	GAM
Cobalt 60	10198-40-0	U		0.042	0.050	U	GAM
Zinc 65	17982-39-3	U		0.097		U	GAM
Ruthenium 106	13967-48-1	U		0.30		U	GAM
Cesium 134	17967-70-9	U		0.041		U	GAM
Cesium 137	10045-97-3	U		0.037	0.050	U	GAM
Europium 152	14683-23-9	U		0.083	0.10	U	GAM
Europium 154	15585-10-1	U		0.055	0.10	U	GAM
Radium 226	13982-67-7	0.46	0.072		0.10		GAM
Thorium 228	14274-82-9	0.63	0.057				GAM
Thorium 232	7440-29-1	0.68	0.16				GAM

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-DS
Version 2.17
Report date 10/05/92

9513354.1040

TMA NORCAL

REPORTING GROUP 7090

Test GAM Matrix SOIL
SDG 7090
Contact Dinkar Kharkar

RESULT SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client Westinghouse Hanford
Contract MBH-SVV-069262

CLIENT SAMPLE ID	LAB SAMPLE ID	SUF-FIX	PLANCHET	Cobalt 60	Cesium 137
Preparation batch 2713-120 Prep error 15.0 %					
B01924	N209203-01		7090-001	U	U
B01926	N209203-02		7090-002	U	U
B01927	N209203-03		7090-003	U	U
Blank (Stnd=QC-9208)	N209203-05		7090-005	U	U
LCS (Stnd=QC-9207)	N209203-04		7090-004	ok	ok
Replicate (N209203-01)	N209203-06		7090-006	- U	- U
Nominal values and limits from method			RDLs (pCi/G)	0.050	0.050

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-CRS
Version 2.17
Report date 10/05/92

9513354.1041

TMA NORCAL

REPORTING GROUP 7090

Test GAM Matrix SOIL
SDG 7090
Contact Dinkar Kharkar

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client Westinghouse Hanford
Contract MBH-SVV-069262

CLIENT SAMPLE ID	LAB SAMPLE ID	SUF-FIX	PLANCHET	MAX MDA pCi/G	ALIQUOT G	RESID mg	YIELD %	COUNT min	FWHM keV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 2713-120 Prep error 15.0 %													
B01924	N209203-01		7090-001	0.037	850			101		8		10/01/92	MB,02,00
B01926	N209203-02		7090-002	0.13	950			101		8		10/01/92	MB,03,00
B01927	N209203-03		7090-003	0.11	970			101		8		10/01/92	MB,05,00
Blank (Stnd=QC-9208)	N209203-05		7090-005	0.039	750			107				10/02/92	MB,05,00
LCS (Stnd=QC-9207)	N209203-04		7090-004	0.048	750			104				10/02/92	MB,02,00
Replicate (N209203-01)	N209203-06		7090-006	0.32	200			100		8		10/01/92	JR,01,00
Nominal values and limits from method				0.050	750	-	-	100		180			

PROCEDURES RC-30 Ge(Li) Preparation

AVERAGES ± 2 SD FOR 6 SAMPLES
MDA 0.11 ± 0.22
YIELD ____ ± ____
FWHM ____ ± ____

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-CMS
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

SAMPLE SUMMARY

The Sample Summary Reports (variously titled LAB, SAMPLE, DEPARTMENT and QC SUMMARY to reflect the sort order) show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The following notes apply to this report:

* LAB SAMPLE ID is the lab's primary identification for a sample.

* DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.

* CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.

* QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

  QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

* All Lab Control Samples, Reagent Blanks, Replicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Reagent Blank, Replicate, Matrix Spike and Result Summary Reports detail these relationships.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

* The preparation batches are shown in the same order as the Report and Method Summary Reports are printed.

* Only analyses of planchets relevant to the SDG are counted.

* Each preparation batch should have at least one Reagent Blank and LCS in it to validate other results.

* The QUALIFIERS shown are all qualifiers other than U, J and B that occur on any analysis in the preparation batch. The Result Summary Report has these qualifiers on a per sample basis.

  These qualifiers should be reviewed as follows:

  X Some data has been manually entered or modified. Transcription errors are possible.

  P One or more results are 'preliminary'. The data is not ready for final reporting.

  2 There were two or more results for one parameter on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

  Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG).

The following notes apply to this report:

* TEST is a code for the method used to measure related parameters. Results and related information for each parameter are on the Data Sheet Report.

* SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.

* The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.

* PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.

* For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Reagent Blank, Replicate, Matrix Spike and Result Summary Reports detail these relationships.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Reagent Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

* TEST is a code for the method used to measure a parameter. If the TEST is empty, no data is available; the parameter was not analyzed for.

* The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

  The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.

* ERRORs can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added (as sum of squares) to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.

* A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.

* When reporting a Reagent Blank a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Reagent Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

U The RESULT is less than the MDA (Minimum Detectable Activity). If the MDA is blank, the ERROR is used as the limit.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

DATA SHEET

J — If the RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.

B — Some Reagent Blank that QC's this sample had a non-U result and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.

For each sample result, all Reagent Blank results in the same preparation batch are compared. The Result Summary Report documents this relationship.

P — The RESULT is 'preliminary'.

T — The test code shown is not the same as on the raw data for this result. It has been changed to match that used for corresponding QC. See the narrative for details.

X — Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.

2 — There were two or more results available for this parameter. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

* An MDA is underlined if it is bigger than its RDL.

* An ERROR is underlined if the 2 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.

* A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

LAB CONTROL SAMPLE

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.

* Amounts ADDED are the lab's estimate of the actual amount spiked into this sample with their ERROR an estimate of the error of this amount.

  An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The error of RESULT, including that introduced by rounding the result prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per parameter bias. The bias changes the center of the computed limit range.

* The second limits are protocol defined upper and lower QC limits for the recovery.

* The recovery is underlined (out of spec) if it is outside either of these ranges.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

REPLICATE

The Replicate Report shows all results, differences and primary supporting information for one Replicate and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Replicate and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Replicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTs divided by their average expressed as a percent.

  If both RESULTs are less than their MDAs, no RPD is computed and a '-' is printed.

  For a parameter, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

* The first, computed limit for the RPD reflects:

  1. The errors of RESULTs, including that introduced by rounding the RESULTs prior to printing.

     If this limit is labeled TOT, it includes the preparation error in the RESULTs. If labeled CNT, it does not.

  2. Error introduced by the arithmetic done to compute the RPD.

  This value reported for this limit is at most 999.

* The second limit for the RPD is the larger of:

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Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
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GUIDE, cont.

Client Westinghouse Hanford
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REPLICATE

1. A fixed percentage specified in the protocol.

2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

* The RPD is underlined (out of spec) if it is greater than either limit.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

* All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

  If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTs are underlined.

* Amounts ADDED are the lab's estimate of the actual amount spiked into the Spike sample with their ERROR an estimate of the error of this amount.

  An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

* REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

* The first, computed limits for the recovery reflect:

  1. The errors of the RESULTs, including that introduced by rounding them prior to printing.

     If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

  2. The error of ADDED.

  3. A lab specified, per parameter bias. The bias changes the center of the computed limit range.

* The second limits are protocol defined upper and lower QC limits for the recovery.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
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Contact Dinkar Kharkar

GUIDE, cont.

Client Westinghouse Hanford
Contract MBH-SVV-069262

MATRIX SPIKE

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

* The recovery is underlined (out of spec) if it is outside either of these ranges.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

RESULT SUMMARY

The Result Summary Report shows up to four results measured using one method. There is one report for each TEST, as used on the Data Sheet Report. The corresponding Method Summary Report has method performance data.

The following notes apply to this report:

* Each per method report is subdivided into sections, one for each preparation batch. A preparation batch should be work done over a restricted period of time by a small group of people in a defined area of the lab.

  There should be Lab Control Sample and Reagent Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab polcy, Replicates need not occur in each batch since they QC sample dependencies such as matrix effects.

* If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

  The J and X flags are as on the data sheet.

* Non-U results for Reagent Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Reagent Blank Report has supporting data.

* Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data' means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See it for supporting data.

* Replicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this replicate. 'OUT' corresponds to when the RPD is underlined on the Replicate Report. See it for supporting data.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
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Version 2.17
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RESULT SUMMARY

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1÷3' means the ratio of the first result column and the third result column.

The error estimate for a ratio reflects the errors of RESULTs, including errors introduced by rounding the RESULTs prior to printing and the preparation error if one is shown for the preparation batch.

> The preparation error is included once, not once for each result, since preparation errors for the results should be highly correlated.

The ratio is underlined (out of spec) if the absolute value of its difference from a nominal value is greater than its error estimate.

Average ratios are computed. These do not include ratios from Lab Control Sample, Reagent Blank or Matrix Spike results since their matrices are not necessarily similar to normal sample's.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant parameter. Results less than their MDA are not included. No sums are computed for QC Samples since their various planchets may not be physically related.

TMA NORCAL
REPORTING GROUP 7090

SDG 7090
Contact Dinkar Kharkar

REPORT GUIDE

Client Westinghouse Hanford
Contract MBH-SVV-069262

METHOD SUMMARY

The Method Summary Report shows performance data for one method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

* Each per method report is subdivided into sections, one for each preparation batch. A preparation batch should be work done over a restricted period of time by a small group of people in a defined area of the lab.

  There should be Lab Control Sample and Reagent Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Replicates need not occur in each batch since they QC sample dependencies such as matrix effects.

* If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.

  MDAs are underlined if greater than the RDL; the smallest RDL if there is more than one.

* Aliquots are underlined if less than a nominal value specified for the method.

* Residues are underlined if outside a range specified for the method.

* Yields, which may be a gravimetric yield, chemical recovery or detector efficiency depending on the method, are underlined if outside a range specified for the method.

* Count times are underlined if less than a nominal value specified for the method.

* Resolutions (as FWHM; Full Width at Half Max) are underlined if

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
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TMA NORCAL
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GUIDE, cont.

Client Westinghouse Hanford
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METHOD SUMMARY

greater than a method specified limit.

* Days Held are underlined if greater than a holding time specified in the protocol.

* Analysis dates are underlined if before their sample's preparation date.

Lab id TMAN
Protocol WHC-HEIS
Version Ver 1.0
Form DVD-RG
Version 2.17
Report date 10/05/92

9513354.1056

APPENDIX 1

COPIES OF CHAINS-OF-CUSTODY

FORM OF PAYMENT

Check ☐ GBL ☐ FCCOD ☐

Bill to Shipper XX Bill to Consignee ☐ Third Party Billing ☐

Shipper's Account Number: E 850281585

EMERY WORLDWIDE — A CF Company

SERVICES **

UNITED STATES / CANADA: Same Day (Extra Charges) ☐ AM ☐ PM ☐ Second Day ☐ Saturday Delivery XX

INTERNATIONAL: Express ☐ Standard Plus ☐ Preferred ☐ Standard ☐ Business Documents ☐ Customs Clearance ☐ Delivery ☐

Date	Origin	Shipment Number
09-25-92	PSC	252156790 6

From:
~~WESTINGHOUSE SHIPPING DEPT (509) 376-6665~~
U.S. DEPARTMENT OF ENERGY C/O
WESTINGHOUSE HANFORD
BLDG 1163
2355 STEVENS DRIVE
RICHLAND WA
Canada ☐

To:
DELORES SANCHEZ
TMA/NORCAL
2030 WRIGHT AVENUE
RICHMOND CA
Hold for Pick Up ☐ Canada ☐

Tariff Dest. | Gateway

Check for Shipper $

EMERY WORLDWIDE will accept Consignee's check with all risks being assumed by Shipper, including but not limited to non-payment, fraud and misrepresentation.

Customer's Reference Numbers: W12410 P3CIJ W92-0-0648#7 97352

Consignee's Account Number: E 94804

Description	Pcs.	L	W	H	Total Pieces	Total Weight (In Lbs.)
1 COOLER SML#273 SAMPLES B01924, B01926, B01927	1		16	17	1	70#

FOR INFORMATION OR RATES CALL 1-800 44 EMERY (1-800-443-6379)

Declared Value $

252156790 6

Remarks: SATURDAY DELIVERY

Shipper's Signature X [signature] 9/25/92

Zip Ship ☐ For shipments within the 50 United States Shipper has the option to check this box and, by checking, agrees that the Zip Ship conditions, described in the area to the right, apply.

Mark if Emery Packaging is used: Urgent Letter 9X12 ☐ Urgent Pack 12X15 ☐

International Shipments: Free Domicile ☐ Commodity Code

Third Party Account Number mandatory for Third Party Billing. Third Party Account Number: E

International Customs Value | International Insurance

Base Charge

Total Transportation Charges

Other Charges/Advance at Origin ☐ OC/AO- $

1-OAK-5A7

Terms and Conditions on Back

9509 1955 154

9513354.1058

APPENDIX 2

ANALYTICAL METHODS USED

ANALYTICAL METHODS USED - SOIL AND PLANT MATERIAL

1. Gross Alpha and Gross Beta: Approximately 5 gram of soil was dissolved by $HF-HNO_3-HCl$ treatment. The dissolved solution was made to a known volume. A volume equivalent to 0.1 gram of soil was uniformly deposited on a stainless steel planchet, weighted, and counted on a low background proportional counter for gross alpha and gross beta determination.

2. Carbon-14 Analysis: An aliquot of soil is combusted in the furnace at 925°C in the presence of oxygen and CuO. The Co_2 is absorbed in $BaCl_2$ to form $BaCo_3$, filtered and placed in a scintillation vial and counted in the LSC counter in the presence of the scintillator.

3. Strontium-90: ^{90}Sr was determined on a 1 gram aliquot. Approximately 3 gram dry soil was dissolved completely by $HF-HNO_3-HCl$ treatment and made to a known volume. One gram aliquot was taken for ^{90}Sr determination. Yttrium carrier was added Yttrium was extracted by HDEHP extraction. Yttrium was converted to yttrium oxide and beta counted.

4. Isotopic Uranium, Plutonium, Americium, and Curium: U, Pu, Am, and Cm were determined by adding appropriate tracers in the dissolved sample and purified by selective ion exchange procedures. Am and Cm are further purified with a DDCP extraction procedure and coprecipitated with a yttrium scavenge. The purified extract is electrodeposited on a stainless steel disc for alpha pulse height spectroscopy. The plutonium plate is striped with HNO_3 and ^{241}Pu is counted in a liquid scintillation counter with an appropriate cocktail.

5. Technetium-99: Approximately 2 gram was ashed at 500°C with ^{99m}Tc tracer and ammonia. The ash was leached with H_2SO_4 and $K_2S_2O_8$. The leached sample is filtered. H_2SO4 and $K_2S_2O_8$ was added to a 10 mL aliquot of water. The water and the leached sample of soil was extracted with TBP and purified by coprecipitation and anion exchange procedure. The purified Tc was electroplated on a stainless steel disc and counted on a gamma detector to determine yield. After decay of ^{99m}Tc, the disc was counted on a low background beta counter.

6. Gamma-Scan: Approximately 200 to 750 gram dry soil was placed in an appropriate geometry and counted on a Ge(Li) detector.

9513354.1060

APPENDIX 3

ALIQUOT INFORMATION

9513354.1061

TC 9/30/92

120

7090 - Soil

TMA #	CUST. ID	T°	Received Wts T.G	T G	N	Done by	Ckd by	DRY WT G	
7090-1	B 01924	9-24-92	16.53	1296.05	1279.52	VE	TC 9/1/92	1295.90	1
2	B01926		16.47	1612.44	1595.97			1588.20	1
3	B01927		16.47	1579.39	1562.92			1557.27	1
4	LCS 9207								
5	Blank 9208								
6	Rep. # 1 9209	9-24-92							

Done by	Chkd by	DRY WTS G	DRY WTS N	GLS Aliquot	Done by	Checkd by	Reviewed by	Wts. After sieve
V.E.	TC 10/1/92	1295.90	1279.37	849.65 ~~849.65~~ MB	V.E. 10-1-92	TC 10/1/92	TC 10/1/92	1279.37
		1588.20	1571.73	948.60 ~~220.95~~ MB				1022.88
		1557.27	1540.80	967.10 ~~215.80~~ MB				1049.93
				1.0 sample MB				
				1.0 sample MB				
				200.04 JR				

9513354.1063

7090 WORK RECORD

SAMPLES	ANALYSIS	PROCEDURE	STEPS	DONE BY	DATE
All	GLS	Weighed		VE/TC	9/30/92
↓	↓	Aliquoted		↓	10/1/92
↓	↓	Turned in samples		TC	10/1/92

9513354.1064

APPENDIX 4

PREPARATION LOG FOR QC SAMPLES

QC Number	IMA/Norcal Number	Date	Analysis	Regression Program	Prep'd By	Spike Made	SPIKE: Volume & I.D. of Spike Tracer	Total Activity (dpm)	% Id Error	Activity Date	Spike Wt (g)	INFORMATION: Matrix	Container	Remarks	ANALYS: Date Rec'd	From	Analysis	OK	NG
9204	5475-3	9/30/92	Sr-90	MCS/A	MCS		—	—	—	—	—								
9205	8263-5	9/30/92	U-KPA	ZN/C	Ky	✓	3ml U^{238} E1-B-A	0.4880 dpm U^{238}	2.0	1.0-92	3.06	10ml 1N HCl	50ml Beaker		10/1/92	SP	U-KPA	✓	
9206	-6	"	U-KPA	"	Ky	✓	—	—	—	—	—	" "	" "		"	"	"	✓	
9207	7090-1	9/30/92	GLY	DPK-TC/E	Ky Ky	✓ ✓	1.1 ml Co^{60} E1-B 1.2 ml Cs^{137} F1-A-(3)	346.9 224.9	2.0 "	1.0-92 "	1.10 1.21	10ml 0.1N HCl	50ml Beaker						
9208	-5	"	GLY	"	Ky	✓	—	—	—	—	—	" "	" "						
9209	-6	"	GLY	"			Duplicate of 7090-1												
9210	7066-24	10/1/92	Tc^{99}	TC/E	RP	✓	1ml Tc^{99} B1-A-B-(1)	113.3	2.0	1.0-92	1.01	10ml 1.0N NH_4OH	50ml Beaker						
9211	25	"	"	"			—	—		—	—	"							
9212	7071-4	"	80	"	RP	✓ ✓	2ml Am^{241} F1-F 1ml Sr^{90} M1-D-(2)	40.07 β=36.48	2.0 "	1.0-92 "	2.01 1.00	10ml 1N HCl	50ml Beaker						
9213	-4	"	GLY	"	RP	✓ ✓	1ml Cs^{137} F1-A(3) 1ml Co^{60} E1-B	187.4 315.4	" "	" "	1.00 1.00	"	"						
9214	-4	"	Sr^{90}	"	RP	✓	500ml SP-1-92-RP ~~200ml~~ Sr^{90} M1-F	19.16	"	"	.50	"	"						
9215	-4	"	C^{14}	"	~~RP~~ 10-1-92	✓	QC # only (Spike prep'd by lab personnel)												
9216	-4	"	U^{238}	"	RP	✓	1ml U^{235} E1-E	9.640	2.0	1.0-92	1.02	10ml 1N HNO_3	"						
9217	-4	"	Pu^{239} Am^{241}	"	RP	✓ ✓	2ml Pu^{239} H1-A-B 2ml Am^{241} F1-D	2.000 2.004	" "	" "	2.28 2.01	"	"						
9218	7071-5	"	80	"	RP	✓	—	—		—	—	10ml 1N HCl	"						
9219	-5	"	GLY	"	RP	✓	—	—		—	—	"	"						
9220	-5	"	Sr^{90}	"	RP	✓	—	—		—	—	"	"						
9221	-5	"	C^{14}	"	~~RP~~ 10-1-92 KP		QC # only (Blank)			—	—	"	"						

9513354.1066

APPENDIX 13

GAMMA SCAN SPIKE

9513554.1067

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Co^{60} E1

Calibration Certificate

n

Principal radionuclide: COBALT-60 Half-life: 5.271 years

Nominal activity: 90.2 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 2506-1

:nt Activity of principal radionuclide

Activity per gram of this solution

18.04 nano curies of Cobalt-60

at 0400 hours PST on July 19, 1988

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

curies per gram

of the daughter nuclide

Total mass of this solution

Approx. 5.0 grams

Method of measurement

0 036

This radionuclide has decayed through 0.02 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after January 1999

584 g × 2.220 dpm/μCi × 1/100 ml = 1956. dpm Co^{60}/ml ± 0.842. @ 201.500 -58

92 Preparation of U^{232} F-G1-B-(4). MCS/NM
KY Transferred the remainder, ~225 ml, of U^{232} E-G1-B-(1) into an 8oz PB.

5,164 dpm U^{232}/ml ± 0.3% @ 206,842-91

K. Yamamoto

92 Preparation of Th^{227} B-C1-B-(11) MCS/NM
KY Transferred ~250ml of Th^{227} B-C1-B-(8) into an 8oz PB.

9,647 dpm Ac^{227}-Th^{227}/ml ± 0.7% @ 144,655-90

K. Yamamoto

92 Preparation of Co^{60} F1
KY Gross 84.2915 g
Tare 79.3331
Net 4.9584 g

Tared a 100ml vol. flask with top using the Balance A (Mettler H10). Broke off the tips of the sealed vial (EPA ampoule no. 2506-1, 18.04 nCi Co^{60}/g at 0400 hrs PST on 7/19/88)

Transferred the Co^{60} solution to the tared flask. Weighed the flask + top + Co^{60} solution. Pipetted 250µl of ~~Co^{8}~~ 2/24/92 Co Carrier F1 (10.00mg Co/ml) into the flask. Diluted to mark with 0.1N HCl. Transferred to a 4oz PB.

From Certificate: 2/24/92

$$18.04\,\frac{nCi}{g} \times 4.9584\,g \times 2220\,\frac{dpm}{nCi} \times \frac{1}{100\,ml} = 1986\ dpm\ Co^{60}/ml \pm 0.8\%$$

@ 201,500-88

Carrier Content:

$$\left(\left[4.9584\,g \times 0.030\,\frac{mg\ Co}{g}\right] + \left[0.250\,ml \times 10.00\,\frac{mg\ Co}{ml}\right]\right) \times \frac{1}{100\,ml} = 0.0265\ mg\ Co/ml$$

2/24/92

K. Yamamoto

0 037

7/27/92 RP

Prep of Am^{243} H-E2-C-(3)

Pipetted 25ml of Am^{243} H-E2 into a 250ml vol flask, diluted to 250ml with 1NHCl. Transferred to 8oz P.B.

99.08 dpm/ml ± 0.7% 262.000-91

R Preston

7/27/92 RP

Prep of Am^{243} H-E2-C-(4)

Transferred 100ml of Am^{243} H-E2-C(3) into 4oz PB

99.08 dpm/ml Am^{243} ± 0.7% 262.000-91

R Preston

7/27/92 RP

Dilution Check of Am^{243} H-E2-C-(3) 1008 (112, 113)

Pipetted 500ul Am^{243} H-E2-C(3) and 1ml Am^{241} A-F3-A into 2 each 50ml beakers Cont TS-AM-1 4/88 Rev 1, Step 2-9.

R Preston

7/27/92 RP

Prep of Co^{60} E1-B

Pipetted 25ml of Co^{60} E1 into 100ml vol Flask, added 200ul of Co G1 (1000mg/ml) carrier, diluted to mark with 1NHCl, Transferred to 4oz PB.

0.038

496.5 dpm/ml Co^{60} ± 0.9% @ 201.500-89

$[(.0265 \frac{mg}{ml} Co \times 25ml) + .2ml \times 10.00 \frac{mg}{ml} Co] \frac{1}{100ml} = .0266 \ mg Co/ml$

R Preston

[redacted]

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Cs^{137} F1

scription

Principal radionuclide: CESIUM-137 Half-life: 30.17 years

Nominal activity: 45.8 nano curies

Nominal volume: 5 ml in ampoule/bottle number: 2437-2

asurement Activity of principal radionuclide

Activity per gram of this solution

9.16 nano curies of Cesium-137

at 0400 hours PST on September 21, 1988

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

8.67 nano curies per gram

of the daughter nuclide Barium-137m

Total mass of this solution

APPROX. 5.0 grams

Method of measurement

The activity of the primary solution was measured using four pi efficiency tracing.

The activity of the dilution was measured using gamma spectroscopy counting.

0 039

lla

This radionuclide has decayed through 0.07 half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after January 1995

F1 Prep'd 2/5/90 by K. Yamamoto

$16 \frac{nCi}{g} \times 4.9682 g \times 2220 \frac{dpm}{nCi} \times \frac{1}{100 ml} = 1010 dpm\ Cs^{137}/ml \pm 1.0\%$ @ 265,500-88

EB 90 Preparation of Cs^{137} F1
KY

Gross 74.4073 g
Tare 69.4391
Net 4.9682 g

Tared a 100 ml vol. flask with top. Broke off the tips of the sealed vial (EPA ampoule # 2437-2, 9.16 nCi Cs^{137}/g at 0400 hr. PST on 9/21/88). Transferred the Cs^{137} solution to the tared 100 ml vol. flask using a transfer pipet. Weighed the flask + Cs^{137} solution + the top. Pipetted 500 λ of Cs Carrier B-A1-A-(6) (53.82 mg Cs_2PtCl_6/ml) into the flask. Diluted to mark with 0.1N HCl. Transferred to 4 oz. PB.

$$\frac{9.16\ nCi}{g} \times 4.9682\ g \times \frac{2220\ dpm}{nCi} \times \frac{1}{100\ ml} = 1010\ dpm\ Cs^{137}/ml \pm 1.0\%$$ @ 265,500-88

$$\left[\left(\frac{0.1\ mg}{g} \times 4.9682\ g\right) + \left(\frac{53.82\ mg\ Cs_2PtCl_6}{ml} \times 0.5\ ml \times 0.3945\right)\right] \times \frac{1}{100\ ml} = 0.111\ \frac{mg\ Cs}{ml}$$

or $2.5348 \times 0.111 = 0.281\ mg\ Cs_2PtCl_6/ml$

K. Yamamoto
mt 2-5-90

EB 90 Preparation of Cs^{137} F1-A
KY Pipetted 10 ml (2 x 5 ml) of Cs^{137} F1 into a 50 ml vol. flask. Pipetted 200 λ of Cs Carrier B-A1-A-(6) into the flask. Diluted to mark with 0.1N HCl. Transferred to 4 oz. PB.

202.0 dpm Cs^{137}/ml ± 1.1% @ 265,500-88

$$\left[\left(\frac{.281\ mg}{ml} \times 10\ ml\right) + \left(\frac{53.82\ mg}{ml}\right)(0.2\ ml)\right] \times \frac{1}{50\ ml} = 0.271\ mg\ Cs_2PtCl_6/ml$$

K. Yamamoto

Prep of Pu^{239} H1-A-B 4-14-
Pipetted 2.5 ml (1+1.5 ml) of Pu^{239} H1-A into RY
a 250 ml vol flask. Dilute to mark with
4 N HNO_3. Transfer to 8oz PB.

1,000 dpm Pu^{239}/ml ± 1.4% @ 81,500-88
R Preston

Prep of Cs^{137} F1-A(3) 4-7-92 RP
Pipetted ~~10 ml (2×5 ml) Cs^{137} F1~~ 20 ml Cs^{137} F1
into 100 ml vol flask. Pipetted 200x Cs 4-15
carrier B-B1 into flask. Diluted to mark B
with .1 N HCl. Transfer to 8oz PB

202.0 dpm Cs^{137}/ml ± 1.0% @ 265,500-88

$$\left[\left(\frac{281\,mg}{ml} \times 20\,ml\right) + \left(\frac{53.24\,mg}{ml}\right)(0.2\,ml)\right] \times \frac{1}{100\,ml} = 0.163\,mg\ \frac{CsHCl}{ml}$$

R Preston 4-15
B

Prep of Am^{242} H-E2-D-(4) TC

Transferred ~250 ml Am^{243} H-E2-D-(1)
into 8oz PB.

4.954 dpm/ml ± .7% @ 262,000-91
R Preston 4-15

Prep of Pu^{242} C4-D2-A-(16) TC

Transfer ~250 ml Pu^{242} C4-D2-A-(14)
into 8oz PB

0 041

5 RP 4/13/92

APPENDIX 16

PRIMARY CALIBRATION REFERENCES, INCLUDED ARE CERTIFICATES OF CALIBRATION FOR THE FOLLOWING DETECTORS:

LBG Beta Counters
LB4000 Gas Proportional Counters
LB4000 GPC for Gross Alpha/Beta
Gamma Spectrometers G1, G2, G3, G4, and G5 for Efficiency Versus Energy

Certificate of Calibration		TMA/*Norcal*
Calibration: ^{90}Y	Instrument: LBG beta counters	Type: Gas Flow Geiger Counter
Calibration Standard: ^{90}Y - Solution SRM 4234-38 from NBS (^{90}Sr)		
Status	**Date**	**Reference Document**
Original Calibration:	March, 1980	CAL 7902
Verification:		
Summary of Results	Standard Efficiency = 56.85% P-Factor = 1.759	

Self Absorption Correction Table
Spline fit

Planchet area = 3.30 sq cm
T = Sample thickness in mg/sq cm = total weight/3.30
PPT = Self absorption divisor

T	PPT	T	PPT	T	PPT	T	PPT
0.00	0.9450	3.05	0.9990	6.09	0.9888	9.14	0.9779
0.14	0.9531	3.18	0.9990	6.23	0.9883	9.28	0.9774
0.27	0.9613	3.32	0.9990	6.37	0.9878	9.41	0.9769
0.41	0.9694	3.45	0.9985	6.50	0.9873	9.55	0.9764
0.54	0.9775	3.59	0.9977	6.64	0.9868	9.68	0.9760
0.68	0.9849	3.72	0.9972	6.77	0.9864	9.82	0.9755
0.81	0.9895	3.86	0.9967	6.91	0.9859	9.95	0.9750
0.95	0.9940	4.00	0.9962	7.04	0.9854	10.09	0.9745
1.08	0.9967	4.13	0.9958	7.18	0.9849	10.23	0.9740
1.22	0.9982	4.27	0.9953	7.31	0.9844	10.36	0.9735
1.35	0.9995	4.40	0.9948	7.45	0.9840	10.50	0.9730
1.56	1.0010	4.60	0.9941	7.65	0.9832	10.70	0.9723
1.69	1.0010	4.74	0.9936	7.79	0.9828	10.83	0.9718
1.83	1.0010	4.88	0.9931	7.92	0.9823	10.97	0.9713
1.96	1.0010	5.01	0.9926	8.06	0.9818	11.11	0.9709
2.10	1.0010	5.15	0.9921	8.19	0.9813	11.24	0.9704
2.23	1.0000	5.28	0.9917	8.33	0.9808	11.38	0.9699
2.37	1.0000	5.42	0.9912	8.46	0.9803	11.51	0.9694
2.51	1.0000	5.55	0.9907	8.60	0.9798	11.65	0.9689
2.64	0.9997	5.69	0.9902	8.74	0.9794	11.78	0.9684
2.78	0.9994	5.82	0.9897	8.87	0.9789	11.92	0.9679
2.91	0.9992	5.96	0.9893	9.01	0.9784	12.05	0.9675

Certificate of Calibration		TMA/*Norcal*
Calibration: ^{90}Y	Instrument: LB4000 (2")	Type: 2" Gas Proportional Counter

Calibration Standard:
^{90}Y - Solution 2454-2 from EPA - EMSL

Status	Date	Reference Document
Original Calibration:	January, 1991	TLW 6229
Verification:		

Summary of Results

Standard Efficiency = 63.57%
P-Factor = 1.573

Self Absorption Correction Table
Spline fit

Planchet area = 3.30 sq cm
T = Sample thickness in mg/sq cm = total weight/3.30
PPT = Self absorption divisor

T	PPT	T	PPT	T	PPT	T	PPT
0.00	1.0400	3.05	0.9999	6.09	0.9879	9.14	0.9758
0.14	1.0372	3.18	0.9994	6.23	0.9873	9.28	0.9752
0.27	1.0343	3.32	0.9989	6.37	0.9868	9.41	0.9746
0.41	1.0314	3.45	0.9983	6.50	0.9863	9.55	0.9740
0.54	1.0285	3.59	0.9978	6.64	0.9857	9.68	0.9735
0.68	1.0263	3.72	0.9972	6.77	0.9852	9.82	0.9729
0.81	1.0250	3.86	0.9967	6.91	0.9846	9.95	0.9723
0.95	1.0231	4.00	0.9962	7.04	0.9841	10.09	0.9717
1.08	1.0200	4.13	0.9956	7.18	0.9836	10.23	0.9711
1.22	1.0169	4.27	0.9951	7.31	0.9830	10.36	0.9705
1.35	1.0161	4.40	0.9946	7.45	0.9825	10.50	0.9700
1.49	1.0152	4.54	0.9940	7.58	0.9820	10.63	0.9694
1.63	1.0136	4.67	0.9935	7.72	0.9814	10.77	0.9688
1.76	1.0118	4.81	0.9930	7.86	0.9809	10.90	0.9682
1.90	1.0102	4.94	0.9924	7.99	0.9804	11.04	0.9676
2.03	1.0089	5.08	0.9919	8.13	0.9798	11.17	0.9671
2.17	1.0075	5.21	0.9913	8.26	0.9793	11.31	0.9665
2.30	1.0062	5.35	0.9908	8.40	0.9787	11.44	0.9659
2.44	1.0048	5.49	0.9903	8.53	0.9782	11.58	0.9653
2.57	1.0030	5.62	0.9897	8.67	0.9777	11.71	0.9647
2.71	1.0013	5.76	0.9892	8.80	0.9771	11.85	0.9642
2.84	1.0006	5.89	0.9887	8.94	0.9766	11.99	0.9636
2.98	1.0002	6.03	0.9881	9.07	0.9761	12.12	0.9630

Certificate of Calibration		TMA/*Norcal*
Calibration: Gross Alpha, Beta	Instrument: LB4000 (2")	Type: 2" Gas Proportional Counter

Calibration Standard:

^{241}Am - Solution S3/46/30 from Amersham Corporation
^{90}Sr - Solution SRM 4919-E from National Bureau of Standards

Status	Date	Reference Document
Original Calibration:	March, 1990	TLW 6227
Verification:		

Summary of Results

Tabulated Data For Efficiency and Correction Curves

mg	Gross Alpha % eff	% Alpha In Beta Channel	Gross Beta % Eff	% Beta In Alpha Channel
0	28.0	35.7	44.0	0.650
10	22.7	23.3	43.5	0.645
20	20.5	23.9	43.0	0.641
30	18.5	24.8	42.5	0.636
40	16.5	25.4	42.3	0.632
50	15.0	26.0	42.2	0.627
60	13.5	26.9	42.0	0.623
70	12.5	27.6	41.8	0.618
80	11.0	28.3	41.5	0.613
90	10.5	29.4	41.3	0.609
100	9.5	30.2	41.0	0.604
110	9.0	31.3	40.8	0.600
120	8.5	32.1	40.6	0.595
130	7.7	33.0	40.5	0.590
140	7.4	34.0	40.4	0.586
150	7.0	35.0	40.2	0.581
160	6.8	35.9	40.0	0.577
170	6.5	36.8	40.0	0.572
180	6.0	37.5	40.0	0.568
190	5.8	38.3	40.0	0.563
200	5.6	39.2	40.0	0.558
210	5.4	40.5	40.0	0.554
220	5.2	41.9	40.0	0.549
230	5.0	43.1	40.0	0.545
240	5.0	44.9	40.0	0.540
250	5.0	46.5	40.0	0.536

Certificate of Calibration		TMA/*Norcal*
Calibration: Efficiency vs Energy	Instrument: G1	Type: Germanium Gamma Spectrometer
Calibration Standard: Multi-gamma standard solution R9/10/135 from Amersham Corporation		

Status	Date	Reference Document
Original Calibration:	March, 1989	*1989 Ge(Li) Calibration, G1*
Verification:		

Summary of Results

The following geometries were calibrated:

60-ml Petri Dish	PD
2" Stainless Steel Planchet	ST
Nylon Planchet	NY,PL
Gamma Well Vial	GW
Small Petri Dish	SP
125-ml Plastic Jar	JR
1" Stainless Steel Cup	CP
3 Filter Papers	FL

Complete efficiency curves can be found in the above referenced document.

Certificate of Calibration		TMA/*Norcal*
Calibration: Efficiency vs Energy	Instrument: G2	Type: Germanium Gamma Spectrometer
Calibration Standard: Multi-gamma standard solution R9/10/135 from Amersham Corporation		

Status	Date	Reference Document
Original Calibration:	March, 1989	*1989 Ge(Li) Calibration, G2*
Verification:		

Summary of Results

The following geometries were calibrated:

Marinelli Beaker	MB
60-ml Petri Dish	PD
2" Stainless Steel Planchet	ST
Nylon Planchet	NY,PL
Gamma Well Vial	GW
Small Petri Dish	SP
125-ml Plastic Jar	JR
1" Stainless Steel Cup	CP
3 Filter Papers	FL
1" Stainless Steel Cup (0.1g)	CL

Complete efficiency curves can be found in the above referenced document.

Certificate of Calibration		TMA/*Norcal*
Calibration: Efficiency vs Energy	Instrument: G3	Type: Germanium Gamma Spectrometer

Calibration Standard:

Multi-gamma standard solution R9/10/135 from Amersham Corporation

Status	Date	Reference Document
Original Calibration:	March, 1989	*1989 Ge(Li) Calibration, G3*
Verification:		

Summary of Results

The following geometries were calibrated:

Marinelli Beaker	MB
60-ml Petri Dish	PD
2" Stainless Steel Planchet	ST
Nylon Planchet	NY,PL
Gamma Well Vial	GW
Small Petri Dish	SP
125-ml Plastic Jar	JR
1" Stainless Steel Cup	CP
3 Filter Papers	FL
1" Stainless Steel Cup (0.1g)	CL

Complete efficiency curves can be found in the above referenced document.

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Certificate of Calibration		TMA/*Norcal*
Calibration: Efficiency vs Energy	Instrument: G4	Type: Germanium Gamma Spectrometer
Calibration Standard: Multi-gamma standard solution R9/10/135 from Amersham Corporation		

Status	Date	Reference Document
Original Calibration:	March, 1989	*1989 Ge(Li) Calibration, G4*
Verification:		

Summary of Results

The following geometries were calibrated:

Marinelli Beaker	MB
60-ml Petri Dish	PD
2" Stainless Steel Planchet	ST
Nylon Planchet	NY,PL
Small Petri Dish	SP
125-ml Plastic Jar	JR
1" Stainless Steel Cup	CP
3 Filter Papers	FL
1" Stainless Steel Cup (0.1g)	CL

Complete efficiency curves can be found in the above referenced document.

Certificate of Calibration		TMA/*Norcal*
Calibration: Efficiency vs Energy	Instrument: G5	Type: Germanium Gamma Spectrometer
Calibration Standard: Multi-gamma standard solution R9/10/135 from Amersham Corporation		
Status	Date	Reference Document
Original Calibration:	March, 1989	*1989 Ge(Li) Calibration, G5*
Verification:		
Summary of Results		

The following geometries were calibrated:

Marinelli Beaker	MB
60-ml Petri Dish	PD
2" Stainless Steel Planchet	ST
Nylon Planchet	NY,PL
Gamma Well Vial	GW
Small Petri Dish	SP
125-ml Plastic Jar	JR
1" Stainless Steel Cup	CP
3 Filter Papers	FL
1" Stainless Steel Cup (0.1g)	CL

Complete efficiency curves can be found in the above referenced document.

9513354.1082

APPENDIX 17

COPIES OF RAW DATA SHEETS

9513354.1083

TMA/NORCAL GE(LI) ANALYSIS REPORT

02-OCT-92

DK 10/2

NUCLIDE	DPM/GRAM	PCI /GRAM	+/- ACT ERR 2 sigma	%ERR 2 sigma
B01924	00001138		TMA # (GLS) 7090	1
TZERO = 268.292 1992			849.6500 GRAM	Aliquot
K 40	6.943E-01	(3.127 +/- 2.128) E-01		68.0%
Cr 51	< 3.659E-01	< 1.648E-01		DET LIM
Mn 54	< 4.259E-02	< 1.918E-02		DET LIM
Co 58	< 3.392E-02	< 1.528E-02		DET LIM
Fe 59	< 8.156E-02	< 3.674E-02		DET LIM
Co 60	< 5.835E-02	< 2.628E-02		DET LIM
Zn 65	< 7.849E-02	< 3.536E-02		DET LIM
Nb 94	< 3.760E-02	< 1.694E-02		DET LIM
Ru106	< 3.709E-01	< 1.671E-01		DET LIM
Cs134	< 5.520E-02	< 2.486E-02		DET LIM
Cs137	< 3.905E-02	< 1.759E-02		DET LIM
Eu152	< 9.656E-02	< 4.350E-02		DET LIM
Eu154	< 6.508E-02	< 2.931E-02		DET LIM
Eu155	< 1.339E-01	< 6.034E-02		DET LIM
Ra226	2.688E-01	(1.211 +/- 0.407) E-01		33.6%
Th228	2.630E-01	(1.185 +/- 0.248) E-01		21.0%
Th232	1.919E-01	(8.645 +/- 7.853) E-02		90.8%

B01926	00001139		TMA # (GLS) 7090	2
TZERO = 268.292 1992			948.6000 GRAM	Aliquot
K 40	3.101E+01	(1.397 +/- 0.093) E+01		6.6%
Cr 51	< 5.832E-01	< 2.627E-01		DET LIM
Mn 54	< 8.057E-02	< 3.629E-02		DET LIM
Co 58	< 8.688E-02	< 3.914E-02		DET LIM
Fe 59	< 2.788E-01	< 1.256E-01		DET LIM
Co 60	< 1.003E-01	< 4.520E-02		DET LIM
Zn 65	< 2.378E-01	< 1.071E-01		DET LIM
Nb 94	< 8.255E-02	< 3.719E-02		DET LIM
Ru106	< 6.584E-01	< 2.966E-01		DET LIM
Cs134	< 7.496E-02	< 3.377E-02		DET LIM
Cs137	< 8.330E-02	< 3.752E-02		DET LIM
Eu152	< 1.536E-01	< 6.921E-02		DET LIM
Eu154	< 1.137E-01	< 5.123E-02		DET LIM
Eu155	< 2.381E-01	< 1.073E-01		DET LIM
Ra226	9.156E-01	(4.124 +/- 0.682) E-01		16.5%
Th228	1.365E+00	(6.147 +/- 0.446) E-01		7.2%
Th232	1.426E+00	(6.425 +/- 1.595) E-01		24.8%

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TMA/NORCAL GE(LI) ANALYSIS REPORT

02-OCT-92

DK 10/2

NUCLIDE	DPM/GRAM	PCI /GRAM	+/- ACT ERR 2 sigma	%ERR 2 sigma
B01927		00001140	TMA # (GLS) 7090	3
TZERO = 268.292 1992			967.1000 GRAM	Aliquot
K 40	3.140E+01	(1.414 +/- 0.086) E+01		6.1%
Cr 51	< 6.959E-01	< 3.135E-01		DET LIM
Mn 54	< 8.111E-02	< 3.653E-02		DET LIM
Co 58	< 7.222E-02	< 3.253E-02		DET LIM
Fe 59	< 2.339E-01	< 1.054E-01		DET LIM
Co 60	< 9.298E-02	< 4.188E-02		DET LIM
Zn 65	< 2.156E-01	< 9.711E-02		DET LIM
Nb 94	< 8.053E-02	< 3.628E-02		DET LIM
Ru106	< 6.659E-01	< 2.999E-01		DET LIM
Cs134	< 9.199E-02	< 4.144E-02		DET LIM
Cs137	< 8.228E-02	< 3.706E-02		DET LIM
Eu152	< 1.852E-01	< 8.341E-02		DET LIM
Eu154	< 1.229E-01	< 5.535E-02		DET LIM
Eu155	< 2.342E-01	< 1.055E-01		DET LIM
Ra226	1.021E+00	(4.599 +/- 0.721) E-01		15.7%
Th228	1.406E+00	(6.334 +/- 0.571) E-01		9.0%
Th232	1.505E+00	(6.778 +/- 1.614) E-01		23.8%
QC LCS 9207		00001141	TMA # (GLS) 7090	4
TZERO = 276.644 1992			1.0000 SMPL	Aliquot
K 40	< 3.309E+02	< 1.491E+02		DET LIM
Cr 51	< 1.908E+02	< 8.596E+01		DET LIM
Mn 54	< 3.520E+01	< 1.586E+01		DET LIM
Co 58	< 3.550E+01	< 1.599E+01		DET LIM
Fe 59	< 8.066E+01	< 3.633E+01		DET LIM
Co 60	2.791E+02	(1.257 +/- 0.279) E+02		22.2%
Zn 65	< 5.450E+01	< 2.455E+01		DET LIM
Nb 94	< 4.915E+01	< 2.214E+01		DET LIM
Ru106	< 2.981E+02	< 1.343E+02		DET LIM
Cs134	< 4.669E+01	< 2.103E+01		DET LIM
Cs137	2.003E+02	(9.023 +/- 2.175) E+01		24.1%
Eu152	< 7.372E+01	< 3.321E+01		DET LIM
Eu154	< 4.765E+01	< 2.146E+01		DET LIM
Eu155	< 9.074E+01	< 4.087E+01		DET LIM
Ra226	< 6.702E+01	< 3.019E+01		DET LIM
Th228	< 5.034E+01	< 2.268E+01		DET LIM
Th232	< 1.915E+02	< 8.628E+01		DET LIM

QC-9207	Added pCi	2σ	F/A	2σ
Co-60	141.5	(±4.2)	0.888	(±23.2)
Cs-137	99.56	(±4.2)	0.906	(±24.2)

Ky 10/5/92

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TMA/NORCAL GE(LI) ANALYSIS REPORT

02-OCT-92

DK 10/2

NUCLIDE	DPM/GRAM	PCI /GRAM	+/- ACT ERR 2 sigma	%ERR 2 sigma
QC BLANK 9208	00001142		TMA # (GLS) 7090	5
TZERO = 276.621 1992			1.0000 SMPL	Aliquot
K 40	< 4.283E+02	< 1.929E+02		DET LIM
Cr 51	< 1.831E+02	< 8.248E+01		DET LIM
Mn 54	< 2.243E+01	< 1.011E+01		DET LIM
Co 58	< 1.974E+01	< 8.892E+00		DET LIM
Fe 59	< 6.512E+01	< 2.933E+01		DET LIM
Co 60	< 3.210E+01	< 1.446E+01		DET LIM
Zn 65	< 5.238E+01	< 2.359E+01		DET LIM
Nb 94	< 2.374E+01	< 1.069E+01		DET LIM
Ru106	< 2.200E+02	< 9.908E+01		DET LIM
Cs134	< 2.525E+01	< 1.137E+01		DET LIM
Cs137	< 2.667E+01	< 1.202E+01		DET LIM
Eu152	< 4.886E+01	< 2.201E+01		DET LIM
Eu154	< 3.238E+01	< 1.458E+01		DET LIM
Eu155	< 6.233E+01	< 2.807E+01		DET LIM
Ra226	< 6.522E+01	< 2.938E+01		DET LIM
Th228	< 4.540E+01	< 2.045E+01		DET LIM
Th232	< 1.123E+02	< 5.060E+01		DET LIM

QC-9208: Added = 0 KY 10/5/92

QC 9209 REPLICATE #1	00001143		TMA # (GLS) 7090	6
TZERO = 268.292 1992			200.0400 GRAM	Aliquot
K 40	< 3.526E+00	< 1.588E+00		DET LIM
Cr 51	< 1.379E+00	< 6.213E-01		DET LIM
Mn 54	< 2.293E-01	< 1.033E-01		DET LIM
Co 58	< 1.649E-01	< 7.429E-02		DET LIM
Fe 59	< 6.997E-01	< 3.152E-01		DET LIM
Co 60	< 2.657E-01	< 1.197E-01		DET LIM
Zn 65	< 4.408E-01	< 1.986E-01		DET LIM
Nb 94	< 1.707E-01	< 7.689E-02		DET LIM
Ru106	< 1.548E+00	< 6.971E-01		DET LIM
Cs134	< 2.333E-01	< 1.051E-01		DET LIM
Cs137	< 2.089E-01	< 9.408E-02		DET LIM
Eu152	< 2.827E-01	< 1.274E-01		DET LIM
Eu154	< 1.975E-01	< 8.895E-02		DET LIM
Eu155	< 3.342E-01	< 1.505E-01		DET LIM
Ra226	< 3.820E-01	< 1.721E-01		DET LIM
Th228	2.620E-01	(1.180 +/- 0.899) E-01		76.2%
Th232	< 7.466E-01	< 3.363E-01		DET LIM

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*****************************************************************************
7090    GLS   1        G-2 MB 276.202 92   100.53 MIN    849.65002 GR      200
LIBR=AKL1  REF TIME= 268.292 92
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Corr 90/2/92

SPECIAL ANALYSIS

PK-ENERGY-GAMMA KEV	BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG DECAY	DPM NOW	ERROR PCT	PCI/GRAM AT TZERO
K 40 4.602E+11 DAYS		LAMBDA= 1.506E-12		DECAY= 1.000E+00 -1G		
1461 (1460.83)	0.110000	0.00313	0.203	3.899E+02 s	34.02%	3.127E-01
Cr 51 2.772E+01 DAYS		LAMBDA= 2.501E-02		DECAY= 8.205E-01	1G	
**** (320.03)	0.102000	0.01315	0.342	2.331E+02 s	<	1.648E-01
Mn 54 3.125E+02 DAYS		LAMBDA= 2.218E-03		DECAY= 9.826E-01	2G	
**** (834.83)	1.000000	0.00543	0.193	3.356E+01 s	<	1.918E-02
Co 58 7.130E+01 DAYS		LAMBDA= 9.722E-03		DECAY= 9.260E-01	4G	
**** (810.76)	0.990000	0.00538	0.147	2.669E+01 s	<	1.528E-02
Fe 59 4.460E+01 DAYS		LAMBDA= 1.554E-02		DECAY= 8.843E-01	6G	
**** (1099.22)	0.565000	0.00418	0.114	4.819E+01 s	<	2.889E-02
**** (1291.56)	0.432000	0.00356	0.094	6.128E+01 s	<	3.674E-02
Co 60 1.921E+03 DAYS		LAMBDA= 3.608E-04		DECAY= 9.972E-01	4G	
**** (1173.23)	0.999200	0.00391	0.182	4.650E+01 s	<	2.472E-02
**** (1332.48)	1.000000	0.00343	0.170	4.943E+01 s	<	2.628E-02
Zn 65 2.440E+02 DAYS		LAMBDA= 2.841E-03		DECAY= 9.778E-01	1G	
**** (1115.52)	0.507500	0.00412	0.136	6.321E+01 s	<	3.536E-02
Nb 94 7.414E+06 DAYS		LAMBDA= 9.349E-08		DECAY= 1.000E+00	3G	
**** (871.10)	1.000000	0.00523	0.167	3.195E+01 s	<	1.694E-02
**** (1573.70)	1.000000	0.00290	0.114	3.920E+01 s	<	2.078E-02
Ru106 3.670E+02 DAYS		LAMBDA= 1.889E-03		DECAY= 9.852E-01	41G	
**** (621.80)	0.097600	0.00716	0.216	3.104E+02 s	<	1.671E-01
**** (1050.10)	0.014500	0.00438	0.192	3.018E+03 s	<	1.624E+00
I 131 8.040E+00 DAYS		LAMBDA= 8.621E-02		DECAY= 9.056E-01	9G	
**** (364.50)	0.820000	0.01182	0.306	3.158E+01 s	<	3.312E-02
Ba133 3.983E+03 DAYS		LAMBDA= 1.741E-04		DECAY= 9.986E-01	10G	
**** (276.30)	0.075000	0.01500	0.346	3.071E+02 s	<	1.630E-01
**** (302.70)	0.196000	0.01383	0.347	1.282E+02 s	<	6.809E-02
**** (355.90)	0.621000	0.01204	0.354	4.738E+01 s	<	2.515E-02
**** (383.70)	0.094000	0.01136	0.251	2.347E+02 s	<	1.246E-01
Cs134 7.531E+02 DAYS		LAMBDA= 9.204E-04		DECAY= 9.927E-01	9G	
**** (475.30)	0.015000	0.00937	0.257	1.832E+03 s	<	9.782E-01
**** (604.60)	0.980000	0.00734	0.236	3.283E+01 s	<	1.753E-02
**** (795.80)	0.880000	0.00568	0.233	4.656E+01 s	<	2.486E-02
Cs137 1.102E+04 DAYS		LAMBDA= 6.290E-05		DECAY= 9.993E-01	3G	
**** (661.64)	0.851000	0.00673	0.190	3.316E+01 s	<	1.759E-02
Eu152 4.331E+03 DAYS		LAMBDA= 1.433E-04		DECAY= 9.989E-01	48G	
**** (121.78)	0.254000	0.02470	0.514	8.190E+01 s	<	4.350E-02
**** (344.31)	0.245000	0.01236	0.340	1.123E+02 s	<	5.958E-02

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****	(778.87)	0.120000	0.00679	0.203	2.925E+02	s	< 1.552E-01
****	(963.36)	0.132000	0.00476	0.212	3.369E+02	s	< 1.788E-01
****	(1112.04)	0.124000	0.00413	0.170	3.313E+02	s	< 1.758E-01
****	(1408.02)	0.198000	0.00323	0.127	1.981E+02	s	< 1.051E-01

Eu154 3.105E+03 DAYS LAMBDA: 2.232E-04 DECAY: 9.982E-01 48G

****	(123.07)	0.390000	0.02477	0.533	5.520E+01	s	< 2.931E-02
****	(723.26)	0.202000	0.00619	0.208	1.660E+02	s	< 8.817E-02
****	(873.16)	0.117000	0.00321	0.130	3.461E+02	s	< 1.307E-01
****	(1004.75)	0.170000	0.00458	0.124	1.593E+02	s	< 8.462E-02
****	(1274.49)	0.336000	0.00399	0.163	1.363E+02	s	< 7.239E-02

Eu155 1.812E+03 DAYS LAMBDA: 3.826E-04 DECAY: 9.970E-01 6G

87	(86.54)	0.320000	0.01810	0.370	6.388E+01	s	33.02% 3.397E-02
****	(105.30)	0.200000	0.02310	0.524	1.135E+02	s	< 6.034E-02

Ta182 1.130E+02 DAYS LAMBDA: 6.027E-03 DECAY: 9.534E-01 33G

****	(67.80)	0.410000	0.01371	0.583	1.037E+02	s	< 5.766E-02
****	(100.10)	0.144000	0.02202	0.540	1.701E+02	s	< 9.460E-02
200	(198.40)	0.015000	0.02035	0.169	5.520E+02		71.83% 3.069E-01
****	(1121.30)	0.358000	0.00410	0.209	1.422E+02	s	<r 7.906E-02
****	(1189.05)	0.166000	0.00386	0.166	2.597E+02	s	< 1.444E-01
****	(1221.40)	0.277000	0.00373	0.107	1.026E+02	s	< 5.704E-02
****	(1231.01)	0.117000	0.00372	0.118	2.702E+02	s	< 1.502E-01

Ra226 5.831E+03 DAYS LAMBDA: 1.188E-06 DECAY: 1.000E+00 48G

186	(186.10)	0.040000	0.02159	0.364	4.209E+02	s	43.27% 2.232E-01
****	(242.00)	0.078000	0.01707	0.387	4.413E+02	s	<r 2.340E-01
****	(351.96)	0.393000	0.01211	0.639	1.128E+02	s	<r 6.983E-02
609	(609.32)	0.484000	0.00729	0.806	2.284E+02	s	46.81% 1.211E-01

Th228 6.987E+02 DAYS LAMBDA: 9.921E-04 DECAY: 9.924E-01 31G

238	(238.62)	0.448000	0.01731	1.720	2.217E+02	s	10.48% 1.185E-01
****	(583.17)	0.287000	0.00762	0.393	1.796E+02	s	<r 9.598E-02

Th232 5.113E+12 DAYS LAMBDA: 1.356E-13 DECAY: 1.000E+00 41G

200	(199.50)	0.003000	0.02025	0.168	2.774E+03		71.83% 1.470E+00
338	(338.40)	0.104000	0.01254	0.340	2.609E+02	s	34.04% 1.383E-01
912	(911.10)	0.260000	0.00601	0.204	1.631E+02	s	46.42% 8.645E-02
****	(968.90)	0.130000	0.00474	0.235	3.311E+02	s	< 1.755E-01

U 235 2.571E+11 DAYS LAMBDA: 2.696E-12 DECAY: 1.000E+00 34G

****	(143.78)	0.132600	0.02478	0.360	1.703E+02	s	< 9.037E-02
186	(185.72)	0.540000	0.02163	0.364	3.112E+01	s	43.27% 1.650E-02
200	(198.91)	0.000300	0.02030	0.168	2.766E+04		71.83% 1.466E+01
****	(205.31)	0.050000	0.01978	0.503	5.082E+02	s	< 2.694E-01

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*****************************************************************************
7090    GLS   1        G-2 MB 276.202 92  100.53 MIN   849.65002 GR        200
LIBR=ARLC  REF TIME= 268.292 92
*****************************************************************************

*****************************************************************************
* Group........................ 7090 * Time of count          276.202 1992 *
* Sample.......................... 1 * Reference GMT........ 268.292 1992 *
* Element.......................... * Elapsed Live Tm....... 100.5333 *
* Type code...................... GLS * Dead Time Pct.......... 0.033145 *
* ID........................... B01924 * Background GMT....... 271.862 1992 *
* Geometry, detector........... MB-2 * Standard GMT......... 270.256 1992 *
* Aliquot...................... 849.65 * Days since T0........... 7.909698 *
* Unit of Aliquot............... GRAM * Time on........... 21:50 PDT  1-OCT *
* Data Sheet Units......... PCI /GRAM * Time off.......... 23:31 PDT  1-OCT *
* Library...................... ARLC * Calc Time......... 08:19 02-OCT-92 *
*****************************************************************************
* Slope....................... 1.017001 * Width slope............... 0.002307 *
* Intercept.................... -9.75339 * Width offset.............. 2.280394 *
* XXX2 TERM.......... -0.560333178-07 * Sensitivity..................... 4. *
  NP:17,673200.GSP                    16 PEAKS

*****************************************************************************
 PK  IT    ENRG  LEFT  WD  BKGND  FWHM    AREA    CHAN        CPM   ERR   EFF  K   FIT
  1   0    20.0    19  25   29312.34     635    29.2  6.328E+00  8.30 0.050  0  0.00
  2   4    87.0    83  21    176 1.64      37    90.1  3.70E-01 63.0 1.83  0  4.10
  3   4    92.4    83  21    153 1.64      32   100.4  3.138-01 39.6 1.98  0  0.00
  4   4   186.7   189  20     84 1.53      66   192.2  5.42E-01 28.3 2.15  0  0.95
  5   4   199.9   189  20     52 1.39      30   206.1  2.968-01 40.9 2.02  0  0.00
  6   6   238.4   239  12     56 1.22     189   244.0  1.88E+00  9.4 1.73  0  0.63
  7   6   241.5   239  12     73 2.08      52   247.1  5.198-01 40.1 1.71  0  0.00
  8   0   296.4   298   6     38 1.41      66   300.1  5.48E-01 23.0 1.44  0  0.00
  9   0   338.1   339   6     34 1.39      38   342.0  3.778-01 29.9 1.26  0  0.00
 10   0   350.3   352   8     56 1.90      77   356.0  7.65E-01 21.3 1.22  0  0.00
 11   0   511.0   503  11     45 2.34      48   512.1  4.738-01 33.40.872  0  0.00
 12   0   583.1   581   5      3 1.88      61   583.0  6.02E-01 15.20.763  0  0.00
 13   0   608.5   603  10     20 1.77      84   607.9  8.378-01 16.20.731  0  0.00
 14   0   911.6   899  10     23 2.44      24   906.0  2.37E-01 38.50.504  0  0.00
 15   0  1120.4  1107   8      4 1.45      14  1111.3  1.418-01 35.90.411  0  0.00
 16   0  1460.9  1440  12      6 2.73      23  1446.2  2.29E-01 29.80.314  0  0.00

*****************************************************************************
BACKGROUND INFO 7090    GLS   1        276.202 92 G- 2     BG DATE 271.862 92
*****************************************************************************

v---------PEAK-----------v     v------BACKGROUND-------v     v------NET------v
ENERGY        CPM   %ERROR       ENERGY        CPM   %ERROR        CPM   %ERROR

  92.36     0.5128 39.66         92.00   0.3080   0.00         0.2047 99.09R
 183.72     0.3423 28.34        186.00   0.1788  18.68         0.3635 43.27
 199.86     0.2960 40.88        198.00   0.1276   0.00         0.1684 71.83
 238.42     1.8797  9.38        238.60   0.1601  23.49         1.7196 10.48
 295.41     0.5477 22.98        296.20   0.0211   0.00         0.5266 23.91
 338.09     0.3774 29.85        338.40   0.0371  72.33         0.3403 34.04
 351.31     0.7661 21.32        351.90   0.0649  16.63         0.7002 23.35
 511.00     0.4730 33.37        511.00   0.4374   6.93         0.0355452.21R
 583.11     0.6020 15.17        583.10   0.0498  33.71         0.5522 16.82
 608.51     0.8371 16.17        609.30   0.0314   8.90         0.8056 16.81
 911.65     0.2874 38.62        911.10   0.0829  48.90         0.2044 45.42
1120.40     0.1415 35.85       1120.30   0.0246   0.00         0.1169 43.39
1460.89     0.2288 29.81       1461.00   0.0256  44.57         0.2032 34.02
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  2 PEAKS REJECTED BY BACKGROUND

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INTERFERING ISOTOPE ANALYSIS 7090     GLS    1        276.202 92 G- 2
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RA226      609.32  0.4840                CALC FROM REF PEAK

v----------PEAK----------------v      v--CALCULATED--v      v------NET---------
ENERGY      CPM        BPM  %ERROR       ENERGY    CPM              CPM  %ERROR

 241.49     0.519      389.9 40.11       242.00  0.3032          0.2161 99.31 R
 295.41     0.537      182.3 23.91       295.20  0.6576         -0.1310****** R
 351.31     0.700      146.1 23.38       351.96  1.0877         -0.3876 63.29 R
 609.31     0.806      227.6 16.81       609.32  0.8036    <-reference peak-> 
1120.40     0.117      177.7 43.39      1120.30  0.1498         -0.0329****** R

TH228      238.62  0.4480                CALC FROM REF PEAK

v----------PEAK----------------v      v--CALCULATED--v      v------NET---------v
ENERGY      CPM        BPM  %ERROR       ENERGY    CPM              CPM  %ERROR

 238.42     1.720      221.9 10.48       238.62  1.7196    <-reference peak-> 
 241.49     0.216      365.0 99.31       240.92  0.0349          0.1812163.69 R
 583.11     0.162      262.2 16.82       583.17  0.4860          0.0662160.03 R

BI214/PB214 RATIO      1.33336+00+/-     1.98%

WT PCT U238    1.98000 +/-    46.42%      DAUT
RGF SENT DATA FROM NP:17,67192273 9802.DTX          TO GSTOR 200
GLB WRITES THE FOLLOWING TO NP:17,67JGYDCSVT01.DAT
 7090 GROUP            L=SAMPL        =SLM     GLS=TYP
    0=1.KW             0=1.KA        ARL1=1.1BR
JLYKTL PARAMETERS
       JELYKTL READ
GEODET
       Old Effs replaced (forced)
EFFICIENCY FILE NP:C23,4JGSLC02M80.EFF
       Effs fetched  33.000    90
FETCH CAL LINE
       Cal line fetched270.256     1992
BKG FETCH ROUTINE GETS 80 FOR  271.862 1992 IERR=    0
SPANE
        FETCHING SPANE
WHOTR CALLED
       HDR WRITTEN IN
GSTFIL
       PKFIL UPDATED
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QC USED IN DATA REDUCTION OF SAMPLE 7090 1 GLS RUN AT 276.202/1992

BACKGROUND FOR GELI DETECTOR 2 OF 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0889	0.00	511.0	0.4374	6.93	1120.3	0.0246	0.00
92.0	0.3080	0.00	583.1	0.0498	33.71	1173.2	0.0632	24.38
143.0	0.0235	0.00	609.3	0.0314	8.90	1238.1	0.0139	0.00
186.0	0.1788	18.68	661.6	0.0270	0.00	1332.5	0.0667	18.43
198.0	0.1273	0.00	727.2	0.0153	0.00	1377.7	0.0000	0.00
238.6	0.1601	23.49	846.0	0.0280	45.04	1461.0	0.0256	44.57
279.0	0.0384	0.00	860.4	0.0000	0.00	1586.0	0.0133	0.00
295.2	0.0211	0.00	911.1	0.0329	48.90	1591.0	0.0065	0.00
338.4	0.0371	72.53	968.9	0.0134	22.68	1729.6	0.0000	0.00
351.9	0.0649	16.63	1001.0	0.0294	0.00	1764.5	0.0237	0.00

GELI STANDARD EFFICIENCY QC FOR DETECTOR G- 2 ON 10/ 2/92

HIGH RADIUM STANDARD					LOW RADIUM STANDARD				
GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES	GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
200.271	92	1.0396	1.924	14.	270.968	90	1.0095	4.535	17.
207.266	92	1.0436	3.470	14.	21.729	91	1.1688	8.879	26.
209.920	92	1.0301	2.372	11.	22.699	91	1.1434	8.427	17.
214.273	92	1.0200	2.394	10.	23.715	91	1.1388	9.086	14.
228.232	92	1.0199	2.291	13.	28.708	91	1.1368	8.039	20.
235.133	92	1.0411	2.492	10.	114.690	91	0.9794	2.007	23.
249.236	92	1.0368	1.983	10.	207.739	91	0.9624	2.205	12.
256.251	92	1.0513	2.371	14.	278.670	91	0.9748	1.107	19.
263.208	92	1.0646	3.200	12.	280.877	91	1.1327	2.091	17.
270.256	92	1.0599	2.919	15.	221.700	92	0.9750	2.072	16.
AVERAGE		1.0427	0.013		AVERAGE		1.0624	0.088	

CALIBRATION LINE FROM STANDARD FOR G- 2 ON 270.256 92
ENERGY = -9.433078 + 1.0170237*CH + -3.6056678-08*CH**2
FWHM = SQRT(2.2804 + 0.002308*ENERGY) (CHO60= 2.314)

EFFICIENCIES FOR GEOMETRY M32 CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	1.050*	110.0	2.380*	170.0	2.320*	400.0	1.100*	1200.0	0.382*
60.0	1.180*	120.0	2.460*	200.0	2.020*	500.0	0.890*	1500.0	0.305*
80.0	1.630*	130.0	2.500*	220.0	1.870*	600.0	0.740*	2000.0	0.228*
90.0	1.900*	140.0	2.490*	250.0	1.650*	800.0	0.560*	2500.0	0.182*
100.0	2.200*	150.0	2.450*	350.0	1.220*	1000.0	0.460*	3000.0	0.150*

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****
7090 l GLS GSTOR 200
****

	PK	ENERGY	CPM	ZERR	COMMENT
	1	20.0	6.32	8.3	.....
	2	87.0	0.37	53.0	..... Cs136 Cd109 Eu155s
b	4	186.7	0.36	43.3	..... Cs137c U 238s Ra226s
b	5	199.9	0.17	71.3	Ac228 .....
b	6	238.4	1.72	10.5	..... Th228s
b	9	338.1	0.34	34.0	Ac228 ..... Th232s
b	13	608.5	0.83	16.8	..... Ra226s
b	14	911.6	0.20	43.4	Ac228 ..... Th232s
b	16	1460.9	0.20	34.0	..... K 40s
			REJECTED PEAKS		
B	3	92.4	0.20	99.3	.....
B	11	511.0	0.04	99.9	Ac228 Th228 ..... La140 Ru106 Na 22
N	7	241.5	0.13	99.9	Th228 ..... La140 Ra226s
bN	8	295.4	-0.13	99.9	Ra226 ..... Ru103 Ir192s
bN	10	351.3	-0.39	99.9	..... Ra226s
bN	12	583.1	0.07	99.9	..... Th228s
bN	15	1120.4	-0.03	99.9	Ra226 ..... Ta182s

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7090    GLS    2        G-3 M8 276.202 92   100.58 MIN    948.59998 GR      202
LIBR=AKLJ   REF TIME= 268.292 92
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GMD 10/2/92

SPECIAL ANALYSIS

PK-ENERGY KEV	GAMMA BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG	DECAY	DPM NOW	ERROR PCT	PCI/GRAM AT TZERO
K 40 4.602E+01 DAYS		LAMBDA: 1.506E-12		DECAY: 1.000E+00			
1461 (1460.85)	0.110000	0.00334	10.798	2.942E+04 s		3.31%	1.397E+01
Cr 51 2.772E+01 DAYS		LAMBDA: 2.501E-02		DECAY: 8.205E-01		1G	
**** (320.03)	0.102000	0.01562	0.723	4.339E+02 s		<	2.627E-01
Mn 54 3.125E+02 DAYS		LAMBDA: 2.218E-03		DECAY: 9.826E-01		2G	
**** (834.83)	1.000000	0.00585	0.439	7.510E+01 s		<	3.629E-02
Co 58 7.130E+01 DAYS		LAMBDA: 9.722E-03		DECAY: 9.260E-01		4G	
**** (810.76)	0.990000	0.00602	0.433	7.632E+01 s		<	3.914E-02
Fe 59 4.460E+01 DAYS		LAMBDA: 1.554E-02		DECAY: 8.848E-01		6G	
**** (1099.22)	0.565000	0.00445	0.321	2.071E+02 s		<	1.112E-01
**** (1291.56)	0.432000	0.00378	0.382	2.339E+02 s		<	1.256E-01
Co 60 1.921E+03 DAYS		LAMBDA: 3.608E-04		DECAY: 9.972E-01		4G	
**** (1173.23)	0.999200	0.00416	0.446	1.070E+02 s		<	5.095E-02
**** (1332.48)	1.000000	0.00366	0.347	9.490E+01 s		<	4.519E-02
Zn 65 2.440E+02 DAYS		LAMBDA: 2.841E-03		DECAY: 9.778E-01		1G	
**** (1115.52)	0.507500	0.00439	0.491	2.206E+02 s		<	1.071E-01
Nb 94 7.414E+06 DAYS		LAMBDA: 9.349E-08		DECAY: 1.000E+00		3G	
**** (871.10)	1.000000	0.00561	0.439	7.831E+01 s		<	3.719E-02
**** (1573.70)	1.000000	0.00310	0.184	5.954E+01 s		<	2.827E-02
Ru106 3.670E+02 DAYS		LAMBDA: 1.889E-03		DECAY: 9.832E-01		41G	
511 (511.80)	0.205000	0.00952	0.484	2.481E+02	60.84%m		1.196E-01
**** (621.80)	0.097600	0.00781	0.469	6.153E+02 s		<m	2.966E-01
**** (1050.10)	0.014500	0.00466	0.408	6.037E+03 s		<m	2.910E+00
I 131 8.040E+00 DAYS		LAMBDA: 8.621E-02		DECAY: 5.036E-01		9G	
**** (364.50)	0.820000	0.01368	0.629	5.608E+01 s		<m	5.267E-02
Ba133 3.931E+03 DAYS		LAMBDA: 1.741E-04		DECAY: 9.986E-01		10G	
**** (276.30)	0.075000	0.01767	0.869	6.557E+02 s		<m	3.118E-01
**** (302.70)	0.196000	0.01636	0.833	2.753E+02 s		<m	1.309E-01
**** (356.90)	0.621000	0.01410	0.634	7.243E+01 s		<m	3.444E-02
**** (383.70)	0.094000	0.01278	0.684	5.688E+02 s		<m	2.705E-01
Cs134 7.531E+02 DAYS		LAMBDA: 9.204E-04		DECAY: 9.927E-01		9G	
**** (475.30)	0.013000	0.01019	0.346	3.573E+03 s		<	1.710E+00
**** (604.60)	0.980000	0.00804	0.556	7.059E+01 s		<	3.377E-02
794 (795.80)	0.830000	0.00613	0.408	7.557E+01 s	49.85%		3.615E-02
Cs137 1.102E+04 DAYS		LAMBDA: 6.290E-05		DECAY: 9.995E-01		3G	
**** (661.64)	0.851000	0.00734	0.494	7.898E+01 s		<	3.752E-02
Eu152 4.821E+03 DAYS		LAMBDA: 1.438E-04		DECAY: 9.989E-01		48G	
**** (121.78)	0.284000	0.03123	1.135	1.456E+02 s		<	6.921E-02

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****	(344.31)	0.241000	0.01463	0.687	1.916E+02	s	<	9.111E-02
****	(778.87)	0.120000	0.00626	0.475	6.329E+02	s	<	3.009E-01
****	(963.36)	0.132000	0.00508	0.542	8.080E+02	s	<	3.841E-01
****	(1112.04)	0.124000	0.00440	0.487	8.924E+02	s	<	4.242E-01
****	(1408.02)	0.198000	0.00346	0.339	4.942E+02	s	<	2.349E-01

Eu154 3.105E+03 DAYS LAMBDA: 2.232E-04 DECAY: 9.982E-01 48G

****	(123.07)	0.390000	0.03125	1.312	1.077E+02	s	<n	5.123E-02
511	(511.20)	0.000600	0.00954	0.484	3.466E+04	60.84%n		4.027E+01
****	(723.26)	0.202000	0.00673	0.542	3.992E+02	s	<n	1.899E-01
****	(873.16)	0.117000	0.00360	0.464	7.078E+02	s	<n	3.367E-01
****	(1004.76)	0.170000	0.00488	0.415	5.011E+02	s	<n	2.384E-01
****	(1274.49)	0.336000	0.00383	0.324	2.983E+02	s	<n	1.420E-01

Eu155 1.812E+03 DAYS LAMBDA: 3.825E-04 DECAY: 9.970E-01 6G

87	(86.54)	0.320000	0.02601	2.277	2.735E+02	s19.38%		1.303E-01
****	(105.30)	0.200000	0.03004	1.363	2.252E+02	s	<	1.073E-01

Ta182 1.150E+02 DAYS LAMBDA: 6.027E-03 DECAY: 9.534E-01 33G

****	(67.80)	0.410000	0.01806	1.336	1.804E+02	s	<	8.983E-02
84	(84.70)	0.027000	0.02542	0.909	1.324E+03	46.29%		6.596E-01
****	(100.10)	0.144000	0.02922	1.386	3.294E+02	s	<	1.641E-01
****	(1121.30)	0.358000	0.00436	0.623	3.989E+02	s	<e	1.987E-01
****	(1189.05)	0.166000	0.00411	0.472	6.918E+02	s	<	3.446E-01
****	(1221.40)	0.277000	0.00400	0.514	4.638E+02	s	<	2.310E-01
****	(1231.01)	0.117000	0.00397	0.561	1.210E+03	s	<	6.027E-01

Ra226 3.851E+03 DAYS LAMBDA: 1.838E-06 DECAY: 1.000E+00 48G

186	(186.10)	0.040000	0.02614	1.141	1.474E+03	s33.03%		7.000E-01
****	(242.00)	0.078000	0.02012	1.148	7.318E+02	s	<e	3.475E-01
****	(351.96)	0.393000	0.01430	1.251	2.227E+02	s	<e	1.057E-01
462	(461.80)	0.002200	0.01045	0.375	1.629E+04	76.37%n		7.736E+00
609	(609.32)	0.484000	0.00798	3.362	8.685E+02	s 8.27%		4.124E-01
786	(785.80)	0.012100	0.00621	0.402	5.347E+03	46.47%		2.539E+00
1764	(1764.50)	0.166000	0.00277	0.298	6.434E+02	36.58%n		3.055E-01

Th228 6.987E+02 DAYS LAMBDA: 9.921E-04 DECAY: 9.922E-01 31G

84	(84.37)	0.004480	0.02563	0.909	8.011E+03	46.29%		3.836E+00
239	(238.62)	0.448000	0.02043	11.757	1.284E+03	s 3.62%		6.146E-01
511	(510.69)	0.076600	0.00954	0.484	6.625E+02	60.84%n		3.171E-01
****	(583.17)	0.287000	0.00834	0.932	4.103E+02	s	<e	1.964E-01
786	(785.46)	0.010200	0.00621	0.402	6.341E+03	46.47%		3.035E+00

Th232 3.103E+12 DAYS LAMBDA: 1.336E-13 DECAY: 1.000E+00 41G

****	(338.40)	0.104000	0.01487	0.979	6.329E+02	s	<e	3.000E-01
462	(463.00)	0.040000	0.01043	0.375	8.981E+02	76.37%n		4.265E-01
511	(509.60)	0.004200	0.00957	0.484	1.206E+04	60.84%n		5.725E+00
794	(794.80)	0.042000	0.00614	0.403	1.381E+03	49.83%		7.510E-01
911	(911.10)	0.250000	0.00537	1.816	1.368E+03	s12.42%		6.420E-01
****	(968.90)	0.150000	0.00503	0.392	7.806E+02	s	<e	3.707E-01

U 235 2.571E+11 DAYS LAMBDA: 2.696E-12 DECAY: 1.000E+00 34G

84	(84.24)	0.031000	0.02527	0.909	7.052E+02	46.29%		3.349E-01
****	(143.78)	0.132600	0.03085	1.117	2.731E+02	s	<	1.297E-01
186	(185.72)	0.540000	0.02619	1.541	1.090E+02	s33.03%		5.176E-02
****	(205.31)	0.050000	0.02390	1.053	8.810E+02	s	<	4.186E-01

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*****************************************************************************
7090     GLS    2          G-3 MB 276.202 92   100.58 MIN    948.59998 GK        202
LIBR=ARLC   REF TIME: 268.292 92
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* Group........................ 7090 * Time of count            276.202 1992 *
* Sample.......................... 2 * Reference GMT........ 268.292 1992 *
* Element.......................     * Elapsed Live Tm........... 100.5833 *
* Type code....................... GLS * Dead Time Pct............ 0.082781 *
* ID........................... B01926 * Background GMT....... 271.862 1992 *
* Geometry, detector........... MB-3 * Standard GMT......... 270.284 1992 *
* Aliquot...................... 948.6 * Days since T0............ 7.909698 *
* Unit of Aliquot............... GRAM * Time on........... 21:50 PDT  1-OCT *
* Data Sheet Units......... PCI /GRAM * Time off.......... 23:30 PDT  1-OCT *
* Library...................... ARLC * Calc Time......... 08:22 02-OCT-92 *
*****************************************************************************
* Slope...................... 1.000163 * Width slope............... 0.004564 *
* Intercept................... -9.84398 * Width offset.............. 0.959452 *
* XXX2 TERM.......... 0.484036398E-07 * Sensitivity..................... 4. *
  NP:17,673202.68P                    31 PEAKS

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PK	IT	ENRG	LEFT	WD	BKGND	FWHM	AREA	CHAN	CPM	ERR	EFF	K	FIT
1	3	13.1	20	12	99	3.03	616	22.9	6.138E+00	5.50	0.014	0	2.19
2	3	16.5	20	12	993	3.71	512	26.4	5.090E+00	13.40	0.027	0	0.00
3	0	76.1	82	11	2285	2.68	975	85.9	9.698E+00	10.4	2.12	0	0.00
4	3	84.2	92	10	784	1.44	106	94.0	1.050E+00	40.0	2.50	0	7.58
5	3	87.1	92	10	807	1.43	229	96.9	2.288E+00	19.4	2.60	0	0.00
6	0	93.6	101	6	1164	1.56	93	103.4	9.260E-01	60.7	2.78	0	0.00
7	0	186.1	193	8	837	1.52	166	193.9	1.658E+00	30.8	2.61	0	0.00
8	0	209.4	216	7	632	1.50	162	219.2	1.610E+00	26.9	2.34	0	0.00
9	5	238.6	243	12	388	1.47	1204	248.4	1.208E+01	3.5	2.05	0	2.03
10	5	241.6	243	12	393	2.10	247	250.4	2.460E+00	20.2	2.02	0	0.00
11	0	269.9	277	7	443	1.93	72	279.6	7.158E-01	49.8	1.83	0	0.00
12	3	295.1	302	12	245	1.56	312	304.9	3.100E+00	9.6	1.70	0	0.74
13	3	300.1	302	12	200	1.21	53	309.9	5.318E-01	40.1	1.67	0	0.00
14	0	338.4	345	7	280	1.53	224	348.2	2.238E+00	14.7	1.49	0	0.00
15	0	352.0	357	10	331	1.86	539	361.8	5.368E+00	7.7	1.43	0	0.00
16	0	463.8	467	9	189	1.77	97	471.5	9.641E-01	28.7	1.06	0	0.00
17	0	511.0	517	10	157	2.67	191	520.7	1.908E+00	15.30	.933	0	0.00
18	0	583.1	588	10	202	1.70	317	592.9	3.150E+00	9.90	.836	0	0.00
19	0	609.4	617	7	148	1.79	341	619.1	3.398E+00	8.20	.799	0	0.00
PK	IT	ENRG	LEFT	WD	BKGND	FWHM	AREA	CHAN	CPM	ERR	EFF	K	FIT
20	0	727.7	735	6	82	3.04	39	737.4	3.868-01	28.30	.676	0	0.00
21	0	786.4	792	8	77	4.82	46	796.1	5.480-01	34.00	.622	0	0.00
22	0	794.4	800	9	75	2.23	76	804.1	7.558-01	26.30	.615	0	0.00
23	0	861.4	867	9	86	1.40	54	871.1	5.350-01	33.90	.570	0	0.00
24	0	911.2	918	9	95	2.01	189	920.8	1.888E+00	11.90	.540	0	0.00
25	0	969.6	976	8	139	2.06	34	979.2	3.380-01	65.40	.507	0	0.00
26	0	1120.2	1127	8	101	2.84	72	1129.8	7.138-01	27.30	.438	0	0.00
27	0	1460.9	1463	14	46	2.56	1101	1470.4	1.090E+01	3.30	.335	0	0.00
28	0	1587.2	1595	5	14	2.04	11	1596.7	1.148-01	59.60	.309	0	0.00
29	0	1592.8	1600	7	23	2.02	15	1602.3	1.468-01	60.40	.308	0	0.00
30	0	1630.1	1637	7	7	1.47	12	1639.6	1.198-01	55.00	.302	0	0.00
31	0	1764.0	1766	15	5	3.33	72	1773.4	7.178-01	14.20	.280	0	0.00

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BACKGROUND INFO 7090     GLS    2          276.202 92 G- 3      BG DATE 271.862 92
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061

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PEAK ENERGY	PEAK CPM	PEAK %ERROR	BACKGROUND ENERGY	BACKGROUND CPM	BACKGROUND %ERROR	NET CPM	NET %ERROR
93.63	0.9247	60.74	92.00	0.1729	0.00	0.7518	74.72
186.11	1.6487	30.84	186.00	0.1072	25.18	1.5414	33.03
238.57	11.9691	3.63	238.60	0.2125	24.33	11.7566	3.62
295.13	3.0972	9.38	295.20	0.0521	0.00	3.0450	9.74
338.40	2.2313	14.74	338.40	0.0413	0.00	2.1900	15.02
351.99	3.3611	7.68	351.90	0.0309	0.00	3.3302	7.72
511.00	1.9017	15.28	511.00	0.4246	8.15	1.4771	19.81
583.14	3.1481	9.86	583.10	0.0616	30.94	3.0864	10.11
609.43	3.3908	8.16	609.30	0.0383	52.52	3.3525	8.27
727.66	0.5855	28.32	727.20	0.0453	0.00	0.5402	30.70
861.45	0.5349	33.89	860.40	0.0601	0.00	0.4748	38.17
911.18	1.8764	11.93	911.10	0.0604	45.23	1.8160	12.42
969.58	0.3376	65.38	968.90	0.0329	31.59	0.3047	72.53
1120.22	0.7134	27.34	1120.30	0.0145	0.00	0.6989	27.91
1460.89	10.9463	3.27	1461.00	0.1479	6.09	10.7985	3.31
1587.22	0.1141	59.64	1586.00	0.0000	0.00	0.1141	59.64
1592.84	0.1462	60.38	1591.00	0.0253	0.00	0.1209	73.03
1764.05	0.7167	14.22	1764.50	0.0185	68.00	0.6982	14.71

0 PEAKS REJECTED BY BACKGROUND

****
INTERFERING ISOTOPE ANALYSIS 7090 GLS 2 276.202 92 G- 3
****

RA226 609.32 0.4840 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR	
241.56	2.457	1561.2	20.20	242.00	1.3637	1.0930	46.57	S
295.13	3.045	893.4	9.74	295.20	2.9538	0.0912421.20		R
351.99	5.330	948.5	7.72	351.96	4.8702	0.4600125.20		R
461.79	0.964	41398.4	28.74	461.80	0.0202	0.9442	29.35	S
609.43	3.362	866.6	8.27	609.32	3.3525	<-reference peak->		
786.41	0.548	7284.6	34.03	785.80	0.0652	0.4830	38.64	S
1120.22	0.699	996.6	27.91	1120.30	0.6077	0.0931221.03		R
1764.05	0.698	1502.3	14.71	1764.50	0.4028	0.2954	36.55	S

TH228 238.62 0.4480 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR	
84.20	1.053	9383.1	39.93	84.37	0.1439	0.9083	46.29	S
238.57	11.757	1282.9	3.62	238.62	11.7566	<-reference peak->		
241.56	1.093	2418.7	46.57	240.92	0.5797	0.5132	99.26	R
300.07	0.533	1096.7	40.12	300.11	0.6217	-0.0902******		R
511.00	1.477	2018.5	19.81	510.69	0.9388	0.5383	54.73	S
583.14	3.086	1286.8	10.11	583.17	3.0771	0.0093******		R
727.66	0.540	1256.6	30.70	727.28	0.5515	-0.0113******		R
786.41	0.483	7613.5	38.64	786.46	0.0814	0.4016	46.47	S
861.45	0.475	1931.6	38.17	860.53	0.3153	0.1595113.89		R

AC228 911.10 0.2500 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR

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 209.37     1.612     1763.8 26.89      209.40   1.2296        0.3829120.07 R
 269.80     0.715     1222.5 49.78      270.30   0.7869       -0.0716******* R
 338.40     2.190     1412.7 15.02      338.40   2.0850        0.1050398.60 R
 461.79     0.944     2229.2 29.36      463.00   0.1696        0.3745 76.37 S
 511.00     0.338    13416.6 54.73      509.60   0.0340        0.4844 60.84 S
 727.66    -0.011     -242.2******      727.00   0.0627       -0.0740******* R
 794.41     0.755     2923.8 26.30      794.80   0.3473        0.4077 49.85 S
 911.18     1.816     1345.0 12.42      911.10   1.8160     <-reference peak->
 969.38     0.305      401.0 72.53      968.90   1.0221       -0.7174-35.52 R
1587.22     0.114     1162.8 59.64     1587.90   0.1332       -0.0190******* R
1630.14     0.119     2324.0 54.96     1630.40   0.0690        0.0503131.58 R

BI214/PB214 RATIO      9.13701E-01+/-     5.63%

WT PCT U235    1.82379 +/-    34.05%      DAUT
RGE SENT DATA FROM NP:17,67192275980 3.GTX          TO GSTOR 202
GLS WRITES THE FOLLOWING TO NP:C7,67 DYOCSVT01.DAT
 7090=GROUP          2=SAMPL        =ELM     GLS=TYP
    0=LRW            0=LRA        ARLI=LIBR
JLYKTL PARAMETERS
        JSLYKTL READ
GEODET
        Old Effs replaced (forced)
EFFICIENCY FILE NP:C25,4 0681 03MB0.EFF
        Effs fetched - 33.000    90
FETCH CAL LINE
        Cal line fetched270.284     1992
BKG FETCH ROUTINE GETS 80 FOR  271.862 1992 ERR=    0
SPANF
         FETCHING SPANF
WHOTR CALLED
        HDR WRITTEN IN
GSTFIL
        PKFIL UPDATED
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****
7090 2 GLS GSTOR 202
****

	PK	ENERGY	CPM	%ERR	COMMENT
	1	13.1	6.13	5.5	NO GEN.....
	2	16.5	5.09	13.4	.....
	3	76.1	9.69	10.4	.....
n	4	84.2	0.91	46.3	.....
	5	87.1	2.28	19.4	..... Cs136 Cd109 Ru155s
b	6	93.6	0.73	74.7	.....
b	7	186.1	1.54	33.0	..... Cs136 U 235s Ra226s
b	9	238.6	11.76	3.6	..... Th228s
n	16	463.8	0.37	76.4	Ra226 Ac228 .....
bn	17	511.0	0.48	60.8	Ac228 Th228 ..... La140 Ru106 Na 22
b	19	609.4	3.35	8.3	..... Ru103 Ra226s
n	21	786.4	0.40	46.5	Ra226 Th228 .....
n	22	794.4	0.41	49.8	Ac228 ..... Cs134s
b	24	911.2	1.82	12.4	Ac228 ..... Th232s
b	27	1460.9	10.80	3.3	..... K 40s
b	29	1592.8	0.12	73.0	Th228p .....
bn	31	1764.0	0.30	36.5	Ra226 .....
			REJECTED PEAKS		
N	8	209.4	0.38	99.9	Ac228 ..... Sb125
N	10	241.6	0.51	99.3	Th228 ..... La140 Ra226s
N	11	269.9	-0.07	99.9	Ac228 ..... Fe 59p
bN	12	295.1	0.09	99.9	Ra226 ..... Ru103 Ir192s
N	13	300.1	-0.09	99.9	Th228 .....
bN	14	338.4	0.11	99.9	Ac228 ..... Th232s
bN	15	352.0	0.46	99.9	..... Ra226s
bN	18	583.1	0.01	99.9	..... Th228s
bN	20	727.7	-0.07	99.9	Ac228 Th228 .....
bN	23	861.4	0.16	99.9	Th228 .....
bN	25	969.6	-0.72	99.9	Ac228 ..... Sb124 Th232s
bN	26	1120.3	0.09	99.9	Ra226 ..... Ta182s
bN	28	1587.2	-0.02	99.9	Ac228 .....
N	30	1630.1	0.01	99.9	Ac228 .....

0 06-1

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QC USED IN DATA REDUCTION OF SAMPLE 7090 2 GLS RUN AT 276.202/1992

BACKGROUND FOR GELI DETECTOR 3 ON 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0362	0.00	511.0	0.4246	8.15	1120.3	0.0145	0.00
92.0	0.1729	0.00	583.1	0.0616	50.94	1173.2	0.0260	11.94
143.0	0.0000	0.00	609.3	0.0383	52.52	1238.1	0.0649	0.00
186.0	0.1072	25.18	661.6	0.0313	25.25	1332.5	0.0294	0.00
198.0	0.0702	0.00	727.2	0.0453	0.00	1377.7	0.0000	0.00
238.6	0.2125	24.33	846.0	0.0446	0.00	1461.0	0.1479	6.09
279.0	0.0233	0.00	860.4	0.0601	0.00	1586.0	0.0000	0.00
295.2	0.0121	0.00	911.1	0.0604	45.23	1691.0	0.0253	0.00
338.4	0.0413	0.00	968.9	0.0329	31.39	1729.6	0.0079	0.00
351.9	0.0309	0.00	1001.0	0.0311	0.00	1764.5	0.0185	68.00

GELI STANDARD EFFICIENCY QC FOR DETECTOR G- 3 ON 10/ 2/92

HIGH RADIUM STANDARD					LOW RADIUM STANDARD				
GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES	GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
200.263	92	1.0181	3.671	10.	207.956	91	1.0116	4.340	10.
207.250	92	1.0471	2.102	12.	211.649	91	0.9872	4.182	11.
214.263	92	1.0348	4.038	10.	220.956	91	1.0360	4.214	11.
221.713	92	1.0483	2.529	23.	238.649	91	1.1746	4.813	18.
228.242	92	1.0460	2.636	15.	242.698	91	0.9701	3.651	13.
235.081	92	1.0402	2.983	11.	266.648	91	0.9629	4.714	12.
249.254	92	1.0386	1.813	10.	278.685	91	1.1581	3.814	10.
256.262	92	1.0776	3.382	14.	300.009	91	0.1835	7.688	10.
263.273	92	1.0496	3.979	11.	119.896	92	1.0178	4.468	11.
270.284	92	1.0403	2.644	10.	145.739	92	0.9856	4.773	27.
AVERAGE		1.0441	0.015		AVERAGE		0.9959	0.027	

CALIBRATION LINE FROM STANDARD FOR G- 3 OF 270.284 92
ENERGY = -9.799362 + 1.0000644*CH + 4.8400798-08*CH**2
FWHM = SQRT(0.9895 + 0.004564*ENERGY) (CHOP= 2.654)

EFFICIENCIES FOR GEOMETRY M83 CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	1.030*	110.0	3.060*	170.0	2.810*	400.0	1.210*	1200.0	0.407*
60.0	1.340*	120.0	3.120*	200.0	2.450*	500.0	0.975*	1500.0	0.325*
80.0	2.370*	130.0	3.120*	220.0	2.230*	600.0	0.810*	2000.0	0.245*
90.0	2.700*	140.0	3.100*	240.0	1.940*	800.0	0.610*	2500.0	0.197*
100.0	2.920*	150.0	3.050*	350.0	1.440*	1000.0	0.490*	3000.0	0.164*

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7090     GCS    3          G-S MB 276.202 92   100.68 MIN    967.09998 GR        204
LIBR=AKLJ   KEY TIME: 268.292 92
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GZ 10/2/92

SPECIAL ANALYSIS

PK-ENERGY-GAMMA KEV	BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG DECAY	DPM NOW	ERROR PCT	PCI/GRAM AT TZERO
K 40 4.602E+01 DAYS		LAMBDA= 1.506E-12		DECAY= 1.000E+00 1G		
1461 (1460.83)	0.110000	0.00353	11.783	3.036E+04 s	3.06%	1.414E+01
Cr 51 2.772E+01 DAYS		LAMBDA= 2.501E-02		DECAY= 8.205E-01 1G		
**** (320.03)	0.102000	0.01435	0.808	3.522E+02 s	<	3.135E-01
Mn 54 3.125E+02 DAYS		LAMBDA= 2.218E-03		DECAY= 9.826E-01 2G		
**** (834.83)	1.000000	0.00395	0.459	7.707E+01 s	<	3.653E-02
Co 58 7.130E+01 DAYS		LAMBDA= 9.722E-03		DECAY= 9.260E-01 4G		
**** (810.76)	0.990000	0.00612	0.392	6.467E+01 s	<	3.253E-02
Fe 59 4.460E+01 DAYS		LAMBDA= 1.554E-02		DECAY= 8.843E-01 6G		
**** (1099.22)	0.563000	0.00436	0.439	1.703E+02 s	<	8.972E-02
**** (1291.56)	0.432000	0.00393	0.340	2.001E+02 s	<	1.054E-01
Co 60 1.921E+03 DAYS		LAMBDA= 3.608E-04		DECAY= 9.972E-01 4G		
**** (1173.21)	0.999200	0.00429	0.547	1.270E+02 s	<	5.956E-02
**** (1332.48)	1.000000	0.00382	0.343	8.966E+01 s	<	4.188E-02
Zn 65 2.440E+02 DAYS		LAMBDA= 2.843E-03		DECAY= 9.778E-01 1G		
**** (1115.52)	0.507500	0.00430	0.466	2.039E+02 s	<	9.711E-02
Nb 94 7.414E+06 DAYS		LAMBDA= 9.349E-08		DECAY= 1.000E+00 3G		
**** (871.10)	1.000000	0.00572	0.445	7.788E+01 s	<	3.628E-02
**** (1573.70)	1.000000	0.00330	0.139	4.213E+01 s	<	1.962E-02
Ru106 3.670E+02 DAYS		LAMBDA= 1.889E-03		DECAY= 9.852E-01 41G		
511 (511.80)	0.205000	0.00929	0.763	4.005E+02	40.09%n	1.894E-01
**** (621.80)	0.097600	0.00774	0.479	6.344E+02 s	<n	2.999E-01
**** (1050.10)	0.014500	0.00477	0.403	5.821E+03 s	<n	2.752E+00
I 131 8.040E+00 DAYS		LAMBDA= 8.621E-02		DECAY= 5.036E-01 9G		
**** (364.50)	0.820000	0.01276	0.728	6.958E+01 s	<n	6.409E-02
Ba133 3.981E+03 DAYS		LAMBDA= 1.741E-04		DECAY= 9.936E-01 10G		
**** (276.30)	0.075000	0.01646	0.905	7.330E+02 s	<n	3.419E-01
**** (302.70)	0.196000	0.01512	0.871	2.940E+02 s	<n	1.371E-01
**** (356.90)	0.621000	0.01301	0.967	1.196E+02 s	<n	5.579E-02
**** (383.70)	0.094000	0.01222	0.718	6.254E+02 s	<n	2.917E-01
Cs134 7.531E+02 DAYS		LAMBDA= 9.204E-04		DECAY= 9.927E-01 9G		
**** (475.30)	0.015000	0.01000	0.332	3.684E+03 s	<	1.729E+00
**** (604.60)	0.980000	0.00794	0.653	8.387E+01 s	<	3.936E-02
**** (795.80)	0.880000	0.00623	0.484	8.832E+01 s	<	4.144E-02
1364 (1365.00)	0.034000	0.00374	1.311	1.031E+04	28.68%	4.836E+00
Cs137 1.102E+04 DAYS		LAMBDA= 6.290E-05		DECAY= 9.993E-01 3G		
**** (661.64)	0.850000	0.00732	0.496	7.958E+01 s	<	3.706E-02
Eu152 4.821E+03 DAYS		LAMBDA= 1.438E-04		DECAY= 9.989E-01 48G		

0 066

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****	(121.78)	0.254000	0.03046	1.384	1.789E+02	s	<n	8.341E-02
****	(344.31)	0.245000	0.01340	0.633	1.996E+02	s	<n	9.306E-02
****	(778.87)	0.120000	0.00635	0.440	5.781E+02	s	<n	2.696E-01
841	(841.33)	0.001000	0.00591	0.291	4.931E+04	60.56%		2.300E+01
****	(963.36)	0.132000	0.00509	0.469	6.862E+02	s	<	3.195E-01
****	(1112.04)	0.124000	0.00451	0.470	8.399E+02	s	<	3.916E-01
1408	(1408.02)	0.198000	0.00364	0.092	1.282E+02	s	82.36%n	5.979E-02

Eu154 3.103E+03 DAYS LAMBDA = 2.232E-04 DECAY = 9.982E-01 48G

****	(123.07)	0.390000	0.03043	1.407	1.186E+02	s	<n	5.538E-02
511	(511.20)	0.000600	0.00930	0.763	1.367E+05	40.09%n		6.378E+01
****	(723.26)	0.202000	0.00677	0.527	3.853E+02	s	<n	1.798E-01
****	(873.16)	0.117000	0.00570	0.463	6.973E+02	s	<n	3.254E-01
****	(1004.75)	0.170000	0.00498	0.414	4.888E+02	s	<n	2.281E-01
****	(1274.49)	0.336000	0.00398	0.404	3.024E+02	s	<n	1.411E-01

Eu155 1.812E+03 DAYS LAMBDA= 3.825E-04 DECAY= 9.970E-01 6G

87	(86.54)	0.320000	0.02343	0.590	7.874E+01	s77.40%		3.679E-02
****	(105.30)	0.200000	0.02944	1.330	2.268E+02	s	<	1.060E-01

Ta182 1.150E+02 DAYS LAMBDA= 6.027E-03 DECAY= 9.334E-01 33G

****	(67.80)	0.410000	0.01054	1.568	3.630E+02	s	<	1.773E-01
****	(100.10)	0.144000	0.02832	1.318	3.209E+02	s	<	1.568E-01
****	(1121.30)	0.358000	0.00448	0.615	3.839E+02	s	<r	1.875E-01
****	(1189.05)	0.166000	0.00424	0.509	7.232E+02	s	<	3.533E-01
****	(1221.40)	0.277000	0.00413	0.516	4.507E+02	s	<	2.202E-01
****	(1231.01)	0.117000	0.00410	0.488	1.016E+03	s	<	4.961E-01

Ra226 1.601E+03 DAYS LAMBDA= 1.180E-06 DECAY= 1.000E+00 48G

186	(186.10)	0.040000	0.02332	1.780	1.392E+03	s26.88%		8.814E-01
242	(242.00)	0.078000	0.01845	1.014	7.047E+02	s52.05%		3.283E-01
****	(351.96)	0.393000	0.01314	1.292	2.502E+02	s	<r	1.165E-01
609	(609.32)	0.484000	0.00789	3.770	9.874E+02	s 7.84%		4.599E-01
1408	(1408.00)	0.026000	0.00364	0.092	9.765E+02	82.36%n		4.548E-01

Th228 6.987E+02 DAYS LAMBDA= 9.921E-04 DECAY= 9.920E-01 31G

238	(238.62)	0.448000	0.01866	11.278	1.349E+03	s 4.31%		6.334E-01
242	(240.92)	0.022400	0.01862	1.014	2.446E+03	52.05%		1.148E+00
511	(510.69)	0.076600	0.00931	0.763	1.070E+03	40.09%n		5.021E-01
584	(583.17)	0.287000	0.00823	0.462	1.961E+02	s75.74%n		9.204E-02

Th232 3.113E+12 DAYS LAMBDA = 1.336E-13 DECAY = 1.000E+00 41G

****	(338.40)	0.104000	0.01362	1.025	7.239E+02	s	<r	3.372E-01
511	(509.60)	0.004200	0.00933	0.763	1.947E+04	40.09%n		9.067E+00
841	(840.20)	0.008600	0.00592	0.291	5.793E+03	60.56%		2.698E+00
911	(911.10)	0.230000	0.00547	1.992	1.455E+03	s11.91%		6.778E-01
****	(968.90)	0.150000	0.00516	0.661	8.549E+02	s	<r	3.982E-01

U 235 2.371E+11 DAYS LAMBDA = 2.696E-12 DECAY = 1.000E+00 34G

****	(143.78)	0.132600	0.02917	1.387	3.586E+02	s	<	1.670E-01
186	(185.72)	0.540000	0.02356	1.780	1.399E+02	s26.88%		6.517E-02
****	(205.31)	0.050000	0.02143	1.154	1.077E+03	s	<	5.017E-01
242	(240.93)	0.000700	0.01832	1.014	7.826E+04	52.05%		3.645E+01

C 067

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**********************************************************************
7090    GLS    3        G-5 MB 276.202 92   100.68 MIN    967.09998 GR        204
LIBR=ARL1   REF TIME= 268.292 92
**********************************************************************

**********************************************************************
* Group........................ 7090 * Time of count          276.202 1992 *
* Sample....................... 3 * Reference GMT........ 268.292 1992 *
* Element...................... * Elapsed Live Tm........... 100.6833 *
* Type code.................... GLS * Dead Time Pct............ 0.049636 *
* ID........................... B01927 * Background GMT....... 271.862 1992 *
* Geometry, detector........... MB-3 * Standard GMT......... 270.268 1992 *
* Aliquot...................... 967.1 * Days since T0............ 7.909698 *
* Unit of Aliquot.............. GRAM * Time on........... 21:30 PDT  1-OCT *
* Data Sheet Units............. PCI /GRAM * Time off.......... 23:31 PDT  1-OCT *
* Library...................... ARL1 * Calc Time.......... 09:02 02-OCT-92 *
**********************************************************************
* Slope....................... 1.004668 * Width slope............... 0.001914 *
* Intercept.................... -9.86072 * Width offset.............. 5.263624 *
* XAA2 TERM.......... 0.2186388076-07 * Sensitivity..................... 4. *
  NP:17,673204.68P                    32 PEAKS

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PK	IT	ENRG	LEFT	WD	BKGND	FWHM	AREA	CHAN	CPM	ERR	EFF	K	FIT
1	4	13.0	19	34	40	3.39	633	22.8	6.298+00	6.00	.013	0	3.75
2	4	16.6	19	34	241	4.07	819	26.3	8.141+00	7.70	.027	0	0.00
3	4	21.3	19	34	373	4.70	623	31.0	6.198+00	11.80	.038	0	0.00
4	4	27.7	19	34	1497	8.00	768	37.4	7.630+00	14.40	.127	0	0.00
5	0	75.9	80	12	1889	4.17	306	83.4	3.008+00	11.7	1.51	0	0.00
6	0	87.0	94	5	914	1.72	59	96.4	5.900-01	77.4	2.33	0	0.00
7	0	92.4	99	7	1080	2.02	222	101.7	2.218+00	23.9	2.63	0	0.00
8	0	185.6	193	8	668	2.59	198	194.6	1.971+00	24.2	2.36	0	0.00
9	0	208.7	213	7	502	2.62	113	217.6	1.138+00	34.4	2.11	0	0.00
10	3	238.5	243	12	431	2.26	1163	247.2	1.161+01	4.4	1.87	0	6.40
11	3	241.9	243	12	434	3.24	301	250.6	2.998+00	17.2	1.85	0	0.00
12	0	294.3	298	10	508	1.95	262	302.8	2.611+00	17.5	1.57	0	0.00
13	0	338.4	342	10	326	2.03	248	346.6	2.468+00	15.4	1.37	0	0.00
14	0	361.9	365	10	293	2.50	141	360.1	1.388+00	7.6	1.31	0	0.00
15	0	462.8	467	8	170	2.31	36	470.5	3.596-01	44.3	1.03	0	0.00
16	0	510.8	513	12	157	2.96	230	518.2	2.288+00	13.20	.933	0	0.00
17	0	583.6	587	11	148	2.67	373	590.7	3.718+00	8.60	.823	0	0.00
18	0	609.2	611	11	127	2.86	387	616.1	3.841+00	7.70	.791	0	0.00
19	0	726.7	730	9	105	2.79	31	733.1	3.038-01	39.90	.681	0	0.00
PK	IT	ENRG	LEFT	WD	BKGND	FWHM	AREA	CHAN	CPM	ERR	EFF	K	FIT
20	0	841.2	844	8	66	2.65	37	847.1	3.648-01	48.40	.593	0	0.00
21	0	911.4	913	9	83	2.75	205	917.0	2.041+00	11.60	.550	0	0.00
22	0	949.9	952	8	77	2.27	23	955.3	2.468-01	70.20	.528	0	0.00
23	0	969.0	968	12	119	2.94	123	974.2	1.230+00	20.50	.517	0	0.00
24	0	1120.2	1120	11	116	1.55	93	1124.8	9.198-01	25.20	.450	0	0.00
25	0	1363.8	1348	38	38	0.79	132	1367.2	1.310+00	28.70	.377	0	0.00
26	0	1408.1	1408	6	10	2.24	19	1411.3	1.868-01	40.70	.366	0	0.00
27	0	1460.9	1458	14	25	2.88	1191	1463.9	1.188+01	3.00	.354	0	0.00
28	0	1590.5	1587	15	13	4.96	39	1592.3	3.888-01	31.90	.329	0	0.00
29	0	1620.8	1618	12	12	0.93	6	1623.0	5.960-02	122.50	.324	0	0.00
30	0	1636.0	1629	20	413	.93	30	1638.2	2.948-01	39.00	.321	0	0.00
31	0	1681.7	1681	8	6	2.74	8	1683.7	7.590-02	71.70	.313	0	0.00
32	0	1763.8	1759	12	3	2.92	57	1765.3	5.688-01	15.40	.300	0	0.00

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**********************************************************************
BACKGROUND (NED 7090    GLS    3        276.202 92 G-5      BG DATE 271.862 92
**********************************************************************
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PEAK ENERGY	PEAK CPM	PEAK %ERROR	BACKGROUND ENERGY	BACKGROUND CPM	BACKGROUND %ERROR	NET CPM	NET %ERROR
92.37	2.2032	23.89	92.00	0.2324	0.00	1.9528	29.24
185.64	1.9707	24.24	186.00	0.1906	12.75	1.7801	26.88
238.60	11.3338	4.38	238.60	0.3762	17.96	11.2776	4.51
294.33	2.6050	17.45	295.20	0.0424	22.15	2.5626	17.74
338.38	2.4606	15.40	338.40	0.0650	0.00	2.3955	15.82
351.94	5.3778	7.58	351.90	0.0767	24.12	5.3011	7.70
510.73	2.2840	13.13	511.00	0.5050	6.26	1.7789	17.01
583.60	3.7058	8.59	583.10	0.0717	35.56	3.6341	8.79
609.17	3.8388	7.69	609.30	0.0691	18.23	3.7696	7.84
726.65	0.5032	39.92	727.20	0.0549	0.00	0.4483	44.81
911.43	2.0362	11.61	911.10	0.0447	41.41	1.9916	11.91
968.96	1.2262	20.46	968.90	0.0307	53.48	1.1955	21.03
1120.19	0.9188	25.16	1120.30	0.0173	40.08	0.9014	25.66
1460.89	11.8286	3.04	1460.80	0.0433	30.37	11.7853	3.06
1590.47	0.3883	31.88	1591.30	0.0262	0.00	0.3623	34.18
1763.79	0.5683	15.44	1764.50	0.0192	0.00	0.5491	15.97

0 PEAKS REJECTED BY BACKGROUND

****
INTERFERING ISOTOPE ANALYSIS 7090 GLS 3 276.202 92 G- 5
****

RA226 609.32 0.4840 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR	
241.91	2.994	2072.9	17.21	242.00	1.4228	1.5714	33.56	S
294.33	2.563	812.7	17.74	295.20	3.1059	-0.5434	-94.92	R
351.94	5.301	1026.3	7.70	351.96	5.0876	0.2134	267.32	R
462.85	0.559	24663.3	44.33	461.80	0.0223	0.5364	46.18	S
609.17	3.770	986.0	7.84	609.32	3.7696	<-reference peak->		
1120.19	0.901	1251.1	25.66	1120.30	0.7096	0.1917	124.07	R
1408.10	0.186	1956.6	40.69	1408.00	0.0938	0.0925	82.36	S
1763.79	0.549	1102.0	15.97	1764.50	0.4908	0.0583	164.28	R

TH228 238.62 0.4480 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR	
238.60	11.278	1343.1	4.51	238.62	11.2776	<-reference peak->		
241.91	1.573	3788.2	33.56	240.92	0.5572	1.0143	52.05	S
510.73	1.779	2490.2	17.01	510.69	0.9595	0.8194	37.30	S
583.60	3.634	1538.8	8.79	583.17	3.1720	0.4621	75.74	S
726.65	0.448	1035.5	44.81	727.28	0.5815	-0.1332	******	R
1620.78	0.060	1305.7	122.47	1620.70	0.0613	-0.0017	******	R

AC228 911.10 0.2500 CALC FROM REF PEAK

PEAK ENERGY	PEAK CPM	PEAK DPM	PEAK %ERROR	CALCULATED ENERGY	CALCULATED CPM	NET CPM	NET %ERROR	
208.72	1.145	1391.5	34.39	209.40	1.1922	-0.0469	******	R
338.38	2.396	1683.2	15.82	338.40	2.0614	0.3341	135.12	R
462.85	0.536	1302.4	46.18	463.00	0.5966	-0.0602	******	R
510.73	0.819	20919.3	37.30	509.60	0.0567	0.7627	40.09	S

C 063

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 726.60     0.133    2030.7XXXXXX        727.00  0.0680        0.2012XXXXXX R
 841.22     0.364    7229.1 48.37        840.20  0.0730        0.2914 60.56 S
 911.43     1.992    1448.5 33.93        911.10  1.9916    <-reference peak-> C
 968.96     1.193    1541.6 21.03        968.90  1.1232        0.0722394.17 R

BI214/PB214 RATIO      9.5974E-01+/-     2.42%

WT PCT U235    2.04391 +/-    28.00%      DAUT
RGF SENT DATA FROM NP:17,67192275980S.GTX          TO GSTOK 204
GLB WRITES THE FOLLOWING TO NP:C7,67JGY0C3VT01.DAT
 7090=GROUP          3=SAMPL        =ELM    GLS=TYP
    0=GRW            0=GRA       ARLI=LIBR
JLYKTL PARAMETERS
       JGLYKTL READ
GEODET
       Old Effs replaced (forced)
EFFICIENCY FILE NP:C25,4108LC0SMB0.EFF
       Effs fetched   33.000    90
FETCH CAL LINE
       Cal line fetched270.268     1992
BKG FETCH ROUTINE GETS 30 FOR  271.862 1992 ERR=    0
SPANF
        FETCHING SPANF
WHOTR CALLED
       HDR WRITTEN IN
GSTFIL
       PKFIL UPDATED
```

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****

7090 3 GLS GSTOR 204

****

	PK	ENERGY	CPM	%ERR	COMMENT
	1	13.0	6.29	6.0	NO GEN.
	2	16.6	8.14	7.7	
	3	21.3	6.19	11.8	
	4	27.7	7.63	14.4	
	5	75.9	8.00	11.7	
	6	87.0	0.59	77.4	Cs136 Cd109 Eu155s
b	7	92.4	1.96	29.2	
b	8	185.6	1.78	26.9	Cs137e U 235s Ra226s
b	10	238.5	11.28	4.5	Th228s
n	11	241.9	1.01	52.1	Th228 La140 Ra226s
bn	16	510.8	0.76	40.1	Ac228 Th228 La140 Ru106 Na 22
bn	17	583.6	0.46	75.7	Th228s
b	18	609.2	3.77	7.8	Ru103 Ra226s
n	20	841.2	0.29	60.6	Ac228
b	21	911.4	1.99	11.9	Ac228 Th232s
	22	949.9	0.25	70.2	La140
	~~25~~	~~1368.8~~	~~1.00~~	~~26.7~~	Cs134
n	26	1408.1	0.09	82.4	Ra226 Cs134 Eu152s
b	27	1460.9	11.79	3.1	K 40s
b	28	1590.5	0.36	34.2	NO GEN.
	30	~~1636.0~~	~~0.29~~	~~39.0~~	
	31	1681.7	0.08	71.7	
			REJECTED PEAKS		
N	9	208.7	0.05	99.9	Ac228 Sb125
bN	12	294.3	0.34	99.9	Ra226 Ru103
bN	13	338.4	0.33	99.9	Ac228 Th232s
bN	14	351.9	0.21	99.9	Ra226s
N	15	462.8	0.06	99.9	Ra226 Ac228 Sb125
bN	19	726.7	0.20	99.9	Ac228 Th228
bN	23	969.0	0.07	99.9	Ac228 Sb124 Th232s
bN	24	1120.2	0.19	99.9	Ra226 Ta182s
N	29	1620.8	0.00	99.9	Th228
bN	32	1763.8	0.06	99.9	Ra226

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QC USED IN DATA REDUCTION OF SAMPLE 7090 3 GLS RUN AT 276.202/1992

BACKGROUND FOR GELI DETECTOR 5 OF 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0000	0.00	511.0	0.3030	6.26	1120.3	0.0175	40.08
92.0	0.2624	0.00	583.1	0.0717	35.16	1173.2	0.0301	0.00
143.0	0.0000	0.00	609.3	0.0691	13.23	1238.1	0.0156	0.00
186.0	0.1906	12.75	661.6	0.0000	0.00	1332.5	0.0192	11.48
198.0	0.0421	0.00	727.2	0.0549	0.00	1377.7	0.0000	0.00
238.6	0.2762	17.96	846.0	0.0406	40.11	1460.8	0.0431	30.37
279.0	0.0000	0.00	860.4	0.0000	0.00	1586.0	0.0000	0.00
295.2	0.0424	22.15	911.1	0.0447	41.41	1591.3	0.0262	0.00
338.4	0.0650	0.00	968.9	0.0307	51.48	1729.6	0.0000	0.00
351.9	0.0767	24.12	1001.0	0.0153	0.00	1764.5	0.0192	0.00

GELI STANDARD EFFICIENCY QC FOR DETECTOR 6 - 5 ON 10/ 2/92

HIGH RADIUM STANDARD

GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
200.282	92	1.1256	4.870	11.
207.277	92	1.1196	2.597	11.
214.281	92	1.0699	3.689	11.
223.714	92	1.1280	3.072	12.
228.254	92	1.1208	5.412	11.
235.141	92	1.1367	3.034	10.
249.263	92	1.1248	3.215	10.
256.273	92	1.1268	3.828	13.
263.254	92	1.1184	3.638	21.
270.268	92	1.1224	2.290	11.
AVERAGE		1.1192	0.018	

LOW RADIUM STANDARD

GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
0.000	0	0.0000	0.000	0.
193.726	90	1.0656	17.337	63.
201.976	90	1.0026	7.798	28.
267.756	90	0.9958	17.344	100.
143.966	91	0.9928	3.560	34.
161.682	91	1.0972	1.613	19.
162.972	91	1.0583	1.586	16.
180.971	91	1.0568	2.669	22.
207.975	91	1.0647	2.084	11.
213.856	91	1.1437	10.869	44.
AVERAGE		1.0531	0.050	

CALIBRATION LINE FROM STANDARD FOR 6- 5 OF 270.268 92
ENERGY = -9.850716 + 1.0046678*CH + 2.1863816-08*CH**2
FWHM = SQRT(5.2635 + 0.00191(*ENERGY) ((CHO= 2.796)

EFFICIENCIES FOR GEOMETRY M85 CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	0.500*	110.0	3.000*	170.0	2.550*	400.0	1.180*	1200.0	0.420*
60.0	0.680*	120.0	3.050*	200.0	2.200*	500.0	0.950*	1500.0	0.345*
80.0	1.850*	130.0	3.000*	220.0	2.000*	600.0	0.800*	2000.0	0.265*
90.0	2.570*	140.0	2.950*	250.0	1.800*	800.0	0.620*	2500.0	0.215*
100.0	2.850*	150.0	2.850*	350.0	1.320*	1000.0	0.500*	3000.0	0.182*

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*****************************************************************************
7090     GLS    4          G-2 MB 276.644 92   103.75 MIN      1.00000 SM      220
LIBR=ANL1   REF TIME= 276.644 92
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Corr 10/2/92

SPECIAL ANALYSIS

PK-ENERGY-GAMMA KEV	BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG DECAY	DPM NOW	ERROR PCT	PCI/SMPL AT TZERO
K 40 4.602E+11 DAYS		LAMBDA= 1.506E-12		DECAY= 1.000E+00	1G	
**** (1460.85)	0.110000	0.00313	0.114	3.309E+02 s		< 1.491E+02
Cr 51 2.772E+01 DAYS		LAMBDA= 2.501E-02		DECAY= 1.000E+00	1G	
**** (320.03)	0.102000	0.01313	0.256	1.908E+02 s		< 8.596E+01
Mn 54 3.125E+02 DAYS		LAMBDA= 2.218E-03		DECAY= 1.000E+00	2G	
**** (834.83)	1.000000	0.00343	0.191	3.320E+01 s		< 1.586E+01
Co 58 7.130E+01 DAYS		LAMBDA= 9.722E-03		DECAY= 1.000E+00	4G	
**** (810.76)	0.990000	0.00338	0.196	3.350E+01 s		< 1.599E+01
Fe 59 4.460E+01 DAYS		LAMBDA= 1.554E-02		DECAY= 1.000E+00	6G	
**** (1099.22)	0.565000	0.00413	0.191	8.088E+01 s		< 3.643E+01
**** (1291.56)	0.432000	0.00356	0.124	8.066E+01 s		< 3.633E+01
Co 60 1.921E+03 DAYS		LAMBDA= 3.608E-04		DECAY= 1.000E+00	4G	
1173 (1173.21)	0.999200	0.00391	0.945	2.418E+02	±12.39%	1.089E+02
1332 (1332.48)	1.000000	0.00343	0.959	2.791E+02	±11.09%	1.257E+02
Zn 65 2.440E+02 DAYS		LAMBDA= 2.841E-03		DECAY= 1.000E+00	1G	
**** (1115.52)	0.507500	0.00412	0.114	5.450E+01 s		< 2.455E+01
Nb 94 7.414E+06 DAYS		LAMBDA= 9.349E-08		DECAY= 1.000E+00	3G	
**** (871.10)	1.000000	0.00323	0.257	4.913E+01 s		< 2.214E+01
**** (1573.70)	1.000000	0.00290	0.091	3.131E+01 s		< 1.410E+01
Ru106 3.670E+02 DAYS		LAMBDA= 1.889E-03		DECAY= 1.000E+00	41G	
**** (621.80)	0.097600	0.00715	0.208	2.981E+02 s		< 1.343E+02
662 (661.20)	0.000150	0.00673	1.147	1.136E+06	12.03%	3.116E+05
**** (1050.10)	0.014500	0.00438	0.217	3.414E+03 s		< 1.538E+03
I 131 8.040E+00 DAYS		LAMBDA= 8.621E-02		DECAY= 1.000E+00	9G	
**** (364.50)	0.820000	0.01182	0.267	2.754E+01 s		< 1.241E+01
Ba133 3.981E+03 DAYS		LAMBDA= 1.741E-04		DECAY= 1.000E+00	10G	
161 (160.60)	0.007600	0.02389	0.429	2.364E+03	31.72%	1.065E+03
**** (276.30)	0.073000	0.01500	0.288	2.558E+02 s		< 1.152E+02
**** (302.70)	0.196000	0.01381	0.265	9.801E+01 s		< 4.416E+01
**** (355.90)	0.621000	0.01204	0.307	4.111E+01 s		< 1.852E+01
**** (383.70)	0.094000	0.01136	0.272	2.549E+02 s		< 1.148E+02
Cs134 7.531E+02 DAYS		LAMBDA= 9.204E-04		DECAY= 1.000E+00	9G	
**** (475.30)	0.015000	0.00937	0.312	2.219E+03 s		< 9.990E+02
**** (604.60)	0.980000	0.00734	0.171	2.375E+01 s		1.070E+01
**** (795.80)	0.880000	0.00568	0.233	4.669E+01 s		< 2.103E+01
Cs137 1.102E+04 DAYS		LAMBDA= 6.290E-05		DECAY= 1.000E+00	3G	
662 (661.64)	0.850000	0.00673	1.147	2.003E+02	±12.05%	9.023E+01
Eu152 4.821E+03 DAYS		LAMBDA= 1.438E-04		DECAY= 1.000E+00	48G	

```
**** ( 121.78)    0.204000    0.02470        0.463   7.372E+01 s      <  3.320E+01
**** ( 344.31)    0.245000    0.01236        0.277   9.149E+01 s      <  4.121E+01
**** ( 778.87)    0.120000    0.00579        0.165   2.382E+02 s      <  1.073E+02
**** ( 963.36)    0.132000    0.00476        0.208   3.306E+02 s      <  1.489E+02
**** (1112.04)    0.124000    0.00413        0.171   3.344E+02 s      <  1.506E+02
**** (1408.02)    0.198000    0.00323        0.114   1.772E+02 s      <  7.981E+01

Eu154    3.101E+03 DAYS      LAMBDA= 2.232E-04      DECAY= 1.000E+00 48G
**** ( 123.07)    0.390000    0.02477        0.460   4.765E+01 s      <  2.146E+01
**** ( 723.26)    0.202000    0.00619        0.197   1.578E+02 s      <  7.109E+01
**** ( 873.16)    0.117000    0.00521        0.211   3.458E+02 s      <  1.558E+02
**** (1004.75)    0.170000    0.00458        0.229   2.946E+02 s      <  1.327E+02
**** (1274.49)    0.336000    0.00339        0.140   1.161E+02 s      <  5.229E+01

Eu155    1.812E+03 DAYS      LAMBDA= 3.826E-04      DECAY= 1.000E+00  6G
**** (  86.54)    0.320000    0.01810        0.383   6.646E+01 s      <  2.994E+01
**** ( 105.30)    0.200000    0.02310        0.419   9.074E+01 s      <  4.087E+01

Ta182    1.150E+02 DAYS      LAMBDA= 6.027E-03      DECAY= 1.000E+00 33G
**** (  67.80)    0.410000    0.01371        0.415   7.383E+01 s      <  3.326E+01
**** ( 100.10)    0.144000    0.02202        0.402   1.268E+02 s      <  5.713E+01
**** (1121.30)    0.358000    0.00410        0.165   1.128E+02 s      <  5.081E+01
**** (1189.05)    0.166000    0.00386        0.135   2.110E+02 s      <  9.503E+01
**** (1221.40)    0.277000    0.00375        0.135   1.300E+02 s      <  5.854E+01
**** (1231.01)    0.117000    0.00372        0.110   2.534E+02 s      <  1.142E+02

Ra226    5.851E+04 DAYS      LAMBDA= 1.185E-06      DECAY= 1.000E+00 48G
**** ( 186.10)    0.040000    0.02139        0.432   5.007E+02 s      <  2.255E+02
**** ( 242.00)    0.078000    0.01707        0.364   2.735E+02 s      <  1.232E+02
**** ( 351.96)    0.393000    0.01213        0.346   7.239E+01 s      <  3.261E+01
**** ( 609.32)    0.484000    0.00729        0.236   6.702E+01 s      <  3.019E+01

Th228    6.987E+02 DAYS      LAMBDA= 9.921E-04      DECAY= 1.000E+00 31G
**** ( 238.62)    0.448000    0.01731        0.390   5.034E+01 s      <  2.268E+01
**** ( 583.17)    0.287000    0.00762        0.234   1.070E+02 s      <  4.819E+01

Th232    5.133E+12 DAYS      LAMBDA= 1.356E-13      DECAY= 1.000E+00 41G
**** ( 338.40)    0.104000    0.01234        0.313   2.416E+02 s      <  1.088E+02
**** ( 911.10)    0.260000    0.00601        0.240   1.915E+02 s      <  8.628E+01
**** ( 968.90)    0.150000    0.00474        0.181   2.553E+02 s      <  1.150E+02
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9513554.1108

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*****************************************************************************
7090    GLS    4        G-2 M3 276.644 92   103.75 MIN      1.00000 SM      220
LIBR=ARLI   REF TIME: 276.644 92
*****************************************************************************

*****************************************************************************
* Group........................ 7090 * Time of count          276.644 1992 *
* Sample.......................... 4 * Reference GMT........ 276.644 1992 *
* Element.............................. * Elapsed Live Tm............ 103.75 *
* Type code....................... GLS * Dead Time Pct................... 0.0 *
* ID..................... BC 1.GS 9207 * Background GMT....... 271.862 1992 *
* Geometry, detector............ M3-2 * Standard GMT......... 270.256 1992 *
* Aliquot.......................... 1. * Days since T0................... 0.0 *
* Unit of Aliquot............... SMPL * Time on............ 8:27 PDT  2-OCT *
* Data Sheet Units.......... PCI /SMPL * Time off......... 10:11 PDT  2-OCT *
* Library....................... ARLI * Calc Time......... 10:50 02-OCT-92 *
*****************************************************************************
* Slope...................... 1.016337 * Width slope............... 0.002307 *
* Intercept................... -9.45828 * Width offset............. 2.280394 *
* XXX2 TERM.......... -0.360462308-07 * Sensitivity..................... 4. *
  NP:17,671220.GSP                    9 PEAKS

*****************************************************************************
 PK IT    ENRG LEFT WD BKGND FWHM    AREA    CHAN        CPM  ERR  EFF  K  FIT
  1  5    16.7   22 22   12 4.97     197    23.7  1.908+00  3.10.028  0  4.01
  2  5    30.0   22 22  136 4.97      54    38.8  5.160-01 41.80.163  0  0.00
  3  0   160.9  165  6   51 3.78      43   167.5  4.398-01 31.7 2.38  0  0.00
  4  0   239.4  241  9   73 1.76      37   244.8  3.600-01 46.0 1.72  0  0.00
  5  0   511.0  505 16   60 3.14      32   511.9  4.988-01 37.90.872  0  0.00
  6  0   661.7  660  9   23 1.76     122   660.1  1.171+00 11.80.681  0  0.00
  7  0  1173.1 1167 10   15 2.38     105  1163.0  1.018+00 11.30.392  0  0.00
  8  3  1328.7 1313 17    0 2.61      13  1316.1  1.230-01 37.60.347  0  0.74
  9  3  1332.5 1313 17    0 1.87     106  1319.8  1.038+00 10.30.346  0  0.00

*****************************************************************************
BACKGROUND (NED 7090    GLS    4        276.644 92 G- 2     BG DATE 271.862 92
*****************************************************************************

v--------PEAK---------v      v------BACKGROUND------v      v------NET-----v
ENERGY       CPM   %ERROR       ENERGY       CPM   %ERROR          CPM   %ERROR

 239.42    0.3332  45.98        238.60  0.1601  23.49          0.1931 85.90R
 511.00    0.4979  37.94        511.00  0.4374   6.93          0.0605316.33R
 661.72    1.1742  11.77        661.60  0.0270   0.00          1.1472 12.05
1173.07    1.0082  11.51       1173.20  0.0632  24.38          0.9450 12.39
1332.48    1.0233  10.30       1332.50  0.0667  18.43          0.9586 11.09
    2 PEAKS REJECTED BY BACKGROUND

*****************************************************************************
INTERFERING ISOTOPE ANALYSIS 7090    GLS    4        276.644 92 G- 2
*****************************************************************************
NONE FOUND

RGF SENT DATA FROM NP:17,671922764242.GTX          TO GSTOR 220
GLB WRITES THE FOLLOWING TO NP:17,671GY003VT01.DAT
 7090=GROUP          4=SAMPL        =ELM     GLS=TYP
    0=LRW            0=LRA        ARLI=LIBR
JLYKTL PARAMETERS
        JSLYKTL READ
GEODET
        Old Diffs replaced (forced)
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075

9513354.1109

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EFFICIENCY FILE NP:[23,1]BEL102MBO.EFF
        Effs fetched  33.000    90
FETCH CAL LINE
        Cal line fetched270.256     1992
BKG FETCH ROUTINE GETS 30 FOR  271.862 1992 CURR=    0
SPANF
         FETCHING SPANF
WHDTR CALLED
        HDR WRITTEN IN
GSTFIL
        PKFIL UPDATED
```

9513354.1110

QC USED IN DATA REDUCTION OF SAMPLE 7090 4 GLS RUN AT 276.644/1992

BACKGROUND FOR GELI DETECTOR 2 OF 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0889	0.00	511.0	0.4374	6.93	1120.3	0.0246	0.00
92.0	0.3080	0.00	583.1	0.0498	33.73	1173.2	0.0632	24.38
143.0	0.0255	0.00	609.3	0.0314	8.90	1238.1	0.0159	0.00
186.0	0.1788	18.68	661.6	0.0270	0.00	1332.5	0.0667	18.43
198.0	0.1275	0.00	727.2	0.0153	0.00	1377.7	0.0000	0.00
238.6	0.1601	23.49	846.0	0.0280	45.04	1461.0	0.0256	44.57
279.0	0.0384	0.00	860.4	0.0000	0.00	1586.0	0.0133	0.00
295.2	0.0211	0.00	911.1	0.0329	48.90	1591.0	0.0065	0.00
338.4	0.0371	72.53	968.9	0.0154	22.63	1729.6	0.0000	0.00
351.9	0.0649	16.63	1001.0	0.0294	0.00	1764.5	0.0237	0.00

GELI STANDARD EFFICIENCY QC FOR DETECTOR G- 2 ON 10/ 2/92

HIGH KADIUM STANDARD

GMT	YEAR	NORMALISED CPM	% ERROR	LENGTH IN MINUTES
200.271	92	1.0396	1.924	14.
207.266	92	1.0436	3.470	14.
209.920	92	1.0501	2.372	11.
214.273	92	1.0200	2.394	10.
228.232	92	1.0199	2.291	13.
235.133	92	1.0411	2.492	10.
249.236	92	1.0363	1.983	10.
256.250	92	1.0513	2.371	14.
263.208	92	1.0646	2.200	12.
270.256	92	1.0199	2.919	15.
AVERAGE		1.0427	0.015	

LOW KADIUM STANDARD

GMT	YEAR	NORMALISED CPM	% ERROR	LENGTH IN MINUTES
270.968	90	1.0095	4.335	17.
21.729	91	1.1688	8.879	26.
22.699	91	1.1454	8.427	17.
23.715	91	1.1388	9.086	14.
28.708	91	1.1368	8.059	20.
114.690	91	0.9794	2.007	23.
207.739	91	0.9624	2.203	12.
278.670	91	0.9748	1.107	19.
280.877	91	1.1327	2.091	17.
221.700	92	0.9750	2.072	16.
AVERAGE		1.0624	0.088	

CALIBRATION LINE FROM STANDARD FOR G- 2 OF 270.256 92
ENERGY = -9.433078 + 1.0170237*CH + -3.6036678-08*CH**2
FWHM = SQRT(2.2804 + 0.002308*ENERGY) (CHI2= 2.314)

EFFICIENCIES FOR GEOMETRY M02 CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	1.050*	110.0	2.380*	170.0	2.320*	400.0	1.100*	1200.0	0.382*
60.0	1.180*	120.0	2.460*	200.0	2.020*	500.0	0.890*	1500.0	0.305*
80.0	1.650*	130.0	2.500*	220.0	1.870*	600.0	0.740*	2000.0	0.228*
90.0	1.900*	140.0	2.490*	250.0	1.650*	800.0	0.560*	2500.0	0.182*
100.0	2.200*	150.0	2.450*	350.0	1.220*	1000.0	0.460*	3000.0	0.150*

0 077

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7090 4 GLS GSTOR 220

****

	PK	ENERGY	CPM	%ERR	COMMENT
	1	16.7	1.90	8.1	.....
	2	30.0	0.32	41.8	.....
	3	160.9	0.43	31.7	.....
b	6	661.7	1.15	12.1	..... Cs137s
b	7	1173.1	0.96	12.4	NO GEN..... Co1348 Co 60s
	8	1328.7	0.12	37.6	.....
b	9	1332.5	0.96	11.1	..... Co 60s
			REJECTED PEAKS		
B	4	239.4	0.20	85.9	..... Th228s
B	5	511.0	0.06	99.9	Ac228 Th228 ..... La140 Ru106 Na 22

0 078

9513354.1112

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7090    GLS   5        G-5 MB 276.621 92  107.12 MIN      1.00000 SM        219
LIBR=AKLI   REF TIME= 276.621 92
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(92) 10/2/92

SPECIAL ANALYSIS

PK-ENERGY KEV	GAMMA BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG DECAY	DPM NOW	ERROR PCT	PCI/SMPL AT TZERO
K 40 4.602E+11 DAYS		LAMBDA= 1.506E-12		DECAY= 1.000E+00		1G
**** (1460.83)	0.110000	0.00333	0.166	4.283E+02 s	<	1.929E+02
Cr 51 2.772E+01 DAYS		LAMBDA= 2.501E-02		DECAY= 1.000E+00		1G
**** (320.03)	0.102000	0.01435	0.268	1.831E+02 s	<	8.248E+01
Mn 54 3.125E+02 DAYS		LAMBDA= 2.218E-03		DECAY= 1.000E+00		2G
**** (834.83)	1.000000	0.00595	0.134	2.243E+01 s	<	1.011E+01
Co 58 7.130E+01 DAYS		LAMBDA= 9.722E-03		DECAY= 1.000E+00		4G
**** (810.76)	0.990000	0.00612	0.120	1.974E+01 s	<	8.892E+00
Fe 59 4.460E+01 DAYS		LAMBDA= 1.554E-02		DECAY= 1.000E+00		6G
**** (1099.22)	0.565000	0.00456	0.110	4.284E+01 s	<	1.930E+01
**** (1291.56)	0.432000	0.00393	0.111	6.512E+01 s	<	2.933E+01
Co 60 1.921E+03 DAYS		LAMBDA= 3.608E-04		DECAY= 1.000E+00		4G
**** (1173.21)	0.999200	0.00429	0.156	3.635E+01 s	<	1.638E+01
**** (1332.48)	1.000000	0.00382	0.123	3.210E+01 s	<	1.446E+01
Zn 65 2.440E+02 DAYS		LAMBDA= 2.841E-03		DECAY= 1.000E+00		1G
**** (1115.52)	0.507300	0.00430	0.120	5.238E+01 s	<	2.359E+01
Nb 94 7.414E+06 DAYS		LAMBDA= 9.349E-08		DECAY= 1.000E+00		3G
**** (871.10)	1.000000	0.00372	0.136	2.374E+01 s	<	1.069E+01
**** (1573.70)	1.000000	0.00330	0.110	3.342E+01 s	<	1.506E+01
Ru106 3.670E+02 DAYS		LAMBDA= 1.889E-03		DECAY= 1.000E+00		41G
**** (621.80)	0.097600	0.00774	0.166	2.200E+02 s	<	9.908E+01
**** (1050.10)	0.014500	0.00477	0.120	1.730E+03 s	<	7.792E+02
I 131 8.040E+00 DAYS		LAMBDA= 8.621E-02		DECAY= 1.000E+00		9G
**** (364.50)	0.820000	0.01276	0.260	2.489E+01 s	<	1.121E+01
Ba133 3.980E+03 DAYS		LAMBDA= 1.741E-04		DECAY= 1.000E+00		10G
**** (276.30)	0.073000	0.01646	0.306	2.479E+02 s	<	1.116E+02
**** (302.70)	0.196000	0.01512	0.268	9.033E+01 s	<	4.069E+01
**** (356.90)	0.621000	0.01301	0.260	3.212E+01 s	<	1.447E+01
**** (383.70)	0.094000	0.01222	0.225	1.961E+02 s	<	8.832E+01
Cs134 7.531E+02 DAYS		LAMBDA= 9.204E-04		DECAY= 1.000E+00		9G
**** (475.30)	0.015000	0.01000	0.194	1.294E+03 s	<	5.828E+02
**** (604.60)	0.980000	0.00794	0.203	2.610E+01 s	<	1.176E+01
**** (795.80)	0.880000	0.00623	0.138	2.525E+01 s	<	1.137E+01
Cs137 1.102E+04 DAYS		LAMBDA= 6.290E-05		DECAY= 1.000E+00		3G
**** (661.64)	0.851000	0.00732	0.166	2.667E+01 s	<	1.202E+01
Eu152 4.821E+03 DAYS		LAMBDA= 1.438E-04		DECAY= 1.000E+00		48G
**** (121.78)	0.254000	0.03046	0.378	4.886E+01 s	<	2.201E+01
**** (344.31)	0.243000	0.01340	0.230	6.993E+01 s	<	3.150E+01

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****	(778.87)	0.120000	0.00636	0.180	2.366E+02 s	< 1.066E+02
****	(963.36)	0.132000	0.00319	0.138	2.022E+02 s	< 9.107E+01
****	(1112.04)	0.124000	0.00450	0.107	1.910E+02 s	< 8.605E+01
****	(1408.02)	0.198000	0.00364	0.110	1.532E+02 s	< 6.900E+01

Eu154 3.105E+03 DAYS LAMBDA= 2.232E-04 DECAY= 1.000E+00 48G

****	(123.07)	0.390000	0.03041	0.384	3.238E+01 s	< 1.458E+01
****	(723.26)	0.202000	0.00677	0.166	1.214E+02 s	< 5.468E+01
****	(873.16)	0.117000	0.00370	0.107	1.601E+02 s	< 7.213E+01
****	(1004.75)	0.170000	0.00498	0.127	1.506E+02 s	< 6.783E+01
****	(1274.49)	0.336000	0.00398	0.096	7.193E+01 s	< 3.240E+01

Eu155 1.812E+03 DAYS LAMBDA= 3.826E-04 DECAY= 1.000E+00 6G

****	(86.54)	0.320000	0.02343	0.423	5.646E+01 s	< 2.543E+01
****	(105.30)	0.200000	0.02944	0.367	6.233E+01 s	< 2.807E+01

Ta182 1.150E+02 DAYS LAMBDA= 6.027E-03 DECAY= 1.000E+00 33G

****	(67.80)	0.410000	0.01054	0.450	1.044E+02 s	< 4.704E+01
****	(100.10)	0.144000	0.02832	0.340	8.289E+01 s	< 3.734E+01
****	(1121.30)	0.358000	0.00448	0.173	1.079E+02 s	< 4.861E+01
****	(1189.05)	0.166000	0.00424	0.134	2.197E+02 s	< 9.897E+01
****	(1221.40)	0.277000	0.00413	0.087	7.578E+01 s	< 3.414E+01
****	(1231.01)	0.117000	0.00410	0.107	2.227E+02 s	< 1.003E+02

Ra226 5.851E+04 DAYS LAMBDA= 1.185E-06 DECAY= 1.000E+00 48G

****	(186.10)	0.040000	0.02332	0.435	4.625E+02 s	<r 2.083E+02
****	(242.00)	0.078000	0.01845	0.356	2.477E+02 s	< 1.116E+02
****	(351.96)	0.393000	0.01314	0.273	5.320E+01 s	< 2.396E+01
****	(609.32)	0.484000	0.00789	0.249	6.522E+01 s	< 2.938E+01

Th228 6.987E+02 DAYS LAMBDA= 9.921E-04 DECAY= 1.000E+00 31G

****	(238.62)	0.448000	0.01866	0.379	4.540E+01 s	< 2.045E+01
****	(583.17)	0.287000	0.00821	0.243	1.032E+02 s	< 4.649E+01

Th232 5.113E+12 DAYS LAMBDA= 1.356E-13 DECAY= 1.000E+00 41G

****	(338.40)	0.104000	0.01362	0.293	2.068E+02 s	< 9.314E+01
****	(911.10)	0.260000	0.00547	0.164	1.323E+02 s	< 5.960E+01
****	(968.90)	0.130000	0.00316	0.116	1.505E+02 s	< 6.781E+01

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*****************************************************************************
7090    GLS    5        G-5 MB 276.621 92  107.12 MIN     1.00000 SM       219
LIBR=ARLI  REF TIME= 276.621 92
*****************************************************************************

*****************************************************************************
* Group........................ 7090 * Time of count          276.621 1992 *
* Sample....................... 5 * Reference GMT........ 276.621 1992 *
* Element.......................  * Elapsed Live Tm........... 107.1167 *
* Type code.................... GLS * Dead Time Pct.................... 0.0 *
* ID.................... RC BLANK 9208 * Background GMT....... 271.862 1992 *
* Geometry, detector........... MB-5 * Standard GMT......... 270.268 1992 *
* Aliquot...................... 1. * Days since TO.................... 0.0 *
* Unit of Aliquot.............. SMPL * Time on............ 7:54 PDT  2-OCT *
* Data Sheet Units..... PCI /SMPL * Time off........... 9:40 PDT  2-OCT *
* Library...................... ARLI * Calc Time......... 10:45 02-OCT-92 *
*****************************************************************************
* Slope...................... 1.004668 * Width slope............... 0.001914 *
* Intercept................... -9.86072 * Width offset.............. 5.263524 *
* XXX2 TERM.......... 0.2186380728-07 * Sensitivity..................... 4. *
  NP:17,673219.GEP                    6 PEAKS

*****************************************************************************
 PK  IT    ENRG  LEFT  WD  BKGND  FWHM    AREA    CHAN        CPM   ERR   EFF  K   FIT
  1   6    13.3    20  21    23  3.19     111    25.1  1.048+00 17.90.022   0  2.14
  2   6    22.5    20  23   136  6.11     117    32.2  1.091+00 28.50.069   0  0.00
  3   0    93.6    99   9    81  3.34      31   102.9  2.938-01 56.1 2.67   0  0.00
  4   0   186.7   191   8    59  1.99      32   194.6  3.011-01 48.8 2.36   0  0.00
  5   0   510.9   513   9    19  3.32      35   518.4  3.178-01 20.60.932   0  0.00
  6   0   643.9   643  17     012.01       3   650.7  2.891-01 35.50.756   0  0.00

*****************************************************************************
BACKGROUND INFO 7090    GLS    5        276.621 92 G- 5      BG DATE 271.862 92
*****************************************************************************

v---------PEAK----------v     v------BACKGROUND------v     v-------NET-----v
ENERGY       CPM   %ERROR       ENERGY       CPM   %ERROR        CPM   %ERROR

  93.58    0.2926  56.12        92.00   0.2524   0.00        0.0402408.08R
 185.63    0.3009  48.76       186.00   0.1906  12.73        0.1103134.86R
 510.95    0.5172  20.16       511.00   0.5050   6.26        0.0122909.40R
    3 PEAKS REJECTED BY BACKGROUND

*****************************************************************************
INTERFERING ISOTOPE ANALYSIS 7090    GLS    5        276.621 92 G- 5
*****************************************************************************
NONE FOUND

RGF SENT DATA FROM NP:L7,673922764045.GTX          TO GSTOR 219
GLB WRITES THE FOLLOWING TO NP:C7,67JGYOCSVT01.DAT
 7090=GROUP          5=SAMPL        =ELM     GLS=TYP
    0=LRW            0=LRA        ARLI=LIBR
JLYKTL PARAMETERS
       JELYKTL READ
GEODET
       Old Effs replaced (forced)
EFFICIENCY FILE NP:C25,41GELIOSMBO.EFF
       Effs fetched  33.000    90
FETCH CAL LINE
       Cal line fetched270.268     1992
BKG FETCH ROUTINE GETS BG FOR  271.862 1992 IERR=    0
```

2 081

9513354.1115

SPANF

FETCHING SPANF

WHDTR CALLED

HDR WRITTEN IN

GSTFIL

PKFIL UPDATED

0 082

9513354.1116

QC USED IN DATA REDUCTION OF SAMPLE 7090 5 GLS RUN AT 276.621/1992

BACKGROUND FOR GELI DETECTOR 3 OF 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0000	0.00	511.0	0.3030	6.26	1120.3	0.0175	40.08
92.0	0.2524	0.00	583.1	0.0717	35.55	1173.2	0.0301	0.00
143.0	0.0000	0.00	609.3	0.0691	18.23	1238.1	0.0156	0.00
186.0	0.1906	12.75	661.6	0.0000	0.00	1332.5	0.0192	11.48
198.0	0.0421	0.00	727.2	0.0549	0.00	1377.7	0.0000	0.00
238.6	0.2762	17.96	846.0	0.0406	40.11	1460.8	0.0431	30.37
279.0	0.0000	0.00	860.4	0.0000	0.00	1386.0	0.0000	0.00
295.2	0.0424	22.15	911.1	0.0447	41.41	1591.3	0.0262	0.00
338.4	0.0630	0.00	968.9	0.0307	31.48	1729.6	0.0000	0.00
351.9	0.0767	24.12	1001.0	0.0153	0.00	1764.5	0.0192	0.00

GELI STANDARD EFFICIENCY QC FOR DETECTOR G-3 ON 10/ 2/92

HIGH RADIUM STANDARD					LOW RADIUM STANDARD				
GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES	GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
200.282	92	1.1256	4.870	11.	0.000	0	0.0000	0.000	0.
207.277	92	1.1196	2.197	11.	193.726	90	1.0646	17.337	63.
214.281	92	1.0699	3.689	11.	201.976	90	1.0026	7.798	28.
223.714	92	1.1280	3.072	12.	267.716	90	0.9958	17.344	100.
228.254	92	1.1208	3.412	11.	143.966	91	0.9928	3.360	34.
235.141	92	1.1357	3.034	10.	161.682	91	1.0972	1.613	19.
249.263	92	1.1248	3.215	10.	162.972	91	1.0383	1.386	16.
256.273	92	1.1268	3.828	13.	180.971	91	1.0568	2.669	22.
263.254	92	1.1184	3.638	21.	207.973	91	1.0647	2.084	11.
270.268	92	1.1224	2.290	11.	213.856	91	1.1437	10.869	44.
AVERAGE		1.1192	0.018		AVERAGE		1.0331	0.050	

CALIBRATION LINE FROM STANDARD FOR G- 5 OF 270.268 92
ENERGY= -9.850716 + 1.0046678*CH + 2.186381E-08*CH**2
FWHM =SQRT(5.2635 + 0.001915*ENERGY) (CHSQ= 2.796)

EFFICIENCIES FOR GEOMETRY MBS CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	0.300*	110.0	3.000*	170.0	2.350*	400.0	1.180*	1200.0	0.420*
60.0	0.680*	120.0	3.050*	200.0	2.200*	500.0	0.950*	1500.0	0.345*
80.0	1.850*	130.0	3.000*	220.0	2.000*	600.0	0.800*	2000.0	0.265*
90.0	2.570*	140.0	2.950*	250.0	1.800*	800.0	0.620*	2500.0	0.215*
100.0	2.850*	150.0	2.850*	300.0	1.320*	1000.0	0.500*	3000.0	0.182*

9513354.1117

****

7090 5 GLS GSTOR 219

****

	PK	ENERGY	CPM	%ERR	COMMENT
	1	15.3	1.04	17.9	NO GEN.....
	2	22.3	1.09	28.3	.....
	6	~~640.9~~	~~0.29~~	~~98.5~~	..... I 131
			REJECTED PEAKS		
B	3	93.6	0.04	99.9	.....
B	4	183.7	0.11	99.9	..... Cs137c U 233s Ra226s
B	5	510.9	0.03	99.9	Ac228 Th228 ..... La140 Ru106 Na 22

0 084

9513354.1118

****
7090 GLS 6 G-1 JR 276.216 92 100.43 MIN 200.03999 GR 211
LIBR=ARLI REF TIME= 268.292 92
****

GRO 10/2/92

SPECIAL ANALYSIS

PK-ENERGY-GAMMA KEV	BRANCH FRAC	EFFICIENCY FRAC	CPM CORR CNTG DECAY	DPM NOW	ERROR PCT	PCI/GRAM AT TZERO
K 40 4.602E+11 DAYS		LAMBDA= 1.506E-12		DECAY= 1.000E+00	1G	
**** (1460.85)	0.110000	0.00353	0.274	7.054E+02 s	<r	1.588E+00
Cr 51 2.772E+01 DAYS		LAMBDA= 2.501E-02		DECAY= 8.203E-01	1G	
**** (320.03)	0.102000	0.01685	0.389	2.263E+02 s	<	6.213E-01
Mn 54 3.125E+02 DAYS		LAMBDA= 2.218E-03		DECAY= 9.826E-01	2G	
**** (834.83)	1.000000	0.00622	0.280	4.507E+01 s	<	1.033E-01
Co 58 7.130E+01 DAYS		LAMBDA= 9.722E-03		DECAY= 9.259E-01	4G	
**** (810.76)	0.990000	0.00641	0.194	3.055E+01 s	<	7.429E-02
Fe 59 4.460E+01 DAYS		LAMBDA= 1.554E-02		DECAY= 8.841E-01	6G	
**** (1099.22)	0.565000	0.00472	0.182	6.822E+01 s	<	1.738E-01
**** (1291.56)	0.432000	0.00400	0.214	1.237E+02 s	<	3.152E-01
Co 60 1.921E+03 DAYS		LAMBDA= 3.608E-04		DECAY= 9.971E-01	4G	
**** (1173.21)	0.999200	0.00442	0.206	4.653E+01 s	<	1.051E-01
**** (1332.48)	1.000000	0.00388	0.206	5.301E+01 s	<	1.197E-01
Zn 65 2.440E+02 DAYS		LAMBDA= 2.841E-03		DECAY= 9.777E-01	1G	
**** (1115.52)	0.507500	0.00465	0.204	8.621E+01 s	<	1.986E-01
Nb 94 7.414E+06 DAYS		LAMBDA= 9.349E-08		DECAY= 1.000E+00	3G	
**** (871.10)	1.000000	0.00596	0.204	3.415E+01 s	<	7.689E-02
**** (1573.70)	1.000000	0.00326	0.103	3.144E+01 s	<	7.079E-02
Ru106 3.670E+02 DAYS		LAMBDA= 1.889E-03		DECAY= 9.851E-01	41G	
**** (621.80)	0.097600	0.00848	0.252	3.050E+02 s	<	6.971E-01
**** (1050.10)	0.014500	0.00495	0.199	2.779E+03 s	<	6.352E+00
I 131 8.040E+00 DAYS		LAMBDA= 8.621E-02		DECAY= 5.050E-01	9G	
**** (364.50)	0.820000	0.01473	0.404	3.348E+01 s	<	1.493E-01
a133 3.981E+03 DAYS		LAMBDA= 1.741E-04		DECAY= 9.986E-01	10G	
*** (276.30)	0.075000	0.01951	0.434	2.969E+02 s	<	6.695E-01
** (302.70)	0.196000	0.01781	0.410	1.173E+02 s	<	2.646E-01
* ** (333.90)	0.621000	0.01512	0.414	4.405E+01 s	<	9.932E-02
* (383.70)	0.094000	0.01392	0.373	2.851E+02 s	<	6.430E-01
4 7.531E+02 DAYS		LAMBDA= 9.204E-04		DECAY= 9.927E-01	9G	
(475.30)	0.015000	0.01114	0.316	1.889E+03 s	<	4.286E+00
(604.60)	0.980000	0.00873	0.280	3.267E+01 s	<	7.411E-02
795.80)	0.880000	0.00654	0.266	4.633E+01 s	<	1.051E-01
1.102E+04 DAYS		LAMBDA= 6.290E-05		DECAY= 9.995E-01	3G	
661.64)	0.851000	0.00794	0.282	4.176E+01 s	<	9.408E-02
4.821E+03 DAYS		LAMBDA= 1.438E-04		DECAY= 9.989E-01	48G	
21.78)	0.254000	0.03943	0.566	5.649E+01 s	<	1.274E-01
4.31)	0.245000	0.01566	0.364	9.496E+01 s	<	2.141E-01

0.085

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**** ( 778.87)   0.120000   0.00668      0.271   3.379E+02 s      <  7.617E-01
**** ( 963.36)   0.132000   0.00540      0.247   3.474E+02 s      <  7.831E-01
**** (1112.04)   0.124000   0.00467      0.162   2.805E+02 s      <  6.322E-01
**** (1408.02)   0.198000   0.00366      0.128   1.761E+02 s      <  3.970E-01

Eu154   3.105E+03 DAYS     LAMBDA= 2.232E-04    DECAY= 9.982E-01 48G
**** ( 123.07)   0.390000   0.03923      0.603   3.943E+01 s      <  8.895E-02
**** ( 723.26)   0.202000   0.00723      0.248   1.700E+02 s      <  3.834E-01
**** ( 873.16)   0.117000   0.00593      0.236   3.386E+02 s      <  7.637E-01
**** (1004.75)   0.170000   0.00518      0.155   1.764E+02 s      <  3.980E-01
**** (1274.49)   0.336000   0.00406      0.162   1.185E+02 s      <  2.673E-01

Eu155   1.812E+03 DAYS     LAMBDA= 3.825E-04    DECAY= 9.970E-01  6G
**** (  86.54)   0.320000   0.04364      0.704   5.038E+01 s      <  1.138E-01
**** ( 105.30)   0.200000   0.04218      0.562   6.665E+01 s      <  1.505E-01

Ta182   1.150E+02 DAYS     LAMBDA= 6.027E-03    DECAY= 9.534E-01 33G
**** (  67.80)   0.410000   0.04383      0.756   4.205E+01 s      <  9.933E-02
**** ( 100.10)   0.144000   0.04279      0.624   1.012E+02 s      <  2.391E-01
**** (1121.30)   0.358000   0.00463      0.242   1.459E+02 s      <  3.445E-01
**** (1189.05)   0.166000   0.00436      0.152   2.101E+02 s      <  4.961E-01
**** (1221.40)   0.277000   0.00424      0.169   1.440E+02 s      <  3.400E-01
**** (1231.01)   0.117000   0.00421      0.220   4.468E+02 s      <  1.055E+00

Ra226   5.851E+05 DAYS     LAMBDA= 1.185E-06    DECAY= 1.000E+00 48G
 187 ( 186.10)   0.040000   0.02913      0.353   3.030E+02 s55.49%  6.822E-01
 243 ( 242.00)   0.078000   0.02236      0.540   3.098E+02 s36.48%  6.975E-01
**** ( 351.96)   0.393000   0.01531      0.411   6.830E+01 s      <  1.540E-01
 609 ( 609.32)   0.484000   0.00866      0.145   3.466E+01 s73.01%  7.804E-02

Th228   6.987E+02 DAYS     LAMBDA= 9.921E-04    DECAY= 9.922E-01 31G
 238 ( 238.62)   0.448000   0.02269      0.529   5.199E+01 s38.11%  1.180E-01
**** ( 583.17)   0.287000   0.00906      0.370   1.422E+02 s      <r 3.227E-01

Th232   5.113E+12 DAYS     LAMBDA= 1.356E-13    DECAY= 1.000E+00 41G
**** ( 338.40)   0.104000   0.01594      0.449   2.712E+02 s      <  6.106E-01
**** ( 911.10)   0.260000   0.00570      0.213   1.493E+02 s      <  3.363E-01
**** ( 968.90)   0.150000   0.00536      0.231   2.876E+02 s      <  6.475E-01

U 235   2.571E+11 DAYS     LAMBDA= 2.696E-12    DECAY= 1.000E+00 34G
**** ( 143.78)   0.132600   0.03373      0.541   1.142E+02 s      <  2.572E-01
 187 ( 185.72)   0.540000   0.02919      0.353   2.240E+01 s55.49%  5.044E-02
**** ( 205.31)   0.050000   0.02630      0.338   4.061E+02 s      <  9.145E-01
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9513354.1120

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*****************************************************************************
7090    GLS   6        G-1 JR 276.216 92  100.43 MIN   200.03999 GR       211
LIBR=ARLI  REF TIME= 268.292 92
*****************************************************************************

*****************************************************************************
* Group........................ 7090 * Time of count          276.216 1992 *
* Sample........................ 6 * Reference GMT........ 268.292 1992 *
* Element.......................  * Elapsed Live Tm........... 100.4333 *
* Type code..................... GLS * Dead Time Pct............ 0.132582 *
* ID........ E  QC 9209 REPLICATE #1 * Background GMT....... 271.862 1992 *
* Geometry, detector........... JR-1 * Standard GMT......... 276.207 1992 *
* Aliquot..................... 200.04 * Days since T0............ 7.923675 *
* Unit of Aliquot............... GRAM * Time on........... 22:11 PDT  1-OCT *
* Data Sheet Units......... PCI /GRAM * Time off.......... 23:51 PDT  1-OCT *
* Library...................... ARLI * Calc Time......... 09:12 02-OCT-92 *
*****************************************************************************
* Slope...................... 1.005637 * Width slope............... 0.004917 *
* Intercept.................. -9.60461 * Width offset............. 9.395522 *
* XXX2 TERM......... -0.217210148-07 * Sensitivity..................... 4. *
  NP:L7,67321J.GSP                    12 PEAKS

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PK	IT	ENRG	LEFT	WD	BKGND	FWHM	AREA	CHAN	CPM	ERR	EFF	K	FIT
1	0	17.3	19	27	330	7.48	548	26.8	3.468+00	9.20	0.031	0	0.00
2	0	63.9	69	8	155	3.03	43	73.1	4.281-01	55.0	4.38	0	0.00
3	0	92.3	98	8	147	2.23	37	101.3	3.698-01	42.7	4.33	0	0.00
4	0	186.6	192	8	83	1.85	59	195.1	6.856-01	32.2	2.91	0	0.00
5	5	238.3	241	13	86	3.14	72	246.6	7.188-01	27.3	2.28	0	0.63
6	5	242.8	241	15	71	3.00	54	251.0	5.401-01	36.5	2.23	0	0.00
7	0	350.2	353	11	53	1.89	32	357.8	3.178-01	32.2	1.54	0	0.00
8	0	511.0	514	14	61	1.89	37	517.7	3.641-01	51.5	1.04	0	0.00
9	0	583.7	588	7	20	1.95	24	590.0	2.418-01	39.30.908		0	0.00
10	0	609.4	611	10	25	1.91	23	615.6	2.271-01	44.90.868		0	0.00
11	0	1228.6	1228	8	10	2.66	7	1231.3	7.358-02	86.70.423		0	0.00
12	0	1460.9	1458	9	6	2.96	23	1462.3	2.311-01	28.60.354		0	0.00

```
*****************************************************************************
BACKGROUND INFO 7090    GLS   6        276.216 92 G- 1      BG DATE 271.862 92
*****************************************************************************
```

PEAK ENERGY	PEAK CPM	PEAK %ERROR	BACKGROUND ENERGY	BACKGROUND CPM	BACKGROUND %ERROR	NET CPM	NET %ERROR
63.93	0.4277	54.99	62.00	0.3167	0.00	0.1110211.98R	
92.32	0.3693	42.69	92.00	0.4643	0.00	0.1049231.77R	
186.64	0.5848	32.23	186.00	0.2318	23.17	0.3530	55.49
238.33	0.7178	27.48	238.60	0.1893	21.40	0.5285	38.11
350.23	0.3170	52.18	350.90	0.0649	10.33	0.2521	65.66
511.00	0.3643	51.32	511.00	0.4851	8.51	0.1208159.09R	
583.70	0.2405	39.25	583.10	0.0565	26.01	0.1840	51.93
609.43	0.2263	44.88	609.30	0.0813	37.16	0.1453	73.01
1460.89	0.2311	28.64	1461.00	0.1569	12.74	0.0741	93.27R

4 PEAKS REJECTED BY BACKGROUND

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*****************************************************************************
INTERFERING ISOTOPE ANALYSIS 7090    GLS   6        276.216 92 G- 1
*****************************************************************************
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TH228 238.62 0.4480 CALC FROM REF PEAK

0 087

9513354.1121

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v-----------PEAK-----------------v      v--CALCULATED--v      v-----NET--------v
ENERGY      CPM         CPM  %ERROR        ENERGY    CPM              CPM  %ERROR

 238.35     0.529       61.8 38.11         238.62  0.5288     <-reference peak->
 583.70     0.184       70.6 51.93         583.17  0.1350          0.0490221.26 R

WT PCT U238   8.74212 +/-    91.70%      DAUT
RGF SENT DATA FROM NP:C7,67192273994L.GTX          TO GSTOR 211
GLB WRITES THE FOLLOWING TO NP:L7,67JGYDCSVT01.DAT
 7090=GROUP          6=SAMPL       =ELM     GLS=TYP
    0=LKW            0:LKA       ARLJ:LJBR
JLYKTL PARAMETERS
       JELYKTL READ
GEODET
       Old Effs replaced (forced)
EFFICIENCY FILE NP:C25,4JGSLC01JR0.EFF
       Effs fetched  33.000    90
FETCH CAL LINE
       Cal line fetched276.20%     1992
BKG FETCH ROUTINE GETS BG FOR  271.862 1992 IERR=   0
SPANF
        FETCHING SPANF
WHDTR CALLED
       HDR WRITTEN IN
GSTFIL
       PKFIL UPDATED
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3 ONS

QC USED IN DATA REDUCTION OF SAMPLE 7090 6 GLS RUN AT 276.216/1992

BACKGROUND FOR GELI DETECTOR 1 OF 271.862/1992

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.3167	0.00	511.0	0.4851	8.51	1120.3	0.0197	27.46
92.0	0.4645	0.00	583.1	0.0565	26.01	1173.2	0.0229	17.05
143.0	0.0807	0.00	609.3	0.0813	37.16	1238.1	0.0171	0.00
186.0	0.2318	23.17	661.6	0.0283	0.00	1332.5	0.0253	46.97
198.0	0.0656	0.00	727.2	0.0363	0.00	1377.7	0.0272	0.00
238.6	0.1893	21.40	846.0	0.0639	0.00	1461.0	0.1569	12.74
279.0	0.0000	0.00	860.4	0.0114	0.00	1586.0	0.0000	0.00
295.2	0.0395	0.00	911.1	0.0730	39.29	1591.0	0.0301	0.00
338.4	0.0238	0.00	968.9	0.0290	0.00	1729.6	0.0105	0.00
351.9	0.0649	10.33	1001.0	0.0177	0.00	1764.5	0.0341	48.39

GELI STANDARD EFFICIENCY QC FOR DETECTOR G- 1 ON 10/ 2/92

HIGH RADIUM STANDARD

GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
214.257	92	1.0271	2.893	10.
221.700	92	1.0093	3.394	15.
224.010	92	1.0330	2.912	14.
226.272	92	1.0195	3.492	10.
228.717	92	1.0080	2.459	12.
235.071	92	1.0192	4.669	13.
255.061	92	1.0204	3.172	10.
263.709	92	1.0411	2.687	10.
270.276	92	1.0182	4.128	10.
276.207	92	1.0012	3.702	11.
AVERAGE		1.0197	0.012	

LOW RADIUM STANDARD

GMT	YEAR	NORMALIZED CPM	% ERROR	LENGTH IN MINUTES
304.620	91	0.9991	3.696	12.NG
305.693	93	1.0106	1.144	25.
361.231	91	0.9884	2.764	20.
22.693	92	0.9995	2.008	14.
121.680	92	0.9942	2.816	69.
157.845	92	0.9834	1.693	23.
236.820	92	1.0004	1.735	15.
240.879	92	0.9907	1.667	18.
247.724	92	0.9273	2.961	11.
256.250	92	0.9860	4.793	15.
AVERAGE		0.9952	0.009	

CALIBRATION LINE FROM STANDARD FOR G- 1 OF 276.207 92
ENERGY= -9.617734 + 1.0046108*CH + -2.1698848-08*CH**2
FWHM =SQRT(9.3955 + 0.004918*ENERGY) (C060= 3.994)

EFFICIENCIES FOR GEOMETRY JR1 CALIBRATED 33.000 1990

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	4.380*	110.0	4.130*	170.0	3.150*	400.0	1.330*	1200.0	0.432*
60.0	4.380*	120.0	3.970*	200.0	2.720*	500.0	1.060*	1500.0	0.343*
80.0	4.380*	130.0	3.820*	220.0	2.470*	600.0	0.880*	2000.0	0.255*
90.0	4.350*	140.0	3.650*	250.0	2.160*	800.0	0.650*	2500.0	0.202*
100.0	4.280*	150.0	3.450*	330.0	1.540*	1000.0	0.520*	3000.0	0.168*

9513354.1123

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*****************************************************************************
7090    6            GLS                                    GSTOR 211
*****************************************************************************

    PK   ENERGY     CPM  %ERR      COMMENT
     1    17.3    6.46   9.2 ..............................................
b    4   186.6    0.35  35.5 ............................ Cs136 U 235s Ra226s
b    5   238.3    0.53  38.1 ........................................ Th228s
     6   242.8    0.54  36.5 ................................... La140 Ra226s
b    7   350.2    0.26  65.7 ..............................................
b   10   609.4    0.13  73.0 ................................... Ru103 Ra226s
                   REJECTED PEAKS
B    2    63.9    0.11  99.9 ..............................................
B    3    92.3    0.10  99.9 ..............................................
B    8   511.0    0.12  99.9 Ac228 Th228 ................... La140 Ru106 Na 22
B   12  1460.9    0.07  93.3 ........................................ K  40s
bN   9   583.7    0.05  99.9 ........................................ Th228s
    11  1228.6    0.07  86.7 ..............................................
```

0 090

TC 9/30/92 9513354.1124

120

7090 - Soil

TMA #	CUST. ID	T°	Received Wts TG	TG	N	Done by	Ckd by	DRY W G
7090-1	B 01924	9-24-92	16.53	1296.05	1279.52	W.E.	TC 9/1/92	1295.90
2	B01926		16.47	1612.44	1595.97			1588.20
3	B01927		16.47	1579.39	1562.92			1557.27
4	LCS 9207							
5	Blank 9208							
6	Rep. # 1 9209	9-24-92						

T6000

Done by	Chkd by	DRY WTS G	DRY WTS N	GLS Aliquot	Done by	checkd by	Reviewed by	Wts. After sieve	
V.E.	TC 10/1/92	1295.90	1279.37	~~888.65~~ V.E. 949.65 MB	V.E. 10-1-92	TC 10/1/92	TC 10/1/92	1279.37	
		1588.20	1571.73	~~220.95~~ 948.60 MB				1022.88	
		1557.27	1540.80	~~215.50~~ 937.10 MB				1049.93	
				1.0 sample MB					
				1.0 sample MB					
				200.04 JR					

9513354.1126

7090 PLANCHET SUMMARY 7090

N209203 WHC Pc Mgr.... OPK Revd... 09/2

SAF #92-311 100-10-4 Calc. units..... PCI /Unit alg Min Pri

1	-- 268,292 92				B01924			
	Type GLS	MR	849.7	gram	≤ 0	≤ 0a	calc	
2	-- 268,292 92				B01926			
	Type GLS	MR	948.6	gram	≤ 0	≤ 0a	calc	
3	-- 268,292 92				B01927			
	Type GLS	MR	967.1	gram	≤ 0	≤ 0a	calc	
4	--				QC LCS 9207			
	Type GLS	MR	1.000	smpl	≤ 0	≤ 0a	calc	
5	--				QC BLANK 9208			
	Type GLS	MR	1.000	smpl	≤ 0	≤ 0a	calc	
6	-- 268,292 92				QC 9209 REPLICATE #1			
	Type GLS	JR	200.0	gram	≤ 0	≤ 0a	calc	

00093