

A4CM-ZR-0011
Revision A.

**AREA IV RADIOLOGICAL
CHARACTERIZATION SURVEY**

FINAL REPORT

Volume IV

**Santa Susana Field Laboratory
Rocketdyne Division
Rockwell International**

August 15, 1996

TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

July 12, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91303

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N5-04-097-6113 (re-analysis)

Dear Mr. Klein:

Enclosed is the data report for the Plutonium 238, 239/240 re-analysis for sample A4CM-95-0074. This sample was previously reported on June 14, 1995. The new report includes data for the sample and the associated quality control samples.

If you have any questions regarding this data, or any problems with the hard copy or electronic deliverable diskette, please call me at (510) 235-2633.

Sincerely,


Italy E. Pittman
Program Manager

Enclosures: Data Report N5-06-070-6113A (re-analysis)
Diskette

Case Narrative

July 12, 1995

1.0 GENERAL

TMA/Richmond Sample Delivery Group (SDG) 6113A consists of one soil sample received on April 27, 1995. This samples was re-analyzed for isotopic-Plutonium.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, blanks, and duplicates. The QC samples are prepared by the Quality Control Department.

The blanks and laboratory control samples are created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consists of the following:

NaHCO ₃	96 mg/L
CaSO ₄ ·2H ₂ O	60 mg/L
MgSO ₄	60 mg/L

KCl at 4.0 mg/L - specified in the table - is not added since KCl contains natural ⁴⁰K which raises the gross beta background.

2.1 Plutonium 238, 239/240 Analyses
6113A (Soil)

Sample prep batch 2781-110C list the sample along with the Laboratory Control Sample and reagent blank that were re-analyzed for isotopic plutonium. The LCS has a MDA greater than the RDL; however, this is not a problem since the activity of the LCS is significantly greater than the MDA. The average chemical yield for three samples was 50% ± 38%.

T M A / R I C H M O N D
REPORTING GROUP 6113

SDG 6113A
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

S U M M A R Y D A T A S E C T I O N

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Italy E. Pittman 7/12/95
Prepared by

202
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

SDG 6113A

act Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0074	SSFL AREA 4	SOIL		N506070-07			04/19/95
Method Blank		SOIL		N506070-28			
Lab Control Sample		SOIL		N506070-27			

SAMPLE SUMMARY

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SUMMARY DATA SECTION

Page 1

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

SDG 6113A

Contact Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL SAMPLE ID	DEPARTMENT SAMPLE ID
6113		A4CM-95-0074	SOIL	10.0			04/27/95 8	N506070-07	6113-007
		Method Blank	SOIL					N506070-28	6113-028
		Lab Control Sample	SOIL					N506070-27	6113-027

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.05

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

SDG 6113A

Contact Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR BATCH	2σ %	CLIENT MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	QUALI- FIERS
Alpha Spectroscopy											
PU	SOIL	Plutonium, Isotopic in Soil	2781-110C	5.0	1			1	1		

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

WORK SUMMARY

SDG 6113A

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED		SUF-									
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD				
A4CM-95-0074		N506070-07	6113-007	PU	A1	07/01/95	07/12/95	IEP	Plutonium, Isotopic in Soil				
SSFL AREA 4	SOIL	04/19/95											
		04/27/95											
Method Blank		N506070-28	6113-028	PU		07/03/95	07/12/95	IEP	Plutonium, Isotopic in Soil				
	SOIL												
Lab Control Sample		N506070-27	6113-027	PU		07/01/95	07/12/95	IEP	Plutonium, Isotopic in Soil				
	SOIL												

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
PU		Plutonium, Isotopic in Soil	HASL 300/PU-02	1			1	1			3
S				1			1	1			3

K SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

N506070-28

METHOD BLANK

Method Blank

SDG 6113A

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N506070-28

Client sample id Method Blank

Dept sample id 6113-028

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Plutonium 238	13981-16-3	-0.006	0.005	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.005	0.01	0.01	U	PU

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQUT	ANALYZED	REVIEWED	BY
N506070-28	PU	6113-028		3.00 g	07/03/95	07/12/95	IEP

QC-BLANK #24175

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 5

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

N506070-27

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6113A

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N506070-27

Dept sample id 6113-027

Client sample id Lab Control Sample

Material/Matrix SOIL

ANALYTE	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ADDED pCi/g	2 σ ERR pCi/g	REC %	3 σ LMTS (TOTAL)	PROTOCOL LIMITS
Plutonium 238	0.38	0.047	0.02	0.01		PU	0.347	0.014	110	77-123	
Plutonium 239/240	0.34	0.042	0.01	0.01		PU	0.309	0.012	110	77-123	

TEST	PLANCHET	SUF- FIX	ALIQUOT	PREP ERR 2 σ %	ANALYZED	REVIEWED	BY
PU	6113-027		3.00 g	5.0	07/01/95	07/12/95	IEP

QC-LCS #24174

CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 6

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

N506070-07

A4CM-95-0074

DATA SHEET

SDG 6113AContact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N506070-07Client sample id A4CM-95-0074Dept sample id 6113-007Location/Matrix SSFL AREA 4 SOILReceived 04/27/95Collected 04/19/95% moisture 10.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Plutonium 238	13981-16-3	-0.003	0.005	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.004	0.006	0.01	U	PU

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5070-07	PU	6113-007	A1	3.02 g	07/01/95	07/12/95	IEP

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 7

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6113

Test PU Matrix SOILSDG 6113AContact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Plutonium 238	Plutonium 239/240
------------------	------------------	-----------------	------------------	------------------	----------------------

Preparation batch 2781-110C

A4CM-95-0074	N506070-07	A1	6113-007	U	U
BLK (QC ID=24175)	N506070-28		6113-028	U	U
LCS (QC ID=24174)	N506070-27		6113-027	ok	ok

Nominal values and limits from method	RDLs (pCi/g)	0.01	0.01
---------------------------------------	--------------	------	------

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MAX MDA g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	--------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-110C 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 110

A4CM-95-0074	N506070-07	A1	0.01	3.02				72	1004				73	06/30/95	07/01	SS-027
BLK (QC ID=24175)	N506070-28		0.01	3.00				39	1123					06/30/95	07/03	SS-064
LCS (QC ID=24174)	N506070-27		0.02	3.00				39	1004					06/30/95	07/01	SS-036

Nominal values and limits from method	0.01	3.00	20-105	500	100	180
---------------------------------------	------	------	--------	-----	-----	-----

PROCEDURES	REFERENCE	HASL 300/PU-02
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.01	±	0.01
FOR 3 SAMPLES	YIELD	50	±	38

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

Page 8

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 07/12/95

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②

③

TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

July 12, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91303

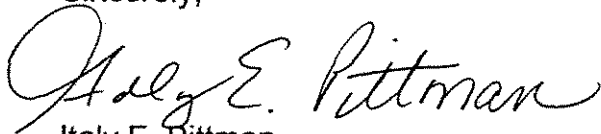
Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N5-05-062-6114
Report N5-05-063-6115

Dear Mr. Klein:

Enclosed is the data report of analyses for the twenty-two soil and one water samples collected between May 8 and 19, 1995. The samples were received at TMA/Richmond on May 25, 1995. The accompanying case narrative discusses all parameters underlined in the data report which are not in compliance with the Statement of Work.

If you have any questions regarding this data, or any problems with the hard copy or electronic deliverable diskette, please call me at (510) 235-2633.

Sincerely,



Italy E. Pittman
Program Manager

Enclosures: Data Report N5-05-062-6114 (rinsate)
Data Report N5-05-063-6115 (soil)
Diskette

DOCUMENT INVENTORY FOR SAMPLE DELIVERY GROUP 6114 AND 6115

SECTION 1	Case Narrative pages 2 - 5
SECTION 2	Summary Data Section pages 6 - 102
APPENDIX 1	Chains-of-Custody Copies pages 103 - 108

SECTION 1 Case Narrative

Case Narrative

July 12, 1995

1.0 GENERAL

TMA/Richmond Sample Delivery Group (SDG) 6114 consists of one liquid sample, and SDG 6115 consists of twenty-two soil samples. These samples were received on May 25, 1995.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, blanks, and duplicates. The QC samples are prepared by the Quality Control Department.

The blanks and laboratory control samples are created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consists of the following:

NaHCO ₃	96 mg/L
CaSO ₄ ·2H ₂ O	60 mg/L
MgSO ₄	60 mg/L

KCl at 4.0 mg/L - specified in the table - is not added since KCl contains natural ⁴⁰K which raises the gross beta background.

2.1 Tritium Analyses

6114 (Rinsate)

No problems were associated with the samples during the analyses.

6115 (Soil)

In changing the reporting format of the tritium results to pCi/volume water extracted the following underlines are noted: the aliquot for the tritium samples are below the minimum required; this is due to the relatively small percent moisture present in the samples. The Minimum Detectable Activity (MDA) is therefore greater than the Required Detection Limit (RDL) because of the small aliquot size. The report list the result units as pCi/g which is incorrect. The data reported is actually for pCi/L values. We are working to change the mechanisms of our reporting software to be able to include multiple units per sample matrix where applicable.

Case Narrative

July 12, 1995

2.2 Strontium-90 Analyses

6114 (Rinsate)

No problems were associated with the samples during the analyses. The average yield for 3 samples was $88\% \pm 9\%$.

6115 (Soil)

Two samples, A4CM-95-0102 and A4CM-95-0103, were counted for less than the 200 minute nominal count time; however, the MDAs were below the RDL despite the shorter count time. The average yield for 25 samples was $90\% \pm 9\%$.

2.3 Thorium 228, 230, 232 Analyses

6114 (Rinsate)

No problems were associated with the samples during the analyses. The average yield for 3 samples was $75\% \pm 19\%$.

6115 (Soil)

All of the samples were aliquoted twice for thorium analyses because of matrix problems encountered during chemistry preparation. Sample A4CM-95-0114 was aliquoted twice and has a MDA slightly greater than the RDL, and a chemical yield slightly lower than the nominal 20% required. The reagent blanks have a result for Th230 greater than the MDA, but only one was slightly greater than the RDL. The average yield for 27 samples was $53\% \pm 20\%$.

2.4 Uranium 233/234, 235, 238 Analyses

6114 (Rinsate)

The reagent blank has a result for U238 greater than the MDA, but less than the RDL. No other problems were associated with the samples during the analyses. The average yield for 3 samples was $67\% \pm 2\%$.

6115 (Soil)

The LCS has an MDA greater than the RDL; however, this is not a problem since the activity the LCS is significantly greater than the MDA. The average yield for 25 samples was $64\% \pm 19\%$.

Case Narrative

July 12, 1995

2.5 Plutonium 238, 239/240 Analyses

6114 (Rinsate)

No problems were associated with the analyses. The average yield for 3 samples was $38\% \pm 15\%$.

6115 (Soil)

No problems were associated with the analyses. The average yield for 25 samples was $74\% \pm 25\%$.

2.6 Gamma Spectroscopy Analyses

6114 (Rinsate)

No problems were associated with the samples during the analyses.

6115 (Soil)

All samples have an aliquot less than the 850 g nominal required, and several have count times less than the nominal 700 minutes required; however, despite the smaller aliquot and shorter count times, all of the MDA's were less than or equal to the RDL.

SECTION 2 Summary Data Section

REPORTING GROUP 6114

Contact Italy E. Pittman

Contract R44PJZ94034044

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pared by

Reviewed by

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

SDG 6114

act Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0100	SSFL AREA 4	WATER		N505062-01			05/08/95
A4CM-95-0101	SSFL AREA 4	WATER		N505062-02			05/08/95
Method Blank		WATER		N505062-04			
Lab Control Sample		WATER		N505062-03			

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 1

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

SDG 6114

act Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
6114		A4CM-95-0100	WATER				05/24/95 16	N505062-01	6114-001
		A4CM-95-0101	WATER				05/24/95 16	N505062-02	6114-002
		Method Blank	WATER					N505062-04	6114-004
		Lab Control Sample	WATER					N505062-03	6114-003

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

SDG 6114

act Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED						QUALI-	
			BATCH	2σ ±	CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	FIERS
Alpha Spectroscopy												
PU	WATER	Plutonium, Isotopic in Water	2781-126	5.0	1			1	1			
TH	WATER	Thorium, Isotopic in Water	2781-126	5.0	1			1	1			
U	WATER	Uranium, Isotopic in Water	2781-126	5.0	1			1	1			
Beta Counting												
SR	WATER	Strontium, Total in Water	2781-126	10.0	1			1	1			
Gamma Scan												
GAM	WATER	Gamma Emitters	2781-126	15.0	1			1	1			
Liquid Scintillation												
H	WATER	Tritium in Water	2781-126	10.0	1			1	1			X

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

SDG 6114

act Italy E. Pittman

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED		TEST	SUF-					
CUSTODY	SAS no	RECEIVED	PLANCHET		FIX	ANALYZED	REVIEWED	BY	METHOD	
A4CM-95-0100		N505062-01	6114-001	H		06/14/95	07/07/95	IEP	Tritium in Water	
SSFL AREA 4	WATER	05/08/95								
		05/24/95								
A4CM-95-0101		N505062-02	6114-002	GAM		07/07/95	07/12/95	IEP	Gamma Emitters	
SSFL AREA 4	WATER	05/08/95	6114-002	PU		06/21/95	07/07/95	IEP	Plutonium, Isotopic in Water	
		05/24/95	6114-002	SR		06/17/95	07/07/95	IEP	Strontium, Total in Water	
			6114-002	TH		06/23/95	07/07/95	IEP	Thorium, Isotopic in Water	
			6114-002	U		06/21/95	07/07/95	IEP	Uranium, Isotopic in Water	
Method Blank		N505062-04	6114-004	GAM		07/07/95	07/12/95	IEP	Gamma Emitters	
	WATER		6114-004	H		06/14/95	07/07/95	IEP	Tritium in Water	
			6114-004	PU		06/21/95	07/07/95	IEP	Plutonium, Isotopic in Water	
			6114-004	SR		06/17/95	07/07/95	IEP	Strontium, Total in Water	
			6114-004	TH		06/23/95	07/07/95	IEP	Thorium, Isotopic in Water	
			6114-004	U		06/21/95	07/07/95	IEP	Uranium, Isotopic in Water	
Lab Control Sample		N505062-03	6114-003	GAM		06/07/95	07/12/95	IEP	Gamma Emitters	
	WATER		6114-003	H		06/14/95	07/07/95	IEP	Tritium in Water	
			6114-003	PU		06/21/95	07/07/95	IEP	Plutonium, Isotopic in Water	
			6114-003	SR		06/17/95	07/07/95	IEP	Strontium, Total in Water	
			6114-003	TH		06/23/95	07/07/95	IEP	Thorium, Isotopic in Water	
			6114-003	U		06/21/95	07/07/95	IEP	Uranium, Isotopic in Water	

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Emitters	ASTM 3649-85; EPA 901.1	1			1	1		3
H		Tritium in Water	EPA 906.0; ASTM 2476-81	1			1	1		3
PU		Plutonium, Isotopic in Water	ASTM 3865-90	1			1	1		3
SR		Strontium, Total in Water	HASL 300/SR-01,-02	1			1	1		3
TH		Thorium, Isotopic in Water		1			1	1		3
U		Uranium, Isotopic in Water	ASTM 3972-90	1			1	1		3
TOTALS				6			6	6		18

WORK SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

N505062-04

Method Blank

METHOD BLANK

SDG 6114

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505062-04Client sample id Method BlankDept sample id 6114-004Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-95	160	300	500	U	H
Strontium 90	10098-97-2	-0.037	0.20	0.2	0.5	U	SR
Thorium 228		0.046	0.070	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.035	0.046	0.06	0.5	U	TH
Thorium 232	7740-29-1	-0.006	0.012	0.04	0.5	U	TH
Uranium 233/234	11-08-5	0.076	0.094	0.1	0.5	U	U
Uranium 235	14117-96-1	0.034	0.046	0.09	0.5	U	U
Uranium 238	7440-61-1	0.10	0.076	0.07	0.5	J	U
Plutonium 238	13981-16-3	0	0.032	0.07	0.1	U	PU
Plutonium 239/240	10-12-8	-0.005	0.021	0.05	0.1	U	PU
IA SCAN ANALYTES		U					
Potassium 40		U		100		U	GAM
Chromium 51		U		30		U	GAM
Manganese 54		U		5		U	GAM
Cobalt 58		U		4		U	GAM
Iron 59		U		8		U	GAM
Cobalt 60		U		5		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		5		U	GAM
Ruthenium 103		U		4		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		5		U	GAM
Cesium 134		U		6		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		10		U	GAM
Europium 154		U		7		U	GAM
Europium 155		U		10		U	GAM
Radium 226		U		9		U	GAM
Thorium 232		U		20		U	GAM

METHOD BLANKS

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

N505062-04

Method Blank

BLANK, cont.

SDG 6114

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505062-04

Client sample id Method Blank

Dept sample id 6114-004

Material/Matrix WATER

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505062-04	H	6114-004		0.0100 L	06/14/95	07/07/95	IEP
N505062-04	SR	6114-004		1.00 L	06/17/95	07/07/95	IEP
N505062-04	TH	6114-004		0.500 L	06/23/95	07/07/95	IEP
N505062-04	U	6114-004		0.200 L	06/21/95	07/07/95	IEP
N505062-04	PU	6114-004		0.500 L	06/21/95	07/07/95	IEP
N505062-04	GAM	6114-004		1.00 L	07/07/95	07/12/95	IEP

QC-BLANK #24010

METHOD BLANKS

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

N505062-03

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6114

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N505062-03

Client sample id Lab Control Sample

Dept sample id 6114-003

Material/Matrix WATER

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	11000	460	300	500	X	H	9980	400	110	80-120	
Strontium 90	19	0.40	0.2	0.5		SR	19.5	0.78	97	84-116	
Thorium 230	4.1	0.32	0.04	0.5		TH	3.94	0.16	104	84-116	
Uranium 233/234	20	1.2	0.5	0.5		U	19.4	0.78	103	86-114	
Uranium 235	15	0.98	0.08	0.5		U	14.8	0.59	101	86-114	
Uranium 238	18	1.1	0.5	0.5		U	19.4	0.78	93	87-113	
Plutonium 238	2.3	0.27	0.09	0.1		PU	2.08	0.083	111	78-122	
Plutonium 239/240	2.1	0.25	0.06	0.1		PU	1.85	0.074	114	77-123	
GAMMA SCAN ANALYTES											
Potassium 40	U		100		U	GAM					
Uranium 51	U		60		U	GAM					
Manganese 54	U		7		U	GAM					
Cobalt 58	U		6		U	GAM					
Iron 59	U		10		U	GAM					
Cobalt 60	U		8		U	GAM					
Zinc 65	U		20		U	GAM					
Niobium 94	U		8		U	GAM					
Ruthenium 103	U		8		U	GAM					
Ruthenium 106	U		80		U	GAM					
Tin 113	U		10		U	GAM					
Cesium 134	U		9		U	GAM					
Cesium 137	290	17		5		GAM	317		91	78-122	
Cerium 144	U		40		U	GAM					
Europium 152	U		20		U	GAM					
Europium 154	U		10		U	GAM					
Europium 155	U		20		U	GAM					
Radium 226	U		20		U	GAM					
Thorium 232	U		30		U	GAM					

LAB CONTROL SAMPLES

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

N505062-03

Lab Control Sample

LAB CONTROL SAMPLE, cont.

SDG 6114Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505062-03Client sample id Lab Control SampleDept sample id 6114-003Material/Matrix WATER

TEST	PLANCHET	SUF-		ALIQOT	PREP ERR			REVIEWED	BY
		FIX			2σ %	ANALYZED			
H	6114-003			0.0100 L	10.0	06/14/95	07/07/95	IEP	
SR	6114-003			1.00 L	10.0	06/17/95	07/07/95	IEP	
TH	6114-003			0.500 L	5.0	06/23/95	07/07/95	IEP	
U	6114-003			0.200 L	5.0	06/21/95	07/07/95	IEP	
PU	6114-003			0.500 L	5.0	06/21/95	07/07/95	IEP	
GAM	6114-003			1.00 L	15.0	06/07/95	07/12/95	IEP	

QC-LCS #24009

TMA/RICHMOND

REPORTING GROUP 6114

N505062-01

DATA SHEET

A4CM-95-0100

SDG 6114Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505062-01Client sample id A4CM-95-0100Dept sample id 6114-001Location/Matrix SSFL AREA 4 WATERReceived 05/24/95Collected 05/08/95

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		44	170	300	500	U	H

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505062-01	H	6114-001		0.0100 L	06/14/95	07/07/95	IEP

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
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TMA/RICHMOND

REPORTING GROUP 6114

N505062-02

DATA SHEET

A4CM-95-0101

SDG 6114

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505062-02Client sample id A4CM-95-0101Dept sample id 6114-002Location/Matrix SSFL AREA 4WATERReceived 05/24/95Collected 05/08/95

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Strontium 90	10098-97-2	-0.026	0.13	0.1	0.5	U	SR
Thorium 228		0.011	0.054	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.027	0.043	0.05	0.5	U	TH
Thorium 232	7740-29-1	-0.011	0.011	0.04	0.5	U	TH
Uranium 233/234	11-08-5	0.009	0.073	0.1	0.5	U	U
Uranium 235	14117-96-1	-0.033	0.022	0.08	0.5	U	U
Uranium 238	7440-61-1	0.027	0.036	0.07	0.5	U	U
Plutonium 238	13981-16-3	0	0.045	0.09	0.1	U	PU
Plutonium 239/240	10-12-8	0.022	0.030	0.06	0.1	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		U		40		U	GAM
Chromium 51		U		90		U	GAM
Manganese 54		U		4		U	GAM
Cobalt 58		U		5		U	GAM
Iron 59		U		20		U	GAM
Cobalt 60		U		5		U	GAM
Zinc 65		U		9		U	GAM
Niobium 94		U		4		U	GAM
Ruthenium 103		U		8		U	GAM
Ruthenium 106		U		30		U	GAM
Tin 113		U		5		U	GAM
Cesium 134		U		4		U	GAM
Cesium 137		U		4	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		7		U	GAM
Europium 154		U		5		U	GAM
Europium 155		U		9		U	GAM
Radium 226		U		6		U	GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

N505062-02

A4CM-95-0101

DATA SHEET, cont

SDG 6114
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N505062-02
Dept sample id 6114-002
Received 05/24/95Client sample id A4CM-95-0101
Location/Matrix SSFL AREA 4 WATER
Collected 05/08/95
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Thorium 232		U		10		U	GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOUT	ANALYZED	REVIEWED	BY
N505062-02	SR	6114-002		1.00 L	06/17/95	07/07/95	IEP
062-02	TH	6114-002		0.500 L	06/23/95	07/07/95	IEP
05062-02	U	6114-002		0.200 L	06/21/95	07/07/95	IEP
N505062-02	PU	6114-002		0.500 L	06/21/95	07/07/95	IEP
N505062-02	GAM	6114-002		1.00 L	07/07/95	07/12/95	IEP

DATA SHEETS

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Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
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TMA/RICHMOND

REPORTING GROUP 6114

Test PU Matrix WATERSDG 6114Contact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Plutonium 238	Plutonium 239/240
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Preparation batch 2781-126

A4CM-95-0101	N505062-02	6114-002	U	U
BLK (QC ID=24010)	N505062-04	6114-004	U	U
LCS (QC ID=24009)	N505062-03	6114-003	ok	ok

Nominal values and limits from method	RDLs (pCi/L)	0.1	0.1
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-126 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 104

A4CM-95-0101	N505062-02	0.09	0.500	30	1026	44	06/21/95	06/21	SS-048
BLK (QC ID=24010)	N505062-04	0.07	0.500	44	1026	06/21/95	06/21	SS-050	
LCS (QC ID=24009)	N505062-03	0.09	0.500	41	1026	06/21/95	06/21	SS-049	

Nominal values and limits from method	0.1	0.500	20-105	1000	100	180
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PROCEDURES	REFERENCE	ASTM 3865-90
EP-040	Environmental Water Dissolution, rev 1	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.08 ± 0.02
FOR 3 SAMPLES	YIELD	38 ± 15

METHOD SUMMARIES

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Lab id	TMAN
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TMA/RICHMOND

REPORTING GROUP 6114

Test TH Matrix WATER

SDG 6114

Contact Italy E. Pittman

METHOD SUMMARY

THORIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
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Preparation batch 2781-126

A4CM-95-0101	N505062-02	6114-002	U	U	U
BLK (QC ID=24010)	N505062-04	6114-004	U	U	U
LCS (QC ID=24009)	N505062-03	6114-003		ok	

Nominal values and limits from method	RDLs (pCi/L)	0.5	0.5	0.5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MAX MDA L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-126 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 104

A4CM-95-0101	N505062-02	0.1	0.500		72	571		46	06/21/95	06/23	SS-027
BLK (QC ID=24010)	N505062-04	0.1	0.500		67	571		06/21/95	06/23	SS-032	
LCS (QC ID=24009)	N505062-03	0.04	0.500		85	571		06/21/95	06/23	SS-029	

Nominal values and limits from method	0.5	0.500	20-110	500	100	180
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PROCEDURES	EP-040	Environmental Water Dissolution, rev 1
	EP-900	Thorium Purification, rev 0
	EP-008	Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	0.08 ± 0.07
FOR 3 SAMPLES	YIELD	75 ± 19

MOD SUMMARIES

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Lab id	TMAN
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TMA/RICHMOND

REPORTING GROUP 6114

Test U Matrix WATERSDG 6114Contact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
			PLANCHET				1+3	2σ	2+3	2σ
Preparation batch 2781-126										
A4CM-95-0101	N505062-02		6114-002	U	U	U				
BLK (QC ID=24010)	N505062-04		6114-004	U	U	0.10 J				
LCS (QC ID=24009)	N505062-03		6114-003	ok	ok	ok				
Nominal values and limits from method				RDLs (pCi/L)	0.5	0.5	0.5	100	4	
							Averages			

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-126 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 104																
A4CM-95-0101	N505062-02			0.1	0.200			66	910				44	06/20/95	06/21	SS-035
BLK (QC ID=24010)	N505062-04			0.1	0.200			67	910					06/20/95	06/21	SS-037
L (QC ID=24009)	N505062-03			0.5	0.200			68	910					06/20/95	06/21	SS-036
Nominal values and limits from method				0.5	0.200			30-105	300	100		180				

PROCEDURES	REFERENCE	ASTM 3972-90
EP-040	Environmental Water Dissolution, rev 1	
EP-910	Uranium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.2	±	0.5
FOR 3 SAMPLES	YIELD	67	±	2

METHOD SUMMARIES

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TMA/RICHMOND

REPORTING GROUP 6114

METHOD SUMMARY

STRONTIUM, TOTAL IN WATER

BETA COUNTING

Test SR Matrix WATER

SDG 6114

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Strontium 90
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Preparation batch 2781-126

A4CM-95-0101	N505062-02	6114-002	U
BLK (QC ID=24010)	N505062-04	6114-004	U
LCS (QC ID=24009)	N505062-03	6114-003	ok

Nominal values and limits from method	RDLs (pCi/L)	0.5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-126 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 104

A4CM-95-0101	N505062-02	0.1	1.00	93	725	40	06/17/95	06/17	LBG-003
BLK (QC ID=24010)	N505062-04	0.2	1.00	85	725	06/17/95	06/17	LBG-015	
LCS (QC ID=24009)	N505062-03	0.2	1.00	85	725	06/17/95	06/17	LBG-004	

Nominal values and limits from method	0.5	1.00	200	180
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PROCEDURES	REFERENCE	HASL 300/SR-01,-02
EP-040	Environmental Water Dissolution, rev 1	
EP-500	Strontium-89,90 - Purification, rev 0	
EP-519	Strontium-89,90 Planchet Demounting and Yttrium Purification, rev 0	

AVERAGES ± 2 SD	MDA	0.2	±	0.1
FOR 3 SAMPLES	YIELD	88	±	9

MOD SUMMARIES

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TMA/RICHMOND

REPORTING GROUP 6114

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Test GAM Matrix WATERSDG 6114Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cobalt 60	Cesium 137
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Preparation batch 2781-126

A4CM-95-0101	N505062-02	6114-002	U	U
BLK (QC ID=24010)	N505062-04	6114-004	U	U
LCS (QC ID=24009)	N505062-03	6114-003	No data U	ok

Nominal values and limits from method	RDLs (pCi/L)	5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-126 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 104

A4CM-95-0101	N505062-02	4	1.00					1673		60			07/07/95	01,02,00
BLK (QC ID=24010)	N505062-04	5	1.00					1000					07/07/95	01,03,00
LCS (QC ID=24009)	N505062-03		1.00					401					06/07/95	MB,03,00

Nominal values and limits from method	5	1.00	400	180
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PROCEDURES	REFERENCE	ASTM 3649-85; EPA 901.1
	EP-100	Ge(Li) Preparation for Environmental Samples, rev 0

AVERAGES ± 2 SD	MDA	4	±	1
FOR 2 SAMPLES	YIELD		±	

METHOD SUMMARIES

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Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	07/12/95

TMA/RICHMOND

REPORTING GROUP 6114

METHOD SUMMARY

TRITIUM IN WATER
LIQUID SCINTILLATION

Test H Matrix WATER

SDG 6114

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-126

A4CM-95-0100	N505062-01	6114-001	U
BLK (QC ID=24010)	N505062-04	6114-004	U
LCS (QC ID=24009)	N505062-03	6114-003	ok X

Nominal values and limits from method RDLs (pCi/L) 500

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA L	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
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Preparation batch 2781-126 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 104

A4CM-95-0100	N505062-01	300	0.0100	50	37	06/12/95	06/14	LSC-004
BLK (QC ID=24010)	N505062-04	300	0.0100	50		06/12/95	06/14	LSC-004
LCS (QC ID=24009)	N505062-03	300	0.0100	50		06/12/95	06/14	LSC-004

Nominal values and limits from method 500 0.0100 50 180

PROCEDURES	REFERENCE	EPA 906.0; ASTM 2476-81
	EP-210	Tritium in Water by Distillation, rev 0

AVERAGES ± 2 SD	MDA 300 ± 0
FOR 3 SAMPLES	YIELD ±

METHOD SUMMARIES

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Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	07/12/95

T M A / R I C H M O N D
REPORTING GROUP 6115

SDG 6115
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

S U M M A R Y D A T A S E C T I O N

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Italy E. Pittman 7/12/95
Prepared by

mgv
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0097	SSFL AREA 4	SOIL		N505063-01			05/08/95
A4CM-95-0098	SSFL AREA 4	SOIL		N505063-02			05/08/95
A4CM-95-0099	SSFL AREA 4	SOIL		N505063-03			05/08/95
A4CM-95-0102	SSFL AREA 4	SOIL		N505063-04			05/08/95
A4CM-95-0103	SSFL AREA 4	SOIL		N505063-05			05/08/95
A4CM-95-0104	SSFL AREA 4	SOIL		N505063-06			05/09/95
A4CM-95-0105	SSFL AREA 4	SOIL		N505063-07			05/09/95
A4CM-95-0106	SSFL AREA 4	SOIL		N505063-08			05/09/95
A4CM-95-0107	SSFL AREA 4	SOIL		N505063-09			05/09/95
A4CM-95-0108	SSFL AREA 4	SOIL		N505063-10			05/09/95
A4CM-95-0109	SSFL AREA 4	SOIL		N505063-11			05/10/95
A4CM-95-0110	SSFL AREA 4	SOIL		N505063-12			05/10/95
A4CM-95-0111	SSFL AREA 4	SOIL		N505063-13			05/10/95
A4CM-95-0112	SSFL AREA 4	SOIL		N505063-14			05/10/95
A4CM-95-0113	SSFL AREA 4	SOIL		N505063-15			05/11/95
A4CM-95-0114	SSFL AREA 4	SOIL		N505063-16			05/11/95
A4CM-95-0115	SSFL AREA 4	SOIL		N505063-17			05/11/95
A4CM-95-0116	SSFL AREA 4	SOIL		N505063-18			05/11/95
A4CM-95-0117	SSFL AREA 4	SOIL		N505063-19			05/11/95
A4CM-95-0118	SSFL AREA 4	SOIL		N505063-20			05/19/95
A4CM-95-0119	SSFL AREA 4	SOIL		N505063-21			05/19/95
A4CM-95-0120	SSFL AREA 4	SOIL		N505063-22			05/19/95
Method Blank		SOIL		N505063-24			
Method Blank		SOIL		N505063-27			
Method Blank		SOIL		N505063-30			
Lab Control Sample		SOIL		N505063-23			
Lab Control Sample		SOIL		N505063-26			
Lab Control Sample		SOIL		N505063-29			
Duplicate (N505063-02)	SSFL AREA 4	SOIL		N505063-25			05/08/95
Duplicate (N505063-02)	SSFL AREA 4	SOIL		N505063-28			05/08/95

SAMPLE SUMMARY

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Lab id TMAN

Protocol ROCKETDYNE

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Form DVD-CS

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY		MATRIX	† MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE		LAB SAMPLE ID	DEPARTMENT SAMPLE ID
		CLIENT SAMPLE ID					RECEIVED	COLL		
6115		A4CM-95-0097	SOIL	5.9			05/24/95	16	N505063-01	6115-001
		A4CM-95-0098	SOIL	3.5			05/24/95	16	N505063-02	6115-002
		A4CM-95-0099	SOIL	6.3			05/24/95	16	N505063-03	6115-003
		A4CM-95-0102	SOIL	10.3			05/24/95	16	N505063-04	6115-004
		A4CM-95-0103	SOIL	10.7			05/24/95	16	N505063-05	6115-005
		A4CM-95-0104	SOIL	3.6			05/24/95	15	N505063-06	6115-006
		A4CM-95-0105	SOIL	4.8			05/24/95	15	N505063-07	6115-007
		A4CM-95-0106	SOIL	2.2			05/24/95	15	N505063-08	6115-008
		A4CM-95-0107	SOIL	1.3			05/24/95	15	N505063-09	6115-009
		A4CM-95-0108	SOIL	5.8			05/24/95	15	N505063-10	6115-010
		A4CM-95-0109	SOIL	4.8			05/24/95	14	N505063-11	6115-011
		A4CM-95-0110	SOIL	4.3			05/24/95	14	N505063-12	6115-012
		A4CM-95-0111	SOIL	6.5			05/24/95	14	N505063-13	6115-013
		A4CM-95-0112	SOIL	15.1			05/24/95	14	N505063-14	6115-014
		A4CM-95-0113	SOIL	3.2			05/24/95	13	N505063-15	6115-015
		A4CM-95-0114	SOIL	3.7			05/24/95	13	N505063-16	6115-016
		A4CM-95-0115	SOIL	5.6			05/24/95	13	N505063-17	6115-017
		A4CM-95-0116	SOIL	7.0			05/24/95	13	N505063-18	6115-018
		A4CM-95-0117	SOIL	6.3			05/24/95	13	N505063-19	6115-019
		A4CM-95-0118	SOIL	11.6			05/24/95	5	N505063-20	6115-020
		A4CM-95-0119	SOIL	13.5			05/24/95	5	N505063-21	6115-021
		A4CM-95-0120	SOIL	10.9			05/24/95	5	N505063-22	6115-022
		Method Blank	SOIL						N505063-24	6115-024
		Method Blank	SOIL						N505063-27	6115-027
		Method Blank	SOIL						N505063-30	6115-030
		Lab Control Sample	SOIL						N505063-23	6115-023
		Lab Control Sample	SOIL						N505063-26	6115-026
		Lab Control Sample	SOIL						N505063-29	6115-029
		Duplicate (N505063-02)	SOIL				05/24/95	16	N505063-25	6115-025
		Duplicate (N505063-02)	SOIL				05/24/95	16	N505063-28	6115-028

QC SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED					QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG
Alpha Spectroscopy											
PU	SOIL	Plutonium, Isotopic in Soil	2781-132	5.0	22			1	1	1/1	
TH	SOIL	Thorium, Isotopic in Soil	2781-132	5.0	21			1	1	1/1	
			2781-132A	5.0	1			1	1		
U	SOIL	Uranium, Isotopic in Soil	2781-132	5.0	22			1	1	1/1	
Beta Counting											
SR	SOIL	Strontium, Total in Soil	2781-132	10.0	22			1	1	1/1	
Gamma Spectroscopy											
GAM	SOIL	Gamma Scan	2781-132	15.0	22			1	1	1/1	
Liquid Scintillation											
H	SOIL	Tritium-Soil	2781-132	10.0	22			1	1	1/1	X

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

Contact Italy E. Pittman

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID													
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	SUF-	ANALYZED	REVIEWED	BY	METHOD						
CUSTODY	SAS no	RECEIVED			FIX										
A4CM-95-0097		N505063-01	6115-001	GAM		06/21/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/08/95	6115-001	H		06/17/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-001	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-001	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-001	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-001	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0098		N505063-02	6115-002	GAM		06/27/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/08/95	6115-002	H		06/17/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-002	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-002	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-002	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-002	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0099		N505063-03	6115-003	GAM		06/21/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/08/95	6115-003	H		06/17/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-003	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-003	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-003	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-003	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0102		N505063-04	6115-004	GAM		06/22/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/08/95	6115-004	H		06/17/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-004	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-004	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-004	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-004	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0103		N505063-05	6115-005	GAM		06/22/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/08/95	6115-005	H		06/17/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-005	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-005	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-005	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-005	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil						

WORK SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED			SUP-								
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD				
A4CM-95-0104		N505063-06	6115-006	GAM		06/22/95	07/11/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	05/09/95	6115-006	H		06/18/95	07/05/95	IEP	Tritium-Soil				
		05/24/95	6115-006	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil				
			6115-006	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil				
			6115-006	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil				
			6115-006	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0105		N505063-07	6115-007	GAM		06/22/95	07/11/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	05/09/95	6115-007	H		06/18/95	07/05/95	IEP	Tritium-Soil				
		05/24/95	6115-007	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil				
			6115-007	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil				
			6115-007	TH	A1	07/05/95	07/05/95	IEP	Thorium, Isotopic in Soil				
			6115-007	U		07/01/95	07/05/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0106		N505063-08	6115-008	GAM		06/22/95	07/11/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	05/09/95	6115-008	H		06/18/95	07/05/95	IEP	Tritium-Soil				
		05/24/95	6115-008	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil				
			6115-008	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil				
			6115-008	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil				
			6115-008	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0107		N505063-09	6115-009	GAM		06/22/95	07/11/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	05/09/95	6115-009	H		06/18/95	07/05/95	IEP	Tritium-Soil				
		05/24/95	6115-009	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil				
			6115-009	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil				
			6115-009	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil				
			6115-009	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0108		N505063-10	6115-010	GAM		06/23/95	07/11/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	05/09/95	6115-010	H		06/18/95	07/05/95	IEP	Tritium-Soil				
		05/24/95	6115-010	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil				
			6115-010	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil				
			6115-010	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil				
			6115-010	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil				

WORK SUMMARY

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Lab id TMAN
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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID													
LOCATION	MATRIX	COLLECTED		SUF-											
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD						
A4CM-95-0109		N505063-11	6115-011	GAM		06/23/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/10/95	6115-011	H		06/18/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-011	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-011	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-011	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-011	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0110		N505063-12	6115-012	GAM		06/27/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/10/95	6115-012	H		06/18/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-012	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-012	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-012	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-012	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0111		N505063-13	6115-013	GAM		06/23/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/10/95	6115-013	H		06/18/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-013	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-013	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-013	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-013	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0112		N505063-14	6115-014	GAM		06/26/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/10/95	6115-014	H		06/18/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-014	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-014	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-014	TH	A1	07/05/95	07/07/95	IEP	Thorium, Isotopic in Soil						
			6115-014	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0113		N505063-15	6115-015	GAM		06/23/95	07/11/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	05/11/95	6115-015	H		06/18/95	07/05/95	IEP	Tritium-Soil						
		05/24/95	6115-015	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil						
			6115-015	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil						
			6115-015	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil						
			6115-015	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil						

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REPORTING GROUP 6115

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tact Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID			SUF-				
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD
CUSTODY	SAS no	RECEIVED							
A4CM-95-0114		N505063-16	6115-016	GAM		06/23/95	07/11/95	IEP	Gamma Scan
SSFL AREA 4	SOIL	05/11/95	6115-016	H		06/18/95	07/05/95	IEP	Tritium-Soil
		05/24/95	6115-016	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil
			6115-016	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil
			6115-016	TH	A2	07/08/95	07/10/95	IEP	Thorium, Isotopic in Soil
			6115-016	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil
A4CM-95-0115		N505063-17	6115-017	GAM		06/23/95	07/11/95	IEP	Gamma Scan
SSFL AREA 4	SOIL	05/11/95	6115-017	H		06/18/95	07/05/95	IEP	Tritium-Soil
		05/24/95	6115-017	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil
			6115-017	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil
			6115-017	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil
			6115-017	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil
A4CM-95-0116		N505063-18	6115-018	GAM		06/23/95	07/11/95	IEP	Gamma Scan
SSFL AREA 4	SOIL	05/11/95	6115-018	H		06/18/95	07/05/95	IEP	Tritium-Soil
		05/24/95	6115-018	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil
			6115-018	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil
			6115-018	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil
			6115-018	U		07/05/95	07/10/95	IEP	Uranium, Isotopic in Soil
A4CM-95-0117		N505063-19	6115-019	GAM		06/23/95	07/11/95	IEP	Gamma Scan
SSFL AREA 4	SOIL	05/11/95	6115-019	H		06/18/95	07/05/95	IEP	Tritium-Soil
		05/24/95	6115-019	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil
			6115-019	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil
			6115-019	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil
			6115-019	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil
A4CM-95-0118		N505063-20	6115-020	GAM		06/24/95	07/11/95	IEP	Gamma Scan
SSFL AREA 4	SOIL	05/19/95	6115-020	H		06/18/95	07/05/95	IEP	Tritium-Soil
		05/24/95	6115-020	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil
			6115-020	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil
			6115-020	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil
			6115-020	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED			SUF-					
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
A4CM-95-0119		N505063-21	6115-021	GAM		06/24/95	07/11/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	05/19/95	6115-021	H		06/18/95	07/05/95	IEP	Tritium-Soil	
		05/24/95	6115-021	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil	
			6115-021	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil	
			6115-021	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil	
			6115-021	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0120		N505063-22	6115-022	GAM		06/24/95	07/11/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	05/19/95	6115-022	H		06/18/95	07/05/95	IEP	Tritium-Soil	
		05/24/95	6115-022	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil	
			6115-022	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil	
			6115-022	TH	A1	07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil	
			6115-022	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil	
Method Blank		N505063-24	6115-024	GAM		06/26/95	07/11/95	IEP	Gamma Scan	
	SOIL		6115-024	H		06/17/95	07/05/95	IEP	Tritium-Soil	
			6115-024	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil	
			6115-024	SR		06/27/95	07/05/95	IEP	Strontium, Total in Soil	
			6115-024	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil	
Method Blank		N505063-27	6115-027	TH		07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil	
	SOIL									
Method Blank		N505063-30	6115-030	TH		07/08/95	07/10/95	IEP	Thorium, Isotopic in Soil	
	SOIL									
Lab Control Sample		N505063-23	6115-023	GAM		06/26/95	07/11/95	IEP	Gamma Scan	
	SOIL		6115-023	H		06/17/95	07/05/95	IEP	Tritium-Soil	
			6115-023	PU		07/03/95	07/05/95	IEP	Plutonium, Isotopic in Soil	
			6115-023	SR		06/27/95	07/05/95	IEP	Strontium, Total in Soil	
			6115-023	U		06/30/95	07/05/95	IEP	Uranium, Isotopic in Soil	
Lab Control Sample		N505063-26	6115-026	TH		07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil	
	SOIL									
Lab Control Sample		N505063-29	6115-029	TH		07/08/95	07/10/95	IEP	Thorium, Isotopic in Soil	
	SOIL									

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TMA/RICHMOND

REPORTING GROUP 6115

SDG 6115

tact Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID								
LOCATION	MATRIX	COLLECTED		SUF-						
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
Duplicate (N505063-02)		N505063-25	6115-025	GAM		06/27/95	07/11/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	05/08/95	6115-025	H		06/17/95	07/05/95	IEP	Tritium-Soil	
		05/24/95	6115-025	PU		06/30/95	07/05/95	IEP	Plutonium, Isotopic in Soil	
			6115-025	SR		06/27/95	07/11/95	IEP	Strontium, Total in Soil	
			6115-025	U		07/03/95	07/05/95	IEP	Uranium, Isotopic in Soil	
Duplicate (N505063-02)		N505063-28	6115-028	TH		07/04/95	07/05/95	IEP	Thorium, Isotopic in Soil	
SSFL AREA 4	SOIL	05/08/95								
		05/24/95								

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Scan		22			1	1	1	25
		Tritium-Soil	EPA 906.0; ASTM 2476-81	22			1	1	1	25
		Plutonium, Isotopic in Soil	HASL 300/PU-02	22			1	1	1	25
SR		Strontium, Total in Soil	HASL 300/SR-01, -02	22			1	1	1	25
TH		Thorium, Isotopic in Soil		22			2	2	1	27
U		Uranium, Isotopic in Soil	HASL 300/U-04	22			1	1	1	25
TOTALS				132			7	7	6	152

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TMA / RICHMOND

REPORTING GROUP 6115

N505063-24

Method Blank

METHOD BLANK

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-24

Client sample id Method Blank

Dept sample id 6115-024

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		44	150	200	500	U	H
Strontium 90	10098-97-2	-0.011	0.044	0.04	0.5	U	SR
Uranium 233/234	11-08-5	0.001	0.005	0.007	0.01	U	U
Uranium 235	14117-96-1	-0.001	0.001	0.004	0.01	U	U
Uranium 238	7440-61-1	0	0.002	0.004	0.01	U	U
Plutonium 238	13981-16-3	0.003	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		U		0.09		U	GAM
Barium 137m		U		0.03		U	GAM
Manganese 54		U		0.005		U	GAM
Cobalt 58		U		0.005		U	GAM
Iron 59		U		0.01		U	GAM
Cobalt 60		U		0.005		U	GAM
Zinc 65		U		0.01		U	GAM
Niobium 94		U		0.005		U	GAM
Ruthenium 103		U		0.005		U	GAM
Ruthenium 106		U		0.05		U	GAM
Tin 113		U		0.006		U	GAM
Cesium 134		U		0.006		U	GAM
Cesium 137		U		0.006	0.02	U	GAM
Cerium 144		U		0.02		U	GAM
Europium 152		U		0.01		U	GAM
Europium 154		U		0.007		U	GAM
Europium 155		U		0.01		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.02		U	GAM

METHOD BLANKS

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-24

Method Blank

BLANK, cont.

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-24

Client sample id Method Blank

Dept sample id 6115-024

Material/Matrix SOIL

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-24	H	6115-024		0.0100 L	06/17/95	07/05/95	IEP
N505063-24	SR	6115-024		2.00 g	06/27/95	07/05/95	IEP
N505063-24	U	6115-024		3.00 g	07/03/95	07/05/95	IEP
N505063-24	PU	6115-024		3.00 g	06/30/95	07/05/95	IEP
N505063-24	GAM	6115-024		850 g	06/26/95	07/11/95	IEP

QC-BLANK #24012

Lab id TMAN

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METHOD BLANKS

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TMA/RICHMOND
REPORTING GROUP 6115
METHOD BLANK

N505063-27

Method Blank

SDG 6115
 Contact Italy E. Pittman

Client Rocketdyne
 Contract R44PJZ94034044

Lab sample id N505063-27
 Dept sample id 6115-027

Client sample id Method Blank
 Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		0	0.011	0.03	0.1	U	TH
Thorium 230	14269-63-7	0.027	0.019	0.02	0.1	J	TH
Thorium 232	7740-29-1	-0.002	0.008	0.01	0.1	U	TH

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOUT	ANALYZED	REVIEWED	BY
N505063-27	TH	6115-027		1.00 g	07/04/95	07/05/95	IEP

QC-BLANK #24209

METHOD BLANKS

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TMA / RICHMOND

REPORTING GROUP 6115

N505063-30

METHOD BLANK

Method Blank

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-30Client sample id Method BlankDept sample id 6115-030Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		-0.004	0.041	0.08	0.1	U	TH
Thorium 230	14269-63-7	0.11	0.050	0.04	0.1		TH
Thorium 232	7740-29-1	0	0.008	0.03	0.1	U	TH

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOUT	ANALYZED	REVIEWED	BY
N505063-30	TH	6115-030		1.00 g	07/08/95	07/10/95	IEP

QC-BLANK #24253

METHOD BLANKS

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-23

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6115

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N505063-23

Client sample id Lab Control Sample

Dept sample id 6115-023

Material/Matrix SOIL

ANALYTE	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
Tritium	10000	450	300	500	X	H	10300	410	97	82-118	
Strontium 90	10	0.16	0.05	0.5		SR	10.7	0.43	93	84-116	
Uranium 233/234	1.4	0.12	0.06	0.01		U	1.43	0.057	98	84-116	
Uranium 235	1.1	0.10	0.01	0.01		U	1.09	0.044	101	82-118	
Uranium 238	1.4	0.12	0.05	0.01		U	1.42	0.057	99	84-116	
Plutonium 238	0.40	0.036	0.004	0.01		PU	0.380	0.015	105	83-117	
Plutonium 239/240	0.34	0.032	0.005	0.01		PU	0.340	0.014	100	83-117	
GAMMA SCAN ANALYTES											
Potassium 40	U		0.1		U	GAM					
Chromium 51	U		0.05		U	GAM					
Neptunium 54	U		0.005		U	GAM					
Cobalt 58	U		0.006		U	GAM					
Iron 59	U		0.01		U	GAM					
Cobalt 60	U		0.007		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.006		U	GAM					
Ruthenium 103	U		0.006		U	GAM					
Ruthenium 106	U		0.05		U	GAM					
Tin 113	U		0.008		U	GAM					
Cesium 134	U		0.007		U	GAM					
Cesium 137	0.48	0.014		0.02		GAM	0.447	0.018	107	75-125	
Cerium 144	U		0.03		U	GAM					
Europium 152	U		0.01		U	GAM					
Europium 154	U		0.008		U	GAM					
Europium 155	U		0.01		U	GAM					
Radium 226	U		0.01		U	GAM					
Thorium 232	U		0.03		U	GAM					

CONTROL SAMPLES

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-23

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6115

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N505063-23

Dept sample id 6115-023

Client sample id Lab Control Sample

Material/Matrix SOIL

TEST	PLANCHET	SUF-		ALIQOT	PREF ERR		ANALYZED	REVIEWED	BY
		FIX			2σ	%			
H	6115-023			0.0100 L	10.0		06/17/95	07/05/95	IEP
SR	6115-023			2.00 g	10.0		06/27/95	07/05/95	IEP
U	6115-023			3.00 g	5.0		06/30/95	07/05/95	IEP
PU	6115-023			3.00 g	5.0		07/03/95	07/05/95	IEP
GAM	6115-023			850 g	15.0		06/26/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-26

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6115Contact Italy E. PittmanClient RocketdyneContract R44FJZ94034044Lab sample id N505063-26Dept sample id 6115-026Client sample id Lab Control SampleMaterial/Matrix SOIL

ANALYTE	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
Thorium 230	2.1	0.15	0.02	0.1	B	TH	2.05	0.082	102	85-115	

TEST	PLANCHET	SUF- FIX	ALIQUOT	PREP ERR 2σ %	ANALYZED	REVIEWED	BY
TH	6115-026		1.00 g	5.0	07/04/95	07/05/95	IEP

QC-LCS #24208

TMA/RICHMOND

REPORTING GROUP 6115

N505063-29

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6115

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N505063-29

Client sample id Lab Control Sample

Dept sample id 6115-029

Material/Matrix SOIL

ANALYTE	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 PROTOCOL (TOTAL) LIMITS
Thorium 230	1.9	0.19	0.04	0.1	B	TH	1.79	0.072	106	81-119

TEST	PLANCHET	SUF- FIX	ALIQUOT	PREP ERR 2σ %	ANALYZED	REVIEWED	BY
TH	6115-029		1.00 g	5.0	07/08/95	07/10/95	IEP

QC-LCS #24252

CONTROL SAMPLES

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-25

A4CM-95-0098

DUPLICATE

SDG 6115

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N505063-25Lab sample id N505063-02Client sample id A4CM-95-0098Dept sample id 6115-025Dept sample id 6115-002Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/08/95% moisture 3.5

Chain of custody id _____

ANALYTE	DUPLICATE 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 TOT	PROT LIMIT
Tritium	980	1400	2000	500	U	H	230	1500	3000	U	-		
Strontium 90	0.022	0.050	0.04	0.5	U	SR	0.001	0.088	0.1	U	-		
Uranium 233/234	0.76	0.047	0.01	0.01		U	0.80	0.052	0.01		5	17	
Uranium 235	0.041	0.010	0.005	0.01		U	0.036	0.010	0.005		13	56	
Uranium 238	0.63	0.051	0.008	0.01		U	0.83	0.054	0.008		0	17	
Plutonium 238	-0.001	0.005	0.01	0.01	U	PU	-0.001	0.001	0.004	U	-		
Plutonium 239/240	0.005	0.005	0.009	0.01	U	PU	0.001	0.002	0.003	U	-		
GAMMA SCAN ANALYTES													
Cesium 40	17	0.73				GAM	22	0.47			26	33	
Chromium 51	U		0.6		U	GAM	U		0.4	U	-		
Manganese 54	U		0.04		U	GAM	U		0.02	U	-		
Cobalt 58	U		0.05		U	GAM	U		0.03	U	-		
Iron 59	U		0.1		U	GAM	U		0.09	U	-		
Cobalt 60	U		0.04		U	GAM	U		0.02	U	-		
Zinc 65	U		0.09		U	GAM	U		0.06	U	-		
Niobium 94	U		0.03		U	GAM	U		0.02	U	-		
Ruthenium 103	U		0.06		U	GAM	U		0.04	U	-		
Ruthenium 106	U		0.3		U	GAM	U		0.2	U	-		
Tin 113	U		0.04		U	GAM	U		0.03	U	-		
Cesium 134	U		0.04		U	GAM	U		0.03	U	-		
Cesium 137	U		0.03	0.02	U	GAM	U		0.02	U	-		
Cerium 144	U		0.2		U	GAM	U		0.1	U	-		
Europium 152	U		0.07		U	GAM	U		0.04	U	-		
Europium 154	U		0.04		U	GAM	U		0.03	U	-		
Europium 155	U		0.1		U	GAM	U		0.09	U	-		
Radium 226	0.78	0.069				GAM	0.94	0.044			19	35	
Thorium 232	1.2	0.16				GAM	1.4	0.098			15	39	

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TMA/RICHMOND

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A4CM-95-0098

DUPLICATE, cont.

SDG 6115

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N505063-25Lab sample id N505063-02Client sample id A4CM-95-0098Dept sample id 6115-025Dept sample id 6115-002Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 3.5

Chain of custody id _____

TEST	DUPLICATE PLANCHET	SUF- FIX	ALIQUOT	ANALYZED	REVIEWED BY	ORIGINAL PLANCHET	SUF- FIX	ALIQUOT	ANALYZED	REVIEWED BY
H	6115-025		0.00110	06/17/95	07/05/95 IEP	6115-002		0.00100 L	06/17/95	07/05/95 IEP
SR	6115-025		2.00	06/27/95	07/11/95 IEP	6115-002		2.00 g	06/27/95	07/11/95 IEP
U	6115-025		3.00	07/03/95	07/05/95 IEP	6115-002		3.00 g	07/01/95	07/05/95 IEP
PU	6115-025		3.00	06/30/95	07/05/95 IEP	6115-002		3.00 g	06/30/95	07/05/95 IEP
GAM	6115-025		187	06/27/95	07/11/95 IEP	6115-002		750 g	06/27/95	07/11/95 IEP

P#2 24013

DUPLICATES

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

N505063-28

A4CM-95-0098

DUPLICATE

SDG 6115

Contact Italy E. Pittman

DUPLICATE

Lab sample id N505063-28

Dept sample id 6115-028

Client Rocketdyne

Contract R44PJZ94034044

ORIGINAL

Lab sample id N505063-02

Dept sample id 6115-002

Received 05/24/95

% moisture 3.5

Client sample id A4CM-95-0098

Location/Matrix SSFL AREA 4 SOIL

Collected 05/08/95

Chain of custody id

ANALYTE	DUPLICATE 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
Thorium 228	0.84	0.082	0.02	0.1		TH	0.93	0.098	0.04		10	24
Thorium 230	0.63	0.070	0.02	0.1	B	TH	0.59	0.074	0.03		7	27
Thorium 232	0.87	0.085	0.01	0.1		TH	0.81	0.088	0.02		7	24

TH	DUPLICATE PLANCHET	SUF- FIX	ALIQUOT	ANALYZED	REVIEWED BY	ORIGINAL PLANCHET	SUF- FIX	ALIQUOT	ANALYZED	REVIEWED BY
	6115-028		1.00	07/04/95	07/05/95 IEP	6115-002	A1	1.00 g	07/04/95	07/05/95 IEP

QC-DUP#2 24210

DUPLICATES

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Lab id TMAN
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TMA / RICHMOND

REPORTING GROUP 6115

N505063-01

DATA SHEET

A4CM-95-0097

SDG 6115
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N505063-01Client sample id A4CM-95-0097Dept sample id 6115-001Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 5.9

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0	830	1000	500	U	H
Strontium 90	10098-97-2	0.006	0.070	0.1	0.5	U	SR
Thorium 228		1.1	0.10	0.05	0.1		TH
Thorium 230	14269-63-7	0.87	0.090	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.83	0.057	0.01	0.01		U
Uranium 235	14117-96-1	0.045	0.012	0.006	0.01		U
Uranium 238	7440-61-1	0.80	0.056	0.009	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		21	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.072	0.031		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Radium 226		0.82	0.060				GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-01

A4CM-95-0097

DATA SHEET, cont

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-01Client sample id A4CM-95-0097Dept sample id 6115-001Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 5.9

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.14				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-01	H	6115-001		0.00180 L	06/17/95	07/05/95	IEP
5063-01	SR	6115-001		2.00 g	06/27/95	07/11/95	IEP
5063-01	TH	6115-001	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-01	U	6115-001		3.00 g	07/01/95	07/05/95	IEP
N505063-01	PU	6115-001		3.00 g	06/30/95	07/05/95	IEP
N505063-01	GAM	6115-001		750 g	06/21/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-02

DATA SHEET

A4CM-95-0098

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-02Client sample id A4CM-95-0098Dept sample id 6115-002Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 3.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		230	1500	3000	500	U	H
Strontium 90	10098-97-2	0.001	0.088	0.1	0.5	U	SR
Thorium 228		0.93	0.098	0.04	0.1		TH
Thorium 230	14269-63-7	0.59	0.074	0.03	0.1		TH
Thorium 232	7740-29-1	0.81	0.088	0.02	0.1		TH
Uranium 233/234	11-08-5	0.80	0.052	0.01	0.01		U
Uranium 235	14117-96-1	0.036	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.83	0.054	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.001	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.003	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		22	0.47				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		U		0.02	0.02	U	GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.09		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-02

A4CM-95-0098

DATA SHEET, cont

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-02Client sample id A4CM-95-0098Dept sample id 6115-002Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 3.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.94	0.044				GAM
Thorium 232		1.4	0.098				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-02	H	6115-002		0.00100 L	06/17/95	07/05/95	IEP
505063-02	SR	6115-002		2.00 g	06/27/95	07/11/95	IEP
N505063-02	TH	6115-002	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-02	U	6115-002		3.00 g	07/01/95	07/05/95	IEP
N505063-02	PU	6115-002		3.00 g	06/30/95	07/05/95	IEP
N505063-02	GAM	6115-002		750 g	06/27/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-03

A4CM-95-0099

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-03

Client sample id A4CM-95-0099

Dept sample id 6115-003

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/08/95

% moisture 6.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		270	740	1000	500	U	H
Strontium 90	10098-97-2	-0.008	0.063	0.1	0.5	U	SR
Thorium 228		1.0	0.089	0.04	0.1		TH
Thorium 230	14269-63-7	0.77	0.074	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.95	0.085	0.01	0.1		TH
Uranium 233/234	11-08-5	0.80	0.052	0.01	0.01		U
Uranium 235	14117-96-1	0.041	0.011	0.006	0.01		U
Uranium 238	7440-61-1	0.76	0.050	0.009	0.01		U
Antonium 238	13981-16-3	-0.001	0.002	0.005	0.01	U	PU
Antonium 239/240	10-12-8	0.006	0.003	0.005	0.01	J	PU
GAMMA SCAN ANALYTES							
Potassium 40		21	0.64				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.19	0.030		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

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Version 3.06

Report date 07/12/95

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-03

A4CM-95-0099

DATA SHEET, cont

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-03

Client sample id A4CM-95-0099

Dept sample id 6115-003

Location/Matrix SSFL AREA 4

SOIL

Received 05/24/95

Collected 05/08/95

% moisture 6.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.70	0.053				GAM
Thorium 232		1.1	0.13				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-03	H	6115-003		0.00200 L	06/17/95	07/05/95	IEP
505063-03	SR	6115-003		2.00 g	06/27/95	07/11/95	IEP
N505063-03	TH	6115-003	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-03	U	6115-003		3.00 g	07/01/95	07/05/95	IEP
N505063-03	PU	6115-003		3.00 g	06/30/95	07/05/95	IEP
N505063-03	GAM	6115-003		750 g	06/21/95	07/11/95	IEP

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Lab id TMAN

Protocol ROCKETDYNE

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-04

DATA SHEET

A4CM-95-0102

SDG 6115

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N505063-04Client sample id A4CM-95-0102Dept sample id 6115-004Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 10.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		410	480	800	500	U	H
Strontium 90	10098-97-2	0.032	0.054	0.1	0.5	U	SR
Thorium 228		1.1	0.098	0.04	0.1		TH
Thorium 230	14269-63-7	0.75	0.077	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.93	0.086	0.02	0.1		TH
Uranium 233/234	11-08-5	0.75	0.057	0.01	0.01		U
Uranium 235	14117-96-1	0.040	0.012	0.008	0.01		U
Uranium 238	7440-61-1	0.70	0.054	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.53				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.44	0.029		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-04

A4CM-95-0102

DATA SHEET, cont

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-04

Client sample id A4CM-95-0102

Dept sample id 6115-004

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/08/95

% moisture 10.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.78	0.046				GAM
Thorium 232		1.3	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
063-04	H	6115-004		0.00320 L	06/17/95	07/05/95	IEP
063-04	SR	6115-004		2.00 g	06/27/95	07/11/95	IEP
N505063-04	TH	6115-004	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-04	U	6115-004		3.00 g	07/01/95	07/05/95	IEP
N505063-04	PU	6115-004		3.00 g	06/30/95	07/05/95	IEP
N505063-04	GAM	6115-004		750 g	06/22/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-05

A4CM-95-0103

DATA SHEET

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-05Client sample id A4CM-95-0103Dept sample id 6115-005Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/08/95% moisture 10.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-110	440	800	500	U	H
Strontium 90	10098-97-2	0.031	0.067	0.1	0.5	U	SR
Thorium 228		1.2	0.11	0.05	0.1		TH
Thorium 230	14269-63-7	0.67	0.074	0.03	0.1		TH
Thorium 232	7740-29-1	1.0	0.095	0.02	0.1		TH
Uranium 233/234	11-08-5	0.64	0.045	0.01	0.01		U
Uranium 235	14117-96-1	0.046	0.012	0.007	0.01		U
Uranium 238	7440-61-1	0.67	0.047	0.009	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.003	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.003	0.003	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.50				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.08		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.41	0.028		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-05

A4CM-95-0103

DATA SHEET, cont

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-05Client sample id A4CM-95-0103Dept sample id 6115-005Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/08/95% moisture 10.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.75	0.044				GAM
Thorium 232		1.2	0.099				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
063-05	H	6115-005		0.00320 L	06/17/95	07/05/95	IEP
5063-05	SR	6115-005		2.00 g	06/27/95	07/11/95	IEP
N505063-05	TH	6115-005	Al	1.00 g	07/04/95	07/05/95	IEP
N505063-05	U	6115-005		3.00 g	07/01/95	07/05/95	IEP
N505063-05	PU	6115-005		3.00 g	07/03/95	07/05/95	IEP
N505063-05	GAM	6115-005		751 g	06/22/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-06

DATA SHEET

A4CM-95-0104

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-06

Client sample id A4CM-95-0104

Dept sample id 6115-006

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/09/95

% moisture 3.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		230	1800	3000	500	U	H
Strontium 90	10098-97-2	0.042	0.044	0.05	0.5	U	SR
Thorium 228		1.2	0.10	0.05	0.1		TH
Thorium 230	14269-63-7	0.87	0.086	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.10	0.01	0.1		TH
Uranium 233/234	11-08-5	0.84	0.053	0.01	0.01		U
Uranium 235	14117-96-1	0.048	0.012	0.005	0.01		U
Uranium 238	7440-61-1	0.80	0.051	0.009	0.01		U
Plutonium 238	13981-16-3	-0.002	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.52				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.10	0.023		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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Lab id TMAN

Protocol ROCKETDYNE

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Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

N505063-06

A4CM-95-0104

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-06</u>	Client sample id <u>A4CM-95-0104</u>
Dept sample id <u>6115-006</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/09/95</u>
% moisture <u>3.6</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.043				GAM
Thorium 232		1.3	0.12				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N5063-06	H	6115-006		8.00E-4 L	06/18/95	07/05/95	IEP
N5063-06	SR	6115-006		2.00 g	06/27/95	07/11/95	IEP
N505063-06	TH	6115-006	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-06	U	6115-006		3.00 g	07/01/95	07/05/95	IEP
N505063-06	PU	6115-006		3.00 g	07/03/95	07/05/95	IEP
N505063-06	GAM	6115-006		750 g	06/22/95	07/11/95	IEP

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TMA / RICHMOND

REPORTING GROUP 6115

N505063-07

A4CM-95-0105

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-07

Client sample id A4CM-95-0105

Dept sample id 6115-007

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/09/95

% moisture 4.8

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0	1200	2000	500	U	H
Strontium 90	10098-97-2	0.039	0.054	0.05	0.5	U	SR
Thorium 228		0.80	0.074	0.04	0.1		TH
Thorium 230	14269-63-7	0.61	0.062	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.75	0.068	0.01	0.1		TH
Uranium 233/234	11-08-5	0.68	0.046	0.009	0.01		U
Uranium 235	14117-96-1	0.037	0.011	0.005	0.01		U
Uranium 238	7440-61-1	0.65	0.045	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.002	0.003	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		20	0.57				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.37	0.028		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-07

A4CM-95-0105

DATA SHEET, cont

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-07Client sample id A4CM-95-0105Dept sample id 6115-007Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/09/95% moisture 4.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.62	0.049				GAM
Thorium 232		0.97	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-07	H	6115-007		0.00120 L	06/18/95	07/05/95	IEP
N505063-07	SR	6115-007		2.00 g	06/27/95	07/11/95	IEP
N505063-07	TH	6115-007	A1	1.00 g	07/05/95	07/05/95	IEP
N505063-07	U	6115-007		3.00 g	07/01/95	07/05/95	IEP
N505063-07	PU	6115-007		3.00 g	06/30/95	07/05/95	IEP
N505063-07	GAM	6115-007		750 g	06/22/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-08

A4CM-95-0106

DATA SHEET

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-08Client sample id A4CM-95-0106Dept sample id 6115-008Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/09/95% moisture 2.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		580	2100	4000	500	U	H
Strontium 90	10098-97-2	0.050	0.062	0.06	0.5	U	SR
Thorium 228		1.0	0.089	0.02	0.1		TH
Thorium 230	14269-63-7	0.72	0.073	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.87	0.081	0.02	0.1		TH
Uranium 233/234	11-08-5	0.77	0.046	0.009	0.01		U
Uranium 235	14117-96-1	0.032	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.76	0.046	0.007	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.59				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.34	0.023		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-08

A4CM-95-0106

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-08</u>	Client sample id <u>A4CM-95-0106</u>
Dept sample id <u>6115-008</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/09/95</u>
% moisture <u>2.2</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.047				GAM
Thorium 232		1.3	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-08	H	6115-008		7.00E-4 L	06/18/95	07/05/95	IEP
5063-08	SR	6115-008		2.00 g	06/27/95	07/11/95	IEP
N505063-08	TH	6115-008	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-08	U	6115-008		3.00 g	07/03/95	07/05/95	IEP
N505063-08	PU	6115-008		3.00 g	06/30/95	07/05/95	IEP
N505063-08	GAM	6115-008		750 g	06/22/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-09

A4CM-95-0107

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-09

Client sample id A4CM-95-0107

Dept sample id 6115-009

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/09/95

% moisture 1.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		220	2400	4000	500	U	H
Strontium 90	10098-97-2	0.010	0.054	0.06	0.5	U	SR
Thorium 228		0.74	0.080	0.02	0.1		TH
Thorium 230	14269-63-7	0.56	0.070	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.75	0.084	0.02	0.1		TH
Uranium 233/234	11-08-5	0.73	0.047	0.009	0.01		U
Uranium 235	14117-96-1	0.035	0.010	0.006	0.01		U
Uranium 238	7440-61-1	0.71	0.046	0.007	0.01		U
Plutonium 238	13981-16-3	0.001	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		20	0.60				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.51	0.034		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-09

A4CM-95-0107

DATA SHEET, cont

SDG 6115
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

Lab sample id N505063-09 Client sample id A4CM-95-0107
 Dept sample id 6115-009 Location/Matrix SSFL AREA 4 SOIL
 Received 05/24/95 Collected 05/09/95
 % moisture 1.3 Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.62	0.048				GAM
Thorium 232		0.93	0.13				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-09	H	6115-009		6.00E-4 L	06/18/95	07/05/95	IEP
5063-09	SR	6115-009		2.00 g	06/27/95	07/11/95	IEP
N505063-09	TH	6115-009	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-09	U	6115-009		3.00 g	07/03/95	07/05/95	IEP
N505063-09	PU	6115-009		3.00 g	07/03/95	07/05/95	IEP
N505063-09	GAM	6115-009		751 g	06/22/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-10

DATA SHEET

A4CM-95-0108

SDG 6115
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N505063-10
Dept sample id 6115-010
Received 05/24/95
% moisture 5.8Client sample id A4CM-95-0108
Location/Matrix SSFL AREA 4 SOIL
Collected 05/09/95
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-530	870	2000	500	U	H
Strontium 90	10098-97-2	0.13	0.050	0.07	0.5	J	SR
Thorium 228		1.1	0.12	0.04	0.1		TH
Thorium 230	14269-63-7	0.89	0.11	0.04	0.1		TH
Thorium 232	7740-29-1	1.1	0.12	0.02	0.1		TH
Uranium 233/234	11-08-5	0.96	0.056	0.01	0.01		U
Uranium 235	14117-96-1	0.042	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.91	0.054	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.55				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.43	0.031		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

TMA/RICHMOND

REPORTING GROUP 6115

N505063-10

A4CM-95-0108

DATA SHEET, cont

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PUZ94034044Lab sample id N505063-10Client sample id A4CM-95-0108Dept sample id 6115-010Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/09/95% moisture 5.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.046				GAM
Thorium 232		1.3	0.12				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-10	H	6115-010		0.00160 L	06/18/95	07/05/95	IEP
5063-10	SR	6115-010		2.00 g	06/27/95	07/11/95	IEP
N505063-10	TH	6115-010	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-10	U	6115-010		3.00 g	07/03/95	07/05/95	IEP
N505063-10	PU	6115-010		3.00 g	06/30/95	07/05/95	IEP
N505063-10	GAM	6115-010		751 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-11

DATA SHEET

A4CM-95-0109

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-11Client sample id A4CM-95-0109Dept sample id 6115-011Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/10/95% moisture 4.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-410	1200	2000	500	U	H
Strontium 90	10098-97-2	-0.008	0.049	0.08	0.5	U	SR
Thorium 228		1.1	0.099	0.02	0.1		TH
Thorium 230	14269-63-7	0.87	0.089	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.099	0.01	0.1		TH
Uranium 233/234	11-08-5	0.77	0.048	0.009	0.01		U
Uranium 235	14117-96-1	0.034	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.77	0.048	0.007	0.01		U
Polonium 238	13981-16-3	-0.001	0.002	0.005	0.01	U	PU
Polonium 239/240	10-12-8	0	0.003	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.58				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.049	0.025		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.07		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

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A4CM-95-0109

DATA SHEET, cont

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-11Client sample id A4CM-95-0109Dept sample id 6115-011Location/Matrix SSFL AREA 4SOILReceived 05/24/95Collected 05/10/95% moisture 4.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.054				GAM
Thorium 232		1.3	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-11	H	6115-011		0.00120 L	06/18/95	07/05/95	IEP
5063-11	SR	6115-011		2.00 g	06/27/95	07/11/95	IEP
N505063-11	TH	6115-011	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-11	U	6115-011		3.00 g	07/03/95	07/05/95	IEP
N505063-11	PU	6115-011		3.00 g	07/03/95	07/05/95	IEP
N505063-11	GAM	6115-011		751 g	06/23/95	07/11/95	IEP

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

N505063-12

DATA SHEET

A4CM-95-0110

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-12Client sample id A4CM-95-0110Dept sample id 6115-012Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/10/95% moisture 4.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-370	1300	2000	500	U	H
Strontium 90	10098-97-2	0.010	0.059	0.09	0.5	U	SR
Thorium 228		0.97	0.10	0.04	0.1		TH
Thorium 230	14269-63-7	0.84	0.096	0.02	0.1	B	TH
Thorium 232	7740-29-1	0.98	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.99	0.075	0.01	0.01		U
Uranium 235	14117-96-1	0.031	0.013	0.008	0.01		U
Uranium 238	7440-61-1	0.98	0.074	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.49				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		U		0.02	0.02	U	GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-12

A4CM-95-0110

DATA SHEET, cont

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-12Client sample id A4CM-95-0110Dept sample id 6115-012Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/10/95% moisture 4.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.91	0.043				GAM
Thorium 232		1.4	0.10				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-12	H	6115-012		0.00110 L	06/18/95	07/05/95	IEP
N505063-12	SR	6115-012		2.00 g	06/27/95	07/11/95	IEP
N505063-12	TH	6115-012	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-12	U	6115-012		3.00 g	07/03/95	07/05/95	IEP
N505063-12	PU	6115-012		3.00 g	06/30/95	07/05/95	IEP
N505063-12	GAM	6115-012		751 g	06/27/95	07/11/95	IEP

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TMA / RICHMOND

REPORTING GROUP 6115

N505063-13

DATA SHEET

A4CM-95-0111

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-13

Client sample id A4CM-95-0111

Dept sample id 6115-013

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/10/95

% moisture 6.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		53	860	1000	500	U	H
Strontium 90	10098-97-2	0.056	0.053	0.08	0.5	U	SR
Thorium 228		1.1	0.099	0.03	0.1		TH
Thorium 230	14269-63-7	0.79	0.082	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.099	0.02	0.1		TH
Uranium 233/234	11-08-5	0.80	0.058	0.01	0.01		U
Uranium 235	14117-96-1	0.045	0.014	0.006	0.01		U
Uranium 238	7440-61-1	0.76	0.056	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.013	0.005	0.004	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.63				GAM
Chromium 51		U		0.5		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		0.044	0.040				GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.05		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.53	0.039		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.09		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-13

A4CM-95-0111

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-13</u>	Client sample id <u>A4CM-95-0111</u>
Dept sample id <u>6115-013</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/10/95</u>
% moisture <u>6.5</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.88	0.055				GAM
Thorium 232		1.5	0.15				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
063-13	H	6115-013		0.00170 L	06/18/95	07/05/95	IEP
5063-13	SR	6115-013		2.00 g	06/27/95	07/11/95	IEP
N505063-13	TH	6115-013	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-13	U	6115-013		3.00 g	07/03/95	07/05/95	IEP
N505063-13	PU	6115-013		3.00 g	07/03/95	07/05/95	IEP
N505063-13	GAM	6115-013		751 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-14

DATA SHEET

A4CM-95-0112

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-14Client sample id A4CM-95-0112Dept sample id 6115-014Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/10/95% moisture 15.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		89	330	600	500	U	H
Strontium 90	10098-97-2	-0.018	0.042	0.07	0.5	U	SR
Thorium 228		1.4	0.12	0.05	0.1		TH
Thorium 230	14269-63-7	1.1	0.10	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.4	0.12	0.02	0.1		TH
Uranium 233/234	11-08-5	0.80	0.058	0.01	0.01		U
Uranium 235	14117-96-1	0.037	0.012	0.009	0.01		U
Uranium 238	7440-61-1	0.78	0.057	0.009	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.003	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.40				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.07		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.036	0.016		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-14

A4CM-95-0112

DATA SHEET, cont

SDG 6115

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-14Client sample id A4CM-95-0112Dept sample id 6115-014Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/10/95% moisture 15.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.86	0.038				GAM
Thorium 232		1.4	0.079				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
3063-14	H	6115-014		0.00450 L	06/18/95	07/05/95	IEP
505063-14	SR	6115-014		2.00 g	06/27/95	07/11/95	IEP
N505063-14	TH	6115-014	A1	1.00 g	07/05/95	07/07/95	IEP
N505063-14	U	6115-014		3.00 g	07/03/95	07/05/95	IEP
N505063-14	PU	6115-014		3.00 g	06/30/95	07/05/95	IEP
N505063-14	GAM	6115-014		750 g	06/26/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-15

A4CM-95-0113

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-15

Client sample id A4CM-95-0113

Dept sample id 6115-015

Location/Matrix SSFL AREA 4

SOIL

Received 05/24/95

Collected 05/11/95

% moisture 3.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-160	1000	2000	500	U	H
Strontium 90	10098-97-2	0.028	0.051	0.07	0.5	U	SR
Thorium 228		1.3	0.14	0.05	0.1		TH
Thorium 230	14269-63-7	0.93	0.11	0.03	0.1		TH
Thorium 232	7740-29-1	1.2	0.12	0.03	0.1		TH
Uranium 233/234	11-08-5	0.91	0.060	0.01	0.01		U
Uranium 235	14117-96-1	0.051	0.012	0.007	0.01		U
Uranium 238	7440-61-1	0.91	0.060	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.49				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.08		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.055	0.038		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.06		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-15

A4CM-95-0113

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-15</u>	Client sample id <u>A4CM-95-0113</u>
Dept sample id <u>6115-015</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/11/95</u>
% moisture <u>3.2</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.81	0.048				GAM
Thorium 232		1.3	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-15	H	6115-015		0.00140 L	06/18/95	07/05/95	IEP
N505063-15	SR	6115-015		2.00 g	06/27/95	07/11/95	IEP
N505063-15	TH	6115-015	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-15	U	6115-015		3.00 g	07/03/95	07/05/95	IEP
N505063-15	PU	6115-015		3.00 g	06/30/95	07/05/95	IEP
N505063-15	GAM	6115-015		750 g	06/23/95	07/11/95	IEP

TMA / RICHMOND

REPORTING GROUP 6115

N505063-16

DATA SHEET

A4CM-95-0114

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-16Client sample id A4CM-95-0114Dept sample id 6115-016Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/11/95% moisture 3.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0	970	2000	500	U	H
Strontium 90	10098-97-2	0.023	0.054	0.07	0.5	U	SR
Thorium 228		0.85	0.24	0.2	0.1		TH
Thorium 230	14269-63-7	0.57	0.16	0.09	0.1	B	TH
Thorium 232	7740-29-1	0.79	0.19	0.09	0.1		TH
Uranium 233/234	11-08-5	0.71	0.042	0.01	0.01		U
Uranium 235	14117-96-1	0.052	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.69	0.041	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.18	0.028		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.09		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-16

A4CM-95-0114

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-16</u>	Client sample id <u>A4CM-95-0114</u>
Dept sample id <u>6115-016</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/11/95</u>
% moisture <u>3.7</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.78	0.056				GAM
Thorium 232		1.2	0.13				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-16	H	6115-016		0.00150 L	06/18/95	07/05/95	IEP
N505063-16	SR	6115-016		2.00 g	06/27/95	07/11/95	IEP
N505063-16	TH	6115-016	A2	1.00 g	07/08/95	07/10/95	IEP
N505063-16	U	6115-016		3.00 g	07/03/95	07/05/95	IEP
N505063-16	PU	6115-016		3.00 g	07/03/95	07/05/95	IEP
N505063-16	GAM	6115-016		751 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-17

A4CM-95-0115

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-17

Client sample id A4CM-95-0115

Dept sample id 6115-017

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/11/95

% moisture 5.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		67	720	1000	500	U	H
Strontium 90	10098-97-2	0.022	0.049	0.07	0.5	U	SR
Thorium 228		0.92	0.11	0.05	0.1		TH
Thorium 230	14269-63-7	0.66	0.089	0.03	0.1		TH
Thorium 232	7740-29-1	0.94	0.11	0.02	0.1		TH
Uranium 233/234	11-08-5	0.79	0.046	0.008	0.01		U
Uranium 235	14117-96-1	0.030	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.76	0.045	0.007	0.01		U
Plutonium 238	13981-16-3	0.001	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES							
		U					
Potassium 40		20	0.64				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.15	0.035		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.1		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-17

A4CM-95-0115

DATA SHEET, cont

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-17

Client sample id A4CM-95-0115

Dept sample id 6115-017

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/11/95

% moisture 5.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.77	0.051				GAM
Thorium 232		1.3	0.13				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOUT	ANALYZED	REVIEWED	BY
5063-17	H	6115-017		0.00200 L	06/18/95	07/05/95	IEP
5063-17	SR	6115-017		2.00 g	06/27/95	07/11/95	IEP
N505063-17	TH	6115-017	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-17	U	6115-017		3.00 g	07/03/95	07/05/95	IEP
N505063-17	PU	6115-017		3.00 g	06/30/95	07/05/95	IEP
N505063-17	GAM	6115-017		750 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-18

DATA SHEET

A4CM-95-0116

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-18

Client sample id A4CM-95-0116

Dept sample id 6115-018

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/11/95

% moisture 7.0

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		380	1000	2000	500	U	H
Strontium 90	10098-97-2	0.022	0.033	0.03	0.5	U	SR
Thorium 228		1.1	0.16	0.1	0.1		TH
Thorium 230	14269-63-7	0.91	0.14	0.04	0.1		TH
Thorium 232	7740-29-1	1.1	0.15	0.03	0.1		TH
Uranium 233/234	11-08-5	0.87	0.048	0.01	0.01		U
Uranium 235	14117-96-1	0.041	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.90	0.050	0.007	0.01		U
Plutonium 238	13981-16-3	0.001	0.003	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.003	0.005	0.01	J	PU
GAMMA SCAN ANALYTES							
Potassium 40		21	0.54				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.040	0.013		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-18

A4CM-95-0116

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-18</u>	Client sample id <u>A4CM-95-0116</u>
Dept sample id <u>6115-018</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/11/95</u>
% moisture <u>7.0</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.85	0.050				GAM
Thorium 232		1.4	0.11				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-18	H	6115-018		0.00140 L	06/18/95	07/05/95	IEP
5063-18	SR	6115-018		2.00 g	06/27/95	07/11/95	IEP
N505063-18	TH	6115-018	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-18	U	6115-018		3.00 g	07/05/95	07/10/95	IEP
N505063-18	PU	6115-018		3.00 g	07/03/95	07/05/95	IEP
N505063-18	GAM	6115-018		750 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-19

A4CM-95-0117

DATA SHEET

SDG 6115Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N505063-19Client sample id A4CM-95-0117Dept sample id 6115-019Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/11/95% moisture 6.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-98	790	1000	500	U	H
Strontium 90	10098-97-2	0.014	0.041	0.03	0.5	U	SR
Thorium 228		1.0	0.091	0.02	0.1		TH
Thorium 230	14269-63-7	0.78	0.078	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.095	0.01	0.1		TH
Uranium 233/234	11-08-5	0.71	0.043	0.009	0.01		U
Uranium 235	14117-96-1	0.038	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.74	0.044	0.007	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.004	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.53				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.022	0.016		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-19

DATA SHEET, cont

A4CM-95-0117

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-19Client sample id A4CM-95-0117Dept sample id 6115-019Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/11/95% moisture 6.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.70	0.044				GAM
Thorium 232		1.3	0.12				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-19	H	6115-019		0.00180 L	06/18/95	07/05/95	IEP
5063-19	SR	6115-019		2.00 g	06/27/95	07/11/95	IEP
N505063-19	TH	6115-019	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-19	U	6115-019		3.00 g	07/03/95	07/05/95	IEP
N505063-19	PU	6115-019		3.00 g	07/03/95	07/05/95	IEP
N505063-19	GAM	6115-019		751 g	06/23/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-20

A4CM-95-0118

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-20

Client sample id A4CM-95-0118

Dept sample id 6115-020

Location/Matrix SSFL AREA 4

SOIL

Received 05/24/95

Collected 05/19/95

% moisture 11.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-200	450	800	500	U	H
Strontium 90	10098-97-2	0.008	0.049	0.04	0.5	U	SR
Thorium 228		1.6	0.14	0.03	0.1		TH
Thorium 230	14269-63-7	1.1	0.11	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.5	0.14	0.02	0.1		TH
Uranium 233/234	11-08-5	0.86	0.047	0.008	0.01		U
Uranium 235	14117-96-1	0.041	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.86	0.047	0.007	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.009	0.004	0.005	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.04		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.12	0.022		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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TMA / RICHMOND

REPORTING GROUP 6115

N505063-20

A4CM-95-0118

DATA SHEET, cont

SDG 6115Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N505063-20Client sample id A4CM-95-0118Dept sample id 6115-020Location/Matrix SSFL AREA 4 SOILReceived 05/24/95Collected 05/19/95% moisture 11.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.78	0.053				GAM
Thorium 232		1.4	0.14				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
5063-20	H	6115-020		0.00310 L	06/18/95	07/05/95	IEP
5063-20	SR	6115-020		2.00 g	06/27/95	07/11/95	IEP
N505063-20	TH	6115-020	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-20	U	6115-020		3.00 g	07/03/95	07/05/95	IEP
N505063-20	PU	6115-020		3.00 g	07/03/95	07/05/95	IEP
N505063-20	GAM	6115-020		751 g	06/24/95	07/11/95	IEP

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-21

A4CM-95-0119

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-21

Client sample id A4CM-95-0119

Dept sample id 6115-021

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/19/95

% moisture 13.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-24	380	700	500	U	H
Strontium 90	10098-97-2	0.093	0.042	0.03	0.5	J	SR
Thorium 228		2.1	0.15	0.02	0.1		TH
Thorium 230	14269-63-7	1.3	0.11	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.9	0.14	0.02	0.1		TH
Uranium 233/234	11-08-5	1.1	0.063	0.01	0.01		U
Uranium 235	14117-96-1	0.069	0.014	0.006	0.01		U
Uranium 238	7440-61-1	1.2	0.065	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.029	0.007	0.004	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		16	0.67				GAM
Chromium 51		U		0.5		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.05		U	GAM
Ruthenium 106		U		0.3		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.05		U	GAM
Cesium 137		0.38	0.039		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.08		U	GAM
Europium 154		U		0.05		U	GAM
Europium 155		U		0.2		U	GAM

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Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-21

A4CM-95-0119

DATA SHEET, cont

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-21

Client sample id A4CM-95-0119

Dept sample id 6115-021

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/19/95

% moisture 13.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		1.4	0.082				GAM
Thorium 232		2.2	0.17				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-21	H	6115-021		0.00370 L	06/18/95	07/05/95	IEP
N505063-21	SR	6115-021		2.00 g	06/27/95	07/11/95	IEP
N505063-21	TH	6115-021	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-21	U	6115-021		3.00 g	07/03/95	07/05/95	IEP
N505063-21	PU	6115-021		3.00 g	07/03/95	07/05/95	IEP
N505063-21	GAM	6115-021		689 g	06/24/95	07/11/95	IEP

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Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-22

A4CM-95-0120

DATA SHEET

SDG 6115

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N505063-22

Client sample id A4CM-95-0120

Dept sample id 6115-022

Location/Matrix SSFL AREA 4 SOIL

Received 05/24/95

Collected 05/19/95

% moisture 10.9

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-22	710	1000	500	U	H
Strontium 90	10098-97-2	0.028	0.035	0.03	0.5	U	SR
Thorium 228		0.39	0.062	0.03	0.1		TH
Thorium 230	14269-63-7	0.61	0.076	0.03	0.1		TH
Thorium 232	7740-29-1	0.42	0.062	0.02	0.1		TH
Uranium 233/234	11-08-5	1.3	0.072	0.01	0.01		U
Uranium 235	14117-96-1	0.082	0.015	0.005	0.01		U
Uranium 238	7440-61-1	1.4	0.074	0.01	0.01		U
Plutonium 238	13981-16-3	0.002	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		19	0.64				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.026	0.016		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6115

N505063-22

A4CM-95-0120

DATA SHEET, cont

SDG <u>6115</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N505063-22</u>	Client sample id <u>A4CM-95-0120</u>
Dept sample id <u>6115-022</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>05/24/95</u>	Collected <u>05/19/95</u>
% moisture <u>10.9</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		1.4	0.070				GAM
Thorium 232		1.1	0.14				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N505063-22	H	6115-022		0.00210 L	06/18/95	07/05/95	IEP
N505063-22	SR	6115-022		2.00 g	06/27/95	07/11/95	IEP
N505063-22	TH	6115-022	A1	1.00 g	07/04/95	07/05/95	IEP
N505063-22	U	6115-022		3.00 g	07/03/95	07/05/95	IEP
N505063-22	PU	6115-022		3.00 g	06/30/95	07/05/95	IEP
N505063-22	GAM	6115-022		750 g	06/24/95	07/11/95	IEP

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test PU Matrix SOIL

SDG 6115

Contact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Plutonium PLANCHET	Plutonium 238	Plutonium 239/240
Preparation batch 2781-132						
A4CM-95-0097	N505063-01	6115-001	U	U		
A4CM-95-0098	N505063-02	6115-002	U	U		
A4CM-95-0099	N505063-03	6115-003	U	0.006 J		
A4CM-95-0102	N505063-04	6115-004	U	0.005 J		
A4CM-95-0103	N505063-05	6115-005	U	0.005 J		
A4CM-95-0104	N505063-06	6115-006	U	U		
A4CM-95-0105	N505063-07	6115-007	U	U		
A4CM-95-0106	N505063-08	6115-008	U	U		
A4CM-95-0107	N505063-09	6115-009	U	U		
A4CM-95-0108	N505063-10	6115-010	U	U		
A4CM-95-0109	N505063-11	6115-011	U	U		
A4CM-95-0110	N505063-12	6115-012	U	U		
A4CM-95-0111	N505063-13	6115-013	U	0.013		
A4CM-95-0112	N505063-14	6115-014	U	U		
A4CM-95-0113	N505063-15	6115-015	U	U		
A4CM-95-0114	N505063-16	6115-016	U	U		
A4CM-95-0115	N505063-17	6115-017	U	U		
A4CM-95-0116	N505063-18	6115-018	U	0.005 J		
A4CM-95-0117	N505063-19	6115-019	U	U		
A4CM-95-0118	N505063-20	6115-020	U	0.009 J		
A4CM-95-0119	N505063-21	6115-021	U	0.029		
A4CM-95-0120	N505063-22	6115-022	U	U		
BLK (QC ID=24012)	N505063-24	6115-024	U	U		
LCS (QC ID=24011)	N505063-23	6115-023	ok	ok		
Duplicate (N505063-02)	N505063-25	6115-025	- U	- U		

Nominal values and limits from method	RDLs (pCi/g)	0.01	0.01
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METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test PU Matrix SOIL

SDG 6115

Contact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-132 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 132															
A4CM-95-0097	N505063-01		0.004	3.00			80	1238				53	06/28/95	06/30	SS-063
A4CM-95-0098	N505063-02		0.004	3.00			83	1238				53	06/28/95	06/30	SS-064
A4CM-95-0099	N505063-03		0.005	3.00			70	1238				53	06/28/95	06/30	SS-065
A4CM-95-0102	N505063-04		0.005	3.00			84	1238				53	06/28/95	06/30	SS-066
A4CM-95-0103	N505063-05		0.003	3.00			76	1123				56	06/28/95	07/03	SS-052
A4CM-95-0104	N505063-06		0.007	3.00			83	1123				55	06/28/95	07/03	SS-053
A4CM-95-0105	N505063-07		0.004	3.00			86	1370				52	06/28/95	06/30	SS-052
A4CM-95-0106	N505063-08		0.005	3.00			78	1370				52	06/28/95	06/30	SS-053
A4CM-95-0107	N505063-09		0.006	3.00			76	1123				55	06/28/95	07/03	SS-054
A4CM-95-0108	N505063-10		0.005	3.00			64	1370				52	06/28/95	06/30	SS-054
A4CM-95-0109	N505063-11		0.006	3.00			82	1123				54	06/28/95	07/03	SS-055
A4CM-95-0110	N505063-12		0.005	3.00			82	1370				51	06/28/95	06/30	SS-055
A4CM-95-0111	N505063-13		0.004	3.00			86	1123				54	06/28/95	07/03	SS-056
A4CM-95-0112	N505063-14		0.004	3.00			78	1370				51	06/28/95	06/30	SS-056
A4CM-95-0113	N505063-15		0.005	3.00			70	1370				50	06/28/95	06/30	SS-057
A4CM-95-0114	N505063-16		0.006	3.00			82	1123				53	06/28/95	07/03	SS-057
A4CM-95-0115	N505063-17		0.008	3.00			49	1370				50	06/28/95	06/30	SS-058
A4CM-95-0116	N505063-18		0.005	3.00			76	1123				53	06/28/95	07/03	SS-058
A4CM-95-0117	N505063-19		0.006	3.00			85	1123				53	06/28/95	07/03	SS-059
A4CM-95-0118	N505063-20		0.005	3.00			80	1123				45	06/28/95	07/03	SS-060
A4CM-95-0119	N505063-21		0.006	3.00			74	1123				45	06/28/95	07/03	SS-062
A4CM-95-0120	N505063-22		0.005	3.00			69	1370				42	06/28/95	06/30	SS-059
BLK (QC ID=24012)	N505063-24		0.006	3.00			53	1370					06/28/95	06/30	SS-060
LCS (QC ID=24011)	N505063-23		0.005	3.00			65	1123					06/28/95	07/03	SS-063
Duplicate (N505063-02)	N505063-25		0.01	3.00			35	1370				53	06/28/95	06/30	SS-061
Nominal values and limits from method			0.01	3.00			20-105	500	100			180			

PROCEDURES REFERENCE HASL 300/PU-02

EP-060 Soil Preparation, rev 0

EP-070 Soil Dissolution, rev 0

EP-940 Plutonium Purification, rev 0

EP-008 Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD MDA 0.005 ± 0.003

FOR 25 SAMPLES YIELD 74 ± 25

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test TH Matrix SOIL

SDG 6115

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
Preparation batch 2781-132						
A4CM-95-0097	N505063-01	A1	6115-001	1.1	0.87	1.1
A4CM-95-0098	N505063-02	A1	6115-002	0.93	0.59	0.81
A4CM-95-0099	N505063-03	A1	6115-003	1.0	0.77	0.95
A4CM-95-0102	N505063-04	A1	6115-004	1.1	0.75	0.93
A4CM-95-0103	N505063-05	A1	6115-005	1.2	0.67	1.0
A4CM-95-0104	N505063-06	A1	6115-006	1.2	0.87	1.1
A4CM-95-0105	N505063-07	A1	6115-007	0.80	0.61	0.75
A4CM-95-0106	N505063-08	A1	6115-008	1.0	0.72	0.87
A4CM-95-0107	N505063-09	A1	6115-009	0.74	0.56	0.75
A4CM-95-0108	N505063-10	A1	6115-010	1.1	0.89	1.1
A4CM-95-0109	N505063-11	A1	6115-011	1.1	0.87	1.1
A4CM-95-0110	N505063-12	A1	6115-012	0.97	0.84	0.98
A4CM-95-0111	N505063-13	A1	6115-013	1.1	0.79	1.1
A4CM-95-0112	N505063-14	A1	6115-014	1.4	1.1	1.4
A4CM-95-0113	N505063-15	A1	6115-015	1.3	0.93	1.2
A4CM-95-0115	N505063-17	A1	6115-017	0.92	0.66	0.94
A4CM-95-0116	N505063-18	A1	6115-018	1.1	0.91	1.1
A4CM-95-0117	N505063-19	A1	6115-019	1.0	0.78	1.1
A4CM-95-0118	N505063-20	A1	6115-020	1.6	1.1	1.5
A4CM-95-0119	N505063-21	A1	6115-021	2.1	1.3	1.9
A4CM-95-0120	N505063-22	A1	6115-022	0.39	0.61	0.42
BLK (QC ID=24209)	N505063-27		6115-027	U	0.027 J	U
LCS (QC ID=24208)	N505063-26		6115-026		ok	
Duplicate (N505063-02)	N505063-28		6115-028	ok	ok	ok

Preparation batch 2781-132A

A4CM-95-0114	N505063-16	A2	6115-016	0.85	0.57	0.79
BLK (QC ID=24253)	N505063-30		6115-030	U	0.11	U
LCS (QC ID=24252)	N505063-29		6115-029		ok	

Nominal values and limits from method	RDLs (pCi/g)	0.1	0.1	0.1
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METHOD SUMMARIES

Page 3

SUMMARY DATA SECTION

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Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test TH Matrix SOIL

SDG 6115

Contact Italy E. Pittman

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MAX MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EPF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
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Preparation batch 2781-132 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 132

A4CM-95-0097	N505063-01	A1	0.05	1.00			52		1074			57	07/04/95	07/04	SS-027
A4CM-95-0098	N505063-02	A1	0.04	1.00			49		1074			57	07/04/95	07/04	SS-028
A4CM-95-0099	N505063-03	A1	0.04	1.00			64		1074			57	07/04/95	07/04	SS-029
A4CM-95-0102	N505063-04	A1	0.04	1.00			66		1074			57	07/04/95	07/04	SS-033
A4CM-95-0103	N505063-05	A1	0.05	1.00			59		1074			57	07/04/95	07/04	SS-036
A4CM-95-0104	N505063-06	A1	0.05	1.00			56		1073			56	07/04/95	07/04	SS-039
A4CM-95-0105	N505063-07	A1	0.04	1.00			62		1321			57	07/04/95	07/05	SS-027
A4CM-95-0106	N505063-08	A1	0.02	1.00			62		1077			56	07/04/95	07/04	SS-044
A4CM-95-0107	N505063-09	A1	0.02	1.00			52		1077			56	07/04/95	07/04	SS-045
A4CM-95-0108	N505063-10	A1	0.04	1.00			39		1077			56	07/04/95	07/04	SS-046
A4CM-95-0109	N505063-11	A1	0.02	1.00			57		1077			55	07/04/95	07/04	SS-048
A4CM-95-0110	N505063-12	A1	0.04	1.00			46		1077			55	07/04/95	07/04	SS-049
A4CM-95-0111	N505063-13	A1	0.03	1.00			61		1077			55	07/04/95	07/04	SS-050
A4CM-95-0112	N505063-14	A1	0.05	1.00			54		1024			56	07/04/95	07/05	SS-039
A4CM-95-0113	N505063-15	A1	0.05	1.00			57		1070			54	07/04/95	07/04	SS-019
A4CM-95-0115	N505063-17	A1	0.05	1.00			56		1070			54	07/04/95	07/04	SS-022
A4CM-95-0116	N505063-18	A1	0.1	1.00			34		1070			54	07/04/95	07/04	SS-024
A4CM-95-0117	N505063-19	A1	0.02	1.00			62		1049			54	07/04/95	07/04	SS-052
A4CM-95-0118	N505063-20	A1	0.03	1.00			45		1049			46	07/04/95	07/04	SS-062
A4CM-95-0119	N505063-21	A1	0.02	1.00			56		1049			46	07/04/95	07/04	SS-063
A4CM-95-0120	N505063-22	A1	0.03	1.00			52		1049			46	07/04/95	07/04	SS-065
BLK (QC ID=24209)	N505063-27		0.03	1.00			55		1049				07/04/95	07/04	SS-054
LCS (QC ID=24208)	N505063-26		0.02	1.00			60		1049				07/04/95	07/04	SS-053
Duplicate (N505063-02)	N505063-28		0.02	1.00			60		1049			57	07/04/95	07/04	SS-056

Preparation batch 2781-132A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 132

A4CM-95-0114	N505063-16	A2	0.2	1.00			19		512			58	07/08/95	07/08	SS-027
BLK (QC ID=24253)	N505063-30		0.08	1.00			51		512				07/08/95	07/08	SS-029
LCS (QC ID=24252)	N505063-29		0.04	1.00			57		512				07/08/95	07/08	SS-028

Nominal values and limits from method 0.1 1.00 20-105 500 180

MOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

METHOD SUMMARY, cont.

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test TH Matrix
SDG 6115
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJ294034044

PROCEDURES	EP-000	Data Entry and Document Preparation, rev 0
	EP-001	Q.C. Preparation, rev 0
	EP-003	Tracing, rev 0
	EP-008	Heavy Elements Electroplating, rev 0
	EP-060	Soil Preparation, rev 0
	EP-070	Soil Dissolution, rev 0
	EP-900	Thorium Purification, rev 0

AVERAGES $\pm$ 2 SD	MDA <u>0.05</u> $\pm$ <u>0.07</u>
FOR 27 SAMPLES	YIELD <u>53</u> $\pm$ <u>20</u>

OD SUMMARIES

Page 5

SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test U Matrix SOILSDG 6115Contact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
							1+3	2σ	2+3	2σ
Preparation batch 2781-132										
A4CM-95-0097	N505063-01		6115-001	0.83	0.045	0.80	104	10	6	2
A4CM-95-0098	N505063-02		6115-002	0.80	0.036	0.83	96	9	4	1
A4CM-95-0099	N505063-03		6115-003	0.80	0.041	0.76	105	10	5	1
A4CM-95-0102	N505063-04		6115-004	0.75	0.040	0.70	107	12	6	2
A4CM-95-0103	N505063-05		6115-005	0.64	0.046	0.67	96	9	7	2
A4CM-95-0104	N505063-06		6115-006	0.84	0.048	0.80	105	9	6	2
A4CM-95-0105	N505063-07		6115-007	0.68	0.037	0.65	105	10	6	2
A4CM-95-0106	N505063-08		6115-008	0.77	0.032	0.76	101	9	4	1
A4CM-95-0107	N505063-09		6115-009	0.73	0.035	0.71	103	9	5	1
A4CM-95-0108	N505063-10		6115-010	0.96	0.042	0.91	105	9	5	1
A4CM-95-0109	N505063-11		6115-011	0.77	0.034	0.77	100	9	4	1
A4CM-95-0110	N505063-12		6115-012	0.99	0.031	0.98	101	11	3	1
A4CM-95-0111	N505063-13		6115-013	0.80	0.045	0.76	105	11	6	2
A4CM-95-0112	N505063-14		6115-014	0.80	0.037	0.78	103	11	5	2
A4CM-95-0113	N505063-15		6115-015	0.91	0.051	0.91	100	9	6	1
A4CM-95-0114	N505063-16		6115-016	0.71	0.052	0.69	103	9	8	2
A4CM-95-0115	N505063-17		6115-017	0.79	0.030	0.76	104	9	4	1
A4CM-95-0116	N505063-18		6115-018	0.87	0.041	0.90	97	8	5	1
A4CM-95-0117	N505063-19		6115-019	0.71	0.038	0.74	96	8	5	1
A4CM-95-0118	N505063-20		6115-020	0.86	0.041	0.86	100	8	5	1
A4CM-95-0119	N505063-21		6115-021	1.1	0.069	1.2	92	7	6	1
A4CM-95-0120	N505063-22		6115-022	1.3	0.082	1.4	93	7	6	1
BLK (QC ID=24012)	N505063-24		6115-024	U	U	U				
LCS (QC ID=24011)	N505063-23		6115-023	ok	ok	ok				
Duplicate (N505063-02)	N505063-25		6115-025	ok	ok	ok	92	8	5	1
Nominal values and limits from method				RDLs (pCi/g)	0.01	0.01	0.01	100	4	
								Averages 100	5	

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test U Matrix SOIL

SDG 6115

Contact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MAX MDA g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-132 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 132																
A4CM-95-0097	N505063-01		0.01	3.00				57	1004				54	06/29/95	07/01	SS-030
A4CM-95-0098	N505063-02		0.01	3.00				67	981				54	06/29/95	07/01	SS-033
A4CM-95-0099	N505063-03		0.01	3.00				65	1004				54	06/29/95	07/01	SS-035
A4CM-95-0102	N505063-04		0.01	3.00				55	1004				54	06/29/95	07/01	SS-037
A4CM-95-0103	N505063-05		0.01	3.00				66	1004				54	06/29/95	07/01	SS-038
A4CM-95-0104	N505063-06		0.01	3.00				67	1004				53	06/29/95	07/01	SS-039
A4CM-95-0105	N505063-07		0.009	3.00				66	1004				53	06/29/95	07/01	SS-040
A4CM-95-0106	N505063-08		0.009	3.00				70	1116				55	06/29/95	07/03	SS-027
A4CM-95-0107	N505063-09		0.009	3.00				63	1116				55	06/29/95	07/03	SS-028
A4CM-95-0108	N505063-10		0.01	3.00				63	1116				55	06/29/95	07/03	SS-029
A4CM-95-0109	N505063-11		0.009	3.00				65	1116				54	06/29/95	07/03	SS-030
A4CM-95-0110	N505063-12		0.01	3.00				40	1116				54	06/29/95	07/03	SS-033
A4CM-95-0111	N505063-13		0.01	3.00				47	1116				54	06/29/95	07/03	SS-035
A4CM-95-0112	N505063-14		0.01	3.00				48	1116				54	06/29/95	07/03	SS-036
A4CM-95-0113	N505063-15		0.01	3.00				53	1116				53	06/29/95	07/03	SS-038
A4CM-95-0114	N505063-16		0.01	3.00				76	1117				53	06/29/95	07/03	SS-039
A4CM-95-0115	N505063-17		0.008	3.00				74	1117				53	06/29/95	07/03	SS-040
A4CM-95-0116	N505063-18		0.01	3.00				63	1321				55	06/29/95	07/05	SS-029
A4CM-95-0117	N505063-19		0.009	3.00				74	1119				53	06/29/95	07/03	SS-044
A4CM-95-0118	N505063-20		0.008	3.00				80	1119				45	06/29/95	07/03	SS-045
A4CM-95-0119	N505063-21		0.01	3.00				63	1119				45	06/29/95	07/03	SS-046
A4CM-95-0120	N505063-22		0.01	3.00				62	1119				45	06/29/95	07/03	SS-048
BLK (QC ID=24012)	N505063-24		0.007	3.00				72	1119					06/29/95	07/03	SS-049
LCS (QC ID=24011)	N505063-23		0.06	3.00				72	623					06/29/95	06/30	SS-024
Duplicate (N505063-02)	N505063-25		0.01	3.00				71	1119				56	06/29/95	07/03	SS-050
Nominal values and limits from method			0.01	3.00				30-105	720	100		180				

PROCEDURES	REFERENCE	HASL 300/U-04
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-910	Uranium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA 0.01 ± 0.02
FOR 25 SAMPLES	YIELD 64 ± 19

TMA/RICHMOND

REPORTING GROUP 6115

Test SR Matrix SOILSDG 6115Contact Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Strontium 90
Preparation batch 2781-132				
A4CM-95-0097	N505063-01	6115-001	U	
A4CM-95-0098	N505063-02	6115-002	U	
A4CM-95-0099	N505063-03	6115-003	U	
A4CM-95-0102	N505063-04	6115-004	U	
A4CM-95-0103	N505063-05	6115-005	U	
A4CM-95-0104	N505063-06	6115-006	U	
A4CM-95-0105	N505063-07	6115-007	U	
A4CM-95-0106	N505063-08	6115-008	U	
A4CM-95-0107	N505063-09	6115-009	U	
A4CM-95-0108	N505063-10	6115-010	0.13 J	
A4CM-95-0109	N505063-11	6115-011	U	
A4CM-95-0110	N505063-12	6115-012	U	
A4CM-95-0111	N505063-13	6115-013	U	
A4CM-95-0112	N505063-14	6115-014	U	
A4CM-95-0113	N505063-15	6115-015	U	
A4CM-95-0114	N505063-16	6115-016	U	
A4CM-95-0115	N505063-17	6115-017	U	
A4CM-95-0116	N505063-18	6115-018	U	
A4CM-95-0117	N505063-19	6115-019	U	
A4CM-95-0118	N505063-20	6115-020	U	
A4CM-95-0119	N505063-21	6115-021	0.093 J	
A4CM-95-0120	N505063-22	6115-022	U	
BLK (QC ID=24012)	N505063-24	6115-024	U	
LCS (QC ID=24011)	N505063-23	6115-023	ok	
Duplicate (N505063-02)	N505063-25	6115-025	- U	

Nominal values and limits from method RDLs (pCi/g) 0.5

SD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-QMSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test SR Matrix SOIL

SDG 6115

Lab Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-132 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 132																
A4CM-95-0097	N505063-01	0.1		2.00				87		201			50	06/27/95	06/27	LBG-004
A4CM-95-0098	N505063-02	0.1		2.00				80		201			50	06/27/95	06/27	LBG-015
A4CM-95-0099	N505063-03	0.1		2.00				94		200			50	06/27/95	06/27	LBG-004
A4CM-95-0102	N505063-04	0.1		2.00				90		132			50	06/27/95	06/27	LBG-003
A4CM-95-0103	N505063-05	0.1		2.00				85		132			50	06/27/95	06/27	LBG-004
A4CM-95-0104	N505063-06	0.05		2.00				93		575			49	06/27/95	06/27	LBG-003
A4CM-95-0105	N505063-07	0.05		2.00				94		575			49	06/27/95	06/27	LBG-004
A4CM-95-0106	N505063-08	0.06		2.00				96		575			49	06/27/95	06/27	LBG-015
A4CM-95-0107	N505063-09	0.06		2.00				92		575			49	06/27/95	06/27	LBG-016
A4CM-95-0108	N505063-10	0.07		2.00				91		201			49	06/27/95	06/27	LBG-003
A4CM-95-0109	N505063-11	0.08		2.00				94		201			48	06/27/95	06/27	LBG-004
A4CM-95-0110	N505063-12	0.09		2.00				90		201			48	06/27/95	06/27	LBG-015
A4CM-95-0111	N505063-13	0.08		2.00				91		201			48	06/27/95	06/27	LBG-016
A4CM-95-0112	N505063-14	0.07		2.00				85		228			48	06/27/95	06/27	LBG-003
A4CM-95-0113	N505063-15	0.07		2.00				89		228			47	06/27/95	06/27	LBG-004
A4CM-95-0114	N505063-16	0.07		2.00				97		228			47	06/27/95	06/27	LBG-015
A4CM-95-0115	N505063-17	0.07		2.00				92		228			47	06/27/95	06/27	LBG-016
A4CM-95-0116	N505063-18	0.03		2.00				91		961			47	06/27/95	06/27	LBG-003
A4CM-95-0117	N505063-19	0.03		2.00				92		961			47	06/27/95	06/27	LBG-004
A4CM-95-0118	N505063-20	0.04		2.00				89		961			39	06/27/95	06/27	LBG-015
A4CM-95-0119	N505063-21	0.03		2.00				92		961			39	06/27/95	06/27	LBG-016
A4CM-95-0120	N505063-22	0.03		2.00				85		907			39	06/27/95	06/27	LBG-003
BLK (QC ID=24012)	N505063-24	0.04		2.00				82		907				06/27/95	06/27	LBG-004
LCS (QC ID=24011)	N505063-23	0.05		2.00				82		587				06/27/95	06/27	LBG-003
Duplicate (N505063-02)	N505063-25	0.04		2.00				86		907			50	06/27/95	06/27	LBG-015
Nominal values and limits from method				0.5	2.00			20-105		200			180			

PROCEDURES REFERENCE HASL 300/SR-01,-02
 EP-060 Soil Preparation, rev 0
 EP-070 Soil Dissolution, rev 0
 EP-500 Strontium-89,90 - Purification, rev 0

AVERAGES ± 2 SD MDA 0.06 ± 0.05
 FOR 25 SAMPLES YIELD 90 ± 9

SD SUMMARIES

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Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test GAM Matrix SOILSDG 6115Contact Italy E. Pittman

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Cesium 137
Preparation batch 2781-132				
A4CM-95-0097	N505063-01	6115-001	0.072	
A4CM-95-0098	N505063-02	6115-002	U	
A4CM-95-0099	N505063-03	6115-003	0.19	
A4CM-95-0102	N505063-04	6115-004	0.44	
A4CM-95-0103	N505063-05	6115-005	0.41	
A4CM-95-0104	N505063-06	6115-006	0.10	
A4CM-95-0105	N505063-07	6115-007	0.37	
A4CM-95-0106	N505063-08	6115-008	0.34	
A4CM-95-0107	N505063-09	6115-009	0.51	
A4CM-95-0108	N505063-10	6115-010	0.43	
A4CM-95-0109	N505063-11	6115-011	0.049	
A4CM-95-0110	N505063-12	6115-012	U	
A4CM-95-0111	N505063-13	6115-013	0.53	
A4CM-95-0112	N505063-14	6115-014	0.036	
A4CM-95-0113	N505063-15	6115-015	0.055	
A4CM-95-0114	N505063-16	6115-016	0.18	
A4CM-95-0115	N505063-17	6115-017	0.15	
A4CM-95-0116	N505063-18	6115-018	0.040	
A4CM-95-0117	N505063-19	6115-019	0.022	
A4CM-95-0118	N505063-20	6115-020	0.12	
A4CM-95-0119	N505063-21	6115-021	0.38	
A4CM-95-0120	N505063-22	6115-022	0.026	
BLK (QC ID=24012)	N505063-24	6115-024	U	
LCS (QC ID=24011)	N505063-23	6115-023	ok	
Duplicate (N505063-02)	N505063-25	6115-025	- U	

Nominal values and limits from method RDLs (pCi/g) 0.02

SD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test GAM Matrix SOILSDG 6115Lab Italy E. Pittman

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST PIX	SUF- pCi/g	MDA g	ALIQ FAC	PREP TION	DILU- t	YIELD t	EFF min	COUNT keV	FWHM KeV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-132 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 132															
A4CM-95-0097	N505063-01			750						445			44	06/08/95	06/21 02,01,00
A4CM-95-0098	N505063-02		0.02	750						905			50	06/08/95	06/27 02,01,00
A4CM-95-0099	N505063-03			750						445			44	06/08/95	06/21 02,03,00
A4CM-95-0102	N505063-04			750						689			45	06/08/95	06/22 02,01,00
A4CM-95-0103	N505063-05			751						689			45	06/08/95	06/22 02,02,00
A4CM-95-0104	N505063-06			750						689			44	06/08/95	06/22 02,03,00
A4CM-95-0105	N505063-07			750						498			44	06/08/95	06/22 02,01,00
A4CM-95-0106	N505063-08			750						499			44	06/08/95	06/22 02,02,00
A4CM-95-0107	N505063-09			751						499			44	06/08/95	06/22 02,03,00
A4CM-95-0108	N505063-10			751						551			45	06/08/95	06/23 02,01,00
A4CM-95-0109	N505063-11			751						551			44	06/08/95	06/23 02,02,00
A4CM-95-0110	N505063-12		0.02	751						918			48	06/08/95	06/27 02,03,00
A4CM-95-0111	N505063-13			751						427			44	06/08/95	06/23 02,01,00
A4CM-95-0112	N505063-14			750						1035			47	06/08/95	06/26 02,02,00
A4CM-95-0113	N505063-15			750						684			43	06/08/95	06/23 02,02,00
A4CM-95-0114	N505063-16			751						451			43	06/08/95	06/23 02,01,00
A4CM-95-0115	N505063-17			750						451			43	06/08/95	06/23 02,03,00
A4CM-95-0116	N505063-18			750						614			43	06/08/95	06/23 02,01,00
A4CM-95-0117	N505063-19			751						614			43	06/08/95	06/23 02,03,00
A4CM-95-0118	N505063-20			751						452			36	06/08/95	06/24 02,01,00
A4CM-95-0119	N505063-21			689						426			36	06/08/95	06/24 02,02,00
A4CM-95-0120	N505063-22			750						452			36	06/08/95	06/24 02,03,00
BLK (QC ID=24012)	N505063-24		0.006	850						1112				06/08/95	06/26 01,03,00
LCS (QC ID=24011)	N505063-23			850						1112				06/08/95	06/26 01,01,00
Duplicate (N505063-02)	N505063-25		0.03	187						1427			50	06/08/95	06/27 JR,02,00

Nominal values and limits from method

0.02 850

700

180

PROCEDURES EP-060 Soil Preparation, rev 0
 EP-100 Ge(Li) Preparation for Environmental Samples,
 rev 0

AVERAGES ± 2 SD MDA 0.02 ± 0.02
 FOR 4 SAMPLES YIELD _____ ± _____

SD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6115

Lab Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-132

A4CM-95-0097	N505063-01	6115-001	U	
A4CM-95-0098	N505063-02	6115-002	U	
A4CM-95-0099	N505063-03	6115-003	U	
A4CM-95-0102	N505063-04	6115-004	U	
A4CM-95-0103	N505063-05	6115-005	U	
A4CM-95-0104	N505063-06	6115-006	U	
A4CM-95-0105	N505063-07	6115-007	U	
A4CM-95-0106	N505063-08	6115-008	580 U	
A4CM-95-0107	N505063-09	6115-009	U	
A4CM-95-0108	N505063-10	6115-010	U	
A4CM-95-0109	N505063-11	6115-011	U	
A4CM-95-0110	N505063-12	6115-012	U	
A4CM-95-0111	N505063-13	6115-013	U	
A4CM-95-0112	N505063-14	6115-014	U	
A4CM-95-0113	N505063-15	6115-015	U	
A4CM-95-0114	N505063-16	6115-016	U	
A4CM-95-0115	N505063-17	6115-017	U	
A4CM-95-0116	N505063-18	6115-018	U	
A4CM-95-0117	N505063-19	6115-019	U	
A4CM-95-0118	N505063-20	6115-020	U	
A4CM-95-0119	N505063-21	6115-021	U	
A4CM-95-0120	N505063-22	6115-022	U	
BLK (QC ID=24012)	N505063-24	6115-024	U	
LCS (QC ID=24011)	N505063-23	6115-023	ok X	
Duplicate (N505063-02)	N505063-25	6115-025	- U	

Nominal values and limits from method	RDLs (pCi/g)	500
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METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 07/12/95

TMA/RICHMOND

REPORTING GROUP 6115

Test H Matrix SOIL

SDG 6115

Contact Italy E. Pittman

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA L	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-132 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 132															
A4CM-95-0097	N505063-01	1000	0.0018						50			40	06/16/95	06/17	LSC-005
A4CM-95-0098	N505063-02	3000	0.0010						50			40	06/16/95	06/17	LSC-005
A4CM-95-0099	N505063-03	1000	0.0020						50			40	06/16/95	06/17	LSC-005
A4CM-95-0102	N505063-04	800	0.0032						50			40	06/16/95	06/17	LSC-005
A4CM-95-0103	N505063-05	800	0.0032						50			40	06/16/95	06/17	LSC-005
A4CM-95-0104	N505063-06	3000	8.0E-4						50			40	06/16/95	06/18	LSC-005
A4CM-95-0105	N505063-07	2000	0.0012						50			40	06/16/95	06/18	LSC-005
A4CM-95-0106	N505063-08	4000	7.0E-4						50			40	06/16/95	06/18	LSC-005
A4CM-95-0107	N505063-09	4000	6.0E-4						50			40	06/16/95	06/18	LSC-005
A4CM-95-0108	N505063-10	2000	0.0016						50			40	06/16/95	06/18	LSC-005
A4CM-95-0109	N505063-11	2000	0.0012						50			39	06/16/95	06/18	LSC-005
A4CM-95-0110	N505063-12	2000	0.0011						50			39	06/16/95	06/18	LSC-005
A4CM-95-0111	N505063-13	1000	0.0017						50			39	06/16/95	06/18	LSC-005
A4CM-95-0112	N505063-14	600	0.0045						50			39	06/16/95	06/18	LSC-005
A4CM-95-0113	N505063-15	2000	0.0014						50			38	06/16/95	06/18	LSC-005
A4CM-95-0114	N505063-16	2000	0.0015						50			38	06/16/95	06/18	LSC-005
A4CM-95-0115	N505063-17	1000	0.0020						50			38	06/16/95	06/18	LSC-005
A4CM-95-0116	N505063-18	2000	0.0014						50			38	06/16/95	06/18	LSC-005
A4CM-95-0117	N505063-19	1000	0.0018						50			38	06/16/95	06/18	LSC-005
A4CM-95-0118	N505063-20	800	0.0031						50			30	06/16/95	06/18	LSC-005
A4CM-95-0119	N505063-21	700	0.0037						50			30	06/16/95	06/18	LSC-005
A4CM-95-0120	N505063-22	1000	0.0021						50			30	06/16/95	06/18	LSC-005
BLK (QC ID=24012)	N505063-24	200	0.0100						50				06/16/95	06/17	LSC-005
LCS (QC ID=24011)	N505063-23	300	0.0100						50				06/16/95	06/17	LSC-005
Duplicate (N505063-02)	N505063-25	2000	0.0011						50			40	06/16/95	06/17	LSC-005
Nominal values and limits from method			500	0.0100					50			180			

PROCEDURES REFERENCE EPA 906.0; ASTM 2476-81
 EP-060 Soil Preparation, rev 0
 EP-070 Soil Dissolution, rev 0
 EP-211 Tritium in Solid Samples by Azeotropic Distillation, rev 0

AVERAGES ± 2 SD MDA 2000 ± 2000
 FOR 25 SAMPLES YIELD ±

D SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 07/12/95

APPENDIX 1: COPIES OF CHAINS-OF-CUSTODY

Claim of Custody

"quality environmental services"

©

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TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

August 16, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91303

Batch 7

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N5-07-011-6117 and
Report N5-07-012-6118

Dear Mr. Klein:

Enclosed is the data report of analyses for the twenty-one soil and two water samples collected between June 12 and 19, 1995. The samples were received at TMA/Richmond on July 6, 1995. The accompanying case narrative discusses all parameters underlined in the data report which are not in compliance with the Statement of Work.

If you have any questions regarding this data, or any problems with the hard copy or electronic deliverable diskette, please call me at (510) 235-2633.

Sincerely,


Italy E. Pittman
Program Manager

IEP/ss

Enclosures: Data Report N5-07-011-6117 (water)
Data Report N5-07-012-6118 (soil)
Diskette

Case Narrative

August 16, 1995

1.0 GENERAL

TMA/Richmond Sample Delivery Group (SDG) 6117 consists of twenty-one soil samples and SDG 6118 consists of two water samples. The samples were received at TMA/Richmond on July 6, 1995.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, method blanks, and duplicates. The QC samples are prepared by the Quality Control Department.

The blanks and laboratory control samples are created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consists of the following:

NaHCO ₃	96 mg/L
CaSO ₄ ·2H ₂ O	60 mg/L
MgSO ₄	60 mg/L

KCl at 4.0 mg/L - specified in the table - is not added since KCl contains natural ⁴⁰K which raises the gross beta background.

2.1 Tritium Analyses

6118 (Water)

No problems were associated with the samples during the analyses.

6117 (Soil)

In changing the reporting format of the tritium results to pCi/volume water extracted the following underlines are noted: the aliquot for the tritium samples are below the minimum required; this is due to the relatively small percent moisture present in the samples. The Minimum Detectable Activity (MDA) is therefore greater than the Required Detection Limit (RDL) because of the small aliquot size. The report list the result units as pCi/g which is incorrect. The data reported is actually for pCi/L values. We are working to change the mechanisms of our reporting software to be able to include multiple units per sample matrix where applicable.

Case Narrative

August 16, 1995

2.0 ANALYTICAL NOTES (cont'd)

2.2 Strontium-90 Analyses

6118 (Water)

No problems were associated with the samples during the analyses. The average yield for 3 samples was $80\% \pm 9\%$.

6117 (Soil)

Several samples were counted for less than the 200 minute nominal count time; however, the MDA's were below the RDL despite the shorter count time. The average yield for 24 samples was $86\% \pm 7\%$.

2.3 Thorium 228, 230, 232 Analyses

6118 (Water)

The method blank has activity for thorium-230 greater than it's MDA, but below the RDL. The average yield for 3 samples was $88\% \pm 3\%$.

6117 (Soil)

Sample A4CM-95-0121 was counted for less than the nominal 500 minute required, however, the MDA was met despite the shorter count time. Sample A4CM-95-0134 was aliquoted twice and has an MDA for thorium-228 slightly greater than the RDL. The average yield for 24 samples was $58\% \pm 39\%$.

2.4 Uranium 233/234, 235, 238 Analyses

6118 (Water)

Sample AC4CM-A5-0131 was processed along with SDG group 6120's laboratory control sample (LCS) and the method blank. The average yield for 3 samples was $68\% \pm 14\%$.

6117 (Soil)

LCS number 6117-22 and 6117-25 have MDA's greater than the RDL and LCS number 6117-22 was counted for less than the nominal count time, however, this is not a problem since the activity the LCS's are significantly greater than the MDA. The average yield for 26 samples was $68\% \pm 23\%$.

Case Narrative

August 16, 1995

2.0 ANALYTICAL NOTES (cont'd)

2.5 Plutonium 238, 239/240 Analyses

6118 (Water)

No problems were associated with the analyses. The average yield for 3 samples was $82\% \pm 6\%$.

6117 (Soil)

No problems were associated with the analyses. The average yield for 24 samples was $72\% \pm 22\%$.

2.6 Gamma Spectroscopy Analyses

6118 (Water)

No problems were associated with the samples during the analyses.

6117 (Soil)

All samples have an aliquot less than the 850 g nominal required, and several have count times less than the nominal 700 minutes required; however, despite the smaller aliquot and shorter count times, all of the MDA's were less than or equal to the RDL.

T M A / R I C H M O N D
REPORTING GROUP 6117

SDG 6117
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

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Italy E. Pittman
Prepared by

Italy E. Pittman 8/16/95
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
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Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

SDG 6117

act Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0121	SSFL AREA 4	SOIL		N507011-01			06/12/95 14:45
A4CM-95-0122	SSFL AREA 4	SOIL		N507011-02			06/12/95 14:45
A4CM-95-0123	SSFL AREA 4	SOIL		N507011-03			06/12/95 14:45
A4CM-95-0124	SSFL AREA 4	SOIL		N507011-04			06/12/95 14:45
A4CM-95-0125	SSFL AREA 4	SOIL		N507011-05			06/12/95 14:45
A4CM-95-0126	SSFL AREA 4	SOIL		N507011-06			06/13/95 13:45
A4CM-95-0127	SSFL AREA 4	SOIL		N507011-07			06/13/95 13:45
A4CM-95-0128	SSFL AREA 4	SOIL		N507011-08			06/13/95 13:45
A4CM-95-0129	SSFL AREA 4	SOIL		N507011-09			06/13/95 13:45
A4CM-95-0132	SSFL AREA 4	SOIL		N507011-10			06/14/95 12:00
A4CM-95-0133	SSFL AREA 4	SOIL		N507011-11			06/14/95 12:00
A4CM-95-0134	SSFL AREA 4	SOIL		N507011-12			06/14/95 12:00
A4CM-95-0135	SSFL AREA 4	SOIL		N507011-13			06/14/95 12:00
A4CM-95-0136	SSFL AREA 4	SOIL		N507011-14			06/15/95 13:30
A4CM-95-0137	SSFL AREA 4	SOIL		N507011-15			06/15/95 13:30
A4CM-95-0138	SSFL AREA 4	SOIL		N507011-16			06/15/95 13:30
A4CM-95-0139	SSFL AREA 4	SOIL		N507011-17			06/15/95 13:30
A4CM-95-0140	SSFL AREA 4	SOIL		N507011-18			06/19/95 13:15
A4CM-95-0141	SSFL AREA 4	SOIL		N507011-19			06/19/95 13:15
A4CM-95-0142	SSFL AREA 4	SOIL		N507011-20			06/19/95 13:15
A4CM-95-0143	SSFL AREA 4	SOIL		N507011-21			06/19/95 13:15
Method Blank		SOIL		N507011-23			
Method Blank		SOIL		N507011-26			
Lab Control Sample		SOIL		N507011-22			
Lab Control Sample		SOIL		N507011-25			
Duplicate (N507011-01)	SSFL AREA 4	SOIL		N507011-24			06/12/95 14:45

SAMPLE SUMMARY

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REPORTING GROUP 6117

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QC SUMMARY

Client Rocketdyne
Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	† MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
6117		A4CM-95-0121	SOIL	10.1			07/06/95 24	N507011-01	6117-001
		A4CM-95-0122	SOIL	9.2			07/06/95 24	N507011-02	6117-002
		A4CM-95-0123	SOIL	9.3			07/06/95 24	N507011-03	6117-003
		A4CM-95-0124	SOIL	3.5			07/06/95 24	N507011-04	6117-004
		A4CM-95-0125	SOIL	13.9			07/06/95 24	N507011-05	6117-005
		A4CM-95-0126	SOIL	5.4			07/06/95 23	N507011-06	6117-006
		A4CM-95-0127	SOIL	2.7			07/06/95 23	N507011-07	6117-007
		A4CM-95-0128	SOIL	7.3			07/06/95 23	N507011-08	6117-008
		A4CM-95-0129	SOIL	4.5			07/06/95 23	N507011-09	6117-009
		A4CM-95-0132	SOIL	11.1			07/06/95 22	N507011-10	6117-010
		A4CM-95-0133	SOIL	11.0			07/06/95 22	N507011-11	6117-011
		A4CM-95-0134	SOIL	10.2			07/06/95 22	N507011-12	6117-012
		A4CM-95-0135	SOIL	9.4			07/06/95 22	N507011-13	6117-013
		A4CM-95-0136	SOIL	9.4			07/06/95 21	N507011-14	6117-014
		A4CM-95-0137	SOIL	3.8			07/06/95 21	N507011-15	6117-015
		A4CM-95-0138	SOIL	9.2			07/06/95 21	N507011-16	6117-016
		A4CM-95-0139	SOIL	12.2			07/06/95 21	N507011-17	6117-017
		A4CM-95-0140	SOIL	6.5			07/06/95 17	N507011-18	6117-018
		A4CM-95-0141	SOIL	4.1			07/06/95 17	N507011-19	6117-019
		A4CM-95-0142	SOIL	5.4			07/06/95 17	N507011-20	6117-020
		A4CM-95-0143	SOIL	6.4			07/06/95 17	N507011-21	6117-021
		Method Blank	SOIL					N507011-23	6117-023
		Method Blank	SOIL					N507011-26	6117-026
		Lab Control Sample	SOIL					N507011-22	6117-022
		Lab Control Sample	SOIL					N507011-25	6117-025
		Duplicate (N507011-01)	SOIL				07/06/95 24	N507011-24	6117-024

QC SUMMARY

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REPORTING GROUP 6117

SDG 6117

act Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		CLIENT MORE	PLANCHETS ANALYZED				QUALI- FIERS
			BATCH	2σ %		RE	BLANK	LCS	DUP/ORIG MS/ORIG	
Alpha Spectroscopy										
PU	SOIL	Plutonium, Isotopic in Soil	2781-146	5.0	21		1	1	1/1	
TH	SOIL	Thorium, Isotopic in Soil	2781-146	5.0	21		1	1	1/1	
U	SOIL	Uranium, Isotopic in Soil	2781-146	5.0	20		1	1	1/1	
			2781-146A	5.0	1		1	1		
Beta Counting										
SR	SOIL	Strontium, Total in Soil	2781-146	10.0	21		1	1	1/1	
Gamma Spectroscopy										
GAM	SOIL	Gamma Scan	2781-146	15.0	21		1	1	1/1	
Liquid Scintillation										
H	SOIL	Tritium-Soil	2781-146	10.0	21		1	1	1/1	

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

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WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID													
LOCATION	MATRIX	COLLECTED	TEST	SUF-	ANALYZED	REVIEWED	BY	METHOD							
CUSTODY	SAS no	RECEIVED	PLANCHET	FIX											
A4CM-95-0121		N507011-01	6117-001	GAM		07/20/95	08/15/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	06/12/95	6117-001	H		07/21/95	08/01/95	IEP	Tritium-Soil						
		07/06/95	6117-001	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil						
			6117-001	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil						
			6117-001	TH	AOR1	08/05/95	08/15/95	IEP	Thorium, Isotopic in Soil						
			6117-001	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0122		N507011-02	6117-002	GAM		07/20/95	08/15/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	06/12/95	6117-002	H		07/21/95	08/01/95	IEP	Tritium-Soil						
		07/06/95	6117-002	PU		08/02/95	08/03/95	IEP	Plutonium, Isotopic in Soil						
			6117-002	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil						
			6117-002	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil						
			6117-002	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0123		N507011-03	6117-003	GAM		07/21/95	08/15/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	06/12/95	6117-003	H		07/21/95	08/01/95	IEP	Tritium-Soil						
		07/06/95	6117-003	PU		08/02/95	08/03/95	IEP	Plutonium, Isotopic in Soil						
			6117-003	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil						
			6117-003	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil						
			6117-003	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0124		N507011-04	6117-004	GAM		07/21/95	08/15/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	06/12/95	6117-004	H		07/21/95	08/01/95	IEP	Tritium-Soil						
		07/06/95	6117-004	PU		08/02/95	08/03/95	IEP	Plutonium, Isotopic in Soil						
			6117-004	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil						
			6117-004	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil						
			6117-004	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0125		N507011-05	6117-005	GAM		07/21/95	08/15/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	06/12/95	6117-005	H		07/21/95	08/01/95	IEP	Tritium-Soil						
		07/06/95	6117-005	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil						
			6117-005	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil						
			6117-005	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil						
			6117-005	U		07/31/95	08/01/95	IEP	Uranium, Isotopic in Soil						

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REPORTING GROUP 6117

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WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	SUF-	FIX	ANALYZED	REVIEWED	BY	METHOD	
CUSTODY	SAS no	RECEIVED									
A4CM-95-0126		N507011-06	6117-006	GAM		07/21/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/13/95	6117-006	H		07/21/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6117-006	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6117-006	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil		
			6117-006	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil		
			6117-006	U		07/31/95	08/01/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0127		N507011-07	6117-007	GAM		07/22/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/13/95	6117-007	H		07/21/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6117-007	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6117-007	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil		
			6117-007	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil		
			6117-007	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0128		N507011-08	6117-008	GAM		07/22/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/13/95	6117-008	H		07/21/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6117-008	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6117-008	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil		
			6117-008	TH		08/01/95	08/02/95	IEP	Thorium, Isotopic in Soil		
			6117-008	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0129		N507011-09	6117-009	GAM		07/24/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/13/95	6117-009	H		07/21/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6117-009	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6117-009	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil		
			6117-009	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil		
			6117-009	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0132		N507011-10	6117-010	GAM		07/24/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/14/95	6117-010	H		07/21/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6117-010	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6117-010	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil		
			6117-010	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil		
			6117-010	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil		

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REPORTING GROUP 6117

SDG 6117

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WORK SUMMARY, cont.

Client Rocketdyne

Contract R442JZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	SUF-	FIX	ANALYZED	REVIEWED	BY	METHOD			
CUSTODY	SAS no	RECEIVED											
A4CM-95-0133		N507011-11	6117-011	GAM		07/24/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/14/95	6117-011	H		07/21/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-011	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-011	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-011	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil				
			6117-011	U		07/31/95	08/02/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0134		N507011-12	6117-012	GAM		07/24/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/14/95	6117-012	H		07/21/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-012	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-012	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-012	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil				
			6117-012	U		08/03/95	08/03/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0135		N507011-13	6117-013	GAM		07/24/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/14/95	6117-013	H		07/22/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-013	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-013	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-013	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil				
			6117-013	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0136		N507011-14	6117-014	GAM		07/25/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/15/95	6117-014	H		07/22/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-014	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-014	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-014	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil				
			6117-014	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil				
A4CM-95-0137		N507011-15	6117-015	GAM		07/25/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/15/95	6117-015	H		07/22/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-015	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-015	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-015	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil				
			6117-015	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil				

K SUMMARY

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Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6117

SDG 6117

Act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID								
LOCATION	MATRIX	COLLECTED		TEST	SUP-					
CUSTODY	SAS no	RECEIVED	PLANCHET		FIX	ANALYZED	REVIEWED	BY	METHOD	
A4CM-95-0138		N507011-16	6117-016	GAM		07/25/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/15/95	6117-016	H		07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6117-016	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6117-016	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil	
			6117-016	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil	
			6117-016	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0139		N507011-17	6117-017	GAM		07/25/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/15/95	6117-017	H		07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6117-017	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6117-017	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil	
			6117-017	TH		08/02/95	08/02/95	IEP	Thorium, Isotopic in Soil	
			6117-017	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0140		N507011-18	6117-018	GAM		07/25/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/19/95	6117-018	H		07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6117-018	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6117-018	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil	
			6117-018	TH	AOR1	08/07/95	08/15/95	IEP	Thorium, Isotopic in Soil	
			6117-018	U		08/01/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0141		N507011-19	6117-019	GAM		07/26/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/19/95	6117-019	H		07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6117-019	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6117-019	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil	
			6117-019	TH		08/02/95	08/03/95	IEP	Thorium, Isotopic in Soil	
			6117-019	U		08/07/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0142		N507011-20	6117-020	GAM		07/26/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/19/95	6117-020	H		07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6117-020	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6117-020	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil	
			6117-020	TH		08/02/95	08/03/95	IEP	Thorium, Isotopic in Soil	
			6117-020	U		08/07/95	08/15/95	IEP	Uranium, Isotopic in Soil	

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TMA/RICHMOND

REPORTING GROUP 6117

SDG 6117

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED			SUF-								
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD				
AACM-95-0143		N507011-21	6117-021	GAM		07/26/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/19/95	6117-021	H		07/22/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-021	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-021	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-021	TH		08/02/95	08/03/95	IEP	Thorium, Isotopic in Soil				
			6117-021	U	A1	08/11/95	08/15/95	IEP	Uranium, Isotopic in Soil				
Method Blank		N507011-23	6117-023	GAM		07/27/95	08/15/95	IEP	Gamma Scan				
	SOIL		6117-023	H		07/21/95	08/01/95	IEP	Tritium-Soil				
			6117-023	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-023	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-023	TH		08/02/95	08/04/95	IEP	Thorium, Isotopic in Soil				
			6117-023	U		08/07/95	08/15/95	IEP	Uranium, Isotopic in Soil				
Method Blank		N507011-26	6117-026	U		08/11/95	08/15/95	IEP	Uranium, Isotopic in Soil				
	SOIL												
Lab Control Sample		N507011-22	6117-022	GAM		07/27/95	08/15/95	IEP	Gamma Scan				
	SOIL		6117-022	H		07/21/95	08/01/95	IEP	Tritium-Soil				
			6117-022	PU		08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-022	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-022	TH		08/02/95	08/04/95	IEP	Thorium, Isotopic in Soil				
			6117-022	U		07/29/95	08/15/95	IEP	Uranium, Isotopic in Soil				
Lab Control Sample		N507011-25	6117-025	U		08/11/95	08/15/95	IEP	Uranium, Isotopic in Soil				
	SOIL												
Duplicate (N507011-01)		N507011-24	6117-024	GAM		07/27/95	08/15/95	IEP	Gamma Scan				
SSFL AREA 4	SOIL	06/12/95	6117-024	H		07/22/95	08/01/95	IEP	Tritium-Soil				
		07/06/95	6117-024	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil				
			6117-024	SR		07/27/95	08/15/95	IEP	Strontium, Total in Soil				
			6117-024	TH		08/02/95	08/03/95	IEP	Thorium, Isotopic in Soil				
			6117-024	U		08/07/95	08/15/95	IEP	Uranium, Isotopic in Soil				

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TMA/RICHMOND

REPORTING GROUP 6117

SDG 6117

Contact Italy E. Pittman

WORK SUMMARY, cont.

Client RocketdyneContract R44PJZ94034044

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Scan		21			1	1	1	24
H		Tritium-Soil	EPA 906.0; ASTM 2476-81	21			1	1	1	24
PU		Plutonium, Isotopic in Soil	HASL 300/PU-02	21			1	1	1	24
SR		Strontium, Total in Soil	HASL 300/SR-01,-02	21			1	1	1	24
TH		Thorium, Isotopic in Soil		21			1	1	1	24
U		Uranium, Isotopic in Soil	HASL 300/U-04	21			2	2	1	26
TOTALS				126			7	7	6	146

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TMA / RICHMOND

REPORTING GROUP 6117

N507011-23

METHOD BLANK

Method Blank

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-23Client sample id Method BlankDept sample id 6117-023Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-42	160	300	500	U	H
Strontium 90	10098-97-2	0.013	0.068	0.1	0.5	U	SR
Thorium 228		0.009	0.022	0.04	0.1	U	TH
Thorium 230	14269-63-7	0	0.013	0.02	0.1	U	TH
Thorium 232	7740-29-1	-0.002	0.009	0.02	0.1	U	TH
Uranium 233/234	11-08-5	-0.002	0.005	0.01	0.01	U	U
Uranium 235	14117-96-1	0.001	0.003	0.005	0.01	U	U
Uranium 238	7440-61-1	0	0.001	0.005	0.01	U	U
Plutonium 238	13981-16-3	-0.001	0.001	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.001	0.005	0.01	U	PU
MA SCAN ANALYTES							
Potassium 40		U		0.09		U	GAM
Chromium 51		U		0.03		U	GAM
Manganese 54		U		0.006		U	GAM
Cobalt 58		U		0.005		U	GAM
Iron 59		U		0.01		U	GAM
Cobalt 60		U		0.007		U	GAM
Zinc 65		U		0.01		U	GAM
Niobium 94		U		0.006		U	GAM
Ruthenium 103		U		0.005		U	GAM
Ruthenium 106		U		0.04		U	GAM
Tin 113		U		0.006		U	GAM
Cesium 134		U		0.007		U	GAM
Cesium 137		U		0.006	0.02	U	GAM
Cerium 144		U		0.02		U	GAM
Europium 152		U		0.01		U	GAM
Europium 154		U		0.008		U	GAM
Europium 155		U		0.01		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.03		U	GAM

METHOD BLANKS

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-23

BLANK, cont.

Method Blank

SDG 6117

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507011-23

Client sample id Method Blank

Dept sample id 6117-023

Material/Matrix SOIL

QC-BLANK #24264

METHOD BLANKS

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TMA / RICHMOND

REPORTING GROUP 6117

N507011-26

METHOD BLANK

Method Blank

SDG 6117

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507011-26

Client sample id Method Blank

Dept sample id 6117-026

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Uranium 233/234	11-08-5	-0.004	0.006	0.01	0.01	U	U
Uranium 235	14117-96-1	-0.003	0.003	0.01	0.01	U	U
Uranium 238	7440-61-1	0.001	0.003	0.005	0.01	U	U

QC-BLANK #24418

METHOD BLANKS

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-22

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-22

Client sample id Lab Control Sample

Dept sample id 6117-022

Material/Matrix SOIL

ANALYTE	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
Tritium	9800	460	300	500		H	19500	780	50	90-110	
Strontium 90	9.9	0.33	0.1	0.5		SR	9.70	0.39	102	83-117	
Thorium 228	0.017	0.029	0.06	0.1	U	TH					
Thorium 230	2.0	0.18	0.04	0.1		TH	1.79	0.072	112	81-119	
Thorium 232	0.003	0.011	0.02	0.1	U	TH					
Uranium 233/234	1.2	0.13	0.07	0.01		U	1.30	0.052	92	82-118	
Uranium 235	1.1	0.12	0.02	0.01		U	0.990	0.040	111	78-122	
Uranium 238	1.3	0.14	0.06	0.01		U	1.29	0.052	101	80-120	
Plutonium 238	0.34	0.029	0.006	0.01		PU	0.347	0.014	98	84-116	
Plutonium 239/240	0.30	0.028	0.004	0.01		PU	0.309	0.012	97	83-117	
A SCAN ANALYTES											
Potassium 40	U		0.1		U	GAM					
Chromium 51	U		0.05		U	GAM					
Manganese 54	U		0.006		U	GAM					
Cobalt 58	U		0.005		U	GAM					
Iron 59	U		0.01		U	GAM					
Cobalt 60	U		0.007		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.006		U	GAM					
Ruthenium 103	U		0.006		U	GAM					
Ruthenium 106	U		0.05		U	GAM					
Tin 113	U		0.008		U	GAM					
Cesium 134	U		0.007		U	GAM					
Cesium 137	0.41	0.015		0.02		GAM	0.372	0.015	110	74-126	
Cerium 144	U		0.03		U	GAM					
Europium 152	U		0.01		U	GAM					
Europium 154	U		0.007		U	GAM					
Europium 155	U		0.01		U	GAM					
Radium 226	U		0.01		U	GAM					
Thorium 232	U		0.03		U	GAM					

CONTROL SAMPLES

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Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-22

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-22Client sample id Lab Control SampleDept sample id 6117-022Material/Matrix SOIL

QC-LCS #24263

CONTROL SAMPLES

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-25

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-25

Dept sample id 6117-025

Client sample id Lab Control Sample

Material/Matrix SOIL

ANALYTE	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
Uranium 233/234	1.3	0.081	0.04	0.01		U	1.30	0.052	100	86-114	
Uranium 235	1.0	0.070	0.006	0.01		U	0.990	0.040	101	84-116	
Uranium 238	1.3	0.081	0.04	0.01		U	1.29	0.052	101	86-114	

QC-LCS #24417

CONTROL SAMPLES

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Lab id TMAN

Protocol ROCKETDYNE

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-24

A4CM-95-0121

DUPLICATE

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N507011-24Lab sample id N507011-01Client sample id A4CM-95-0121Dept sample id 6117-024Dept sample id 6117-001Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 10.1

Chain of custody id _____

ANALYTE	DUPLICATE 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 t	3σ TOT	PROT LIMIT
Tritium	28	490	900	500	U	H	-310	500	900	U	-		
Strontium 90	0.049	0.059	0.1	0.5	U	SR	0.062	0.046	0.07	U	-		
Thorium 228	0.89	0.13	0.07	0.1		TH	1.2	0.21	0.05		30	37	
Thorium 230	0.61	0.10	0.05	0.1		TH	1.0	0.19	0.05		48	42	
Thorium 232	0.85	0.12	0.03	0.1		TH	1.2	0.20	0.05		34	36	
Uranium 233/234	0.64	0.040	0.01	0.01		U	0.68	0.044	0.009		6	17	
Uranium 235	0.036	0.009	0.004	0.01		U	0.040	0.010	0.005		11	54	
Uranium 238	0.75	0.044	0.007	0.01		U	0.77	0.048	0.008		3	17	
Plutonium 238	0	0.002	0.004	0.01	U	PU	0.001	0.001	0.005	U	-		
Plutonium 239/240	0.002	0.003	0.003	0.01	U	PU	0.019	0.007	0.005		162	110	
GAMMA SCAN ANALYTES													
Potassium 40	15	0.79				GAM	17	0.53			12	34	
Chromium 51	U		0.7		U	GAM	U		0.3	U	-		
Manganese 54	U		0.04		U	GAM	U		0.02	U	-		
Cobalt 58	U		0.06		U	GAM	U		0.03	U	-		
Iron 59	U		0.2		U	GAM	U		0.08	U	-		
Cobalt 60	U		0.06		U	GAM	U		0.02	U	-		
Zinc 65	U		0.1		U	GAM	U		0.06	U	-		
Niobium 94	U		0.03		U	GAM	U		0.02	U	-		
Ruthenium 103	U		0.06		U	GAM	U		0.03	U	-		
Ruthenium 106	U		0.3		U	GAM	U		0.2	U	-		
Tin 113	U		0.05		U	GAM	U		0.03	U	-		
Cesium 134	U		0.05		U	GAM	U		0.03	U	-		
Cesium 137	0.071	0.036		0.02		GAM	0.095	0.024			29	85	
Cerium 144	U		0.2		U	GAM	U		0.1	U	-		
Europium 152	U		0.08		U	GAM	U		0.05	U	-		
Europium 154	U		0.05		U	GAM	U		0.03	U	-		
Europium 155	U		0.1		U	GAM	U		0.07	U	-		

DUPLICATES

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-24

A4CM-95-0121

DUPLICATE, cont.

SDG 6117

Contact Italy E. Pittman

DUPLICATE

Lab sample id N507011-24

Dept sample id 6117-024

Client Rocketdyne

Contract R44PJZ94034044

ORIGINAL

Lab sample id N507011-01

Dept sample id 6117-001

Received 07/06/95

% moisture 10.1

Client sample id A4CM-95-0121

Location/Matrix SSFL AREA 4 SOIL

Collected 06/12/95 14:45

Chain of custody id

ANALYTE	DUPLICATE 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 TOT	PROT LIMIT
Radium 226	0.65	0.074				GAM	0.59	0.046			10	38	
Thorium 232	1.0	0.17				GAM	1.1	0.12			10	44	

QC-DUP#1 24265

DUPLICATES

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DUP

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-01

A4CM-95-0121

DATA SHEET

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-01Client sample id A4CM-95-0121Dept sample id 6117-001Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 10.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-310	500	900	500	U	H
Strontium 90	10098-97-2	0.062	0.046	0.07	0.5	U	SR
Thorium 228		1.2	0.21	0.05	0.1		TH
Thorium 230	14269-63-7	1.0	0.19	0.05	0.1		TH
Thorium 232	7740-29-1	1.2	0.20	0.05	0.1		TH
Uranium 233/234	11-08-5	0.68	0.044	0.009	0.01		U
Uranium 235	14117-96-1	0.040	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.77	0.048	0.008	0.01		U
Polonium 238	13981-16-3	0.001	0.001	0.005	0.01	U	PU
Polonium 239/240	10-12-8	0.019	0.007	0.005	0.01		PU
GAMMA SCAN ANALYTES							
Potassium 40		17	0.53				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.08		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.095	0.024		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.07		U	GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-01

A4CM-95-0121

DATA SHEET, cont

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-01Client sample id A4CM-95-0121Dept sample id 6117-001Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 10.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.59	0.046				GAM
Thorium 232		1.1	0.12				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-02

A4CM-95-0122

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-02Client sample id A4CM-95-0122Dept sample id 6117-002Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 9.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-82	570	1000	500	U	H
Strontium 90	10098-97-2	0.062	0.056	0.08	0.5	U	SR
Thorium 228		1.1	0.12	0.04	0.1		TH
Thorium 230	14269-63-7	0.88	0.11	0.03	0.1		TH
Thorium 232	7740-29-1	0.93	0.11	0.02	0.1		TH
Uranium 233/234	11-08-5	0.89	0.053	0.01	0.01		U
Uranium 235	14117-96-1	0.041	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.88	0.052	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.007	0.004	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.56				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.05		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.13	0.018		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

DATA SHEETS

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-02

A4CM-95-0122

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-02Client sample id A4CM-95-0122Dept sample id 6117-002Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 9.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.76	0.053				GAM
Thorium 232		1.3	0.13				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-03

A4CM-95-0123

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-03Client sample id A4CM-95-0123Dept sample id 6117-003Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 9.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-180	550	1000	500	U	H
Strontium 90	10098-97-2	0.047	0.056	0.08	0.5	U	SR
Thorium 228		0.66	0.10	0.05	0.1		TH
Thorium 230	14269-63-7	0.59	0.087	0.03	0.1		TH
Thorium 232	7740-29-1	0.71	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.83	0.054	0.01	0.01		U
Uranium 235	14117-96-1	0.044	0.011	0.005	0.01		U
Uranium 238	7440-61-1	0.84	0.054	0.009	0.01		U
Polonium 238	13981-16-3	0.001	0.003	0.005	0.01	U	PU
Polonium 239/240	10-12-8	0.005	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.63				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.16	0.034		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-03

A4CM-95-0123

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-03Client sample id A4CM-95-0123Dept sample id 6117-003Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 9.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.76	0.057				GAM
Thorium 232		1.2	0.13				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-04

A4CM-95-0124

DATA SHEET

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-04Client sample id A4CM-95-0124Dept sample id 6117-004Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 3.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-120	610	1000	500	U	H
Strontium 90	10098-97-2	0.13	0.057	0.08	0.5	J	SR
Thorium 228		0.89	0.12	0.06	0.1		TH
Thorium 230	14269-63-7	0.64	0.097	0.04	0.1		TH
Thorium 232	7740-29-1	0.95	0.12	0.02	0.1		TH
Uranium 233/234	11-08-5	0.60	0.044	0.01	0.01		U
Uranium 235	14117-96-1	0.030	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.66	0.047	0.007	0.01		U
Polonium 238	13981-16-3	0.002	0.003	0.004	0.01	U	PU
Polonium 239/240	10-12-8	0.005	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		15	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.17	0.023		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.09		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-04

A4CM-95-0124

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-04Client sample id A4CM-95-0124Dept sample id 6117-004Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 3.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.55	0.056				GAM
Thorium 232		1.1	0.13				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-05

DATA SHEET

A4CM-95-0125

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-05Client sample id A4CM-95-0125Dept sample id 6117-005Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 13.9

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-390	430	800	500	U	H
Strontium 90	10098-97-2	0.003	0.042	0.07	0.5	U	SR
Thorium 228		0.65	0.089	0.05	0.1		TH
Thorium 230	14269-63-7	0.56	0.082	0.03	0.1		TH
Thorium 232	7740-29-1	0.65	0.088	0.02	0.1		TH
Uranium 233/234	11-08-5	0.68	0.043	0.009	0.01		U
Uranium 235	14117-96-1	0.033	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.74	0.046	0.007	0.01		U
Uranium 238	13981-16-3	0.001	0.002	0.004	0.01	U	PU
Uranium 239/240	10-12-8	0.002	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.64				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.084	0.031		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.09		U	GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-05

A4CM-95-0125

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-05Client sample id A4CM-95-0125Dept sample id 6117-005Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/12/95 14:45% moisture 13.9

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.67	0.053				GAM
Thorium 232		1.3	0.12				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-06

A4CM-95-0126

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-06Client sample id A4CM-95-0126Dept sample id 6117-006Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/13/95 13:45% moisture 5.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-470	1100	2000	500	U	H
Strontium 90	10098-97-2	0.053	0.052	0.07	0.5	U	SR
Thorium 228		0.83	0.11	0.06	0.1		TH
Thorium 230	14269-63-7	0.76	0.10	0.03	0.1		TH
Thorium 232	7740-29-1	0.79	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.84	0.052	0.009	0.01		U
Uranium 235	14117-96-1	0.042	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.81	0.050	0.009	0.01		U
Plutonium 238	13981-16-3	0	0.001	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.57				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.15	0.027		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.08		U	GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-06

A4CM-95-0126

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-06Client sample id A4CM-95-0126Dept sample id 6117-006Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/13/95 13:45% moisture 5.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.77	0.051				GAM
Thorium 232		1.0	0.14				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-07

A4CM-95-0127

DATA SHEET

SDG 6117

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-07Client sample id A4CM-95-0127Dept sample id 6117-007Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/13/95 13:45% moisture 2.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-480	2100	4000	500	U	H
Strontium 90	10098-97-2	0.019	0.064	0.1	0.5	U	SR
Thorium 228		1.1	0.15	0.07	0.1		TH
Thorium 230	14269-63-7	0.79	0.12	0.03	0.1		TH
Thorium 232	7740-29-1	1.0	0.14	0.03	0.1		TH
Uranium 233/234	11-08-5	0.88	0.057	0.01	0.01		U
Uranium 235	14117-96-1	0.053	0.013	0.005	0.01		U
Uranium 238	7440-61-1	0.91	0.058	0.009	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.007	0.004	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.68				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.04		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.09		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.3		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.032	0.026		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.1		U	GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-07

A4CM-95-0127

DATA SHEET, cont

SDG 6117

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507011-07

Client sample id A4CM-95-0127

Dept sample id 6117-007

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/13/95 13:45

% moisture 2.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.86	0.062				GAM
Thorium 232		1.4	0.14				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-08

DATA SHEET

A4CM-95-0128

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-08Client sample id A4CM-95-0128Dept sample id 6117-008Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/13/95 13:45% moisture 7.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-120	590	1000	500	U	H
Strontium 90	10098-97-2	0.052	0.056	0.09	0.5	U	SR
Thorium 228		1.4	0.097	0.03	0.1		TH
Thorium 230	14269-63-7	0.98	0.079	0.02	0.1		TH
Thorium 232	7740-29-1	1.4	0.096	0.01	0.1		TH
Uranium 233/234	11-08-5	0.83	0.058	0.01	0.01		U
Uranium 235	14117-96-1	0.055	0.013	0.006	0.01		U
Uranium 238	7440-61-1	0.84	0.059	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.006	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES							
Potassium 40		19	0.66				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.17	0.031		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.2		U	GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-08

A4CM-95-0128

DATA SHEET, cont

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-08Client sample id A4CM-95-0128Dept sample id 6117-008Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/13/95 13:45% moisture 7.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.057				GAM
Thorium 232		1.4	0.13				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-09

A4CM-95-0129

DATA SHEET

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-09

Client sample id A4CM-95-0129

Dept sample id 6117-009

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/13/95 13:45

% moisture 4.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-200	1200	2000	500	U	H
Strontium 90	10098-97-2	0.088	0.053	0.08	0.5	J	SR
Thorium 228		1.2	0.14	0.06	0.1		TH
Thorium 230	14269-63-7	1.0	0.12	0.02	0.1		TH
Thorium 232	7740-29-1	1.0	0.13	0.02	0.1		TH
Uranium 233/234	11-08-5	0.97	0.065	0.01	0.01		U
Uranium 235	14117-96-1	0.035	0.011	0.006	0.01		U
Uranium 238	7440-61-1	0.92	0.062	0.009	0.01		U
Plutonium 238	13981-16-3	-0.001	0.004	0.008	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		19	0.65				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.19	0.032		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.1		U	GAM

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-09

A4CM-95-0129

DATA SHEET, cont

SDG 6117
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507011-09
Dept sample id 6117-009
Received 07/06/95
% moisture 4.5Client sample id A4CM-95-0129
Location/Matrix SSFL AREA 4 SOIL
Collected 06/13/95 13:45
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.91	0.059				GAM
Thorium 232		1.4	0.14				GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-10

A4CM-95-0132

DATA SHEET

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-10

Client sample id A4CM-95-0132

Dept sample id 6117-010

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/14/95 12:00

% moisture 11.1

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-200	450	800	500	U	H
Strontium 90	10098-97-2	0.11	0.057	0.08	0.5	J	SR
Thorium 228		0.90	0.11	0.04	0.1		TH
Thorium 230	14269-63-7	0.60	0.082	0.02	0.1		TH
Thorium 232	7740-29-1	1.0	0.11	0.02	0.1		TH
Uranium 233/234	11-08-5	0.64	0.047	0.009	0.01		U
Uranium 235	14117-96-1	0.024	0.009	0.006	0.01		U
Uranium 238	7440-61-1	0.66	0.048	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.012	0.005	0.005	0.01		PU
GAMMA SCAN ANALYTES							
Potassium 40		11	0.59				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.29	0.035		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-10

A4CM-95-0132

DATA SHEET, cont

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-10Client sample id A4CM-95-0132Dept sample id 6117-010Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/14/95 12:00% moisture 11.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.54	0.056				GAM
Thorium 232		0.89	0.13				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-11

A4CM-95-0133

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-11Client sample id A4CM-95-0133Dept sample id 6117-011Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/14/95 12:00% moisture 11.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-290	490	900	500	U	H
Strontium 90	10098-97-2	0.031	0.057	0.06	0.5	U	SR
Thorium 228		1.0	0.17	0.1	0.1		TH
Thorium 230	14269-63-7	0.50	0.12	0.04	0.1		TH
Thorium 232	7740-29-1	0.83	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.69	0.046	0.008	0.01		U
Uranium 235	14117-96-1	0.025	0.009	0.005	0.01		U
Uranium 238	7440-61-1	0.79	0.050	0.006	0.01		U
Polonium 238	13981-16-3	-0.001	0.003	0.007	0.01	U	PU
Polonium 239/240	10-12-8	-0.001	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.35				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.06		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.04		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.042	0.018		0.02		GAM
Cerium 144		U		0.08		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.07		U	GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-11

A4CM-95-0133

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-11Client sample id A4CM-95-0133Dept sample id 6117-011Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/14/95 12:00% moisture 11.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.70	0.034				GAM
Thorium 232		1.3	0.081				GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-12

A4CM-95-0134

DATA SHEET

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-12

Client sample id A4CM-95-0134

Dept sample id 6117-012

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/14/95 12:00

% moisture 10.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-290	470	800	500	U	H
Strontium 90	10098-97-2	0.12	0.070	0.07	0.5	J	SR
Thorium 228		1.1	0.24	0.2	0.1		TH
Thorium 230	14269-63-7	0.64	0.17	0.1	0.1		TH
Thorium 232	7740-29-1	0.86	0.20	0.08	0.1		TH
Uranium 233/234	11-08-5	0.68	0.042	0.009	0.01		U
Uranium 235	14117-96-1	0.035	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.74	0.045	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.003	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		16	0.42				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.07		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.099	0.021		0.02		GAM
Cerium 144		U		0.09		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.1		U	GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-12

A4CM-95-0134

DATA SHEET, cont

SDG 6117

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-12Client sample id A4CM-95-0134Dept sample id 6117-012Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/14/95 12:00% moisture 10.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.67	0.041				GAM
Thorium 232		1.2	0.094				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-13

A4CM-95-0135

DATA SHEET

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507011-13

Client sample id A4CM-95-0135

Dept sample id 6117-013

Location/Matrix SSFL AREA 4

SOIL

Received 07/06/95

Collected 06/14/95 12:00

% moisture 9.4

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-160	560	1000	500	U	H
Strontium 90	10098-97-2	0.051	0.035	0.04	0.5	J	SR
Thorium 228		0.80	0.11	0.06	0.1		TH
Thorium 230	14269-63-7	0.61	0.088	0.03	0.1		TH
Thorium 232	7740-29-1	0.77	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.46	0.034	0.008	0.01		U
Uranium 235	14117-96-1	0.032	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.51	0.036	0.007	0.01		U
Plutonium 238	13981-16-3	0.002	0.003	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		9.3	0.29				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.01		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.05		U	GAM
Cobalt 60		U		0.01		U	GAM
Zinc 65		U		0.04		U	GAM
Niobium 94		U		0.01		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.067	0.016		0.02		GAM
Cerium 144		U		0.08		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.06		U	GAM

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

DATA SHEETS

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-13

A4CM-95-0135

DATA SHEET, cont

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-13Client sample id A4CM-95-0135Dept sample id 6117-013Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/14/95 12:00% moisture 9.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.40	0.029				GAM
Thorium 232		0.76	0.067				GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-14

A4CM-95-0136

DATA SHEET

SDG 6117

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-14Client sample id A4CM-95-0136Dept sample id 6117-014Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 9.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-370	480	900	500	U	H
Strontium 90	10098-97-2	0.061	0.045	0.04	0.5	J	SR
Thorium 228		0.95	0.18	0.1	0.1		TH
Thorium 230	14269-63-7	0.88	0.15	0.05	0.1		TH
Thorium 232	7740-29-1	0.83	0.15	0.05	0.1		TH
Uranium 233/234	11-08-5	0.64	0.042	0.009	0.01		U
Uranium 235	14117-96-1	0.041	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.71	0.045	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.002	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.014	0.005	0.005	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.11	0.027		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.1		U	GAM

ATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-14

A4CM-95-0136

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-14Client sample id A4CM-95-0136Dept sample id 6117-014Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 9.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.73	0.057				GAM
Thorium 232		1.1	0.13				GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-15

A4CM-95-0137

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-15Client sample id A4CM-95-0137Dept sample id 6117-015Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 3.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-1500	1400	3000	500	U	H
Strontium 90	10098-97-2	0.053	0.052	0.05	0.5	J	SR
Thorium 228		0.91	0.12	0.07	0.1		TH
Thorium 230	14269-63-7	1.0	0.13	0.03	0.1		TH
Thorium 232	7740-29-1	0.96	0.12	0.03	0.1		TH
Uranium 233/234	11-08-5	1.1	0.063	0.01	0.01		U
Uranium 235	14117-96-1	0.049	0.011	0.005	0.01		U
Uranium 238	7440-61-1	1.1	0.060	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.001	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.004	0.005	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.70				GAM
Chromium 51		U		0.5		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.05		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.12	0.033		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.07		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

ATA SHEETS

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-15

A4CM-95-0137

DATA SHEET, cont

SDG 6117Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507011-15Client sample id A4CM-95-0137Dept sample id 6117-015Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 3.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.97	0.064				GAM
Thorium 232		1.4	0.15				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-16

A4CM-95-0138

DATA SHEET

SDG 6117

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507011-16

Client sample id A4CM-95-0138

Dept sample id 6117-016

Location/Matrix SSFL AREA 4

SOIL

Received 07/06/95

Collected 06/15/95 13:30

% moisture 9.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-360	310	600	500	U	H
Strontium 90	10098-97-2	0.054	0.042	0.04	0.5	J	SR
Thorium 228		1.3	0.21	0.1	0.1		TH
Thorium 230	14269-63-7	0.88	0.16	0.05	0.1		TH
Thorium 232	7740-29-1	1.1	0.19	0.05	0.1		TH
Uranium 233/234	11-08-5	0.63	0.041	0.009	0.01		U
Uranium 235	14117-96-1	0.043	0.011	0.005	0.01		U
Uranium 238	7440-61-1	0.68	0.044	0.007	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.003	0.003	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		14	0.49				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.08		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.032	0.023		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-16

A4CM-95-0138

DATA SHEET, cont

SDG 6117
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507011-16
Dept sample id 6117-016
Received 07/06/95
% moisture 9.2Client sample id A4CM-95-0138
Location/Matrix SSFL AREA 4 SOIL
Collected 06/15/95 13:30
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.57	0.043				GAM
Thorium 232		1.1	0.12				GAM

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-17

A4CM-95-0139

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-17Client sample id A4CM-95-0139Dept sample id 6117-017Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 12.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-240	450	800	500	U	H
Strontium 90	10098-97-2	0.080	0.055	0.09	0.5	U	SR
Thorium 228		1.1	0.11	0.04	0.1		TH
Thorium 230	14269-63-7	0.81	0.092	0.02	0.1		TH
Thorium 232	7740-29-1	1.0	0.10	0.02	0.1		TH
Uranium 233/234	11-08-5	0.66	0.042	0.009	0.01		U
Uranium 235	14117-96-1	0.041	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.72	0.045	0.007	0.01		U
Plutonium 238	13981-16-3	-0.003	0.002	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		15	0.58				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.1		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.092	0.026		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.1		U	GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-17

DATA SHEET, cont

A4CM-95-0139

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-17Client sample id A4CM-95-0139Dept sample id 6117-017Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/15/95 13:30% moisture 12.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.70	0.057				GAM
Thorium 232		0.92	0.13				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-18

A4CM-95-0140

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-18Client sample id A4CM-95-0140Dept sample id 6117-018Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 6.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-270	780	1000	500	U	H
Strontium 90	10098-97-2	0.027	0.059	0.1	0.5	U	SR
Thorium 228		1.4	0.14	0.07	0.1		TH
Thorium 230	14269-63-7	1.1	0.12	0.03	0.1		TH
Thorium 232	7740-29-1	1.4	0.14	0.02	0.1		TH
Uranium 233/234	11-08-5	1.1	0.063	0.01	0.01		U
Uranium 235	14117-96-1	0.046	0.012	0.005	0.01		U
Uranium 238	7440-61-1	1.1	0.061	0.008	0.01		U
Plutonium 238	13981-16-3	0.001	0.003	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.024	0.006	0.004	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.62				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.10	0.024		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.09		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

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SUMMARY DATA SECTION

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TMA/RICHMOND

REPORTING GROUP 6117

N507011-18

A4CM-95-0140

DATA SHEET, cont

SDG 6117
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507011-18Client sample id A4CM-95-0140Dept sample id 6117-018Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 6.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.96	0.058				GAM
Thorium 232		1.2	0.14				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-19

A4CM-95-0141

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-19Client sample id A4CM-95-0141Dept sample id 6117-019Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 4.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-200	1100	2000	500	U	H
Strontium 90	10098-97-2	0.036	0.059	0.1	0.5	U	SR
Thorium 228		1.3	0.17	0.08	0.1		TH
Thorium 230	14269-63-7	1.0	0.14	0.04	0.1		TH
Thorium 232	7740-29-1	1.3	0.16	0.03	0.1		TH
Uranium 233/234	11-08-5	0.90	0.051	0.01	0.01		U
Uranium 235	14117-96-1	0.053	0.011	0.005	0.01		U
Uranium 238	7440-61-1	0.94	0.052	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.001	0.003	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.003	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		23	0.41				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.07		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.064	0.018		0.02		GAM
Cerium 144		U		0.09		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.07		U	GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-19

A4CM-95-0141

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-19Client sample id A4CM-95-0141Dept sample id 6117-019Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 4.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.95	0.032				GAM
Thorium 232		1.4	0.091				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-20

A4CM-95-0142

DATA SHEET

SDG 6117

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-20Client sample id A4CM-95-0142Dept sample id 6117-020Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 5.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-570	760	1000	500	U	H
Strontium 90	10098-97-2	0.040	0.058	0.1	0.5	U	SR
Thorium 228		1.1	0.12	0.06	0.1		TH
Thorium 230	14269-63-7	0.81	0.10	0.03	0.1		TH
Thorium 232	7740-29-1	1.0	0.12	0.02	0.1		TH
Uranium 233/234	11-08-5	0.80	0.048	0.01	0.01		U
Uranium 235	14117-96-1	0.042	0.011	0.004	0.01		U
Uranium 238	7440-61-1	0.85	0.050	0.008	0.01		U
Plutonium 238	13981-16-3	0.001	0.001	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.39				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.06		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.01		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		U		0.02	0.02	U	GAM
Cerium 144		U		0.09		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.06		U	GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-20

DATA SHEET, cont

A4CM-95-0142

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-20Client sample id A4CM-95-0142Dept sample id 6117-020Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 5.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.81	0.036				GAM
Thorium 232		1.3	0.085				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

N507011-21

DATA SHEET

A4CM-95-0143

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-21Client sample id A4CM-95-0143Dept sample id 6117-021Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 6.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-390	660	1000	500	U	H
Strontium 90	10098-97-2	-0.012	0.049	0.1	0.5	U	SR
Thorium 228		1.0	0.16	0.1	0.1		TH
Thorium 230	14269-63-7	0.80	0.13	0.03	0.1		TH
Thorium 232	7740-29-1	1.2	0.16	0.03	0.1		TH
Uranium 233/234	11-08-5	0.81	0.056	0.01	0.01		U
Uranium 235	14117-96-1	0.046	0.012	0.006	0.01		U
Uranium 238	7440-61-1	0.82	0.056	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.003	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.38				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.06		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		U		0.02	0.02	U	GAM
Cerium 144		U		0.08		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.09		U	GAM

DATA SHEETS

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6117

N507011-21

A4CM-95-0143

DATA SHEET, cont

SDG 6117Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507011-21Client sample id A4CM-95-0143Dept sample id 6117-021Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/19/95 13:15% moisture 6.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.79	0.033				GAM
Thorium 232		1.3	0.065				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPY

Test PU Matrix SOIL

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX PLANCHET	Plutonium 238	Plutonium 239/240
Preparation batch 2781-146				
A4CM-95-0121	N507011-01	6117-001	U	0.019
A4CM-95-0122	N507011-02	6117-002	U	0.007 J
A4CM-95-0123	N507011-03	6117-003	U	0.005 J
A4CM-95-0124	N507011-04	6117-004	U	0.005 J
A4CM-95-0125	N507011-05	6117-005	U	U
A4CM-95-0126	N507011-06	6117-006	U	0.005 J
A4CM-95-0127	N507011-07	6117-007	U	0.007 J
A4CM-95-0128	N507011-08	6117-008	U	0.006 J
A4CM-95-0129	N507011-09	6117-009	U	U
A4CM-95-0132	N507011-10	6117-010	U	0.012
A4CM-95-0133	N507011-11	6117-011	U	U
A4CM-95-0134	N507011-12	6117-012	U	U
A4CM-95-0135	N507011-13	6117-013	U	U
A4CM-95-0136	N507011-14	6117-014	U	0.014
A4CM-95-0137	N507011-15	6117-015	U	0.005 J
A4CM-95-0138	N507011-16	6117-016	U	0.004 J
A4CM-95-0139	N507011-17	6117-017	U	U
A4CM-95-0140	N507011-18	6117-018	U	0.024
A4CM-95-0141	N507011-19	6117-019	U	U
A4CM-95-0142	N507011-20	6117-020	U	U
A4CM-95-0143	N507011-21	6117-021	U	U
BLK (QC ID=24263)	N507011-23	6117-023	U	U
LCS (QC ID=24263)	N507011-22	6117-022	ok	ok
Duplicate (N507011-01)	N507011-24	6117-024	- U	OUT U
Nominal values and limits from method			RDLs (pCi/g)	0.01 0.01

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest PU Matrix SOIL
SDG 6117
act Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX pCi/g	MDA g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146		2σ prep error 5.0 %			Reference Lab Notebook 2781 pg. 146												
A4CM-95-0121	N507011-01			0.005	3.00				51	1079				53	07/28/95	08/04	SS-002
A4CM-95-0122	N507011-02			0.007	3.00				54	1212				51	07/28/95	08/02	SS-044
A4CM-95-0123	N507011-03			0.005	3.00				62	1212				51	07/28/95	08/02	SS-045
A4CM-95-0124	N507011-04			0.004	3.00				70	1212				51	07/28/95	08/02	SS-046
A4CM-95-0125	N507011-05			0.004	3.00				65	1079				53	07/28/95	08/04	SS-003
A4CM-95-0126	N507011-06			0.004	3.00				69	1079				52	07/28/95	08/04	SS-004
A4CM-95-0127	N507011-07			0.004	3.00				75	1079				52	07/28/95	08/04	SS-005
A4CM-95-0128	N507011-08			0.004	3.00				82	1079				52	07/28/95	08/04	SS-006
A4CM-95-0129	N507011-09			0.008	3.00				65	1079				52	07/28/95	08/04	SS-007
A4CM-95-0132	N507011-10			0.007	3.00				70	1374				56	07/28/95	08/09	SS-051
A4CM-95-0133	N507011-11			0.008	3.00				71	1079				51	07/28/95	08/04	SS-008
A4CM-95-0134	N507011-12			0.005	3.00				81	1079				51	07/28/95	08/04	SS-010
A4CM-95-0135	N507011-13			0.004	3.00				78	1374				56	07/28/95	08/09	SS-052
A4CM-95-0136	N507011-14			0.006	3.00				87	1374				55	07/28/95	08/09	SS-055
A4CM-95-0137	N507011-15			0.005	3.00				55	1079				50	07/28/95	08/04	SS-011
A4CM-95-0138	N507011-16			0.004	3.00				86	1374				55	07/28/95	08/09	SS-059
A4CM-95-0139	N507011-17			0.007	3.00				73	1079				50	07/28/95	08/04	SS-012
A4CM-95-0140	N507011-18			0.005	3.00				86	1374				51	07/28/95	08/09	SS-060
A4CM-95-0141	N507011-19			0.003	3.00				82	1079				46	07/28/95	08/04	SS-013
A4CM-95-0142	N507011-20			0.004	3.00				76	1079				46	07/28/95	08/04	SS-014
A4CM-95-0143	N507011-21			0.005	3.00				84	1374				51	07/28/95	08/09	SS-061
BLK (QC ID=24263)	N507011-23			0.005	3.00				60	1079					07/28/95	08/04	SS-015
LCS (QC ID=24263)	N507011-22			0.006	3.00				61	1374					07/28/95	08/09	SS-062
Duplicate (N507011-01)	N507011-24			0.004	3.00				80	1079				53	07/28/95	08/04	SS-016
1 values and limits from method				0.01	3.00				20-105	500	100			180			

PROCEDURES	REFERENCE	HASL 300/PU-02
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.005 ± 0.003
FOR 24 SAMPLES	YIELD	72 ± 22

METHOD SUMMARIES

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SUMMARY DATA SECTION

Page 61

Lab id	TMA
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

Test TH Matrix SOIL

SDG 6117

Contact Italy E. Pittman

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
Preparation batch 2781-146						
A4CM-95-0121	N507011-01	AOR1	6117-001	1.2	1.0	1.2
A4CM-95-0122	N507011-02		6117-002	1.1	0.88	0.93
A4CM-95-0123	N507011-03		6117-003	0.66	0.59	0.71
A4CM-95-0124	N507011-04		6117-004	0.89	0.64	0.95
A4CM-95-0125	N507011-05		6117-005	0.65	0.56	0.65
A4CM-95-0126	N507011-06		6117-006	0.83	0.76	0.79
A4CM-95-0127	N507011-07		6117-007	1.1	0.79	1.0
A4CM-95-0128	N507011-08		6117-008	1.4	0.98	1.4
A4CM-95-0129	N507011-09		6117-009	1.2	1.0	1.0
A4CM-95-0132	N507011-10		6117-010	0.90	0.60	1.0
A4CM-95-0133	N507011-11		6117-011	1.0	0.50	0.83
A4CM-95-0134	N507011-12		6117-012	1.1	0.64	0.86
A4CM-95-0135	N507011-13		6117-013	0.80	0.61	0.77
A4CM-95-0136	N507011-14		6117-014	0.95	0.88	0.83
A4CM-95-0137	N507011-15		6117-015	0.91	1.0	0.96
A4CM-95-0138	N507011-16		6117-016	1.3	0.88	1.1
A4CM-95-0139	N507011-17		6117-017	1.1	0.81	1.0
A4CM-95-0140	N507011-18	AOR1	6117-018	1.4	1.1	1.4
A4CM-95-0141	N507011-19		6117-019	1.3	1.0	1.3
A4CM-95-0142	N507011-20		6117-020	1.1	0.81	1.0
A4CM-95-0143	N507011-21		6117-021	1.0	0.80	1.2
BLK (QC ID=24264)	N507011-23		6117-023	U	U	U
LCS (QC ID=24263)	N507011-22		6117-022	No data U	ok	No data U
Duplicate (N507011-01)	N507011-24		6117-024	ok	OUT	ok
Nominal values and limits from method				RDLs (pCi/g)	0.1	0.1
					0.1	0.1

METHOD SUMMARIES

Page 3

SUMMARY DATA SECTION

Page 62

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest TH Matrix SOIL
SDG 6117
act Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 146																
A4CM-95-0121	N507011-01	AOR1		0.05	1.00			35		442			54	08/03/95	08/05	SS-048
A4CM-95-0122	N507011-02			0.04	1.00			76		527			50	07/28/95	08/01	SS-028
A4CM-95-0123	N507011-03			0.05	1.00			69		527			50	07/28/95	08/01	SS-029
A4CM-95-0124	N507011-04			0.06	1.00			68		527			50	07/28/95	08/01	SS-036
A4CM-95-0125	N507011-05			0.05	1.00			79		527			50	07/28/95	08/01	SS-039
A4CM-95-0126	N507011-06			0.06	1.00			70		527			49	07/28/95	08/01	SS-040
A4CM-95-0127	N507011-07			0.07	1.00			58		527			49	07/28/95	08/01	SS-041
A4CM-95-0128	N507011-08			0.03	1.00			67		1259			49	07/28/95	08/01	SS-032
A4CM-95-0129	N507011-09			0.06	1.00			66		547			50	07/28/95	08/02	SS-027
A4CM-95-0132	N507011-10			0.04	1.00			77		547			49	07/28/95	08/02	SS-028
A4CM-95-0133	N507011-11			0.1	1.00			35		547			49	07/28/95	08/02	SS-029
A4CM-95-0134	N507011-12			0.2	1.00			20		547			49	07/28/95	08/02	SS-036
A4CM-95-0135	N507011-13			0.06	1.00			67		547			49	07/28/95	08/02	SS-039
A4CM-95-0136	N507011-14			0.1	1.00			34		547			48	07/28/95	08/02	SS-040
A4CM-95-0137	N507011-15			0.07	1.00			63		547			48	07/28/95	08/02	SS-041
A4CM-95-0138	N507011-16			0.1	1.00			27		635			48	07/28/95	08/02	SS-028
A4CM-95-0139	N507011-17			0.04	1.00			75		635			48	07/28/95	08/02	SS-029
A4CM-95-0140	N507011-18	AOR1		0.07	1.00			37		1074			49	08/04/95	08/07	SS-032
A4CM-95-0141	N507011-19			0.08	1.00			42		633			44	07/28/95	08/02	SS-039
A4CM-95-0142	N507011-20			0.06	1.00			61		633			44	07/28/95	08/02	SS-040
A4CM-95-0143	N507011-21			0.1	1.00			40		633			44	07/28/95	08/02	SS-041
BLK (QC ID=24264)	N507011-23			0.04	1.00			86		574				07/28/95	08/02	SS-029
LCS (QC ID=24263)	N507011-22			0.06	1.00			85		634				07/28/95	08/02	SS-017
Duplicate (N507011-01)	N507011-24			0.07	1.00			56		576			51	07/28/95	08/02	SS-036

Nominal values and limits from method 0.1 1.00 20-105 500 180

PROCEDURES EP-000 Data Entry and Document Preparation, rev 0
 EP-001 Q.C. Preparation, rev 0
 EP-003 Tracing, rev 0
 EP-008 Heavy Elements Electroplating, rev 0
 EP-060 Soil Preparation, rev 0
 EP-070 Soil Dissolution, rev 0
 EP-900 Thorium Purification, rev 0

AVERAGES ± 2 SD MDA 0.07 ± 0.07
 FOR 24 SAMPLES YIELD 58 ± 39

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest U Matrix SOIL
SDG 6117
Fact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
								1+3	2σ	2+3	2σ
Preparation batch 2781-146											
A4CM-95-0121	N507011-01			6117-001	0.68	0.040	0.77	88	8	5	1
A4CM-95-0122	N507011-02			6117-002	0.89	0.041	0.88	101	8	5	1
A4CM-95-0123	N507011-03			6117-003	0.83	0.044	0.84	99	9	5	1
A4CM-95-0124	N507011-04			6117-004	0.60	0.030	0.66	91	9	5	2
A4CM-95-0125	N507011-05			6117-005	0.68	0.033	0.74	92	8	4	1
A4CM-95-0126	N507011-06			6117-006	0.84	0.042	0.81	104	9	5	1
A4CM-95-0127	N507011-07			6117-007	0.88	0.053	0.91	97	9	6	1
A4CM-95-0128	N507011-08			6117-008	0.83	0.055	0.84	99	10	7	2
A4CM-95-0129	N507011-09			6117-009	0.97	0.035	0.92	105	10	4	1
A4CM-95-0132	N507011-10			6117-010	0.64	0.024	0.66	97	10	4	1
A4CM-95-0133	N507011-11			6117-011	0.69	0.025	0.79	87	8	3	1
A4CM-95-0134	N507011-12			6117-012	0.68	0.035	0.74	92	8	5	1
A4CM-95-0135	N507011-13			6117-013	0.46	0.032	0.51	90	9	6	2
A4CM-95-0136	N507011-14			6117-014	0.64	0.041	0.71	90	8	6	1
A4CM-95-0137	N507011-15			6117-015	1.1	0.049	1.1	100	8	4	1
A4CM-95-0138	N507011-16			6117-016	0.63	0.043	0.68	93	9	6	2
A4CM-95-0139	N507011-17			6117-017	0.66	0.041	0.72	92	8	6	1
A4CM-95-0140	N507011-18			6117-018	1.1	0.046	1.1	100	8	4	1
A4CM-95-0141	N507011-19			6117-019	0.90	0.053	0.94	96	8	6	1
A4CM-95-0142	N507011-20			6117-020	0.80	0.042	0.85	94	8	5	1
BLK (QC ID=24264)	N507011-23			6117-023	U	U	U				
LCS (QC ID=24263)	N507011-22			6117-022	ok	ok	ok				
Duplicate (N507011-01)	N507011-24			6117-024	ok	ok	ok	85	7	5	1
Preparation batch 2781-146A											
A4CM-95-0143	N507011-21	A1		6117-021	0.81	0.046	0.82	99	10	6	2
F ID=24418)	N507011-26			6117-026	U	U	U				
1 ID=24417)	N507011-25			6117-025	ok	ok	ok				
Nominal values and limits from method					RDLs (pCi/g)	0.01	0.01	0.01	100	4	
									Averages	95	5

TMA/RICHMOND

REPORTING GROUP 6117

Test U Matrix SOIL

SDG 6117

act Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 146																
A4CM-95-0121	N507011-01			0.009	3.00			70		1062			49	07/27/95	07/31	SS-027
A4CM-95-0122	N507011-02			0.01	3.00			70		1062			49	07/27/95	07/31	SS-028
A4CM-95-0123	N507011-03			0.01	3.00			59		1062			49	07/27/95	07/31	SS-029
A4CM-95-0124	N507011-04			0.01	3.00			60		1062			49	07/27/95	07/31	SS-030
A4CM-95-0125	N507011-05			0.009	3.00			73		1062			49	07/27/95	07/31	SS-032
A4CM-95-0126	N507011-06			0.009	3.00			75		1062			48	07/27/95	07/31	SS-033
A4CM-95-0127	N507011-07			0.01	3.00			59		1062			48	07/27/95	07/31	SS-035
A4CM-95-0128	N507011-08			0.01	3.00			54		1062			48	07/27/95	07/31	SS-037
A4CM-95-0129	N507011-09			0.01	3.00			53		1062			48	07/27/95	07/31	SS-038
A4CM-95-0132	N507011-10			0.009	3.00			56		1060			47	07/27/95	07/31	SS-039
A4CM-95-0133	N507011-11			0.008	3.00			66		1060			47	07/27/95	07/31	SS-040
A4CM-95-0134	N507011-12			0.009	3.00			71		1215			50	08/01/95	08/03	SS-033
A4CM-95-0135	N507011-13			0.008	3.00			76		1006			51	08/01/95	08/04	SS-029
A4CM-95-0136	N507011-14			0.009	3.00			79		1012			50	08/01/95	08/04	SS-037
A4CM-95-0137	N507011-15			0.01	3.00			74		1012			50	08/01/95	08/04	SS-038
A4CM-95-0138	N507011-16			0.009	3.00			74		1012			50	08/01/95	08/04	SS-040
A4CM-95-0139	N507011-17			0.009	3.00			78		1012			50	08/01/95	08/04	SS-041
A4CM-95-0140	N507011-18			0.01	3.00			30		1075			43	08/01/95	08/01	SS-033
A4CM-95-0141	N507011-19			0.01	3.00			75		1074			49	08/01/95	08/07	SS-036
A4CM-95-0142	N507011-20			0.01	3.00			76		1074			49	08/01/95	08/07	SS-037
BLK (QC ID=24264)	N507011-23			0.01	3.00			58		1074				08/01/95	08/07	SS-041
LCS (QC ID=24263)	N507011-22			0.07	3.00			63		420				07/27/95	07/29	SS-018
Duplicate (N507011-01)	N507011-24			0.01	3.00			79		1074			56	08/01/95	08/07	SS-042
Preparation batch 2781-146A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 146																
A4CM-95-0143	N507011-21	A1		0.01	3.00			74		1033			53	08/11/95	08/11	SS-018
ID=24418)	N507011-26			0.01	3.00			73		1033				08/11/95	08/11	SS-020
ID=24417)	N507011-25			0.04	3.00			80		1033				08/11/95	08/11	SS-019
Nominal values and limits from method				0.01	3.00			30-105		720	100		180			

PROCEDURES	REFERENCE	HASL 300/U-04
EP-060		Soil Preparation, rev 0
EP-070		Soil Dissolution, rev 0
EP-910		Uranium Purification, rev 0
EP-008		Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	0.01	±	0.03
FOR 26 SAMPLES	YIELD	68	±	23

METHOD SUMMARIES

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SUMMARY DATA SECTION

Page 65

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL
BETA COUNTING

Test SR Matrix SOIL

SDG 6117

tact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Strontium 90
Preparation batch 2781-146				
A4CM-95-0121	N507011-01	6117-001	U	
A4CM-95-0122	N507011-02	6117-002	U	
A4CM-95-0123	N507011-03	6117-003	U	
A4CM-95-0124	N507011-04	6117-004	0.13 J	
A4CM-95-0125	N507011-05	6117-005	U	
A4CM-95-0126	N507011-06	6117-006	U	
A4CM-95-0127	N507011-07	6117-007	U	
A4CM-95-0128	N507011-08	6117-008	U	
A4CM-95-0129	N507011-09	6117-009	0.088 J	
A4CM-95-0132	N507011-10	6117-010	0.11 J	
A4CM-95-0133	N507011-11	6117-011	U	
A4CM-95-0134	N507011-12	6117-012	0.12 J	
A4CM-95-0135	N507011-13	6117-013	0.051 J	
A4CM-95-0136	N507011-14	6117-014	0.061 J	
A4CM-95-0137	N507011-15	6117-015	0.053 J	
A4CM-95-0138	N507011-16	6117-016	0.054 J	
A4CM-95-0139	N507011-17	6117-017	U	
A4CM-95-0140	N507011-18	6117-018	U	
A4CM-95-0141	N507011-19	6117-019	U	
A4CM-95-0142	N507011-20	6117-020	U	
A4CM-95-0143	N507011-21	6117-021	U	
BLK (QC ID=24264)	N507011-23	6117-023	U	
LCS (QC ID=24263)	N507011-22	6117-022	ok	
Duplicate (N507011-01)	N507011-24	6117-024	- U	

Nominal values and limits from method RDLs (pCi/g) 0.5

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL
BETA COUNTING

Test SR Matrix SOIL

SDG 6117

Act Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 146															
A4CM-95-0121	N507011-01		0.07	2.00			88		202			45	07/27/95	07/27	LBG-003
A4CM-95-0122	N507011-02		0.08	2.00			83		202			45	07/27/95	07/27	LBG-004
A4CM-95-0123	N507011-03		0.08	2.00			86		213			45	07/27/95	07/27	LBG-016
A4CM-95-0124	N507011-04		0.08	2.00			89		191			45	07/27/95	07/27	LBG-016
A4CM-95-0125	N507011-05		0.07	2.00			83		239			45	07/27/95	07/27	LBG-003
A4CM-95-0126	N507011-06		0.07	2.00			86		239			44	07/27/95	07/27	LBG-004
A4CM-95-0127	N507011-07		0.1	2.00			81		172			44	07/27/95	07/27	LBG-015
A4CM-95-0128	N507011-08		0.09	2.00			85		172			44	07/27/95	07/27	LBG-016
A4CM-95-0129	N507011-09		0.08	2.00			80		170			44	07/27/95	07/27	LBG-003
A4CM-95-0132	N507011-10		0.08	2.00			89		170			43	07/27/95	07/27	LBG-004
A4CM-95-0133	N507011-11		0.06	2.00			85		593			43	07/27/95	07/27	LBG-003
A4CM-95-0134	N507011-12		0.07	2.00			88		593			43	07/27/95	07/27	LBG-004
A4CM-95-0135	N507011-13		0.04	2.00			90		606			43	07/27/95	07/27	LBG-003
A4CM-95-0136	N507011-14		0.04	2.00			84		606			42	07/27/95	07/27	LBG-004
A4CM-95-0137	N507011-15		0.05	2.00			84		606			42	07/27/95	07/27	LBG-015
A4CM-95-0138	N507011-16		0.04	2.00			91		606			42	07/27/95	07/27	LBG-016
A4CM-95-0139	N507011-17		0.09	2.00			92		102			42	07/27/95	07/27	LBG-003
A4CM-95-0140	N507011-18		0.1	2.00			88		102			38	07/27/95	07/27	LBG-004
A4CM-95-0141	N507011-19		0.1	2.00			91		128			38	07/27/95	07/27	LBG-016
A4CM-95-0142	N507011-20		0.1	2.00			86		102			38	07/27/95	07/27	LBG-003
A4CM-95-0143	N507011-21		0.1	2.00			83		110			38	07/27/95	07/27	LBG-003
BLK (QC ID=24264)	N507011-23		0.1	2.00			82		110				07/27/95	07/27	LBG-015
LCS (QC ID=24263)	N507011-22		0.1	2.00			86		110				07/27/95	07/27	LBG-004
Duplicate (N507011-01)	N507011-24		0.1	2.00			91		110			45	07/27/95	07/27	LBG-016

Nominal values and limits from method 0.5 2.00 20-105 200 180

PROCEDURES	REFERENCE	HASL 300/SR-01,-02
	EP-060	Soil Preparation, rev 0
	EP-070	Soil Dissolution, rev 0
	EP-500	Strontium-89,90 - Purification, rev 0

AVERAGES ± 2 SD	MDA	0.08 ± 0.04
FOR 24 SAMPLES	YIELD	86 ± 7

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

GAMMA SCAN
GAMMA SPECTROSCOPYTest GAM Matrix SOIL
SDG 6117
act Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-146

A4CM-95-0121	N507011-01	6117-001	0.095
A4CM-95-0122	N507011-02	6117-002	0.13
A4CM-95-0123	N507011-03	6117-003	0.16
A4CM-95-0124	N507011-04	6117-004	0.17
A4CM-95-0125	N507011-05	6117-005	0.084
A4CM-95-0126	N507011-06	6117-006	0.15
A4CM-95-0127	N507011-07	6117-007	0.032
A4CM-95-0128	N507011-08	6117-008	0.17
A4CM-95-0129	N507011-09	6117-009	0.19
A4CM-95-0132	N507011-10	6117-010	0.29
A4CM-95-0133	N507011-11	6117-011	0.042
A4CM-95-0134	N507011-12	6117-012	0.099
A4CM-95-0135	N507011-13	6117-013	0.067
A4CM-95-0136	N507011-14	6117-014	0.11
A4CM-95-0137	N507011-15	6117-015	0.12
A4CM-95-0138	N507011-16	6117-016	0.032
A4CM-95-0139	N507011-17	6117-017	0.092
A4CM-95-0140	N507011-18	6117-018	0.10
A4CM-95-0141	N507011-19	6117-019	0.064
A4CM-95-0142	N507011-20	6117-020	U
A4CM-95-0143	N507011-21	6117-021	U
BLK (QC ID=24264)	N507011-23	6117-023	U
LCS (QC ID=24263)	N507011-22	6117-022	ok
Duplicate (N507011-01)	N507011-24	6117-024	ok

Nominal values and limits from method	RDLs (pCi/g)	0.02
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METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	<u>TMAN</u>
Protocol	<u>ROCKETDYNE</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-CMS</u>
Version	<u>3.06</u>
Report date	<u>08/16/95</u>

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOILSDG 6117act Italy E. PittmanClient RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 146																
A4CM-95-0121	N507011-01			750						532			38	07/20/95	07/20	02,02,00
A4CM-95-0122	N507011-02			750						532			38	07/20/95	07/20	02,03,00
A4CM-95-0123	N507011-03			750						400			39	07/20/95	07/21	02,02,00
A4CM-95-0124	N507011-04			636						400			39	07/20/95	07/21	02,03,00
A4CM-95-0125	N507011-05			751						405			39	07/20/95	07/21	02,03,00
A4CM-95-0126	N507011-06			751						550			38	07/20/95	07/21	02,03,00
A4CM-95-0127	N507011-07			751						402			39	07/20/95	07/22	02,03,00
A4CM-95-0128	N507011-08			707						402			39	07/20/95	07/22	02,01,00
A4CM-95-0129	N507011-09			750						421			41	07/20/95	07/24	02,01,00
A4CM-95-0132	N507011-10			553						401			40	07/20/95	07/24	02,02,00
A4CM-95-0133	N507011-11			673						1332			40	07/20/95	07/24	02,03,00
A4CM-95-0134	N507011-12			651						908			40	07/20/95	07/24	02,01,00
A4CM-95-0135	N507011-13			750						977			40	07/20/95	07/24	02,02,00
A4CM-95-0136	N507011-14			751						408			40	07/20/95	07/25	02,02,00
A4CM-95-0137	N507011-15			750						403			40	07/20/95	07/25	02,03,00
A4CM-95-0138	N507011-16			750						497			40	07/20/95	07/25	02,01,00
A4CM-95-0139	N507011-17			608						497			40	07/20/95	07/25	02,02,00
A4CM-95-0140	N507011-18			751						471			36	07/20/95	07/25	02,03,00
A4CM-95-0141	N507011-19			751						1180			37	07/20/95	07/26	02,01,00
A4CM-95-0142	N507011-20		0.02	750						1191			37	07/20/95	07/26	02,02,00
A4CM-95-0143	N507011-21		0.02	750						1191			37	07/20/95	07/26	02,03,00
BLK (QC ID=24264)	N507011-23		0.006	850						1007				07/20/95	07/27	01,03,00
LCS (QC ID=24263)	N507011-22			850						1007				07/20/95	07/27	01,01,00
Duplicate (N507011-01)	N507011-24			165						1060			45	07/20/95	07/27	JR,02,00

Nominal values and limits from method

0.02 850

700

180

PROCEDURES EP-060 Soil Preparation, rev 0
 EP-100 Ge(Li) Preparation for Environmental Samples,
 rev 0

AVERAGES ± 2 SD MDA 0.02 ± 0.02
 FOR 3 SAMPLES YIELD ±

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

METHOD SUMMARY

TRITIUM-SOIL
LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6117

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Tritium
Preparation batch 2781-146				
A4CM-95-0121	N507011-01	6117-001		U
A4CM-95-0122	N507011-02	6117-002		U
A4CM-95-0123	N507011-03	6117-003		U
A4CM-95-0124	N507011-04	6117-004		U
A4CM-95-0125	N507011-05	6117-005		U
A4CM-95-0126	N507011-06	6117-006		U
A4CM-95-0127	N507011-07	6117-007		U
A4CM-95-0128	N507011-08	6117-008		U
A4CM-95-0129	N507011-09	6117-009		U
A4CM-95-0132	N507011-10	6117-010		U
A4CM-95-0133	N507011-11	6117-011		U
A4CM-95-0134	N507011-12	6117-012		U
A4CM-95-0135	N507011-13	6117-013		U
A4CM-95-0136	N507011-14	6117-014		U
A4CM-95-0137	N507011-15	6117-015		U
A4CM-95-0138	N507011-16	6117-016		U
A4CM-95-0139	N507011-17	6117-017		U
A4CM-95-0140	N507011-18	6117-018		U
A4CM-95-0141	N507011-19	6117-019		U
A4CM-95-0142	N507011-20	6117-020		U
A4CM-95-0143	N507011-21	6117-021		U
BLK (QC ID=24264)	N507011-23	6117-023		U
LCS (QC ID=24263)	N507011-22	6117-022		LOW
Duplicate (N507011-01)	N507011-24	6117-024		- U

Nominal values and limits from method

RDLs (pCi/g)

500

METHOD SUMMARIES

Page 11

SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6117

Test H Matrix SOIL

SDG 6117

act Italy E. Pittman

METHOD SUMMARY

TRITIUM-SOIL
LIQUID SCINTILLATION

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT keV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-146 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 146																
A4CM-95-0121	N507011-01		900	0.0032						50			39	07/20/95	07/21	LSC-005
A4CM-95-0122	N507011-02		1000	0.0028						50			39	07/20/95	07/21	LSC-005
A4CM-95-0123	N507011-03		1000	0.0029						50			39	07/20/95	07/21	LSC-005
A4CM-95-0124	N507011-04		1000	0.0026						50			39	07/20/95	07/21	LSC-005
A4CM-95-0125	N507011-05		800	0.0035						50			39	07/20/95	07/21	LSC-005
A4CM-95-0126	N507011-06		2000	0.0015						50			38	07/20/95	07/21	LSC-005
A4CM-95-0127	N507011-07		4000	8.0E-4						50			38	07/20/95	07/21	LSC-005
A4CM-95-0128	N507011-08		1000	0.0027						50			38	07/20/95	07/21	LSC-005
A4CM-95-0129	N507011-09		2000	0.0014						50			38	07/20/95	07/21	LSC-005
A4CM-95-0132	N507011-10		800	0.0035						50			37	07/20/95	07/21	LSC-005
A4CM-95-0133	N507011-11		900	0.0032						50			37	07/20/95	07/21	LSC-005
A4CM-95-0134	N507011-12		800	0.0033						50			37	07/20/95	07/21	LSC-005
A4CM-95-0135	N507011-13		1000	0.0029						50			38	07/20/95	07/22	LSC-005
A4CM-95-0136	N507011-14		900	0.0033						50			37	07/20/95	07/22	LSC-005
A4CM-95-0137	N507011-15		3000	0.0011						50			37	07/20/95	07/22	LSC-005
A4CM-95-0138	N507011-16		600	0.0049						50			37	07/20/95	07/22	LSC-005
A4CM-95-0139	N507011-17		800	0.0036						50			37	07/20/95	07/22	LSC-005
A4CM-95-0140	N507011-18		1000	0.0020						50			33	07/20/95	07/22	LSC-005
A4CM-95-0141	N507011-19		2000	0.0014						50			33	07/20/95	07/22	LSC-005
A4CM-95-0142	N507011-20		1000	0.0020						50			33	07/20/95	07/22	LSC-005
A4CM-95-0143	N507011-21		1000	0.0025						50			33	07/20/95	07/22	LSC-005
BLK (QC ID=24264)	N507011-23		300	0.0100						50				07/20/95	07/21	LSC-005
LCS (QC ID=24263)	N507011-22		300	0.0100						50				07/20/95	07/21	LSC-005
Duplicate (N507011-01)	N507011-24		900	0.0032						50			40	07/20/95	07/22	LSC-005
Nominal values and limits from method				500	0.0100					50			180			

PROCEDURES	REFERENCE	EPA 906.0; ASTM 2476-81
	EP-060	Soil Preparation, rev 0
	EP-070	Soil Dissolution, rev 0
	EP-211	Tritium in Solid Samples by Azeotropic Distillation, rev 0

AVERAGES ± 2 SD	MDA 1000 ± 2000
FOR 24 SAMPLES	YIELD _____ ± _____



T M A / R I C H M O N D
REPORTING GROUP 6118

SDG 6118
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

S U M M A R Y D A T A S E C T I O N

T A B L E O F C O N T E N T S

Sample Summaries		1
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Sara L. Lomen

Prepared by

Italy E. Pittman 8/15/95

Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

SDG 6118

Contract Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44FJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0130	SSFL AREA4	WATER		N507012-01			06/13/95 14:10
A4CM-95-0131	SSFL AREA4	WATER		N507012-02			06/13/95 14:10
Method Blank		WATER		N507012-04			
Method Blank		WATER		N507014-04			
Lab Control Sample		WATER		N507012-03			
Lab Control Sample		WATER		N507014-03			

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 1

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

SDG 6118

act Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
6118		A4CM-95-0130	WATER				07/06/95 23	N507012-01	6118-001
		A4CM-95-0131	WATER				07/06/95 23	N507012-02	6118-002
		Method Blank	WATER					N507012-04	6118-004
		Lab Control Sample	WATER					N507012-03	6118-003
6120		Method Blank	WATER					N507014-04	6120-004
		Lab Control Sample	WATER					N507014-03	6120-003

SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

SDG 6118

tact Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-			
			BATCH	2σ %	CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	FIERS
Alpha Spectroscopy												
PU	WATER	Plutonium, Isotopic in Water	2781-160	5.0	1			1	1			
TH	WATER	Thorium, Isotopic in Water	2781-160	5.0	1			1	1			
U	WATER	Uranium, Isotopic in Water	2781-176	5.0	1			1	1			
Beta Counting												
SR	WATER	Strontium, Total in Water	2781-160	10.0	1			1	1			
Gamma Scan												
GAM	WATER	Gamma Emitters	2781-160	15.0	1			1	1			
Liquid Scintillation												
H	WATER	Tritium in Water	2781-160	10.0	1			1	1			

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

SDG 6118

act Italy E. Pittman

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED		SUF-									
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD				
A4CM-95-0130		N507012-01	6118-001	H		07/25/95	08/01/95	IEP	Tritium in Water				
SSFL AREA4	WATER	06/13/95											
		07/06/95											
A4CM-95-0131		N507012-02	6118-002	GAM		07/18/95	08/15/95	IEP	Gamma Emitters				
SSFL AREA4	WATER	06/13/95	6118-002	PU		07/28/95	08/01/95	IEP	Plutonium, Isotopic in Water				
		07/06/95	6118-002	SR		07/21/95	08/03/95	IEP	Strontium, Total in Water				
			6118-002	TH		07/25/95	08/11/95	IEP	Thorium, Isotopic in Water				
			6118-002	U		07/31/95			Uranium, Isotopic in Water				
Method Blank		N507012-04	6118-004	GAM		07/18/95	08/15/95	IEP	Gamma Emitters				
	WATER		6118-004	H		07/25/95	08/01/95	IEP	Tritium in Water				
			6118-004	PU		07/31/95	08/01/95	IEP	Plutonium, Isotopic in Water				
			6118-004	SR		07/21/95	08/03/95	IEP	Strontium, Total in Water				
			6118-004	TH		08/02/95	08/11/95	IEP	Thorium, Isotopic in Water				
Method Blank		N507014-04	6120-004	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Water				
	WATER												
1 Control Sample		N507012-03	6118-003	GAM		07/18/95	08/15/95	IEP	Gamma Emitters				
	WATER		6118-003	H		07/25/95	08/01/95	IEP	Tritium in Water				
			6118-003	PU		07/28/95	08/01/95	IEP	Plutonium, Isotopic in Water				
			6118-003	SR		07/21/95	08/03/95	IEP	Strontium, Total in Water				
			6118-003	TH		07/25/95	08/11/95	IEP	Thorium, Isotopic in Water				
Lab Control Sample		N507014-03	6120-003	U		07/25/95	08/01/95	IEP	Uranium, Isotopic in Water				
	WATER												

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

SDG 6118

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Emitters	ASTM 3649-85; EPA 901.1	1			1	1		3
H		Tritium in Water	EPA 906.0; ASTM 2476-81	1			1	1		3
PU		Plutonium, Isotopic in Water	ASTM 3865-90	1			1	1		3
SR		Strontium, Total in Water	HASL 300/SR-01,-02	1			1	1		3
TH		Thorium, Isotopic in Water		1			1	1		3
U		Uranium, Isotopic in Water	ASTM 3972-90	1			1	1		3
TOTALS				6			6	6		18

RK SUMMARY

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-04

METHOD BLANK

Method Blank

SDG 6118

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507012-04Client sample id Method BlankDept sample id 6118-004Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		9.1	160	300	500	U	H
Strontium 90	10098-97-2	-0.007	0.11	0.09	0.5	U	SR
Thorium 228		0	0.039	0.07	0.5	U	TH
Thorium 230	14269-63-7	0.074	0.039	0.03	0.5	J	TH
Thorium 232	7740-29-1	-0.008	0.008	0.03	0.5	U	TH
Plutonium 238	13981-16-3	-0.005	0.014	0.03	0.1	U	PU
Plutonium 239/240	10-12-8	0.005	0.009	0.02	0.1	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		U		90		U	GAM
Chromium 51		U		30		U	GAM
Vanadium 54		U		4		U	GAM
Calcium 58		U		5		U	GAM
Iron 59		U		10		U	GAM
Cobalt 60		U		5		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		5		U	GAM
Ruthenium 103		U		4		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		5		U	GAM
Cesium 134		U		6		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		8		U	GAM
Europium 154		U		5		U	GAM
Europium 155		U		9		U	GAM
Radium 226		U		9		U	GAM
Thorium 232		U		20		U	GAM

METHOD BLANKS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/15/95

TMA / RICHMOND

REPORTING GROUP 6118

N507012-04

BLANK, cont.

Method Blank

SDG 6118

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507012-04Client sample id Method BlankDept sample id 6118-004Material/Matrix WATER

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQUOT	ANALYZED	REVIEWED	BY
N507012-04	H	6118-004		0.0100 L	07/25/95	08/01/95	IEP
N507012-04	SR	6118-004		1.00 L	07/21/95	08/03/95	IEP
N507012-04	TH	6118-004		0.500 L	08/02/95	08/11/95	IEP
N507012-04	PU	6118-004		0.500 L	07/31/95	08/01/95	IEP
N507012-04	GAM	6118-004		1.00 L	07/18/95	08/15/95	IEP

QC-BLANK #24267

THOD BLANKS

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507014-04

METHOD BLANK

Method Blank

SDG 6118

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507014-04

Client sample id Method Blank

Dept sample id 6120-004

Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		N.A.			500		H
Strontium 90	10098-97-2	N.A.			0.5		SR
Thorium 228		N.A.			0.5		TH
Thorium 230	14269-63-7	N.A.			0.5		TH
Thorium 232	7740-29-1	N.A.			0.5		TH
Uranium 233/234	11-08-5	0.008	0.063	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.019	0.07	0.5	U	U
Uranium 238	7440-61-1	0	0.016	0.06	0.5	U	U
Plutonium 238	13981-16-3	N.A.			0.1		PU
Plutonium 239/240	10-12-8	N.A.			0.1		PU
A SCAN ANALYTES		U					
Potassium 40		N.A.					GAM
Chromium 51		N.A.					GAM
Manganese 54		N.A.					GAM
Cobalt 58		N.A.					GAM
Iron 59		N.A.					GAM
Cobalt 60		N.A.					GAM
Zinc 65		N.A.					GAM
Niobium 94		N.A.					GAM
Ruthenium 103		N.A.					GAM
Ruthenium 106		N.A.					GAM
Tin 113		N.A.					GAM
Cesium 134		N.A.					GAM
Cesium 137		N.A.			5		GAM
Cerium 144		N.A.					GAM
Europium 152		N.A.					GAM
Europium 154		N.A.					GAM
Europium 155		N.A.					GAM
Radium 226		N.A.					GAM
Thorium 232		N.A.					GAM

METHOD BLANKS

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507014-04

BLANK, cont.

Method Blank

SDG 6118Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507014-04Client sample id Method BlankDept sample id 6120-004Material/Matrix WATER

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N507014-04	U	6120-004		0.200 L	08/04/95	08/15/95	IEP

QC-BLANK #24277

METHOD BLANKS

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-03

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6118

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507012-03

Client sample id Lab Control Sample

Dept sample id 6118-003

Material/Matrix WATER

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC t	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	10000	460	300	500		H	10200	410	98	82-118	
Strontium 90	22	0.31	0.09	0.5		SR	21.4	0.86	103	83-117	
Thorium 228	0	0.043	0.08	0.5	U	TH					
Thorium 230	4.3	0.32	0.03	0.5	B	TH	4.10	0.16	105	85-115	
Thorium 232	-0.008	0.008	0.03	0.5	U	TH					
Plutonium 238	2.3	0.16	0.03	0.1		PU	2.28	0.091	101	85-115	
Plutonium 239/240	1.9	0.14	0.02	0.1		PU	2.04	0.082	93	86-114	
GAMMA SCAN ANALYTES											
Potassium 40	U		70		U	GAM					
Chromium 51	U		30		U	GAM					
Neptunium 54	U		4		U	GAM					
Uranium 58	U		4		U	GAM					
Iron 59	U		9		U	GAM					
Cobalt 60	U		5		U	GAM					
Zinc 65	U		9		U	GAM					
Niobium 94	U		4		U	GAM					
Ruthenium 103	U		5		U	GAM					
Ruthenium 106	U		50		U	GAM					
Tin 113	U		6		U	GAM					
Cesium 134	U		5		U	GAM					
Cesium 137	360	11		5		GAM	380	15	95	77-123	
Cerium 144	U		20		U	GAM					
Europium 152	U		9		U	GAM					
Europium 154	U		6		U	GAM					
Europium 155	U		10		U	GAM					
Radium 226	U		9		U	GAM					
Thorium 232	U		20		U	GAM					

CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-03

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6118

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507012-03

Dept sample id 6118-003

Client sample id Lab Control Sample

Material/Matrix WATER

TEST	PLANCHET	SUF- FIX	ALIQOT	PREP ERR			
				2σ ±	ANALYZED	REVIEWED	BY
H	6118-003		0.0100 L	10.0	07/25/95	08/01/95	IEP
SR	6118-003		1.00 L	10.0	07/21/95	08/03/95	IEP
TH	6118-003		0.500 L	5.0	07/25/95	08/11/95	IEP
PU	6118-003		0.500 L	5.0	07/28/95	08/01/95	IEP
GAM	6118-003		1.00 L	15.0	07/18/95	08/15/95	IEP

QC-LCS #24266

CONTROL SAMPLES

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507014-03

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6118

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507014-03

Dept sample id 6120-003

Client sample id Lab Control Sample

Material/Matrix WATER

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	N.A.			500		H					
Strontium 90	N.A.			0.5		SR					
Thorium 228	N.A.			0.5		TH					
Thorium 230	N.A.			0.5		TH					
Thorium 232	N.A.			0.5		TH					
Uranium 233/234	20	1.8	0.9	0.5		U	19.4	0.78	103	83-117	
Uranium 235	15	1.5	0.2	0.5		U	14.8	0.59	101	82-118	
Uranium 238	20	1.7	0.8	0.5		U	19.4	0.78	103	83-117	
Plutonium 238	N.A.			0.1		PU					
Plutonium 239/240	N.A.			0.1		PU					
ALL SCAN ANALYTES	U										
Barium 137	N.A.					GAM					
Chromium 51	N.A.					GAM					
Manganese 54	N.A.					GAM					
Cobalt 58	N.A.					GAM					
Iron 59	N.A.					GAM					
Cobalt 60	N.A.					GAM					
Zinc 65	N.A.					GAM					
Niobium 94	N.A.					GAM					
Ruthenium 103	N.A.					GAM					
Ruthenium 106	N.A.					GAM					
Tin 113	N.A.					GAM					
Cesium 134	N.A.					GAM					
Cesium 137	N.A.			5		GAM					
Cerium 144	N.A.					GAM					
Europium 152	N.A.					GAM					
Europium 154	N.A.					GAM					
Europium 155	N.A.					GAM					
Radium 226	N.A.					GAM					
Thorium 232	N.A.					GAM					

CONTROL SAMPLES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507014-03

Lab Control Sample

LAB CONTROL SAMPLE, cont.

SDG 6118

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507014-03

Client sample id Lab Control Sample

Dept sample id 6120-003

Material/Matrix WATER

TEST	PLANCHET	SUF-		PREP ERR			
		FIX	ALIQ	2σ	%	ANALYZED	REVIEWED BY
U	6120-003		0.200 L	5.0		07/25/95 08/01/95	IEP

QC-LCS #24276

CONTROL SAMPLES

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-01

A4CM-95-0130

DATA SHEET

SDG 6118
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507012-01
Dept sample id 6118-001
Received 07/06/95Client sample id A4CM-95-0130
Location/Matrix SSFL AREA4 WATER
Collected 06/13/95 14:10
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		23	160	300	500	U	H

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOUT	ANALYZED	REVIEWED	BY
N507012-01	H	6118-001		0.0100 L	07/25/95	08/01/95	IEP

DATA SHEETS

Page 1

SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-02

DATA SHEET

A4CM-95-0131

SDG 6118

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507012-02

Client sample id A4CM-95-0131

Dept sample id 6118-002

Location/Matrix SSFL AREA4

WATER

Received 07/06/95

Collected 06/13/95 14:10

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Strontium 90	10098-97-2	0.007	0.086	0.09	0.5	U	SR
Thorium 228		0.040	0.066	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.059	0.066	0.09	0.5	U	TH
Thorium 232	7740-29-1	0.033	0.040	0.05	0.5	U	TH
Uranium 233/234	11-08-5	0	0.072	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.022	0.08	0.5	U	U
Uranium 238	7440-61-1	0.036	0.036	0.07	0.5	U	U
Plutonium 238	13981-16-3	-0.002	0.007	0.02	0.1	U	PU
Plutonium 239/240	10-12-8	0.007	0.011	0.02	0.1	U	PU
ALPHA SCAN ANALYTES		U					
Potassium 40		U		50		U	GAM
Chromium 51		U		60		U	GAM
Manganese 54		U		4		U	GAM
Cobalt 58		U		5		U	GAM
Iron 59		U		10		U	GAM
Cobalt 60		U		6		U	GAM
Zinc 65		U		8		U	GAM
Niobium 94		U		4		U	GAM
Ruthenium 103		U		6		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		5		U	GAM
Cesium 134		U		4		U	GAM
Cesium 137		U		4	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		8		U	GAM
Europium 154		U		5		U	GAM
Europium 155		U		10		U	GAM
Radium 226		U		9		U	GAM

DATA SHEETS

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

N507012-02

A4CM-95-0131

DATA SHEET, cont

SDG 6118Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507012-02Client sample id A4CM-95-0131Dept sample id 6118-002Location/Matrix SSFL AREA4WATERReceived 07/06/95Collected 06/13/95 14:10

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Thorium 232		U		20		U	GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N507012-02	SR	6118-002		1.00 L	07/21/95	08/03/95	IEP
7012-02	TH	6118-002		0.500 L	07/25/95	08/11/95	IEP
07012-02	U	6118-002		0.200 L	07/31/95		
N507012-02	PU	6118-002		0.500 L	07/28/95	08/01/95	IEP
N507012-02	GAM	6118-002		1.00 L	07/18/95	08/15/95	IEP

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

Test PU Matrix WATER

SDG 6118

Contact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Plutonium PLANCHET	Plutonium 238	Plutonium 239/240
------------------	------------------	-------------	-------------	-----------------------	------------------	----------------------

Preparation batch 2781-160

A4CM-95-0131	N507012-02	6118-002	U	U
BLK (QC ID=24267)	N507012-04	6118-004	U	U
LCS (QC ID=24266)	N507012-03	6118-003	ok	ok

Nominal values and limits from method	RDLs (pCi/L)	0.1	0.1
---------------------------------------	--------------	-----	-----

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-------------	-------------	------------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-160 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 160

A4CM-95-0131	N507012-02	0.02	0.500	81	1511	45	07/24/95	07/28	SS-006
BLK (QC ID=24267)	N507012-04	0.03	0.500	85	1202	07/24/95	07/31	SS-051	
LCS (QC ID=24266)	N507012-03	0.03	0.500	79	1511	07/24/95	07/28	SS-007	

Nominal values and limits from method	0.1	0.500	20-105	1000	100	180
---------------------------------------	-----	-------	--------	------	-----	-----

PROCEDURES	REFERENCE	ASTM 3865-90
EP-040	Environmental Water Dissolution, rev 1	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.03 ± 0.01
FOR 3 SAMPLES	YIELD	82 ± 6

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

Test TH Matrix WATER

SDG 6118

Contact Italy E. Pittman

METHOD SUMMARY

THORIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
------------------	------------------	-----------------	------------------	-------------	-------------	-------------

Preparation batch 2781-160

A4CM-95-0131	N507012-02	6118-002	U	U	U
BLK (QC ID=24267)	N507012-04	6118-004	U	0.074 J	U
LCS (QC ID=24266)	N507012-03	6118-003	No data U	ok	No data U

Nominal values and limits from method	RDLs (pCi/L)	0.5	0.5	0.5
---------------------------------------	--------------	-----	-----	-----

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MAX MDA L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	--------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-160 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 160

A4CM-95-0131	N507012-02	0.1	0.500	86	575	42	07/25/95	07/25	SS-020
BLK (QC ID=24267)	N507012-04	0.07	0.500	89	635	07/25/95	08/02	SS-027	
LCS (QC ID=24266)	N507012-03	0.08	0.500	89	577	07/25/95	07/25	SS-027	

Nominal values and limits from method	0.5	0.500	20-110	500	100	180
---------------------------------------	-----	-------	--------	-----	-----	-----

PROCEDURES	EP-040	Environmental Water Dissolution, rev 1
	EP-900	Thorium Purification, rev 0
	EP-008	Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	0.08 ± 0.03
FOR 3 SAMPLES	YIELD	88 ± 3

SD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6118

Test U Matrix WATER
SDG 6118
Contact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
							1+3	2σ	2+3	2σ
Preparation batch 2781-176										
A4CM-95-0131	N507012-02		6118-002	U	U	U				
BLK (QC ID=24277)	N507014-04		6120-004	U	U	U				
LCS (QC ID=24267)	N507014-03		6120-003	ok	ok	ok				
Nominal values and limits from method				RDLs (pCi/L)	0.5	0.5	0.5	100	4	
Averages										

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-176 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 176															
A4CM-95-0131	N507012-02		0.1	0.200			60	1060				48	07/24/95	07/31	SS-041
BLK (QC ID=24277)	N507014-04		0.1	0.200			70	1006					07/24/95	08/04	SS-030
I ID=24267)	N507014-03		0.9	0.200			74	575					07/24/95	07/25	SS-019
Nominal values and limits from method			0.5	0.200			30-105	300	100		180				

PROCEDURES REFERENCE ASTM 3972-90
EP-040 Environmental Water Dissolution, rev 1
EP-910 Uranium Purification, rev 0
EP-008 Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD MDA 0.4 ± 0.9
FOR 3 SAMPLES YIELD 68 ± 14

MOD SUMMARIES

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TMA/RICHMOND

REPORTING GROUP 6118

Test SR Matrix WATERSDG 6118Contact Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN WATER

BETA COUNTING

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	
				Strontium 90

Preparation batch 2781-160

A4CM-95-0131	N507012-02	6118-002	U
BLK (QC ID=24167)	N507012-04	6118-004	U
LCS (QC ID=24166)	N507012-03	6118-003	ok

Nominal values and limits from method RDLs (pCi/L) 0.5

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA L	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
------------------	------------------	-----------------	---------------	----------	-------------	--------------	------------	------------	------------	--------------	-------------	---------------	------------------	---------------	----------

Preparation batch 2781-160 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 160

A4CM-95-0131	N507012-02	0.09	1.00	82	613	38	07/21/95	07/21	LBG-004
BLK (QC ID=24167)	N507012-04	0.09	1.00	83	908	07/21/95	07/21	LBG-004	
LCS (QC ID=24166)	N507012-03	0.09	1.00	75	908	07/21/95	07/21	LBG-003	

Nominal values and limits from method 0.5 1.00 200 180

PROCEDURES	REFERENCE	HASL 300/SR-01,-02
EP-040	Environmental Water Dissolution, rev 1	
EP-500	Strontium-89,90 - Purification, rev 0	
EP-519	Strontium-89,90 Planchet Demounting and Yttrium Purification, rev 0	

AVERAGES ± 2 SD

MDA 0.09 ± 0

FOR 3 SAMPLES

YIELD 80 ± 9

SD SUMMARIES

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TMA/RICHMOND

REPORTING GROUP 6118

Test GAM Matrix WATERSDG 6118Contact Italy E. Pittman

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cobalt 60	Cesium 137
------------------	------------------	-----------------	------------------	-----------	------------

Preparation batch 2781-160

A4CM-95-0131	N507012-02	6118-002	U	U
BLK (QC ID=24267)	N507012-04	6118-004	U	U
LCS (QC ID=24266)	N507012-03	6118-003	No data U	ok

Nominal values and limits from method	RDLs (pCi/L)	5
---------------------------------------	--------------	---

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT keV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	-----	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-160 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 160

A4CM-95-0131	N507012-02	4	1.00					1000		35	07/18/95	07/18	01,02,00
BLK (QC ID=24267)	N507012-04	5	1.00					1001			07/18/95	07/18	01,01,00
LCS (QC ID=24266)	N507012-03	1.00						1222			07/18/95	07/18	01,03,00

N	al values and limits from method	5	1.00					400		180
---	----------------------------------	---	------	--	--	--	--	-----	--	-----

PROCEDURES REFERENCE ASTM 3649-85; EPA 901.1

EP-100 Ge(Li) Preparation for Environmental Samples,
rev 0

AVERAGES ± 2 SD

MDA 4 ± 1

FOR 2 SAMPLES

YIELD ±

JD SUMMARIES

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TMA/RICHMOND

REPORTING GROUP 6118

Test H Matrix WATER

SDG 6118

Contact Italy E. Pittman

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Tritium
------------------	------------------	----------------------	----------	---------

Preparation batch 2781-160

A4CM-95-0130	N507012-01	6118-001	U
BLK (QC ID=24267)	N507012-04	6118-004	U
LCS (QC ID=24266)	N507012-03	6118-003	ok

Nominal values and limits from method RDLs (pCi/L) 500

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	----------------------	--------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-160 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 160

A4CM-95-0130	N507012-01	300	0.0100						50		42	07/25/95	07/25	LSC-005
BLK (QC ID=24267)	N507012-04	300	0.0100						50			07/25/95	07/25	LSC-005
LCS (QC ID=24266)	N507012-03	300	0.0100						50			07/25/95	07/25	LSC-005

Nominal values and limits from method 500 0.0100 50 180

PROCEDURES REFERENCE EPA 906.0; ASTM 2476-81
EP-210 Tritium in Water by Distillation, rev 0

AVERAGES ± 2 SD MDA 300 ± 0
FOR 3 SAMPLES YIELD ±

DD SUMMARIES

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Report date 08/15/95

TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

Batch 68

August 16, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91303

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N5-07-014-6120 and
Report N5-07-013-6119

Dear Mr. Klein:

Enclosed is the data report of analyses for the seventeen soil and two water samples collected between June 20 and 28, 1995. The samples were received at TMA/Richmond on July 6, 1995. The accompanying case narrative discusses all parameters underlined in the data report which are not in compliance with the Statement of Work.

If you have any questions regarding this data, or any problems with the hard copy or electronic deliverable diskette, please call me at (510) 235-2633.

Sincerely,



Italy E. Pittman
Program Manager

IEP/ss

Enclosures: Data Report N5-07-014-6120 (water)
Data Report N5-05-013-6119 (soil)
Diskette

Case Narrative

August 16, 1995

1.0 GENERAL

TMA/Richmond Sample Delivery Group (SDG) 6119 consists of seventeen soil samples and SDG 6120 consists of two water samples. The samples were received at TMA/Richmond on July 6, 1995.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, method blanks, and duplicates. The QC samples are prepared by the Quality Control Department.

The blanks and laboratory control samples are created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consists of the following:

NaHCO ₃	96 mg/L
CaSO ₄ ·2H ₂ O	60 mg/L
MgSO ₄	60 mg/L

KCl at 4.0 mg/L - specified in the table - is not added since KCl contains natural ⁴⁰K which raises the gross beta background.

2.1 Tritium Analyses

6120 (Water)

No problems were associated with the samples during the analyses.

6119 (Soil)

In changing the reporting format of the tritium results to pCi/volume water extracted the following underlines are noted: the aliquot for the tritium samples are below the minimum required; this is due to the relatively small percent moisture present in the samples. The Minimum Detectable Activity (MDA) is therefore greater than the Required Detection Limit (RDL) because of the small aliquot size. The report list the result units as pCi/g which is incorrect. The data reported is actually for pCi/L values. We are working to change the mechanisms of our reporting software to be able to include multiple units per sample matrix where applicable.

Case Narrative

August 16, 1995

2.0 ANALYTICAL NOTES (cont'd)

2.2 Strontium-90 Analyses

6120 (Water)

No problems were associated with the samples during the analyses. The average yield for 3 samples was $82\% \pm 5\%$.

2.2 Strontium-90 Analyses

6119 (Soil)

Several samples were counted for less than the 200 minute nominal count time; however, the MDA's were below the RDL despite the shorter count time. The average yield for 14 samples was $78\% \pm 4\%$.

2.3 Thorium 228, 230, 232 Analyses

6120 (Water)

The sample and the method blank were counted for less than the 500 minute nominal count time, however, the RDL was met despite the lower count times. The method blank has a result for thorium-230 greater than it's MDA, but less than the RDL. The average yield for 3 samples was $82\% \pm 20\%$.

6119 (Soil)

Sample A4CM-95-0155 and A4CM-95-0156 were counted for less than the 500 minute nominal count time, however, the MDA's were met despite the lower count time. Sample A4CM-95-0152 has an MDA slightly greater than the RDL. The average yield for 20 samples was $53\% \pm 39\%$.

2.4 Uranium 233/234, 235, 238 Analyses

6120 (Water)

The laboratory control sample (LCS) has an MDA greater than the RDL, however, this is not a problem since the activity of the LCS is significantly greater than the MDA. The average yield for 3 samples was $68\% \pm 14\%$.

6119 (Soil)

Several samples had MDA's slightly greater than the RDL, however, the activity present in the samples is significantly greater than the MDA's. The LCS has an MDA greater than the RDL; however, this is not a problem since the activity the LCS is significantly greater than the MDA. The average yield for 20 samples was $50\% \pm 21\%$.

Case Narrative

August 16, 1995

2.0 ANALYTICAL NOTES (cont'd)

2.5 Plutonium 238, 239/240 Analyses

6120 (Water)

No problems were associated with the analyses. The average yield for 3 samples was $81\% \pm 7\%$.

6119 (Soil)

Sample A4CM-95-0162 has an MDA slightly greater than the RDL. The average yield for 14 samples was $72\% \pm 25\%$.

2.6 Gamma Spectroscopy Analyses

6120 (Water)

No problems were associated with the samples during the analyses.

6119 (Soil)

All samples have an aliquot less than the 850 g nominal required, and several have count times less than the nominal 700 minutes required. Despite the smaller aliquot and shorter count times the activity present in the samples were greater than the RDL and does not affect the MDA's.

T M A / R I C H M O N D
REPORTING GROUP 6119

SDG 6119
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

S U M M A R Y D A T A S E C T I O N

T A B L E O F C O N T E N T S

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Italy E. Pittman
Prepared by
Italy E. Pittman 8/16/95
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

Contact Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0144	SSFL AREA 4	SOIL		N507013-01			06/20/95 14:00
A4CM-95-0145	SSFL AREA 4	SOIL		N507013-02			06/20/95 14:00
A4CM-95-0146	SSFL AREA 4	SOIL		N507013-03			06/21/95 13:00
A4CM-95-0147	SSFL AREA 4	SOIL		N507013-04			06/21/95 13:00
A4CM-95-0148	SSFL AREA 4	SOIL		N507013-05			06/22/95 11:00
A4CM-95-0149	SSFL AREA 4	SOIL		N507013-06			06/22/95 11:00
A4CM-95-0150	SSFL AREA 4	SOIL		N507013-07			06/26/95 14:00
A4CM-95-0151	SSFL AREA 4	SOIL		N507013-08			06/26/95 14:00
A4CM-95-0152	SSFL AREA 4	SOIL		N507013-09			06/26/95 14:00
A4CM-95-0153	SSFL AREA 4	SOIL		N507013-10			06/26/95 14:00
A4CM-95-0154	SSFL AREA 4	SOIL		N507013-11			06/26/95 14:00
A4CM-95-0155	SSFL AREA 4	SOIL		N507013-12			06/27/95 13:30
A4CM-95-0156	SSFL AREA 4	SOIL		N507013-13			06/27/95 13:30
A4CM-95-0157	SSFL AREA 4	SOIL		N507013-14			06/27/95 13:30
A4CM-95-0158	SSFL AREA 4	SOIL		N507013-15			06/27/95 13:30
A4CM-95-0159	SSFL AREA 4	SOIL		N507013-16			06/27/95 13:30
A4CM-95-0162	SSFL AREA 4	SOIL		N507013-17			06/28/95 08:15
Method Blank		SOIL		N507013-19			
Control Sample		SOIL		N507013-18			
Duplicate (N507013-07)	SSFL AREA 4	SOIL		N507013-20			06/26/95 14:00

SAMPLE SUMMARY

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Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

act Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CHAIN OF		CLIENT SAMPLE ID	MATRIX	* MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE		LAB SAMPLE ID	DEPARTMENT SAMPLE ID
QC BATCH	CUSTODY						RECEIVED	COLL		
6119		A4CM-95-0144	SOIL	17.0			07/06/95	16	N507013-01	6119-001
		A4CM-95-0145	SOIL	17.9			07/06/95	16	N507013-02	6119-002
		A4CM-95-0146	SOIL	10.0			07/06/95	15	N507013-03	6119-003
		A4CM-95-0147	SOIL	7.8			07/06/95	15	N507013-04	6119-004
		A4CM-95-0148	SOIL	8.3			07/06/95	14	N507013-05	6119-005
		A4CM-95-0149	SOIL	8.8			07/06/95	14	N507013-06	6119-006
		A4CM-95-0150	SOIL	4.8			07/06/95	10	N507013-07	6119-007
		A4CM-95-0151	SOIL	13.2			07/06/95	10	N507013-08	6119-008
		A4CM-95-0152	SOIL	8.5			07/06/95	10	N507013-09	6119-009
		A4CM-95-0153	SOIL	9.2			07/06/95	10	N507013-10	6119-010
		A4CM-95-0154	SOIL	5.6			07/06/95	10	N507013-11	6119-011
		A4CM-95-0155	SOIL	14.5			07/06/95	9	N507013-12	6119-012
		A4CM-95-0156	SOIL	9.0			07/06/95	9	N507013-13	6119-013
		A4CM-95-0157	SOIL	5.7			07/06/95	9	N507013-14	6119-014
		A4CM-95-0158	SOIL	5.1			07/06/95	9	N507013-15	6119-015
		A4CM-95-0159	SOIL	6.2			07/06/95	9	N507013-16	6119-016
		A4CM-95-0162	SOIL	5.6			07/06/95	8	N507013-17	6119-017
		Method Blank	SOIL						N507013-19	6119-019
		Lab Control Sample	SOIL						N507013-18	6119-018
		Duplicate (N507013-07)	SOIL				07/06/95	10	N507013-20	6119-020

QC SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

ct Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED		QUALI-					
			BATCH	2σ %	CLIENT	MORE		RE	BLANK	LCS	DUP/ORIG	MS/ORIG
Alpha Spectroscopy												
PU	SOIL	Plutonium, Isotopic in Soil	2781-164	5.0	11			1	1	1/1		
TH	SOIL	Thorium, Isotopic in Soil	2781-164	5.0	17			1	1	1/1		
U	SOIL	Uranium, Isotopic in Soil	2781-164	5.0	17			1	1	1/1		
Beta Counting												
SR	SOIL	Strontium, Total in Soil	2781-164	10.0	11			1	1	1/1		
Gamma Spectroscopy												
GAM	SOIL	Gamma Scan	2781-164	15.0	11			1	1	1/1		
Liquid Scintillation												
H	SOIL	Tritium-Soil	2781-164	10.0	11			1	1	1/1		

Duplicates 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, Duplicate or Spike sample.

ATCH SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

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WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID																						
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	SUF-	FIX	ANALYZED	REVIEWED	BY	METHOD														
CUSTODY	SAS no	RECEIVED																						
A4CM-95-0144		N507013-01	6119-001	TH	AOR1	08/07/95	08/15/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/20/95	6119-001	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0145		N507013-02	6119-002	TH		08/02/95	08/03/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/20/95	6119-002	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0146		N507013-03	6119-003	TH	AOR1	08/07/95	08/15/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/21/95	6119-003	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0147		N507013-04	6119-004	TH		08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/21/95	6119-004	U		08/07/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0148		N507013-05	6119-005	TH		08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/22/95	6119-005	U		08/09/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0149		N507013-06	6119-006	TH		08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil															
SSFL AREA 4	SOIL	06/22/95	6119-006	U		08/09/95	08/15/95	IEP	Uranium, Isotopic in Soil															
		07/06/95																						
A4CM-95-0150		N507013-07	6119-007	GAM		07/28/95	08/15/95	IEP	Gamma Scan															
SSFL AREA 4	SOIL	06/26/95	6119-007	H		07/22/95	08/01/95	IEP	Tritium-Soil															
		07/06/95	6119-007	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil															
			6119-007	SR		08/07/95	08/15/95	IEP	Strontium, Total in Soil															
			6119-007	TH		08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil															
			6119-007	U		08/09/95	08/15/95	IEP	Uranium, Isotopic in Soil															
A4CM-95-0151		N507013-08	6119-008	GAM		07/28/95	08/15/95	IEP	Gamma Scan															
SSFL AREA 4	SOIL	06/26/95	6119-008	H		07/22/95	08/01/95	IEP	Tritium-Soil															
		07/06/95	6119-008	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil															
			6119-008	SR		08/09/95	08/15/95	IEP	Strontium, Total in Soil															
			6119-008	TH		08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil															
			6119-008	U		08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil															

RK SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID							
LOCATION	MATRIX	COLLECTED		SUF-					
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD
A4CM-95-0152		N507013-09	6119-009	GAM	07/28/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/26/95	6119-009	H	07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6119-009	PU	08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6119-009	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil	
			6119-009	TH	08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil	
			6119-009	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0153		N507013-10	6119-010	GAM	07/28/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/26/95	6119-010	H	07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6119-010	PU	08/04/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6119-010	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil	
			6119-010	TH	08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil	
			6119-010	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0154		N507013-11	6119-011	GAM	07/29/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/26/95	6119-011	H	07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6119-011	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6119-011	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil	
			6119-011	TH	08/03/95	08/04/95	IEP	Thorium, Isotopic in Soil	
			6119-011	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0155		N507013-12	6119-012	GAM	07/28/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/27/95	6119-012	H	07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6119-012	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6119-012	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil	
			6119-012	TH	08/05/95	08/15/95	IEP	Thorium, Isotopic in Soil	
			6119-012	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil	
A4CM-95-0156		N507013-13	6119-013	GAM	07/29/95	08/15/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	06/27/95	6119-013	H	07/22/95	08/01/95	IEP	Tritium-Soil	
		07/06/95	6119-013	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil	
			6119-013	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil	
			6119-013	TH	08/05/95	08/15/95	IEP	Thorium, Isotopic in Soil	
			6119-013	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil	

WORK SUMMARY

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TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

act Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED			SUP-						
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD		
A4CM-95-0157		N507013-14	6119-014	GAM	07/31/95	08/15/95	IEP	Gamma Scan			
SSFL AREA 4	SOIL	06/27/95	6119-014	H	07/22/95	08/01/95	IEP	Tritium-Soil			
		07/06/95	6119-014	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil			
			6119-014	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil			
			6119-014	TH	08/07/95	08/15/95	IEP	Thorium, Isotopic in Soil			
			6119-014	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil			
A4CM-95-0158		N507013-15	6119-015	GAM	07/31/95	08/15/95	IEP	Gamma Scan			
SSFL AREA 4	SOIL	06/27/95	6119-015	H	07/22/95	08/01/95	IEP	Tritium-Soil			
		07/06/95	6119-015	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil			
			6119-015	SR	08/07/95	08/15/95	IEP	Strontium, Total in Soil			
			6119-015	TH	08/08/95	08/15/95	IEP	Thorium, Isotopic in Soil			
			6119-015	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil			
A4CM-95-0159		N507013-16	6119-016	GAM	08/01/95	08/15/95	IEP	Gamma Scan			
SSFL AREA 4	SOIL	06/27/95	6119-016	H	07/23/95	08/01/95	IEP	Tritium-Soil			
		07/06/95	6119-016	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil			
			6119-016	SR	08/09/95	08/15/95	IEP	Strontium, Total in Soil			
			6119-016	TH	08/08/95	08/15/95	IEP	Thorium, Isotopic in Soil			
			6119-016	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil			
A4CM-95-0162		N507013-17	6119-017	GAM	07/31/95	08/15/95	IEP	Gamma Scan			
SSFL AREA 4	SOIL	06/28/95	6119-017	H	07/23/95	08/01/95	IEP	Tritium-Soil			
		07/06/95	6119-017	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil			
			6119-017	SR	08/09/95	08/15/95	IEP	Strontium, Total in Soil			
			6119-017	TH	08/09/95	08/15/95	IEP	Thorium, Isotopic in Soil			
			6119-017	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil			
Method Blank		N507013-19	6119-019	GAM	07/31/95	08/15/95	IEP	Gamma Scan			
	SOIL		6119-019	H	07/22/95	08/01/95	IEP	Tritium-Soil			
			6119-019	PU	08/12/95	08/15/95	IEP	Plutonium, Isotopic in Soil			
			6119-019	SR	08/08/95	08/15/95	IEP	Strontium, Total in Soil			
			6119-019	TH	08/09/95	08/15/95	IEP	Thorium, Isotopic in Soil			
			6119-019	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil			

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TMA/RICHMOND

REPORTING GROUP 6119

SDG 6119

tact Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID								
LOCATION	MATRIX	COLLECTED			SUF-					
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
Lab Control Sample		N507013-18	6119-018	GAM	08/01/95	08/15/95	IEP	Gamma Scan		
	SOIL		6119-018	H	07/22/95	08/01/95	IEP	Tritium-Soil		
			6119-018	PU	08/10/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6119-018	SR	08/08/95	08/15/95	IEP	Strontium, Total in Soil		
			6119-018	TH	08/08/95	08/15/95	IEP	Thorium, Isotopic in Soil		
			6119-018	U	08/02/95	08/04/95	IEP	Uranium, Isotopic in Soil		
Duplicate (N507013-07)		N507013-20	6119-020	GAM	07/31/95	08/15/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	06/26/95	6119-020	H	07/23/95	08/01/95	IEP	Tritium-Soil		
		07/06/95	6119-020	PU	08/09/95	08/15/95	IEP	Plutonium, Isotopic in Soil		
			6119-020	SR	08/09/95	08/15/95	IEP	Strontium, Total in Soil		
			6119-020	TH	08/08/95	08/15/95	IEP	Thorium, Isotopic in Soil		
			6119-020	U	08/10/95	08/15/95	IEP	Uranium, Isotopic in Soil		

COUNTS OF TESTS BY SAMPLE TYPE

SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
GAM	Gamma Scan		11			1	1	1		14
H	Tritium-Soil	EPA 906.0; ASTM 2476-81	11			1	1	1		14
PU	Plutonium, Isotopic in Soil	HASL 300/PU-02	11			1	1	1		14
SR	Strontium, Total in Soil	HASL 300/SR-01,-02	11			1	1	1		14
TH	Thorium, Isotopic in Soil		17			1	1	1		20
U	Uranium, Isotopic in Soil	HASL 300/U-04	17			1	1	1		20
TOTALS			78			6	6	6		96

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-19

METHOD BLANK

Method Blank

SDG 6119

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507013-19

Client sample id Method Blank

Dept sample id 6119-019

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-54	150	300	500	U	H
Strontium 90	10098-97-2	-0.018	0.048	0.04	0.5	U	SR
Thorium 228		-0.018	0.037	0.07	0.1	U	TH
Thorium 230	14269-63-7	0.022	0.022	0.03	0.1	U	TH
Thorium 232	7740-29-1	-0.004	0.015	0.03	0.1	U	TH
Uranium 233/234	11-08-5	0.003	0.005	0.008	0.01	U	U
Uranium 235	14117-96-1	-0.001	0.003	0.006	0.01	U	U
Uranium 238	7440-61-1	0.001	0.002	0.004	0.01	U	U
Plutonium 238	13981-16-3	-0.001	0.004	0.008	0.01	U	PU
Plutonium 239/240	10-12-8	-0.001	0.003	0.006	0.01	U	PU
IA SCAN ANALYTES		U					
Barium 40		U		0.1		U	GAM
Chromium 51		U		0.1		U	GAM
Manganese 54		U		0.007		U	GAM
Cobalt 58		U		0.008		U	GAM
Iron 59		U		0.02		U	GAM
Cobalt 60		U		0.007		U	GAM
Zinc 65		U		0.01		U	GAM
Niobium 94		U		0.006		U	GAM
Ruthenium 103		U		0.01		U	GAM
Ruthenium 106		U		0.05		U	GAM
Tin 113		U		0.009		U	GAM
Cesium 134		U		0.007		U	GAM
Cesium 137		U		0.006	0.02	U	GAM
Cerium 144		U		0.03		U	GAM
Europium 152		U		0.01		U	GAM
Europium 154		U		0.006		U	GAM
Europium 155		U		0.01		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.03		U	GAM

METHOD BLANKS

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-19

BLANK, cont.

Method Blank

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-19

Client sample id Method Blank

Dept sample id 6119-019

Material/Matrix SOIL

QC-BLANK #24274

RICHMOND BLANKS

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-18

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6119

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507013-18

Client sample id Lab Control Sample

Dept sample id 6119-018

Material/Matrix SOIL

ANALYTE	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
Tritium	10000	450	300	500		H	10700	430	93	83-117	
Strontium 90	12	0.60	0.2	0.5		SR	12.1	0.48	99	82-118	
Thorium 228	0.003	0.025	0.05	0.1	U	TH					
Thorium 230	2.5	0.19	0.02	0.1		TH	2.31	0.092	108	84-116	
Thorium 232	0	0.010	0.02	0.1	U	TH					
Uranium 233/234	1.6	0.12	0.05	0.01		U	1.62	0.065	99	85-115	
Uranium 235	1.2	0.10	0.01	0.01		U	1.24	0.050	97	84-116	
Uranium 238	1.7	0.12	0.05	0.01		U	1.61	0.064	106	85-115	
Plutonium 238	0.44	0.040	0.01	0.01		PU	0.433	0.017	102	83-117	
Plutonium 239/240	0.41	0.037	0.006	0.01		PU	0.387	0.015	106	83-117	
SCAN ANALYTES	U										
Cesium 40	U		0.2		U	GAM					
Chromium 51	U		0.07		U	GAM					
Manganese 54	U		0.009		U	GAM					
Cobalt 58	U		0.008		U	GAM					
Iron 59	U		0.02		U	GAM					
Cobalt 60	U		0.01		U	GAM					
Zinc 65	U		0.02		U	GAM					
Niobium 94	U		0.01		U	GAM					
Ruthenium 103	U		0.009		U	GAM					
Ruthenium 106	U		0.08		U	GAM					
Tin 113	U		0.01		U	GAM					
Cesium 134	U		0.01		U	GAM					
Cesium 137	0.53	0.024		0.02		GAM	0.520	0.021	102	75-125	
Cerium 144	U		0.04		U	GAM					
Europium 152	U		0.02		U	GAM					
Europium 154	U		0.01		U	GAM					
Europium 155	U		0.02		U	GAM					
Radium 226	U		0.02		U	GAM					
Thorium 232	U		0.04		U	GAM					

CONTROL SAMPLES

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-18

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6119

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507013-18

Client sample id Lab Control Sample

Dept sample id 6119-018

Material/Matrix SOIL

QC-LCS #24273

Lab id TMAN
Protocol ROCKETDYNE
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TMA/RICHMOND

REPORTING GROUP 6119

N507013-20

A4CM-95-0150

DUPLICATE

SDG 6119

Contact Italy E. Pittman

DUPLICATE

Lab sample id N507013-20Dept sample id 6119-020

ORIGINAL

Lab sample id N507013-07Dept sample id 6119-007Received 07/06/95% moisture 4.8Client RocketdyneContract R44PJZ94034044Client sample id A4CM-95-0150Location/Matrix SSFL AREA 4 SOILCollected 06/26/95 14:00

Chain of custody id _____

ANALYTE	DUPLICATE 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
Tritium	430	800	1000	500	U	H	270	870	1000	U	-	
Strontium 90	0.063	0.041	0.05	0.5	J	SR	0.037	0.059	0.09	U	52	217
Thorium 228	0.63	0.094	0.06	0.1		TH	0.88	0.10	0.05		33	29
Thorium 230	0.50	0.080	0.03	0.1		TH	0.70	0.090	0.03		33	32
Thorium 232	0.67	0.094	0.02	0.1		TH	0.89	0.097	0.02		28	28
Uranium 233/234	0.60	0.048	0.01	0.01		U	0.68	0.044	0.01		12	19
Uranium 235	0.035	0.012	0.006	0.01		U	0.032	0.009	0.006		9	68
Uranium 238	0.59	0.047	0.008	0.01		U	0.69	0.044	0.007		16	19
Plutonium 238	-0.001	0.008	0.01	0.01	U	PU	0	0.002	0.004	U	-	
Plutonium 239/240	0.002	0.003	0.006	0.01	U	PU	0.003	0.002	0.003	J	40	219
GAMMA SCAN ANALYTES	U						U					
Potassium 40	17	0.78				GAM	21	0.67			21	33
Chromium 51	U		0.5		U	GAM	U		0.3	U	-	
Manganese 54	U		0.04		U	GAM	U		0.03	U	-	
Cobalt 58	U		0.05		U	GAM	U		0.03	U	-	
Iron 59	U		0.1		U	GAM	U		0.1	U	-	
Cobalt 60	U		0.04		U	GAM	U		0.03	U	-	
Zinc 65	U		0.1		U	GAM	U		0.08	U	-	
Niobium 94	U		0.03		U	GAM	U		0.03	U	-	
Ruthenium 103	U		0.05		U	GAM	U		0.04	U	-	
Ruthenium 106	U		0.3		U	GAM	U		0.2	U	-	
Tin 113	U		0.04		U	GAM	U		0.04	U	-	
Cesium 134	U		0.05		U	GAM	U		0.04	U	-	
Cesium 137	0.15	0.043		0.02		GAM	0.20	0.037			29	58
Cerium 144	U		0.2		U	GAM	U		0.1	U	-	
Europium 152	U		0.06		U	GAM	U		0.05	U	-	
Europium 154	U		0.04		U	GAM	U		0.04	U	-	
Europium 155	U		0.1		U	GAM	U		0.08	U	-	

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TMA/RICHMOND

REPORTING GROUP 6119

NS07013-20

A4CM-95-0150

DUPLICATE, cont.

SDG 6119

Contact Italy E. Pittman

DUPLICATE

ORIGINAL

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id NS07013-20

Lab sample id NS07013-07

Client sample id A4CM-95-0150

Dept sample id 6119-020

Dept sample id 6119-007

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/26/95 14:00

% moisture 4.8

Chain of custody id

ANALYTE	DUPLICATE 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 TOT	PROT LIMIT
Radium 226	0.76	0.064				GAM	0.86	0.060			12	36	
Thorium 232	1.1	0.16				GAM	1.3	0.14			17	42	

QC-DUP#7 24275

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-01

A4CM-95-0144

DATA SHEET

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-01Client sample id A4CM-95-0144Dept sample id 6119-001Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/20/95 14:00% moisture 17.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		1.1	0.10	0.05	0.1		TH
Thorium 230	14269-63-7	3.8	0.22	0.02	0.1		TH
Thorium 232	7740-29-1	0.95	0.094	0.02	0.1		TH
Uranium 233/234	11-08-5	1.9	0.13	0.02	0.01		U
Uranium 235	14117-96-1	0.10	0.021	0.009	0.01		U
Uranium 238	7440-61-1	1.7	0.12	0.02	0.01		U

DATA SHEETS

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TMA / RICHMOND

REPORTING GROUP 6119

N507013-02

DATA SHEET

A4CM-95-0145

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-02Client sample id A4CM-95-0145Dept sample id 6119-002Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/20/95 14:00% moisture 17.9

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		0.95	0.12	0.06	0.1		TH
Thorium 230	14269-63-7	4.2	0.30	0.03	0.1		TH
Thorium 232	7740-29-1	0.92	0.11	0.02	0.1		TH
Uranium 233/234	11-08-5	1.6	0.11	0.02	0.01		U
Uranium 235	14117-96-1	0.065	0.019	0.009	0.01		U
Uranium 238	7440-61-1	1.4	0.10	0.01	0.01		U

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

N507013-03

DATA SHEET

A4CM-95-0146

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-03Client sample id A4CM-95-0146Dept sample id 6119-003Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/21/95 13:00% moisture 10.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		1.2	0.19	0.1	0.1		TH
Thorium 230	14269-63-7	0.92	0.15	0.04	0.1		TH
Thorium 232	7740-29-1	1.2	0.17	0.05	0.1		TH
Uranium 233/234	11-08-5	0.81	0.065	0.02	0.01		U
Uranium 235	14117-96-1	0.039	0.014	0.01	0.01		U
Uranium 238	7440-61-1	0.77	0.061	0.01	0.01		U

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

NS07013-04

DATA SHEET

A4CM-95-0147

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id NS07013-04Client sample id A4CM-95-0147Dept sample id 6119-004Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/21/95 13:00% moisture 7.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		0.93	0.13	0.07	0.1		TH
Thorium 230	14269-63-7	0.71	0.11	0.03	0.1		TH
Thorium 232	7740-29-1	0.91	0.12	0.03	0.1		TH
Uranium 233/234	11-08-5	0.74	0.068	0.02	0.01		U
Uranium 235	14117-96-1	0.042	0.015	0.01	0.01		U
Uranium 238	7440-61-1	0.77	0.069	0.01	0.01		U

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

DATA SHEET

N507013-05

A4CM-95-0148

SDG 6119Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N507013-05Client sample id A4CM-95-0148Dept sample id 6119-005Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/22/95 11:00% moisture 8.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		1.6	0.22	0.08	0.1		TH
Thorium 230	14269-63-7	1.1	0.17	0.04	0.1		TH
Thorium 232	7740-29-1	1.5	0.20	0.04	0.1		TH
Uranium 233/234	11-08-5	0.98	0.086	0.02	0.01		U
Uranium 235	14117-96-1	0.043	0.017	0.01	0.01		U
Uranium 238	7440-61-1	0.98	0.086	0.01	0.01		U

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

N507013-06

DATA SHEET

A4CM-95-0149

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-06Client sample id A4CM-95-0149Dept sample id 6119-006Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/22/95 11:00% moisture 8.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		1.4	0.14	0.05	0.1		TH
Thorium 230	14269-63-7	1.1	0.12	0.02	0.1		TH
Thorium 232	7740-29-1	1.3	0.13	0.02	0.1		TH
Uranium 233/234	11-08-5	0.89	0.060	0.01	0.01		U
Uranium 235	14117-96-1	0.054	0.013	0.006	0.01		U
Uranium 238	7440-61-1	0.96	0.064	0.01	0.01		U

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-07

A4CM-95-0150

DATA SHEET

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-07Client sample id A4CM-95-0150Dept sample id 6119-007Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 4.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		270	870	1000	500	U	H
Strontium 90	10098-97-2	0.037	0.059	0.09	0.5	U	SR
Thorium 228		0.88	0.10	0.05	0.1		TH
Thorium 230	14269-63-7	0.70	0.090	0.03	0.1		TH
Thorium 232	7740-29-1	0.89	0.097	0.02	0.1		TH
Uranium 233/234	11-08-5	0.68	0.044	0.01	0.01		U
Uranium 235	14117-96-1	0.032	0.009	0.006	0.01		U
Uranium 238	7440-61-1	0.69	0.044	0.007	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.002	0.003	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.67				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.20	0.037		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-07

A4CM-95-0150

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-07Client sample id A4CM-95-0150Dept sample id 6119-007Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 4.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.86	0.060				GAM
Thorium 232		1.3	0.14				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

N507013-08

A4CM-95-0151

DATA SHEET

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-08Client sample id A4CM-95-0151Dept sample id 6119-008Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 13.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ KRR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-56	320	600	500	U	H
Strontium 90	10098-97-2	0.024	0.051	0.06	0.5	U	SR
Thorium 228		0.49	0.068	0.04	0.1		TH
Thorium 230	14269-63-7	0.37	0.058	0.03	0.1		TH
Thorium 232	7740-29-1	0.49	0.067	0.02	0.1		TH
Uranium 233/234	11-08-5	0.36	0.032	0.01	0.01		U
Uranium 235	14117-96-1	0.020	0.008	0.005	0.01		U
Uranium 238	7440-61-1	0.38	0.033	0.008	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.003	0.01	U	PU
Plutonium 239/240	10-12-8	0.026	0.006	0.003	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.68				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.04		U	GAM
Iron 59		U		0.1		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.3		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		1.2	0.050		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.07		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.09		U	GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-08

A4CM-95-0151

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-08Client sample id A4CM-95-0151Dept sample id 6119-008Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 13.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.74	0.067				GAM
Thorium 232		1.2	0.14				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

N507013-09

DATA SHEET

A4CM-95-0152

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-09

Client sample id A4CM-95-0152

Dept sample id 6119-009

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/26/95 14:00

% moisture 8.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		240	700	1000	500	U	H
Strontium 90	10098-97-2	0.027	0.059	0.1	0.5	U	SR
Thorium 228		0.79	0.18	0.2	0.1		TH
Thorium 230	14269-63-7	0.69	0.15	0.06	0.1		TH
Thorium 232	7740-29-1	0.76	0.16	0.06	0.1		TH
Uranium 233/234	11-08-5	0.74	0.053	0.01	0.01		U
Uranium 235	14117-96-1	0.053	0.013	0.006	0.01		U
Uranium 238	7440-61-1	0.77	0.055	0.01	0.01		U
Plutonium 238	13981-16-3	0.003	0.007	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.002	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.36				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.05		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.04		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.025	0.011		0.02		GAM
Cerium 144		U		0.08		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.07		U	GAM

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-09

A4CM-95-0152

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-09Client sample id A4CM-95-0152Dept sample id 6119-009Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 8.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.84	0.034				GAM
Thorium 232		1.3	0.088				GAM

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SUMMARY DATA SECTION

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-10

DATA SHEET

A4CM-95-0153

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-10Client sample id A4CM-95-0153Dept sample id 6119-010Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 9.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		430	440	700	500	U	H
Strontium 90	10098-97-2	0.063	0.071	0.1	0.5	U	SR
Thorium 228		0.69	0.11	0.07	0.1		TH
Thorium 230	14269-63-7	0.65	0.099	0.03	0.1		TH
Thorium 232	7740-29-1	0.76	0.11	0.03	0.1		TH
Uranium 233/234	11-08-5	0.65	0.050	0.01	0.01		U
Uranium 235	14117-96-1	0.031	0.010	0.006	0.01		U
Uranium 238	7440-61-1	0.66	0.050	0.009	0.01		U
Plutonium 238	13981-16-3	0.003	0.006	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.023	0.007	0.006	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.59				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.94	0.039		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-10

A4CM-95-0153

DATA SHEET, cont

SDG 6119
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507013-10
Dept sample id 6119-010
Received 07/06/95
% moisture 9.2Client sample id A4CM-95-0153
Location/Matrix SSFL AREA 4 SOIL
Collected 06/26/95 14:00
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.81	0.052				GAM
Thorium 232		1.2	0.12				GAM

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-11

DATA SHEET

A4CM-95-0154

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-11Client sample id A4CM-95-0154Dept sample id 6119-011Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 5.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		280	610	1000	500	U	H
Strontium 90	10098-97-2	0.094	0.075	0.1	0.5	U	SR
Thorium 228		0.42	0.070	0.05	0.1		TH
Thorium 230	14269-63-7	0.40	0.066	0.02	0.1		TH
Thorium 232	7740-29-1	0.36	0.061	0.02	0.1		TH
Uranium 233/234	11-08-5	0.52	0.048	0.01	0.01		U
Uranium 235	14117-96-1	0.041	0.014	0.01	0.01		U
Uranium 238	7440-61-1	0.51	0.047	0.01	0.01		U
Neptunium 238	13981-16-3	0.001	0.003	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.002	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		22	0.43				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.06		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.51	0.023		0.02		GAM
Cerium 144		U		0.09		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.08		U	GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-11

A4CM-95-0154

DATA SHEET, cont

SDG 6119
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507013-11Client sample id A4CM-95-0154Dept sample id 6119-011Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/26/95 14:00% moisture 5.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.88	0.034				GAM
Thorium 232		1.4	0.092				GAM

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-12

A4CM-95-0155

DATA SHEET

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-12

Client sample id A4CM-95-0155

Dept sample id 6119-012

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/27/95 13:30

% moisture 14.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0	790	1000	500	U	H
Strontium 90	10098-97-2	0.053	0.072	0.1	0.5	U	SR
Thorium 228		0.97	0.23	0.1	0.1		TH
Thorium 230	14269-63-7	0.69	0.20	0.09	0.1		TH
Thorium 232	7740-29-1	0.74	0.20	0.09	0.1		TH
Uranium 233/234	11-08-5	1.3	0.077	0.01	0.01		U
Uranium 235	14117-96-1	0.072	0.015	0.006	0.01		U
Uranium 238	7440-61-1	1.3	0.078	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.003	0.002	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		16	0.39				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.06		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.090	0.016		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.07		U	GAM

Lab id TMAN

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-12

A4CM-95-0155

DATA SHEET, cont

SDG 6119
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507013-12Client sample id A4CM-95-0155Dept sample id 6119-012Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 14.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		1.6	0.051				GAM
Thorium 232		2.2	0.10				GAM

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Lab id TMAN
Protocol ROCKETDYNE
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TMA/RICHMOND

REPORTING GROUP 6119

N507013-13

A4CM-95-0156

DATA SHEET

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-13Client sample id A4CM-95-0156Dept sample id 6119-013Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 9.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		140	470	800	500	U	H
Strontium 90	10098-97-2	0.029	0.063	0.1	0.5	U	SR
Thorium 228		0.84	0.14	0.05	0.1		TH
Thorium 230	14269-63-7	0.86	0.14	0.04	0.1		TH
Thorium 232	7740-29-1	0.84	0.14	0.04	0.1		TH
Uranium 233/234	11-08-5	0.68	0.057	0.02	0.01		U
Uranium 235	14117-96-1	0.045	0.014	0.009	0.01		U
Uranium 238	7440-61-1	0.68	0.055	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.010	0.005	0.004	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.50				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.08		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.06		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.03		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.13	0.025		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.07		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-13

A4CM-95-0156

DATA SHEET, cont

SDG 6119
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507013-13Client sample id A4CM-95-0156Dept sample id 6119-013Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 9.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.81	0.043				GAM
Thorium 232		1.2	0.10				GAM

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TMA / RICHMOND

REPORTING GROUP 6119

N507013-14

DATA SHEET

A4CM-95-0157

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-14

Client sample id A4CM-95-0157

Dept sample id 6119-014

Location/Matrix SSFL AREA 4

SOIL

Received 07/06/95

Collected 06/27/95 13:30

% moisture 5.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		520	740	1000	500	U	H
Strontium 90	10098-97-2	0.038	0.072	0.1	0.5	U	SR
Thorium 228		0.82	0.099	0.06	0.1		TH
Thorium 230	14269-63-7	0.71	0.088	0.03	0.1		TH
Thorium 232	7740-29-1	0.87	0.095	0.02	0.1		TH
Uranium 233/234	11-08-5	0.57	0.050	0.01	0.01		U
Uranium 235	14117-96-1	0.033	0.012	0.007	0.01		U
Uranium 238	7440-61-1	0.58	0.050	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0.007	0.003	0.004	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.63				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.08		U	GAM
Niobium 94		U		0.02		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.04		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.23	0.024		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.03		U	GAM
Europium 155		U		0.1		U	GAM

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-14

A4CM-95-0157

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-14Client sample id A4CM-95-0157Dept sample id 6119-014Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 5.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.85	0.054				GAM
Thorium 232		1.4	0.15				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA / RICHMOND

REPORTING GROUP 6119

N507013-15

A4CM-95-0158

DATA SHEET

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-15Client sample id A4CM-95-0158Dept sample id 6119-015Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 5.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		110	780	1000	500	U	H
Strontium 90	10098-97-2	0.059	0.080	0.1	0.5	U	SR
Thorium 228		0.79	0.12	0.06	0.1		TH
Thorium 230	14269-63-7	0.69	0.11	0.03	0.1		TH
Thorium 232	7740-29-1	0.86	0.12	0.03	0.1		TH
Uranium 233/234	11-08-5	0.74	0.058	0.01	0.01		U
Uranium 235	14117-96-1	0.033	0.011	0.007	0.01		U
Uranium 238	7440-61-1	0.81	0.061	0.01	0.01		U
Plutonium 238	13981-16-3	0.005	0.006	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.004	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.66				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.09		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		0.12	0.032		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-15

A4CM-95-0158

DATA SHEET, cont

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-15

Client sample id A4CM-95-0158

Dept sample id 6119-015

Location/Matrix SSFL AREA 4 SOIL

Received 07/06/95

Collected 06/27/95 13:30

% moisture 5.1

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.78	0.056				GAM
Thorium 232		1.2	0.13				GAM

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

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Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-16

A4CM-95-0159

DATA SHEET

SDG 6119

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507013-16

Client sample id A4CM-95-0159

Dept sample id 6119-016

Location/Matrix SSFL AREA 4

SOIL

Received 07/06/95

Collected 06/27/95 13:30

% moisture 6.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		260	770	1000	500	U	H
Strontium 90	10098-97-2	0.096	0.079	0.1	0.5	U	SR
Thorium 228		0.69	0.090	0.05	0.1		TH
Thorium 230	14269-63-7	0.60	0.083	0.03	0.1		TH
Thorium 232	7740-29-1	0.67	0.089	0.02	0.1		TH
Uranium 233/234	11-08-5	0.61	0.043	0.009	0.01		U
Uranium 235	14117-96-1	0.034	0.009	0.005	0.01		U
Uranium 238	7440-61-1	0.64	0.044	0.008	0.01		U
Plutonium 238	13981-16-3	0.003	0.006	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.11	0.014	0.004	0.01		PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.63				GAM
Chromium 51		U		0.3		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.03		U	GAM
Iron 59		U		0.09		U	GAM
Cobalt 60		U		0.03		U	GAM
Zinc 65		U		0.07		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.04		U	GAM
Ruthenium 106		U		0.2		U	GAM
Tin 113		U		0.03		U	GAM
Cesium 134		0.035	0.034				GAM
Cesium 137		0.26	0.032		0.02		GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-16

A4CM-95-0159

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-16Client sample id A4CM-95-0159Dept sample id 6119-016Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/27/95 13:30% moisture 6.2

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.80	0.057				GAM
Thorium 232		1.1	0.12				GAM

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TMA/RICHMOND

REPORTING GROUP 6119

N507013-17

DATA SHEET

A4CM-95-0162

SDG 6119

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-17Client sample id A4CM-95-0162Dept sample id 6119-017Location/Matrix SSFL AREA 4SOILReceived 07/06/95Collected 06/28/95 08:15% moisture 5.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		140	690	1000	500	U	H
Strontium 90	10098-97-2	0.002	0.058	0.06	0.5	U	SR
Thorium 228		0.52	0.15	0.1	0.1		TH
Thorium 230	14269-63-7	0.48	0.13	0.07	0.1		TH
Thorium 232	7740-29-1	0.65	0.15	0.08	0.1		TH
Uranium 233/234	11-08-5	0.40	0.037	0.01	0.01		U
Uranium 235	14117-96-1	0.022	0.008	0.006	0.01		U
Uranium 238	7440-61-1	0.42	0.038	0.009	0.01		U
Polonium 238	13981-16-3	0	0.009	0.02	0.01	U	PU
Polonium 239/240	10-12-8	0	0.003	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.41				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.02		U	GAM
Cobalt 58		U		0.02		U	GAM
Iron 59		U		0.05		U	GAM
Cobalt 60		U		0.02		U	GAM
Zinc 65		U		0.05		U	GAM
Niobium 94		U		0.01		U	GAM
Ruthenium 103		U		0.02		U	GAM
Ruthenium 106		U		0.1		U	GAM
Tin 113		U		0.02		U	GAM
Cesium 134		U		0.02		U	GAM
Cesium 137		0.042	0.016		0.02		GAM
Cerium 144		U		0.08		U	GAM
Europium 152		U		0.03		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.04		U	GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

N507013-17

A4CM-95-0162

DATA SHEET, cont

SDG 6119Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507013-17Client sample id A4CM-95-0162Dept sample id 6119-017Location/Matrix SSFL AREA 4 SOILReceived 07/06/95Collected 06/28/95 08:15% moisture 5.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.42	0.031				GAM
Thorium 232		0.74	0.076				GAM

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Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPY

Test PU Matrix SOIL

SDG 6119

Act Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX PLANCHET	Plutonium 238	Plutonium 239/240
Preparation batch 2781-164				
A4CM-95-0150	N507013-07	6119-007	U	0.003 J
A4CM-95-0151	N507013-08	6119-008	U	0.026
A4CM-95-0152	N507013-09	6119-009	U	U
A4CM-95-0153	N507013-10	6119-010	U	0.023
A4CM-95-0154	N507013-11	6119-011	U	U
A4CM-95-0155	N507013-12	6119-012	U	0.004 J
A4CM-95-0156	N507013-13	6119-013	U	0.010
A4CM-95-0157	N507013-14	6119-014	U	0.007 J
A4CM-95-0158	N507013-15	6119-015	U	U
A4CM-95-0159	N507013-16	6119-016	U	0.11
A4CM-95-0162	N507013-17	6119-017	U	U
BLK (QC ID=24274)	N507013-19	6119-019	U	U
LCS (QC ID=24273)	N507013-18	6119-018	ok	ok
Duplicate (N507013-07)	N507013-20	6119-020	- U	ok U

Nominal values and limits from method RDLs (pCi/g) 0.01 0.01

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-164 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 164														
A4CM-95-0150	N507013-07		0.004	3.00			67	1350				39 08/03/95 08/04	SS-045	
5-0151	N507013-08		0.003	3.00			83	1350				39 08/03/95 08/04	SS-046	
5-0152	N507013-09		0.01	3.00			65	1000				39 08/03/95 08/04	SS-032	
A4CM-95-0153	N507013-10		0.01	3.00			83	1012				39 08/03/95 08/04	SS-035	
A4CM-95-0154	N507013-11		0.004	3.00			87	1374				44 08/03/95 08/09	SS-063	
A4CM-95-0155	N507013-12		0.005	3.00			82	1374				43 08/03/95 08/09	SS-064	
A4CM-95-0156	N507013-13		0.006	3.00			57	1374				43 08/03/95 08/09	SS-065	
A4CM-95-0157	N507013-14		0.004	3.00			81	1374				43 08/03/95 08/09	SS-066	
A4CM-95-0158	N507013-15		0.01	3.00			57	1067				43 08/03/95 08/09	SS-039	
A4CM-95-0159	N507013-16		0.01	3.00			87	1067				43 08/03/95 08/09	SS-040	
A4CM-95-0162	N507013-17		0.02	3.00			53	1067				42 08/03/95 08/09	SS-041	
BLK (QC ID=24274)	N507013-19		0.008	3.00			57	1019				08/03/95 08/12	SS-050	
LCS (QC ID=24273)	N507013-18		0.01	3.00			64	1019				08/03/95 08/10	SS-035	
Duplicate (N507013-07)	N507013-20		0.01	3.00			80	1067				44 08/03/95 08/09	SS-042	
Nominal values and limits from method			0.01	3.00			20-105	500	100		180			

PROCEDURES	REFERENCE	HASL 300/PU-02
EP-060		Soil Preparation, rev 0
EP-070		Soil Dissolution, rev 0
EP-940		Plutonium Purification, rev 0
EP-008		Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	0.008 ± 0.009
FOR 14 SAMPLES	YIELD	72 ± 25

METHOD SUMMARIES

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest TH Matrix SOIL
SDG 6119
Sact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Thorium 228	Thorium 230	Thorium 232
Preparation batch 2781-164							
A4CM-95-0144	N507013-01	AOR1	6119-001		1.1	3.8	0.95
A4CM-95-0145	N507013-02		6119-002		0.95	4.2	0.92
A4CM-95-0146	N507013-03	AOR1	6119-003		1.2	0.92	1.2
A4CM-95-0147	N507013-04		6119-004		0.93	0.71	0.91
A4CM-95-0148	N507013-05		6119-005		1.6	1.1	1.5
A4CM-95-0149	N507013-06		6119-006		1.4	1.1	1.3
A4CM-95-0150	N507013-07		6119-007		0.88	0.70	0.89
A4CM-95-0151	N507013-08		6119-008		0.49	0.37	0.49
A4CM-95-0152	N507013-09		6119-009		0.79	0.69	0.76
A4CM-95-0153	N507013-10		6119-010		0.69	0.65	0.76
A4CM-95-0154	N507013-11		6119-011		0.42	0.40	0.36
A4CM-95-0155	N507013-12		6119-012		0.97	0.69	0.74
A4CM-95-0156	N507013-13		6119-013		0.84	0.86	0.84
A4CM-95-0157	N507013-14		6119-014		0.82	0.71	0.87
A4CM-95-0158	N507013-15		6119-015		0.79	0.69	0.86
A4CM-95-0159	N507013-16		6119-016		0.69	0.60	0.67
A4CM-95-0162	N507013-17		6119-017		0.52	0.48	0.65
BLK (QC ID=24274)	N507013-19		6119-019		U	U	U
LCS (QC ID=24273)	N507013-18		6119-018		No data U	ok	No data U
Duplicate (N507013-07)	N507013-20		6119-020		OUT	OUT	ok

Nominal values and limits from method RDLs (pCi/g) 0.1 0.1 0.1

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-164 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 164																
A4CM-95-0144	N507013-01	AOR1		0.05	1.00			54	1074				48	08/04/95	08/07	SS-039
A4CM-95-0145	N507013-02			0.06	1.00			66	578				43	08/02/95	08/02	SS-040
A4CM-95-0146	N507013-03	AOR1		0.1	1.00			22	1008				47	08/04/95	08/07	SS-027
A4CM-95-0147	N507013-04			0.07	1.00			45	680				43	08/02/95	08/03	SS-027
A4CM-95-0148	N507013-05			0.08	1.00			31	680				42	08/02/95	08/03	SS-028
A4CM-95-0149	N507013-06			0.05	1.00			63	680				42	08/02/95	08/03	SS-029
A4CM-95-0150	N507013-07			0.05	1.00			68	680				38	08/02/95	08/03	SS-032
A4CM-95-0151	N507013-08			0.04	1.00			80	680				38	08/02/95	08/03	SS-036
A4CM-95-0152	N507013-09			0.2	1.00			22	680				38	08/02/95	08/03	SS-039
A4CM-95-0153	N507013-10			0.07	1.00			48	680				38	08/02/95	08/03	SS-040
A4CM-95-0154	N507013-11			0.05	1.00			74	680				38	08/02/95	08/03	SS-041
A4CM-95-0155	N507013-12			0.1	1.00			21	442				39	08/02/95	08/05	SS-049
A4CM-95-0156	N507013-13			0.05	1.00			50	442				39	08/02/95	08/05	SS-050
A4CM-95-0157	N507013-14			0.06	1.00			47	1008				41	08/02/95	08/07	SS-028
A4CM-95-0158	N507013-15			0.06	1.00			53	568				42	08/02/95	08/08	SS-027
A4CM-95-0159	N507013-16			0.05	1.00			78	568				42	08/02/95	08/08	SS-028
A4CM-95-0162	N507013-17			0.1	1.00			36	641				42	08/02/95	08/09	SS-019
BLK (QC ID=24274)	N507013-19			0.07	1.00			61	641					08/02/95	08/09	SS-018
LCS (QC ID=24273)	N507013-18			0.05	1.00			78	568					08/02/95	08/08	SS-032
Duplicate (N507013-07)	N507013-20			0.06	1.00			70	532				43	08/02/95	08/08	SS-039

Nominal values and limits from method 0.1 1.00 20-105 500 180

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY, cont.

THORIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest TH Matrix SOIL
SDG 6119
act Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

PROCEDURES	EP-000	Data Entry and Document Preparation, rev 0
	EP-001	Q.C. Preparation, rev 0
	EP-003	Tracing, rev 0
	EP-008	Heavy Elements Electroplating, rev 0
	EP-060	Soil Preparation, rev 0
	EP-070	Soil Dissolution, rev 0
	EP-900	Thorium Purification, rev 0

AVERAGES $\pm$ 2 SD	MDA	0.07	$\pm$	0.07
FOR 20 SAMPLES	YIELD	53	$\pm$	39

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 08/16/95

TMA/RICHMOND
REPORTING GROUP 6119

METHOD SUMMARY
URANIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPY

Test U Matrix SOIL
SDG 6119
Act Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX PLANCHET	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
						1+3	2σ	2+3	2σ
Preparation batch 2781-164									
A4CM-95-0144	N507013-01	6119-001	1.9	0.10	1.7	112	11	6	1
A4CM-95-0145	N507013-02	6119-002	1.6	0.065	1.4	114	11	5	1
A4CM-95-0146	N507013-03	6119-003	0.81	0.039	0.77	105	12	5	2
A4CM-95-0147	N507013-04	6119-004	0.74	0.042	0.77	96	12	5	2
A4CM-95-0148	N507013-05	6119-005	0.98	0.043	0.98	100	12	4	2
A4CM-95-0149	N507013-06	6119-006	0.89	0.054	0.96	93	9	6	1
A4CM-95-0150	N507013-07	6119-007	0.68	0.032	0.69	99	9	5	1
A4CM-95-0151	N507013-08	6119-008	0.36	0.020	0.38	95	12	5	2
A4CM-95-0152	N507013-09	6119-009	0.74	0.053	0.77	96	10	7	2
A4CM-95-0153	N507013-10	6119-010	0.65	0.031	0.66	98	11	5	2
A4CM-95-0154	N507013-11	6119-011	0.52	0.041	0.51	102	13	8	3
A4CM-95-0155	N507013-12	6119-012	1.3	0.072	1.3	100	8	6	1
A4CM-95-0156	N507013-13	6119-013	0.68	0.045	0.68	100	12	7	2
A4CM-95-0157	N507013-14	6119-014	0.57	0.033	0.58	98	12	6	2
A4CM-95-0158	N507013-15	6119-015	0.74	0.033	0.81	91	10	4	1
A4CM-95-0159	N507013-16	6119-016	0.61	0.034	0.64	95	9	5	1
A4CM-95-0162	N507013-17	6119-017	0.40	0.022	0.42	95	12	5	2
BLK (QC ID=24274)	N507013-19	6119-019	U	U	U				
LCS (QC ID=24273)	N507013-18	6119-018	ok	ok	ok				
Duplicate (N507013-07)	N507013-20	6119-020	ok	ok	ok	102	11	6	2
Nominal values and limits from method			RDLs (pCi/g)	0.01	0.01	0.01	100	4	
							Averages 100	5	

IOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MAX MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-164 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 164															
A4CM-95-0144	N507013-01	0.02	3.00				38	1006				45	08/02/95	08/04	SS-028
A4CM-95-0145	N507013-02	0.02	3.00				38	1012				45	08/02/95	08/04	SS-039
A4CM-95-0146	N507013-03	0.02	3.00				43	1012				44	08/02/95	08/04	SS-042
A4CM-95-0147	N507013-04	0.02	3.00				33	1074				47	08/02/95	08/07	SS-038
A4CM-95-0148	N507013-05	0.02	3.00				31	1046				48	08/02/95	08/09	SS-027
A4CM-95-0149	N507013-06	0.01	3.00				53	1046				48	08/02/95	08/09	SS-029
A4CM-95-0150	N507013-07	0.01	3.00				53	1437				44	08/02/95	08/09	SS-036
A4CM-95-0151	N507013-08	0.01	3.00				63	1019				45	08/02/95	08/10	SS-042
A4CM-95-0152	N507013-09	0.01	3.00				55	1018				45	08/02/95	08/10	SS-028
A4CM-95-0153	N507013-10	0.01	3.00				54	1018				45	08/02/95	08/10	SS-029
A4CM-95-0154	N507013-11	0.01	3.00				44	1018				45	08/02/95	08/10	SS-030
A4CM-95-0155	N507013-12	0.01	3.00				58	1019				44	08/02/95	08/10	SS-032
A4CM-95-0156	N507013-13	0.02	3.00				45	1019				44	08/02/95	08/10	SS-036
A4CM-95-0157	N507013-14	0.01	3.00				49	1019				44	08/02/95	08/10	SS-037
A4CM-95-0158	N507013-15	0.01	3.00				47	1018				44	08/02/95	08/10	SS-027
A4CM-95-0159	N507013-16	0.009	3.00				68	1019				44	08/02/95	08/10	SS-038
A4CM-95-0162	N507013-17	0.01	3.00				54	1019				43	08/02/95	08/10	SS-039
BLK (QC ID=24274)	N507013-19	0.008	3.00				65	1019					08/02/95	08/10	SS-040
LCS (QC ID=24273)	N507013-18	0.05	3.00				61	578					08/02/95	08/02	SS-042
Duplicate (N507013-07)	N507013-20	0.01	3.00				53	1019				45	08/02/95	08/10	SS-041
Nominal values and limits from method			0.01	3.00			30-105	720	100		180				

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY, cont.

URANIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPYTest U Matrix SOIL
SDG 6119
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044

PROCEDURES	REFERENCE	HASL 300/U-04
	EP-060	Soil Preparation, rev 0
	EP-070	Soil Dissolution, rev 0
	EP-910	Uranium Purification, rev 0
	EP-008	Heavy Elements Electroplating, rev 0

AVERAGES $\pm$ 2 SD	MDA	0.01	$\pm$	0.02
FOR 20 SAMPLES	YIELD	50	$\pm$	21

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL
BETA COUNTINGTest SR Matrix SOIL
SDG 6119
act Italy E. PittmanClient Rocketdyne
Contract R44PUZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Strontium 90
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Preparation batch 2781-164

A4CM-95-0150	N507013-07	6119-007	U	
A4CM-95-0151	N507013-08	6119-008	U	
A4CM-95-0152	N507013-09	6119-009	U	
A4CM-95-0153	N507013-10	6119-010	U	
A4CM-95-0154	N507013-11	6119-011	U	
A4CM-95-0155	N507013-12	6119-012	U	
A4CM-95-0156	N507013-13	6119-013	U	
A4CM-95-0157	N507013-14	6119-014	U	
A4CM-95-0158	N507013-15	6119-015	U	
A4CM-95-0159	N507013-16	6119-016	U	
A4CM-95-0162	N507013-17	6119-017	U	
BLK (QC ID=24274)	N507013-19	6119-019	U	
LCS (QC ID=24273)	N507013-18	6119-018	ok	
Duplicate (N507013-07)	N507013-20	6119-020	ok	J

Nominal values and limits from method	RDLs (pCi/g)	0.5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MDA pCi/g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- YZED	DETECTOR
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Preparation batch 2781-164 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 164

A4CM-95-0150	N507013-07	0.09	2.00	77	212	42	08/01/95	08/07	LBG-004
A4CM-95-0151	N507013-08	0.06	2.00	78	432	44	08/01/95	08/09	LBG-004
A4CM-95-0152	N507013-09	0.1	2.00	80	133	42	08/01/95	08/07	LBG-003
A4CM-95-0153	N507013-10	0.1	2.00	79	133	42	08/01/95	08/07	LBG-004
A4CM-95-0154	N507013-11	0.1	2.00	82	180	42	08/01/95	08/07	LBG-016
A4CM-95-0155	N507013-12	0.1	2.00	78	133	41	08/01/95	08/07	LBG-016
A4CM-95-0156	N507013-13	0.1	2.00	75	126	41	08/01/95	08/07	LBG-003
A4CM-95-0157	N507013-14	0.1	2.00	78	126	41	08/01/95	08/07	LBG-004
A4CM-95-0158	N507013-15	0.1	2.00	78	220	41	08/01/95	08/07	LBG-003
A4CM-95-0159	N507013-16	0.1	2.00	75	126	43	08/01/95	08/09	LBG-016
A4CM-95-0162	N507013-17	0.06	2.00	78	432	42	08/01/95	08/09	LBG-015
BLK (QC ID=24274)	N507013-19	0.04	2.00	77	929		08/01/95	08/08	LBG-004
LCS (QC ID=24273)	N507013-18	0.2	2.00	77	80		08/01/95	08/08	LBG-016
Duplicate (N507013-07)	N507013-20	0.05	2.00	82	432	44	08/01/95	08/09	LBG-003

Nominal values and limits from method	0.5	2.00	20-105	200	180
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PROCEDURES	REFERENCE	HASL 300/SR-01,-02
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-500	Strontium-89,90 - Purification, rev 0	

AVERAGES ± 2 SD	MDA	0.09 ± 0.08
FOR 14 SAMPLES	YIELD	78 ± 4

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOIL

SDG 6119

act Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-164

A4CM-95-0150	N507013-07	6119-007	0.20
A4CM-95-0151	N507013-08	6119-008	1.2
A4CM-95-0152	N507013-09	6119-009	0.025
A4CM-95-0153	N507013-10	6119-010	0.94
A4CM-95-0154	N507013-11	6119-011	0.51
A4CM-95-0155	N507013-12	6119-012	0.090
A4CM-95-0156	N507013-13	6119-013	0.13
A4CM-95-0157	N507013-14	6119-014	0.23
A4CM-95-0158	N507013-15	6119-015	0.12
A4CM-95-0159	N507013-16	6119-016	0.26
A4CM-95-0162	N507013-17	6119-017	0.042
BLK (QC ID=24274)	N507013-19	6119-019	0
LCS (QC ID=24273)	N507013-18	6119-018	ok
Duplicate (N507013-07)	N507013-20	6119-020	ok

Nominal values and limits from method	RDLs (pCi/g)	0.02
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-164 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 164

A4CM-95-0150	N507013-07		750					421					32	07/28/95	07/28	02,01,00
A4CM-95-0151	N507013-08		575					439					32	07/28/95	07/28	02,02,00
A4CM-95-0152	N507013-09		685					1488					32	07/28/95	07/28	02,03,00
A4CM-95-0153	N507013-10		750					462					32	07/28/95	07/28	02,01,00
A4CM-95-0154	N507013-11		751					1036					33	07/28/95	07/29	02,01,00
A4CM-95-0155	N507013-12		751					1019					31	07/28/95	07/28	02,02,00
A4CM-95-0156	N507013-13		657					817					32	07/28/95	07/29	02,03,00
A4CM-95-0157	N507013-14		751					405					34	07/28/95	07/31	02,01,00
A4CM-95-0158	N507013-15		751					405					34	07/28/95	07/31	02,02,00
A4CM-95-0159	N507013-16		706					405					35	07/28/95	08/01	02,02,00
A4CM-95-0162	N507013-17		750					1014					33	07/28/95	07/31	02,02,00
BLK (QC ID=24274)	N507013-19	0.006	850					1006						07/28/95	07/31	01,01,00
LCS (QC ID=24273)	N507013-18		850					411						07/28/95	08/01	01,01,00
Duplicate (N507013-07)	N507013-20		193					1006					35	07/28/95	07/31	JR,03,00

Nominal values and limits from method	0.02	850	700	180
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PROCEDURES	EP-060	Soil Preparation, rev 0
	EP-100	Ge(Li) Preparation for Environmental Samples, rev 0

AVERAGES ± 2 SD	MDA	0.006 ±
FOR 1 SAMPLES	YIELD	±

METHOD SUMMARIES

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SUMMARY DATA SECTION

Page 48

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.05
Report date	08/16/95

TMA/RICHMOND

REPORTING GROUP 6119

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6119

act Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Tritium
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Preparation batch 2781-164

A4CM-95-0150	N507013-07	6119-007	U	
A4CM-95-0151	N507013-08	6119-008	U	
A4CM-95-0152	N507013-09	6119-009	U	
A4CM-95-0153	N507013-10	6119-010	U	
A4CM-95-0154	N507013-11	6119-011	U	
A4CM-95-0155	N507013-12	6119-012	U	
A4CM-95-0156	N507013-13	6119-013	U	
A4CM-95-0157	N507013-14	6119-014	520	U
A4CM-95-0158	N507013-15	6119-015	U	
A4CM-95-0159	N507013-16	6119-016	U	
A4CM-95-0162	N507013-17	6119-017	U	
BLK (QC ID=24274)	N507013-19	6119-019	U	
LCS (QC ID=24273)	N507013-18	6119-018	ok	
Duplicate (N507013-07)	N507013-20	6119-020	-	U

Nominal values and limits from method	RDLs (pCi/g)	500
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	MDA pCi/g	ALIQ L	PREP PAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-164 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 164

A4CM-95-0150	N507013-07	1000	0.0018						50			26	07/22/95	07/22	LSC-005
A4CM-95-0151	N507013-08	600	0.0048						50			26	07/22/95	07/22	LSC-005
A4CM-95-0152	N507013-09	1000	0.0022						50			26	07/22/95	07/22	LSC-005
A4CM-95-0153	N507013-10	700	0.0036						50			26	07/22/95	07/22	LSC-005
A4CM-95-0154	N507013-11	1000	0.0026						50			26	07/22/95	07/22	LSC-005
A4CM-95-0155	N507013-12	1000	0.0020						50			25	07/22/95	07/22	LSC-005
A4CM-95-0156	N507013-13	800	0.0034						50			25	07/22/95	07/22	LSC-005
A4CM-95-0157	N507013-14	1000	0.0022						50			25	07/22/95	07/22	LSC-005
A4CM-95-0158	N507013-15	1000	0.0020						50			25	07/22/95	07/22	LSC-005
A4CM-95-0159	N507013-16	1000	0.0021						50			26	07/22/95	07/23	LSC-005
A4CM-95-0162	N507013-17	1000	0.0023						50			25	07/22/95	07/23	LSC-005
BLK (QC ID=24274)	N507013-19	300	0.0100						50				07/22/95	07/22	LSC-005
LCS (QC ID=24273)	N507013-18	300	0.0100						50				07/22/95	07/22	LSC-005
Duplicate (N507013-07)	N507013-20	1000	0.0020						50			27	07/22/95	07/23	LSC-005

Nominal values and limits from method	500	0.0100	50	180
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PROCEDURES	REFERENCE	EPA 906.0; ASTM 2476-81
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-211	Tritium in Solid Samples by Azeotropic Distillation, rev 0	

AVERAGES ± 2 SD	MDA 800 ± 500
FOR 14 SAMPLES	YIELD ±

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Version	Ver 1.0
Form	DVD-CMS
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Report date	08/16/95

T M A / R I C H M O N D
REPORTING GROUP 6120

SDG 6120
Contact Italy E. Pittman

Client Rocketdyne
Contract R44PJZ94034044

S U M M A R Y D A T A S E C T I O N

T A B L E O F C O N T E N T S				
Sample Summaries	.	.	.	1
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Italy E. Pittman
Prepared by
Italy E. Pittman 8/15/95
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

SDG 6120

tact Italy E. Pittman

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-95-0160	SSFL AREA4	WATER		N507014-01			06/27/95 13:30
A4CM-95-0161	SSFL AREA4	WATER		N507014-02			06/27/95 13:30
Method Blank		WATER		N507014-04			
Lab Control Sample		WATER		N507014-03			

SAMPLE SUMMARY

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

SDG 6120

act Italy E. Pittman

QC SUMMARY

Client RocketdyneContract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
6120		A4CM-95-0160	WATER				07/06/95	9 N507014-01	6120-001
		A4CM-95-0161	WATER				07/06/95	9 N507014-02	6120-002
		Method Blank	WATER					N507014-04	6120-004
		Lab Control Sample	WATER					N507014-03	6120-003

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-QSVersion 3.06Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

SDG 6120

Contact Italy E. Pittman

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED					QUALI-	
			BATCH	2σ ±	CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG
Alpha Spectroscopy											
PU	WATER	Plutonium, Isotopic in Water	2781-176	5.0	1			1	1		
TH	WATER	Thorium, Isotopic in Water	2781-176	5.0	1			1	1		
U	WATER	Uranium, Isotopic in Water	2781-176	5.0	1			1	1		
Beta Counting											
SR	WATER	Strontium, Total in Water	2781-176	10.0	1			1	1		
Gamma Scan											
GAM	WATER	Gamma Emitters	2781-176	15.0	1			1	1		
Liquid Scintillation											
H	WATER	Tritium in Water	2781-176	10.0	1			1	1		

Duplicates 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, Duplicate or Spike sample.

BATCH SUMMARY

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

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Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

SDG 6120

act Italy E. Pittman

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED		SUF-						
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
A4CM-95-0160		N507014-01	6120-001	H		07/25/95	08/01/95	IEP	Tritium in Water	
SSFL AREA4	WATER	06/27/95								
		07/06/95								
A4CM-95-0161		N507014-02	6120-002	GAM		07/19/95	08/15/95	IEP	Gamma Emitters	
SSFL AREA4	WATER	06/27/95	6120-002	PU		07/28/95	08/01/95	IEP	Plutonium, Isotopic in Water	
		07/06/95	6120-002	SR		07/22/95	08/03/95	IEP	Strontium, Total in Water	
			6120-002	TH		07/27/95	08/01/95	IEP	Thorium, Isotopic in Water	
			6120-002	U		07/26/95	08/01/95	IEP	Uranium, Isotopic in Water	
Method Blank		N507014-04	6120-004	GAM		07/19/95	08/15/95	IEP	Gamma Emitters	
	WATER		6120-004	H		07/25/95	08/01/95	IEP	Tritium in Water	
			6120-004	PU		08/04/95	08/15/95	IEP	Plutonium, Isotopic in Water	
			6120-004	SR		07/22/95	08/15/95	IEP	Strontium, Total in Water	
			6120-004	TH		07/27/95	08/01/95	IEP	Thorium, Isotopic in Water	
			6120-004	U		08/04/95	08/15/95	IEP	Uranium, Isotopic in Water	
Lab Control Sample		N507014-03	6120-003	GAM		07/19/95	08/15/95	IEP	Gamma Emitters	
	WATER		6120-003	H		07/25/95	08/01/95	IEP	Tritium in Water	
			6120-003	PU		07/28/95	08/01/95	IEP	Plutonium, Isotopic in Water	
			6120-003	SR		07/22/95	08/01/95	IEP	Strontium, Total in Water	
			6120-003	TH		08/02/95	08/04/95	IEP	Thorium, Isotopic in Water	
			6120-003	U		07/25/95	08/01/95	IEP	Uranium, Isotopic in Water	

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Emitters	ASTM 3649-85; EPA 901.1	1			1	1		3
H		Tritium in Water	EPA 906.0; ASTM 2476-81	1			1	1		3
PU		Plutonium, Isotopic in Water	ASTM 3865-90	1			1	1		3
SR		Strontium, Total in Water	HASL 300/SR-01,-02	1			1	1		3
TH		Thorium, Isotopic in Water		1			1	1		3
U		Uranium, Isotopic in Water	ASTM 3972-90	1			1	1		3
TOTALS				6			6	6		18

RK SUMMARY

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

N507014-04

METHOD BLANK

Method Blank

SDG 6120

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507014-04

Client sample id Method Blank

Dept sample id 6120-004

Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-130	150	300	500	U	H
Strontium 90	10098-97-2	0.020	0.082	0.1	0.5	U	SR
Thorium 228		0	0.065	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.18	0.082	0.09	0.5	J	TH
Thorium 232	7740-29-1	0	0.032	0.06	0.5	U	TH
Uranium 233/234	11-08-5	0.008	0.063	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.019	0.07	0.5	U	U
Uranium 238	7440-61-1	0	0.016	0.06	0.5	U	U
Plutonium 238	13981-16-3	0.002	0.008	0.02	0.1	U	PU
Plutonium 239/240	10-12-8	0.012	0.012	0.02	0.1	U	PU
MA SCAN ANALYTES		U					
Potassium 40		U		80		U	GAM
Chromium 51		U		20		U	GAM
Manganese 54		U		4		U	GAM
Cobalt 58		U		4		U	GAM
Iron 59		U		8		U	GAM
Cobalt 60		U		4		U	GAM
Zinc 65		U		9		U	GAM
Niobium 94		U		4		U	GAM
Ruthenium 103		U		4		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		4		U	GAM
Cesium 134		U		5		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		8		U	GAM
Europium 154		U		5		U	GAM
Europium 155		U		9		U	GAM
Radium 226		U		7		U	GAM
Thorium 232		U		20		U	GAM

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

N507014-04

BLANK, cont.

Method Blank

SDG 6120

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507014-04

Client sample id Method Blank

Dept sample id 6120-004

Material/Matrix WATER

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N507014-04	H	6120-004		0.0100 L	07/25/95	08/01/95	IEP
N507014-04	SR	6120-004		1.00 L	07/22/95	08/15/95	IEP
N507014-04	TH	6120-004		0.500 L	07/27/95	08/01/95	IEP
N507014-04	U	6120-004		0.200 L	08/04/95	08/15/95	IEP
N507014-04	PU	6120-004		0.500 L	08/04/95	08/15/95	IEP
N507014-04	GAM	6120-004		1.00 L	07/19/95	08/15/95	IEP

QC-BLANK #24277

METHOD BLANKS

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

N507014-03

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6120

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507014-03

Dept sample id 6120-003

Client sample id Lab Control Sample

Material/Matrix WATER

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	10000	450	300	500		H	9760	390	102	81-119	
Strontium 90	20	0.29	0.09	0.5		SR	19.4	0.78	103	83-117	
Thorium 228	0.042	0.042	0.08	0.5	U	TH					
Thorium 230	4.0	0.34	0.05	0.5	B	TH	3.58	0.14	112	82-118	
Thorium 232	0	0.010	0.04	0.5	U	TH					
Uranium 233/234	20	1.8	0.9	0.5		U	19.4	0.78	103	83-117	
Uranium 235	15	1.5	0.2	0.5		U	14.8	0.59	101	82-118	
Uranium 238	20	1.7	0.8	0.5		U	19.4	0.78	103	83-117	
Plutonium 238	2.2	0.16	0.01	0.1		PU	2.08	0.083	106	84-116	
Plutonium 239/240	1.9	0.14	0.01	0.1		PU	1.85	0.074	103	85-115	
SCAN ANALYTES	U										
Barium 40	U		50		U	GAM					
Chromium 51	U		30		U	GAM					
Manganese 54	U		4		U	GAM					
Cobalt 58	U		4		U	GAM					
Iron 59	U		8		U	GAM					
Cobalt 60	U		5		U	GAM					
Zinc 65	U		9		U	GAM					
Niobium 94	U		4		U	GAM					
Ruthenium 103	U		4		U	GAM					
Ruthenium 106	U		40		U	GAM					
Tin 113	U		6		U	GAM					
Cesium 134	U		4		U	GAM					
Cesium 137	350	12		5		GAM	316	13	111	74-126	
Cerium 144	U		20		U	GAM					
Europium 152	U		10		U	GAM					
Europium 154	U		6		U	GAM					
Europium 155	U		10		U	GAM					
Radium 226	U		9		U	GAM					
Thorium 232	U		20		U	GAM					

CONTROL SAMPLES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

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TMA/RICHMOND

REPORTING GROUP 6120

N507014-03

Lab Control Sample

LAB CONTROL SAMPLE, cont.

SDG 6120

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N507014-03

Dept sample id 6120-003

Client sample id Lab Control Sample

Material/Matrix WATER

TEST	PLANCHET	SUF- FIX	ALIQUOT	PREP ERR			
				2σ %	ANALYZED	REVIEWED	BY
H	6120-003		0.0100 L	10.0	07/25/95	08/01/95	IEP
SR	6120-003		1.00 L	10.0	07/22/95	08/01/95	IEP
TH	6120-003		0.500 L	5.0	08/02/95	08/04/95	IEP
U	6120-003		0.200 L	5.0	07/25/95	08/01/95	IEP
PU	6120-003		0.500 L	5.0	07/28/95	08/01/95	IEP
GAM	6120-003		1.00 L	15.0	07/19/95	08/15/95	IEP

QC-LCS #24276

CONTROL SAMPLES

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Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

N507014-01

DATA SHEET

A4CM-95-0160

SDG 6120
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N507014-01
Dept sample id 6120-001
Received 07/06/95Client sample id A4CM-95-0160
Location/Matrix SSFL AREA4 WATER
Collected 06/27/95 13:30
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-120	150	300	500	U	H

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQVOT	ANALYZED	REVIEWED	BY
N507014-01	H	6120-001		0.0100 L	07/25/95	08/01/95	IEP

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN
Protocol ROCKETDYNE
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Form DVD-DS
Version 3.06
Report date 08/15/95

TMA / RICHMOND

REPORTING GROUP 6120

N507014-02

DATA SHEET

A4CM-95-0161

SDG 6120

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N507014-02

Client sample id A4CM-95-0161

Dept sample id 6120-002

Location/Matrix SSFL AREA4

WATER

Received 07/06/95

Collected 06/27/95 13:30

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Strontium 90	10098-97-2	-0.020	0.089	0.09	0.5	U	SR
Thorium 228		-0.019	0.058	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.16	0.097	0.1	0.5	JB	TH
Thorium 232	7740-29-1	0.010	0.039	0.07	0.5	U	TH
Uranium 233/234	11-08-5	-0.008	0.067	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.020	0.08	0.5	U	U
Uranium 238	7440-61-1	0.050	0.050	0.06	0.5	U	U
Plutonium 238	13981-16-3	0.002	0.007	0.01	0.1	U	PU
Plutonium 239/240	10-12-8	0.004	0.007	0.01	0.1	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		U		90		U	GAM
Chromium 51		U		50		U	GAM
Manganese 54		U		5		U	GAM
Cobalt 58		U		6		U	GAM
Iron 59		U		20		U	GAM
Cobalt 60		U		5		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		5		U	GAM
Ruthenium 103		U		6		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		6		U	GAM
Cesium 134		U		6		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		20		U	GAM
Europium 152		U		8		U	GAM
Europium 154		U		5		U	GAM
Europium 155		U		9		U	GAM
Radium 226		U		9		U	GAM

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

N507014-02

A4CM-95-0161

DATA SHEET, cont

SDG 6120

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N507014-02Client sample id A4CM-95-0161Dept sample id 6120-002Location/Matrix SSFL AREA4 WATERReceived 07/06/95Collected 06/27/95 13:30

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Thorium 232		U		20		U	GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQOT	ANALYZED	REVIEWED	BY
N507014-02	SR	6120-002		1.00 L	07/22/95	08/03/95	IEP
507014-02	TH	6120-002		0.500 L	07/27/95	08/01/95	IEP
507014-02	U	6120-002		0.200 L	07/26/95	08/01/95	IEP
N507014-02	PU	6120-002		0.500 L	07/28/95	08/01/95	IEP
N507014-02	GAM	6120-002		1.00 L	07/19/95	08/15/95	IEP

DATA SHEETS

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TMA/RICHMOND

REPORTING GROUP 6120

Test PU Matrix WATER

SDG 6120

Contact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Plutonium 238	Plutonium 239/240
------------------	------------------	-----------------	------------------	------------------	----------------------

Preparation batch 2781-176

A4CM-95-0161	N507014-02	6120-002	U	U
BLK (QC ID=24277)	N507014-04	6120-004	U	U
LCS (QC ID=24276)	N507014-03	6120-003	ok	ok

Nominal values and limits from method	RDLs (pCi/L)	0.1	0.1
---------------------------------------	--------------	-----	-----

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MAX MDA L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	--------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-176 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 176

A4CM-95-0161	N507014-02	0.01	0.500	84	1511	31	07/24/95	07/28	SS-003
BLK (QC ID=24277)	N507014-04	0.02	0.500	81	1350	07/24/95	08/04	SS-043	
LCS (QC ID=24276)	N507014-03	0.01	0.500	77	1511	07/24/95	07/28	SS-004	

Nominal values and limits from method	0.1	0.500	20-105	1000	100	180
---------------------------------------	-----	-------	--------	------	-----	-----

PROCEDURES	REFERENCE	ASTM 3865-90
EP-040	Environmental Water Dissolution, rev 1	
EP-940	Plutonium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.01 ± 0.01
FOR 3 SAMPLES	YIELD	81 ± 7

AD SUMMARIES

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SUMMARY DATA SECTION

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Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

METHOD SUMMARY

THORIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Test TH Matrix WATER

SDG 6120

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJ294034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
------------------	------------------	-----------------	------------------	-------------	-------------	-------------

Preparation batch 2781-176

A4CM-95-0161	N507014-02	6120-002	U	0.16 J	U
BLK (QC ID=24277)	N507014-04	6120-004	U	0.18 J	U
LCS (QC ID=24276)	N507014-03	6120-003	No data U	ok	No data U

Nominal values and limits from method	RDLs (pCi/L)	0.5	0.5	0.5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MAX MDA L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	--------------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-176 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 176

A4CM-95-0161	N507014-02	0.1	0.500	79	405	30	07/25/95	07/27	SS-021
BLK (QC ID=24277)	N507014-04	0.1	0.500	93	405	07/25/95	07/27	SS-017	
LCS (QC ID=24276)	N507014-03	0.08	0.500	74	574	07/25/95	08/02	SS-028	

Nominal values and limits from method	0.5	0.500	20-110	500	100	180
---------------------------------------	-----	-------	--------	-----	-----	-----

PROCEDURES	EP-040	Environmental Water Dissolution, rev 1
	EP-900	Thorium Purification, rev 0
	EP-008	Heavy Elements Electroplating, rev 0

AVERAGES ± 2 SD	MDA	0.09 ± 0.02
FOR 3 SAMPLES	YIELD	82 ± 20

AD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

Test U Matrix WATER

SDG 6120

Contact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
			PLANCHET				1+3	2σ	2+3	2σ
Preparation batch 2781-176										
A4CM-95-0161	N507014-02		6120-002	U	U	U				
BLK (QC ID=24277)	N507014-04		6120-004	U	U	U				
LCS (QC ID=24267)	N507014-03		6120-003	ok	ok	ok				
Nominal values and limits from method				RDLs (pCi/L)	0.5	0.5	0.5	100	4	
										Averages

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MAX MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-176 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 176																
A4CM-95-0161	N507014-02			0.1	0.200			60	1100				29	07/24/95	07/26	SS-030
BLK (QC ID=24277)	N507014-04			0.1	0.200			70	1006					07/24/95	08/04	SS-030
L (QC ID=24267)	N507014-03			0.9	0.200			74	575					07/24/95	07/25	SS-019
Nominal values and limits from method				0.5	0.200			30-105	300	100		180				

PROCEDURES	REFERENCE	ASTM 3972-90
EP-040	Environmental Water Dissolution, rev 1	
EP-910	Uranium Purification, rev 0	
EP-008	Heavy Elements Electroplating, rev 0	

AVERAGES ± 2 SD	MDA	0.4	±	0.9
FOR 3 SAMPLES	YIELD	68	±	14

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

Test SR Matrix WATERSDG 6120Contact Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN WATER

BETA COUNTING

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Strontium 90
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Preparation batch 2781-176

A4CM-95-0161	N507014-02	6120-002	U
BLK (QC ID=24277)	N507014-04	6120-004	U
LCS (QC ID=24276)	N507014-03	6120-003	ok

Nominal values and limits from method RDLs (pCi/L) 0.5

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
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Preparation batch 2781-176 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 176

A4CM-95-0161	N507014-02	0.09	1.00	79	613	25	07/22/95	07/22	LBG-016
BLK (QC ID=24277)	N507014-04	0.1	1.00	83	212	07/22/95	07/22	LBG-003	
LCS (QC ID=24276)	N507014-03	0.09	1.00	83	908	07/22/95	07/22	LBG-016	

Nominal values and limits from method 0.5 1.00 200 180

PROCEDURES	REFERENCE	HASL 300/SR-01,-02
EP-040	Environmental Water Dissolution, rev 1	
EP-500	Strontium-89,90 - Purification, rev 0	
EP-519	Strontium-89,90 Planchet Demounting and Yttrium Purification, rev 0	

AVERAGES ± 2 SD	MDA	0.09 ± 0.01
FOR 3 SAMPLES	YIELD	82 ± 5

D SUMMARIES

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SUMMARY DATA SECTION

Page 15

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Test GAM Matrix WATERSDG 6120Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cobalt 60	Cesium 137
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Preparation batch 2781-176

A4CM-95-0161	N507014-02	6120-002	U	U
BLK (QC ID=24277)	N507014-04	6120-004	U	U
LCS (QC ID=24276)	N507014-03	6120-003	No data U	ok

Nominal values and limits from method	RDLs (pCi/L)	5
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA L	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
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Preparation batch 2781-176 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 176

A4CM-95-0161	N507014-02	5	1.00	1019	22	07/19/95	07/19	01,01,00
BLK (QC ID=24277)	N507014-04	5	1.00	1199		07/19/95	07/19	01,03,00
LCS (QC ID=24276)	N507014-03	1.00	1019			07/19/95	07/19	01,02,00

1 values and limits from method	5	1.00	400	180
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PROCEDURES	REFERENCE	ASTM 3649-85; EPA 901.1
	EP-100	Ge(Li) Preparation for Environmental Samples, rev 0

AVERAGES ± 2 SD	MDA	5	±	0
FOR 2 SAMPLES	YIELD		±	

ND SUMMARIES

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SUMMARY DATA SECTION

Page 16

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	08/15/95

TMA/RICHMOND

REPORTING GROUP 6120

METHOD SUMMARY

TRITIUM IN WATER
LIQUID SCINTILLATION

Test H Matrix WATER

SDG 6120

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-176

A4CM-95-0160	N507014-01	6120-001	U
BLK (QC ID=24277)	N507014-04	6120-004	U
LCS (QC ID=24276)	N507014-03	6120-003	ok

Nominal values and limits from method	RDLs (pCi/L)	500
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METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/L	MDA L	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
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Preparation batch 2781-176 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 176

A4CM-95-0160	N507014-01	300	0.0100						50			28	07/25/95	07/25	LSC-005
BLK (QC ID=24277)	N507014-04	300	0.0100						50				07/25/95	07/25	LSC-005
LCS (QC ID=24276)	N507014-03	300	0.0100						50				07/25/95	07/25	LSC-005

l values and limits from method	500	0.0100							50			180
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PROCEDURES	REFERENCE	EPA 906.0; ASTM 2476-81
	EP-210	Tritium in Water by Distillation, rev 0

AVERAGES ± 2 SD	MDA 300 ± 0
FOR 3 SAMPLES	YIELD ±

Rocketdyne Laboratory Data Sheets

G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV94077

Rockwell Int'l/ Rocketdyne Environmental Lab T100

Sample description: SITE SURVEY - SOIL, N137,E200 0-2"DEPTH, ENV940077, 9/14/

Spectrum file name: ENV94077

Sample identifier : A4001

Sample size : 5.530E+02 g

Measured by : FCD

Date of Activity Calculation : 15-Sep-1994 at 6:55:44
Collect started on : 15-Sep-1994 at 6:55:44
Collect ended on : 15-Sep-1994 at 8:52:41

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 7.000E+03 s real time: 7.017E+03 s dead time: .24 %

Calibration Files

Shape calibration requested : CL032894
Shape calibration used : CL032894
Created : 28-Mar-1994 11:11:55
Modified : 28-Mar-1994 11:40:16

Energy calibration requested : CL032894
Energy calibration used : CL032894
Created : 28-Mar-1994 11:12:27
Modified : 28-Mar-1994 11:42:37

Efficiency calibration requested : CL032894
Efficiency calibration used : CL032894
Created : 28-Mar-1994 11:12:54
Modified : 28-Mar-1994 11:44:18

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\LIB40693.ILF
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

3

Peaked background file: C:\SAMPO\SPECTRA\BW032894.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:

RP&HPS

Date: 9/15/94

Spectrum file: ENV94077

Date: 15-Sep-1994

Time: 8:52:41

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number	nuclide	conf.value	----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9742	2.195E+01 +- 2.68%		2.195E+01	0.000E+00
2	CS-137	.9954	2.132E-01 +- 4.39%		2.132E-01	0.000E+00
3	Tl-208T	.9787	3.591E-01 +- 4.60%		3.591E-01	0.000E+00
4	Pb-210U	.9981	5.861E+00 +- 6.02%		5.861E+00	0.000E+00
5	Pb-212T	.9989	1.224E+00 +- 3.05%		1.224E+00	0.000E+00
6	Pb-214U	.9099	5.978E+00 +- 1.81%		5.978E+00	0.000E+00
7	Bi-211A	.9971	6.674E-01 +- 34.56%		6.674E-01	0.000E+00
8	Bi-214U	.6667	5.645E+00 +- 1.37%		5.645E+00	0.000E+00
9	Rn-219A	.9872	7.260E-01 +- 8.80%		7.260E-01	0.000E+00
10	Ra-223A	.9980	5.014E-01 +- 12.24%		5.014E-01	0.000E+00
11	Ra-224T	.9956	1.363E+00 +- 10.73%		1.363E+00	0.000E+00
12	Ac-228T	.9632	1.024E+00 +- 2.90%		1.024E+00	0.000E+00
13	Th-227A	.9189	6.062E-01 +- 4.26%		6.062E-01	0.000E+00
14	Th-234U	.9942	1.308E+01 +- 4.13%		1.308E+01	0.000E+00
15	Pa-234mU	.9932	1.572E+01 +- 6.84%		1.572E+01	0.000E+00
16	U-235	.9976	8.055E-01 +- 9.21%		8.055E-01	0.000E+00
			-----		-----	-----
			7.572E+01		7.572E+01	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94077

Date: 15-Sep-1994

Time: 8:52:41

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	24.14	.41	4.43	.15	.0
2	55.14	.30	12.39	.13	3.6
3	68.53	.14	15.83	.11	5.4
4	189.59	.07	46.61	.11	10.5
5	203.73	.18	50.17	.12	3.7
6	216.27	.18	53.33	.11	4.6
7	256.11	.03	63.35	.10	25.6
8	302.08	.04	74.90	.10	24.3
9	311.13	.02	77.17	.10	34.8
10	319.98	.31	79.40	.13	4.3
11	327.00	.13	81.16	.11	8.5
12	337.78	.10	83.87	.10	12.6
13	339.80	.29	84.38	.12	1000000.0
14	350.44	.27	87.05	.12	1000000.0
15	352.62	.36	87.60	.13	13.4
16	362.21	.08	90.01	.10	11.1
17	372.29	.10	92.54	.10	29.4
18	374.54	.21	93.10	.11	1000000.0
19	380.50	.16	94.60	.11	4.3
20	396.24	.12	98.55	.10	3.9
21	452.43	.22	112.66	.11	3.9
22	576.86	.11	143.87	.10	10.0
23	617.94	.18	154.22	.11	4.3
24	635.55	.23	158.65	.12	3.2
25	654.57	.14	163.43	.11	7.0
26	743.58	.15	185.78	.11	29.3
27	745.41	.14	186.24	.11	1000000.0
28	822.03	.20	205.49	.11	5.1
29	837.48	.18	209.37	.11	6.0
30	938.11	.51	234.64	.16	1000000.0
31	943.87	.09	236.09	.10	8.0
32	954.27	.03	238.70	.10	29.8
33	963.98	.23	241.14	.12	1000000.0
34	967.76	.02	242.09	.10	24.8
35	1024.43	.20	256.32	.11	5.3
36	1034.73	.30	258.91	.13	4.7
37	1076.75	.15	269.46	.11	6.3
38	1079.99	.44	270.27	.15	1000000.0
39	1084.04	.19	271.29	.11	3.8
40	1096.39	.34	274.39	.13	1000000.0
41	1109.23	.29	277.62	.12	3.9
42	1179.79	.02	295.34	.10	42.6
43	1199.04	.10	300.17	.10	8.5
44	1209.23	.30	302.73	.13	3.4
45	1294.48	.22	324.14	.11	4.4
46	1310.16	.21	328.08	.11	4.0
47	1317.44	.30	329.91	.13	3.1
48	1351.36	.07	338.43	.10	12.9
49	1402.26	.55	351.21	.17	1000000.0
50	1405.56	.03	352.04	.10	52.5
51	1451.30	.56	363.53	.17	3.2
52	1604.59	.17	402.02	.11	5.5
53	1617.14	.34	405.17	.13	3.6

54	1812.74	.37	454.25	.14	3.2
55	1847.64	.15	463.01	.11	4.9
56	2037.99	.14	510.78	.12	8.1
57	2314.74	.27	580.28	.13	3.7
58	2326.78	.05	583.30	.11	18.5
59	2430.74	.01	609.41	.10	46.7
60	2639.26	.10	661.78	.10	10.6
61	2654.37	.15	665.58	.11	8.3
62	2900.71	.14	727.43	.11	6.6
63	3064.49	.11	768.55	.10	10.9
64	3134.11	.22	786.03	.11	5.2
65	3170.26	.31	795.11	.13	5.1
66	3214.77	.24	806.28	.12	5.9
67	3409.43	.41	855.16	.14	3.2
68	3430.73	.35	860.51	.13	3.5
69	3633.17	.07	911.33	.10	12.8
70	3723.77	.22	934.08	.11	8.0
71	3727.45	.56	935.00	.17	1000000.0
72	3846.44	.32	964.87	.13	4.3
73	3863.70	.13	969.20	.11	8.6
74	3991.17	.01	1001.20	.10	8.6
75	4466.40	.06	1120.50	.10	21.4
76	4605.95	.23	1155.53	.12	5.7
77	4936.23	.11	1238.43	.10	12.3
78	5106.90	.34	1281.26	.13	4.7
79	5492.26	.11	1377.95	.10	10.8
80	5522.62	.13	1385.57	.10	4.3
81	5587.69	.26	1401.89	.12	5.1
82	5605.35	2.25	1406.32	.57	1000000.0
83	5612.95	.18	1408.22	.11	7.0
84	5823.72	.02	1461.09	.10	32.0
85	6016.18	.29	1509.36	.12	5.8
86	6623.15	.44	1661.60	.15	4.6
87	6895.75	.25	1729.97	.12	7.8
88	7034.82	.09	1764.85	.10	18.9
89	7366.16	.23	1847.96	.12	7.6

Spectrum file: ENV94077

Date: 15-Sep-1994

Time: 8:52:41

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	2	55.14	12.39	3.7815E+02	15.8	1.4324E+03	1.3506E+01	16.2	2.4
B			12.60	1.4242E+03	2.9				
	3	68.53	15.83	5.0418E+02	9.3	1.2344E+03	1.3107E+01	9.9	1.4
B			15.78	1.5571E+03	3.6				
B			16.46	4.9054E+02	13.7				
	4	189.59	46.61	7.7986E+02	4.1	9.7348E+02	4.9528E+00	5.9	.9
B			46.60	1.7517E+02	7.4				
m	5	203.73	50.17	1.8384E+02	14.9	1.0429E+03	1.0586E+00	15.5	1.0
M	6	216.27	53.33	2.7345E+02	10.7	1.1140E+03	1.4519E+00	11.5	1.0
	7	256.11	63.35	2.7915E+03	2.0	1.3978E+03	1.1787E+01	4.2	1.1
B			63.38	9.3213E+02	1.3				
m	8	302.08	74.90	2.9239E+03	2.1	1.5838E+03	9.8795E+00	3.9	1.3
B			74.93	1.1673E+02	15.9				
m	9	311.13	77.17	5.1721E+03	1.4	1.5201E+03	1.6795E+01	3.5	1.3
m	10	319.98	79.40	1.8223E+02	20.7	1.4587E+03	5.6979E-01	20.9	1.3
m	11	327.00	81.16	4.9285E+02	8.0	1.4107E+03	1.4966E+00	8.6	1.3
m	12	337.78	83.87	1.0705E+03	7.2	1.3383E+03	3.1116E+00	7.8	1.3
B			84.46	1.2897E+02	12.4				
m	13	339.80	84.38	4.1088E+02	13.9	1.3248E+03	1.1848E+00	14.2	1.3
B			84.46	1.2897E+02	12.4				
m	14	350.44	87.05	1.0489E+03	19.9	1.2550E+03	2.9016E+00	20.1	1.3
m	15	352.62	87.60	7.9123E+02	26.3	1.2409E+03	2.1706E+00	26.4	1.3
m	16	362.21	90.01	1.0017E+03	4.4	1.1793E+03	2.7097E+00	5.2	1.3
	17	372.29	92.54	3.8113E+03	7.1	1.1157E+03	1.0215E+01	7.7	1.3
			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				
m	18	374.54	93.10	1.7165E+03	15.6	1.1018E+03	4.5911E+00	15.8	1.3
B			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				
M	19	380.50	94.60	4.9937E+02	7.3	1.0650E+03	1.3285E+00	7.8	1.3
	20	396.24	98.55	2.7852E+02	12.1	9.6889E+02	7.3089E-01	12.4	1.2
	21	452.43	112.66	2.1852E+02	11.8	9.4820E+02	5.4835E-01	12.0	1.2
B			112.85	9.3529E+01	14.4				
	22	576.86	143.87	6.8066E+02	6.3	9.0822E+02	1.7018E+00	6.8	1.9
B			143.80	1.4294E+02	11.0				
	23	617.94	154.22	2.8190E+02	9.0	9.1142E+02	7.5216E-01	9.4	.9
	24	635.55	158.65	1.3064E+02	18.4	7.9724E+02	3.5796E-01	18.6	1.0
	25	654.57	163.43	3.5426E+02	10.1	7.6742E+02	9.8968E-01	10.4	1.4
B			163.56	8.9334E+01	13.2				
m	26	743.58	185.78	2.4009E+03	15.4	8.0214E+02	7.2728E+00	15.7	1.2
B			185.82	6.9396E+02	2.4				
M	27	745.41	186.24	2.7616E+03	13.4	7.9575E+02	8.3784E+00	13.7	1.2
B			185.82	6.9396E+02	2.4				
	28	822.03	205.49	3.0116E+02	11.0	6.1751E+02	9.7225E-01	11.3	1.4
B			205.28	9.0475E+01	16.0				
	29	837.48	209.37	3.0875E+02	10.8	5.6337E+02	1.0086E+00	11.1	1.4
m	30	938.11	234.64	6.0301E+01	20.2	5.2810E+02	2.1168E-01	20.4	.7
m	31	943.87	236.09	4.2748E+02	4.8	5.1911E+02	1.5065E+00	5.5	.7
m	32	954.27	238.70	3.0922E+03	1.2	5.0359E+02	1.0973E+01	3.0	.7
B			238.70	3.6604E+02	5.4				
m	33	963.98	241.14	3.0460E+02	10.4	4.8995E+02	1.0879E+00	10.7	.7
	34	967.76	242.09	2.5319E+03	1.7	4.8485E+02	9.0651E+00	3.3	.7
m	35	1024.43	256.32	2.0412E+02	6.8	4.5663E+02	7.5768E-01	7.4	1.3

M	36	1034.73	258.91	2.0765E+02	20.0	4.2926E+02	7.7567E-01	20.2	1.3
m	37	1076.75	269.46	4.1901E+02	7.6	4.2994E+02	1.6052E+00	8.2	.8
m	38	1079.99	270.27	2.2024E+02	11.6	4.2804E+02	8.4534E-01	11.9	.8
	39	1084.04	271.29	3.0589E+02	8.6	4.2551E+02	1.1768E+00	9.0	.8
	40	1096.39	274.39	1.3315E+02	12.4	4.1679E+02	5.1598E-01	12.7	.8
M	41	1109.23	277.62	1.0456E+02	13.0	4.0608E+02	4.0819E-01	13.3	.8
	42	1179.79	295.34	5.8329E+03	1.0	3.8117E+02	2.3677E+01	3.1	.9
m	43	1199.04	300.17	3.8035E+02	5.7	3.1548E+02	1.5599E+00	6.4	.8
M	44	1209.23	302.73	1.0327E+02	16.6	3.2297E+02	4.2579E-01	16.8	.8
m	45	1294.48	324.14	1.4370E+02	10.7	3.2380E+02	6.1860E-01	11.2	.8
m	46	1310.16	328.08	1.4680E+02	11.0	3.0774E+02	6.3680E-01	11.4	.8
M	47	1317.44	329.91	9.3844E+01	15.2	3.2305E+02	4.0852E-01	15.5	.8
	48	1351.36	338.43	7.4769E+02	3.4	3.2021E+02	3.3076E+00	4.5	1.0
m	49	1402.26	351.21	3.6789E+02	34.4	2.6489E+02	1.6660E+00	34.6	1.6
M	50	1405.56	352.04	9.6599E+03	1.6	2.4520E+02	4.3811E+01	3.4	1.6
B			352.09	7.7292E+01	13.0				
	51	1451.30	363.53	5.1815E+01	15.9	2.5169E+02	2.3981E-01	16.2	1.4
m	52	1604.59	402.02	1.9832E+02	8.1	2.6394E+02	9.8046E-01	8.8	.9
M	53	1617.14	405.17	1.1750E+02	12.6	2.6333E+02	5.8419E-01	13.0	.9
	54	1812.74	454.25	5.0588E+01	31.0	2.2517E+02	2.7325E-01	31.4	.8
	55	1847.64	463.01	2.0581E+02	6.3	2.2197E+02	1.1272E+00	8.2	.7
	56	2037.99	510.78	3.7793E+02	5.2	2.3168E+02	2.2225E+00	8.5	1.1
B			511.01	0.0000E+00	.0				
m	57	2314.74	580.28	1.0551E+02	12.9	1.2947E+02	6.8772E-01	13.8	.9
M	58	2326.78	583.30	9.9937E+02	2.7	1.3201E+02	6.5411E+00	5.3	.9
B			583.24	1.0913E+02	8.2				
	59	2430.74	609.41	7.1403E+03	.5	1.2013E+02	4.8423E+01	3.8	.8
m	60	2639.26	661.78	5.1605E+02	3.7	1.3084E+02	3.7417E+00	4.3	1.0
M	61	2654.37	665.58	2.2878E+02	6.5	1.1782E+02	1.6692E+00	6.8	1.0
	62	2900.71	727.43	2.1516E+02	7.6	1.2025E+02	1.7303E+00	7.9	1.0
	63	3064.49	768.55	5.2742E+02	4.6	1.9430E+02	4.5046E+00	5.0	1.1
	64	3134.11	786.03	1.5562E+02	8.9	1.5247E+02	1.3623E+00	9.1	.8
	65	3170.26	795.11	1.1451E+02	12.5	1.0689E+02	1.0150E+00	12.7	1.4
	66	3214.77	806.28	1.5270E+02	9.6	1.0569E+02	1.3744E+00	9.9	1.3
m	67	3409.43	855.16	3.0646E+01	21.0	1.0329E+02	2.9420E-01	21.1	1.0
M	68	3430.73	860.51	9.8186E+01	11.7	1.1466E+02	9.4905E-01	11.9	1.0
	69	3633.17	911.33	6.0187E+02	3.2	1.1208E+02	6.1605E+00	3.8	.9
B			911.28	4.6172E+01	15.4				
m	70	3723.77	934.08	2.9692E+02	9.4	9.6367E+01	3.0934E+00	9.6	.5
M	71	3727.45	935.00	9.8410E+01	29.3	9.3773E+01	1.0260E+00	29.4	.5
m	72	3846.44	964.87	1.4242E+02	9.9	9.7839E+01	1.5188E+00	10.1	1.3
M	73	3863.70	969.20	3.1798E+02	5.7	9.0693E+01	3.4018E+00	6.0	1.3
	74	3991.17	1001.20	2.5726E+02	6.3	9.1406E+01	2.8171E+00	6.6	1.2
B			1001.12	6.4691E+01	12.9				
	75	4466.40	1120.50	1.4651E+03	2.0	1.0439E+02	1.7394E+01	2.6	1.0
	76	4605.95	1155.53	1.5104E+02	8.2	1.0831E+02	1.8332E+00	8.3	.8
	77	4936.23	1238.43	5.4067E+02	3.7	1.1260E+02	6.9228E+00	4.2	1.0
	78	5106.90	1281.26	1.2659E+02	9.6	8.1471E+01	1.6649E+00	9.9	1.1
	79	5492.26	1377.95	3.6692E+02	3.5	5.9073E+01	5.1081E+00	4.3	.7
	80	5522.62	1385.57	1.0532E+02	8.6	4.3605E+01	1.4725E+00	8.9	.9
m	81	5587.69	1401.89	1.3536E+02	7.0	3.2780E+01	1.9098E+00	7.4	.9
m	82	5605.35	1406.32	3.6073E+00	20.3	3.5308E+01	5.1020E-02	20.4	.9
M	83	5612.95	1408.22	1.9291E+02	5.3	3.7256E+01	2.7313E+00	5.8	.9
	84	5823.72	1461.09	3.3307E+03	1.2	4.2854E+01	4.8526E+01	2.7	.9
B			1460.92	2.2909E+02	7.5				
	85	6016.18	1509.36	1.6115E+02	9.4	2.0070E+01	2.4077E+00	9.7	1.6
	86	6623.15	1661.60	6.3865E+01	17.0	2.1530E+01	1.0281E+00	17.2	1.1
	87	6895.75	1729.97	2.3045E+02	7.1	1.4271E+01	3.8276E+00	7.4	1.0
	88	7034.82	1764.85	1.1270E+03	3.0	1.1007E+01	1.9012E+01	3.7	.9
	89	7366.16	1847.96	1.5221E+02	9.0	1.2151E+01	2.6609E+00	9.2	1.0

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
= background peak - will be subtracted from the peak above.

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se peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
2	55.1	12.39	6.384E+00 +- 33.83%
3	68.5	15.83	7.440E+00 +- 16.96%
8	302.1	74.90	9.824E+00 +- 3.93%
9	311.1	77.17	1.679E+01 +- 3.52%
10	320.0	79.40	5.698E-01 +- 20.89%
11	327.0	81.16	1.497E+00 +- 8.59%
12	337.8	83.87	3.059E+00 +- 7.94%
13	339.8	84.38	1.133E+00 +- 14.86%
14	350.4	87.05	2.902E+00 +- 20.07%
15	352.6	87.60	2.171E+00 +- 26.41%
16	362.2	90.01	2.710E+00 +- 5.22%
17	372.3	92.54	9.875E+00 +- 7.91%
18	374.5	93.10	4.252E+00 +- 17.07%
19	380.5	94.60	1.329E+00 +- 7.82%
20	396.2	98.55	7.309E-01 +- 12.38%
22	576.9	143.87	1.652E+00 +- 7.03%
27	745.4	186.24	8.084E+00 +- 14.14%
28	822.0	205.49	9.314E-01 +- 11.78%
37	1076.7	269.46	1.605E+00 +- 8.16%
38	1080.0	270.27	8.453E-01 +- 11.95%
39	1084.0	271.29	1.177E+00 +- 9.03%
43	1199.0	300.17	1.560E+00 +- 6.41%
44	1209.2	302.73	4.258E-01 +- 16.82%
45	1294.5	324.14	6.186E-01 +- 11.15%
46	1310.2	328.08	6.368E-01 +- 11.36%
47	1317.4	329.91	4.085E-01 +- 15.51%
48	1351.4	338.43	3.308E+00 +- 4.54%
51	1451.3	363.53	2.398E-01 +- 16.20%
53	1617.1	405.17	5.842E-01 +- 13.04%
56	2038.0	510.78	2.222E+00 +- 8.45%
62	2900.7	727.43	1.730E+00 +- 7.93%
63	3064.5	768.55	4.505E+00 +- 5.04%
64	3134.1	786.03	1.362E+00 +- 9.13%
65	3170.3	795.11	1.015E+00 +- 12.68%
67	3409.4	855.16	2.942E-01 +- 21.12%
71	3727.5	935.00	1.026E+00 +- 29.35%
72	3846.4	964.87	1.519E+00 +- 10.06%
82	5605.3	1406.32	5.102E-02 +- 20.43%
83	5612.9	1408.22	2.731E+00 +- 5.80%

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	84	5823.72	1461.09	100.00%
CS-137	60	2639.26	661.78	100.00%
Tl-208T	41	1109.23	277.62	116.99%
	58	2326.78	583.30	98.10%
	68	3430.73	860.51	92.90%
Pb-210U	4	189.59	46.61	100.00%
Pb-212T	32	954.27	238.70	100.00%
Pb-214U	6	216.27	53.33	92.68%
	34	967.76	242.09	100.80%
	36	1034.73	258.91	86.74%
	40	1096.39	274.39	75.86%
	42	1179.79	295.34	99.19%
	50	1405.56	352.04	103.70%
	57	2314.74	580.28	64.03%
Bi-211A	49	1402.26	351.21	100.00%
Bi-214U	54	1812.74	454.25	134.58%
	59	2430.74	609.41	109.94%
	60	2639.26	661.78	100.00%
	61	2654.37	665.58	108.15%
	66	3214.77	806.28	103.20%
	70	3723.77	934.08	118.17%
	75	4466.40	1120.50	99.87%
	76	4605.95	1155.53	106.48%
	77	4936.23	1238.43	98.70%
	78	5106.90	1281.26	102.26%
	79	5492.26	1377.95	90.90%
	80	5522.62	1385.57	60.90%
	81	5587.69	1401.89	83.82%
	85	6016.18	1509.36	105.15%
	86	6623.15	1661.60	129.20%
	87	6895.75	1729.97	91.94%
	88	7034.82	1764.85	96.72%
	89	7366.16	1847.96	92.15%
Rn-219A	52	1604.59	402.02	100.00%
Ra-223A	23	617.94	154.22	105.22%
	24	635.55	158.65	19.58%
Ra-224T	33	963.98	241.14	100.00%
Ac-228T	23	617.94	154.22	105.22%
	29	837.48	209.37	94.56%
	55	1847.64	463.01	86.23%
	69	3633.17	911.33	99.68%

	73	3863.70	969.20	107.51%
Th-227A	5	203.73	50.17	99.58%
	21	452.43	112.66	147.06%
	23	617.94	154.22	105.22%
	30	938.11	234.64	26.37%
	31	943.87	236.09	92.21%
	35	1024.43	256.32	111.31%
Th-234U	7	256.11	63.35	92.88%
	21	452.43	112.66	147.06%
Pa-234mU	74	3991.17	1001.20	100.00%
U-235	25	654.57	163.43	81.13%
	26	743.58	185.78	127.53%

Flags: C = check; nuclide is a part of an underdetermined solution

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7						
1	55	477.59	463.01	14.58	0.000E+00	1.915E-01

						1.915E-01
NA-22						
1	78	1274.54	1281.26	-6.72	0.000E+00	3.123E-02

						3.123E-02
K-40						
1	84	1460.75	1461.09	-.34	2.216E+01	2.600E-01

						2.600E-01
CO-60						
1	76	1173.23	1155.53	17.70	0.000E+00	3.396E-02
2	79	1332.51	1377.95	-45.44	0.000E+00	2.921E-02

						2.921E-02
SB-125						
1	4	35.46	46.61	-11.15	0.000E+00	1.229E+00
2	11	81.80	81.16	.64	7.239E+00	2.606E+00
3	26	176.29	185.78	-9.49	0.000E+00	3.216E-01
4	51	380.51	363.53	16.98	0.000E+00	1.446E+00
5	53	427.95	405.17	22.78	0.000E+00	7.632E-02
6	55	463.51	463.01	.50	5.513E-01	1.929E-01
7	59	600.77	609.41	-8.64	0.000E+00	1.190E-01
8	59	606.82	609.41	-2.59	0.000E+00	4.758E-01
9	60	636.15	661.78	-25.63	0.000E+00	1.664E-01
10	61	671.66	665.58	6.08	0.000E+00	1.175E+00

						7.632E-02
CS-134						
1	55	475.35	463.01	12.34	0.000E+00	1.340E+00
2	57	563.26	580.28	-17.02	0.000E+00	2.547E-01
3	57	569.29	580.28	-10.99	0.000E+00	1.313E-01
4	59	604.66	609.41	-4.75	0.000E+00	2.215E-02
5	65	795.76	795.11	.65	5.814E-02	2.579E-02
6	66	801.84	806.28	-4.44	0.000E+00	2.892E-01
7	74	1038.50	1001.20	37.30	0.000E+00	2.653E+00
8	76	1167.86	1155.53	12.33	0.000E+00	1.871E+00
9	79	1365.13	1377.95	-12.82	0.000E+00	9.186E-01

						2.215E-02
CS-136						
1	7	66.91	63.35	3.56	0.000E+00	3.101E-01
2	14	86.29	87.05	-.76	0.000E+00	4.682E-01

3	21	109.66	112.66	-3.00	0.000E+00	5.199E+00
4	23	153.22	154.22	-1.00	0.000E+00	2.767E-01
5	25	163.89	163.43	.46	1.049E+00	3.913E-01
	26	176.56	185.78	-9.22	0.000E+00	1.485E-01
	40	273.65	274.39	-.74	0.000E+00	1.726E-01
8	48	340.57	338.43	2.14	0.000E+00	4.515E-02
9	56	507.21	510.78	-3.57	0.000E+00	1.969E+00
10	66	818.50	806.28	12.22	0.000E+00	2.347E-02
11	74	1048.07	1001.20	46.87	0.000E+00	3.458E-02
12	77	1235.34	1238.43	-3.09	0.000E+00	1.940E-01

2.347E-02

CS-137

1	60	661.64	661.78	-.14	2.161E-01	2.341E-02
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2.341E-02

BA-133

1	3	30.63	15.83	14.80	0.000E+00	2.666E-01
2	3	30.97	15.83	15.14	0.000E+00	1.323E-01
3	4	35.00	46.61	-11.61	0.000E+00	3.943E-01
4	4	35.80	46.61	-10.81	0.000E+00	1.770E+00
5	6	53.17	53.33	-.16	3.238E+00	1.870E+00
6	10	79.59	79.40	.19	1.142E+00	1.131E+00
7	11	81.01	81.16	-.15	2.239E-01	8.059E-02
8	41	276.29	277.62	-1.33	0.000E+00	2.761E-01
9	44	302.71	302.73	-.02	1.118E-01	9.339E-02
10	50	355.86	352.04	3.82	0.000E+00	3.074E-02
11	52	383.70	402.02	-18.32	0.000E+00	2.243E-01

3.074E-02

EU-152

1	21	121.78	112.66	9.12	0.000E+00	6.290E-02
2	34	244.67	242.09	2.58	0.000E+00	2.518E-01
3	48	344.30	338.43	5.87	0.000E+00	7.038E-02
4	53	411.09	405.17	5.92	0.000E+00	9.718E-01
5	54	444.00	454.25	-10.25	0.000E+00	6.429E-01
6	64	778.90	786.03	-7.13	0.000E+00	1.797E-01
7	68	867.39	860.51	6.88	0.000E+00	6.634E-01
8	72	964.00	964.87	-.87	0.000E+00	2.676E-01
9	75	1085.83	1120.50	-34.67	0.000E+00	2.993E-01
10	75	1112.07	1120.50	-8.43	0.000E+00	2.437E-01
11	83	1408.08	1408.22	-.14	6.293E-01	1.014E-01

6.290E-02

EU-154

1	21	123.07	112.66	10.41	0.000E+00	4.461E-02
2	34	248.04	242.09	5.95	0.000E+00	2.931E-01
3	58	591.70	583.30	8.40	0.000E+00	4.494E-01
4	61	692.50	665.58	26.92	0.000E+00	1.381E+00
5	62	723.30	727.43	-4.13	0.000E+00	1.183E-01
6	63	756.70	768.55	-11.85	0.000E+00	5.915E-01
7	68	873.20	860.51	12.69	0.000E+00	2.402E-01
8	74	996.30	1001.20	-4.90	0.000E+00	2.674E-01
9	74	1004.80	1001.20	3.60	0.000E+00	1.642E-01
10	78	1274.80	1281.26	-6.46	0.000E+00	8.792E-02
	81	1397.80	1401.89	-4.09	0.000E+00	1.613E+00

12	86	1597.30	1661.60	-64.30	0.000E+00	1.553E+00

						4.461E-02

IR-192

1	7	61.49	63.35	-1.86	0.000E+00	3.528E+00
2	7	63.00	63.35	-.35	2.546E+01	1.652E+00
3	7	65.12	63.35	1.77	0.000E+00	1.445E+00
4	7	66.83	63.35	3.48	0.000E+00	7.909E-01
5	8	75.70	74.90	.80	0.000E+00	2.894E+00
6	28	205.78	205.49	.29	1.363E+00	5.385E-01
7	42	295.95	295.34	.61	3.843E+00	6.162E-02
8	44	308.44	302.73	5.71	0.000E+00	6.305E-02
9	45	316.49	324.14	-7.65	0.000E+00	2.289E-02
10	51	374.51	363.53	10.98	0.000E+00	2.826E+00
11	55	468.06	463.01	5.05	0.000E+00	3.690E-02
12	55	484.54	463.01	21.53	0.000E+00	6.013E-01
13	58	588.60	583.30	5.30	0.000E+00	4.182E-01
14	59	604.40	609.41	-5.01	0.000E+00	2.344E-01
15	59	612.45	609.41	3.04	0.000E+00	3.605E-01

						2.289E-02

Tl-208T

1	8	72.80	74.90	-2.10	0.000E+00	1.825E+00
2	8	74.97	74.90	.07	1.378E+01	8.876E-01
3	13	84.80	84.38	.42	4.794E+00	2.014E+00
4	14	87.30	87.05	.25	4.036E+01	6.445E+00
5	29	211.50	209.37	2.13	0.000E+00	1.153E+01
6	30	233.50	234.64	-1.14	0.000E+00	6.884E+00
7	35	252.60	256.32	-3.72	0.000E+00	2.891E+00
8	41	277.36	277.62	-.26	3.067E-01	2.829E-01
9	56	510.72	510.78	-.06	4.827E-01	9.388E-02
10	58	583.14	583.30	-.16	3.716E-01	2.152E-02
11	63	763.30	768.55	-5.25	0.000E+00	1.417E+00
12	66	821.10	806.28	14.82	0.000E+00	2.786E+01
13	68	860.47	860.51	-.04	3.865E-01	2.067E-01
14	70	927.70	934.08	-6.38	0.000E+00	2.180E+01
15	73	982.80	969.20	13.60	0.000E+00	1.365E+01
16	75	1093.90	1120.50	-26.60	0.000E+00	7.826E+00

						2.152E-02

Tl-210U

1	20	97.00	98.55	-1.55	0.000E+00	5.073E-01
2	42	296.00	295.34	.66	1.449E+00	2.322E-02
3	65	795.00	795.11	-.11	4.960E-02	2.200E-02

						2.200E-02

Pb-210U

1	4	46.52	46.61	-.09	6.067E+00	1.158E+00

						1.158E+00

Pb-211A

1	9	76.86	77.17	-.31	4.854E+02	1.728E+01
2	10	79.29	79.40	-.11	8.999E+00	8.906E+00
3	16	89.60	90.01	-.41	1.206E+02	1.955E+01
4	17	92.40	92.54	-.14	1.427E+03	6.042E+01

5	53	404.80	405.17	-.37	9.511E-01	6.328E-01
6	53	427.10	405.17	21.93	0.000E+00	1.577E+00
7	59	610.00	609.41	.59	5.921E+03	4.452E+01
	62	703.30	727.43	-24.13	0.000E+00	8.283E+00
9	63	766.20	768.55	-2.35	0.000E+00	6.928E+00
10	67	831.80	855.16	-23.36	0.000E+00	1.092E+00

6.328E-01

Pb-212T

1	8	74.81	74.90	-.09	5.038E+00	3.245E-01
2	9	77.11	77.17	-.06	4.695E+00	1.671E-01
3	14	87.20	87.05	.15	2.246E+00	3.586E-01
4	16	89.80	90.01	-.21	7.573E+00	1.228E+00
5	21	115.18	112.66	2.52	0.000E+00	3.517E+00
6	32	238.63	238.70	-.07	1.244E+00	4.428E-02
7	43	300.09	300.17	-.08	2.331E+00	5.229E-01

4.428E-02

Pb-214U

1	6	53.20	53.33	-.13	6.471E+00	3.738E+00
2	8	74.81	74.90	-.09	7.640E+00	4.922E-01
3	9	77.11	77.17	-.06	7.679E+00	2.733E-01
4	14	87.20	87.05	.15	3.824E+00	6.106E-01
5	16	89.80	90.01	-.21	1.287E+01	2.086E+00
6	22	141.30	143.87	-2.57	0.000E+00	4.868E+01
7	28	205.59	205.49	.10	3.169E+02	1.252E+02
8	34	241.92	242.09	-.17	5.928E+00	2.461E-01
9	36	258.82	258.91	-.09	6.891E+00	3.288E+00
10	40	274.53	274.39	.14	7.883E+00	5.782E+00
	42	295.92	295.34	.58	6.035E+00	9.675E-02
12	45	324.30	324.14	.16	1.512E+02	9.092E+01
13	50	351.99	352.04	-.05	5.771E+00	4.567E-02
14	55	462.10	463.01	-.91	0.000E+00	1.498E+01
15	55	480.50	463.01	17.49	0.000E+00	6.646E+00
16	56	487.25	510.78	-23.53	0.000E+00	4.995E+00
17	56	511.03	510.78	.25	3.622E+02	7.044E+01
18	57	580.30	580.28	.02	9.337E+00	4.922E+00
19	63	768.40	768.55	-.15	2.751E+02	3.523E+01
20	64	785.95	786.03	-.08	6.107E+00	2.360E+00
21	67	839.03	855.16	-16.13	0.000E+00	5.644E+00

4.567E-02

Bi-211A

1	8	70.83	74.90	-4.07	0.000E+00	5.107E+00
2	8	72.87	74.90	-2.03	0.000E+00	3.037E+00
3	11	82.50	81.16	1.34	0.000E+00	6.900E+00
4	13	84.90	84.38	.52	4.786E+01	2.011E+01
5	49	351.10	351.21	-.11	6.673E-01	1.422E-01
6	53	404.80	405.17	-.37	6.959E-01	4.631E-01
7	53	426.90	405.17	21.73	0.000E+00	1.203E+00
8	59	609.30	609.41	-.11	6.761E+03	5.083E+01
9	62	704.30	727.43	-23.13	0.000E+00	5.295E+00
10	63	766.40	768.55	-2.15	0.000E+00	5.589E+00
11	67	831.80	855.16	-23.36	0.000E+00	9.263E-01
12	69	897.30	911.33	-14.03	0.000E+00	8.832E+00
13	75	1109.10	1120.50	-11.40	0.000E+00	2.684E+01

1.422E-01

Bi-212T

1	4	39.86	46.61	-6.75	0.000E+00	5.679E+00
2	8	70.83	74.90	-4.07	0.000E+00	6.842E+01
3	8	72.87	74.90	-2.03	0.000E+00	3.758E+01
4	8	74.81	74.90	-.09	1.180E+03	7.599E+01
5	9	77.11	77.17	-.06	1.126E+03	4.006E+01
6	11	82.50	81.16	1.34	0.000E+00	8.321E+01
7	13	84.90	84.38	.52	5.743E+02	2.413E+02
8	14	87.20	87.05	.15	5.442E+02	8.689E+01
9	16	89.80	90.01	-.21	1.893E+03	3.070E+02
10	22	144.90	143.87	1.03	0.000E+00	2.028E+02
11	42	288.08	295.34	-7.26	0.000E+00	6.203E+00
12	42	295.10	295.34	-.24	5.029E+03	8.062E+01
13	46	327.96	328.08	-.12	2.223E+01	1.276E+01
14	54	452.83	454.25	-1.42	0.000E+00	5.934E+00
15	55	473.50	463.01	10.49	0.000E+00	4.338E+01
16	62	727.17	727.43	-.26	7.164E-01	1.788E-01
17	64	785.42	786.03	-.61	3.326E+00	1.285E+00
18	69	893.39	911.33	-17.94	0.000E+00	4.187E+00
19	72	952.10	964.87	-12.77	0.000E+00	8.900E+00
20	75	1078.62	1120.50	-41.88	0.000E+00	3.473E+00
21	85	1512.75	1509.36	3.39	0.000E+00	4.774E+00
22	86	1620.56	1661.60	-41.04	0.000E+00	1.044E+00
23	88	1806.00	1764.85	41.15	0.000E+00	8.968E+00

1.788E-01

Bi-214U

1	9	76.86	77.17	-.31	2.346E+02	8.348E+00
2	10	79.29	79.40	-.11	4.731E+00	4.682E+00
3	16	89.60	90.01	-.41	6.426E+01	1.042E+01
4	17	92.40	92.54	-.14	8.069E+02	3.416E+01
5	52	387.00	402.02	-15.02	0.000E+00	6.255E+00
6	52	389.10	402.02	-12.92	0.000E+00	5.575E+00
7	54	454.77	454.25	.52	4.198E+00	6.016E+00
8	59	609.30	609.41	-.11	5.134E+00	3.860E-02
9	60	661.40	661.78	-.38	4.231E+02	4.584E+01
10	61	665.45	665.58	-.13	5.218E+00	1.213E+00
11	61	665.45	665.58	-.13	5.218E+00	1.213E+00
12	62	703.20	727.43	-24.23	0.000E+00	5.815E+00
13	62	719.86	727.43	-7.57	0.000E+00	6.476E+00
14	63	768.36	768.55	-.19	4.506E+00	5.770E-01
15	64	786.10	786.03	.07	2.117E+01	8.182E+00
16	66	806.17	806.28	-.11	5.469E+00	1.810E+00
17	70	934.05	934.08	-.03	4.777E+00	7.781E-01
18	72	964.08	964.87	-.79	0.000E+00	1.018E+01
19	74	1051.96	1001.20	50.76	0.000E+00	1.065E+01
20	75	1120.28	1120.50	-.22	5.651E+00	1.937E-01
21	75	1133.66	1120.50	13.16	0.000E+00	1.327E+01
22	76	1155.19	1155.53	-.34	5.300E+00	1.794E+00
23	77	1207.68	1238.43	-30.75	0.000E+00	8.684E+00
24	77	1238.11	1238.43	-.32	5.718E+00	5.506E-01
25	78	1280.96	1281.26	-.30	5.519E+00	1.948E+00
26	79	1377.65	1377.95	-.30	6.209E+00	6.507E-01
27	80	1385.31	1385.57	-.26	9.268E+00	2.941E+00
28	81	1401.50	1401.89	-.39	6.733E+00	1.459E+00
29	83	1407.98	1408.22	-.24	5.388E+00	8.686E-01
30	85	1509.19	1509.36	-.17	5.368E+00	7.842E-01
	85	1538.50	1509.36	29.14	0.000E+00	7.669E+00

32	85	1543.32	1509.36	33.96	0.000E+00	1.100E+01
33	85	1583.22	1509.36	73.86	0.000E+00	4.597E+00
34	86	1661.28	1661.60	-.32	4.369E+00	1.661E+00
	86	1683.99	1661.60	22.39	0.000E+00	1.083E+01
36	87	1729.60	1729.97	-.37	6.138E+00	5.401E-01
37	88	1764.51	1764.85	-.34	5.836E+00	9.391E-02
38	89	1838.36	1847.96	-9.60	0.000E+00	7.372E+00
39	89	1847.44	1847.96	-.52	6.124E+00	7.612E-01
40	89	1896.30	1847.96	48.34	0.000E+00	1.346E+01

3.860E-02

Rn-219A

1	39	271.23	271.29	-.06	5.809E-01	1.873E-01
2	52	401.78	402.02	-.24	7.257E-01	2.864E-01

1.873E-01

Rn-220T

1	57	549.70	580.28	-30.58	0.000E+00	2.068E+01
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2.068E+01

Ra-223A

1	11	81.07	81.16	-.09	4.884E-01	1.758E-01
2	12	83.78	83.87	-.09	6.116E-01	9.914E-02
3	19	94.70	94.60	.10	7.460E-01	2.308E-01
4	20	97.60	98.55	-.95	0.000E+00	8.095E-01
5	21	122.40	112.66	9.74	0.000E+00	1.540E+00
6	22	144.30	143.87	.43	2.574E+00	5.437E-01
7	23	154.30	154.22	.08	6.591E-01	3.347E-01
8	24	158.70	158.65	.05	2.562E+00	2.629E+00
9	35	256.00	256.32	-.32	9.250E+01	4.627E+01
10	37	269.60	269.46	.14	5.770E-01	1.365E-01
11	42	288.30	295.34	-7.04	0.000E+00	1.287E+01
12	45	324.10	324.14	-.04	7.558E-01	4.544E-01
13	46	328.70	328.08	.62	1.505E+01	8.644E+00
14	48	334.40	338.43	-4.03	0.000E+00	1.975E+01
15	48	338.60	338.43	.17	5.615E+00	6.454E-01
16	54	445.50	454.25	-8.75	0.000E+00	1.390E+00
17	59	609.20	609.41	-.21	3.241E+03	2.437E+01

9.914E-02

Ra-224T

1	11	81.07	81.16	-.09	6.104E+01	2.197E+01
2	12	83.78	83.87	-.09	7.252E+01	1.176E+01
3	19	94.70	94.60	.10	8.113E+01	2.510E+01
4	20	97.60	98.55	-.95	0.000E+00	9.150E+01
5	33	241.00	241.14	-.14	1.363E+00	4.727E-01
6	53	410.00	405.17	4.83	0.000E+00	5.677E+02

4.727E-01

Ra-226U

1	26	186.00	185.78	.22	1.084E+01	6.275E-01
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6.275E-01

Ra-227A

1	11	81.08	81.16	-.08	1.046E+04	3.766E+03
2	12	83.96	83.87	.09	6.871E+02	1.114E+02
3	15	87.50	87.60	-.10	8.568E+02	1.804E+02
20		100.00	98.55	1.45	0.000E+00	6.465E+01
5	24	160.40	158.65	1.75	0.000E+00	1.067E+02

						6.465E+01

Ac-228T

1	6	57.76	53.33	4.43	0.000E+00	8.088E+00
2	20	99.45	98.55	.90	0.000E+00	1.576E+00
3	22	129.10	143.87	-14.77	0.000E+00	6.554E-01
4	22	145.90	143.87	2.03	0.000E+00	8.356E+00
5	23	154.20	154.22	-.02	3.728E+00	1.893E+00
6	26	184.60	185.78	-1.18	0.000E+00	2.718E+01
7	28	204.10	205.49	-1.39	0.000E+00	1.273E+01
8	29	209.40	209.37	.03	1.083E+00	3.966E-01
9	38	270.30	270.27	.03	1.096E+00	4.923E-01
10	47	332.40	329.91	2.49	0.000E+00	4.179E+00
11	48	338.40	338.43	-.03	1.346E+00	1.547E-01
12	48	340.90	338.43	2.47	0.000E+00	4.723E+00
13	53	409.40	405.17	4.23	0.000E+00	1.072E+00
14	55	463.00	463.01	-.01	1.187E+00	4.154E-01
15	55	474.60	463.01	11.59	0.000E+00	6.940E+01
16	56	509.60	510.78	-1.18	0.000E+00	5.738E+00
17	57	562.30	580.28	-17.98	0.000E+00	2.088E+00
18	62	727.00	727.43	-.43	1.060E+01	2.645E+00
19	63	755.20	768.55	-13.35	0.000E+00	2.406E+00
20	63	772.10	768.55	3.55	0.000E+00	1.594E+00
21	64	782.00	786.03	-4.03	0.000E+00	4.641E+00
22	65	794.80	795.11	-.31	1.024E+00	4.542E-01
	66	830.40	806.28	24.12	0.000E+00	4.673E+00
24	67	835.60	855.16	-19.56	0.000E+00	1.560E+00
25	67	840.20	855.16	-14.96	0.000E+00	3.368E+00
26	69	904.20	911.33	-7.13	0.000E+00	3.560E+00
27	69	911.07	911.33	-.26	1.038E+00	9.098E-02
28	72	964.60	964.87	-.27	1.361E+00	4.656E-01
29	73	968.90	969.20	-.30	9.520E-01	1.407E-01
30	77	1247.10	1238.43	8.67	0.000E+00	5.923E+00
31	84	1459.20	1461.09	-1.89	0.000E+00	1.121E+01
32	85	1495.80	1509.36	-13.56	0.000E+00	2.950E+00
33	85	1501.50	1509.36	-7.86	0.000E+00	4.968E+00
34	85	1556.90	1509.36	47.54	0.000E+00	1.299E+01
35	85	1580.20	1509.36	70.84	0.000E+00	3.648E+00
36	86	1587.90	1661.60	-73.70	0.000E+00	9.328E-01
37	86	1624.70	1661.60	-36.90	0.000E+00	7.696E+00
38	86	1630.40	1661.60	-31.20	0.000E+00	1.376E+00
39	86	1638.00	1661.60	-23.60	0.000E+00	4.502E+00
40	86	1666.40	1661.60	4.80	0.000E+00	8.474E+00

						9.098E-02

Ac-228Tw

1	22	141.00	143.87	-2.87	0.000E+00	3.921E+01
2	25	174.10	163.43	10.67	0.000E+00	6.064E+01
3	27	191.50	186.24	5.26	0.000E+00	1.769E+01
4	28	199.50	205.49	-5.99	0.000E+00	5.958E+00
5	35	257.30	256.32	.98	0.000E+00	6.836E+01
6	41	279.00	277.62	1.38	0.000E+00	8.638E+00
	45	321.70	324.14	-2.44	0.000E+00	8.060E+00

8	51	372.20	363.53	8.67	0.000E+00	2.281E+02
9	52	396.80	402.02	-5.22	0.000E+00	6.211E+01
	52	398.60	402.02	-3.42	0.000E+00	5.804E+01
	54	440.30	454.25	-13.95	0.000E+00	1.391E+01
12	56	503.70	510.78	-7.08	0.000E+00	9.338E+00
13	56	523.00	510.78	12.22	0.000E+00	1.720E+01
14	57	546.30	580.28	-33.98	0.000E+00	9.781E+00
15	57	570.70	580.28	-9.58	0.000E+00	1.151E+01
16	57	572.10	580.28	-8.18	0.000E+00	1.325E+01
17	58	583.00	583.30	-.30	2.119E+02	1.227E+01
18	59	620.30	609.41	10.89	0.000E+00	2.090E+01
19	60	651.40	661.78	-10.38	0.000E+00	2.063E+01
20	61	674.60	665.58	9.02	0.000E+00	2.093E+01
21	61	677.30	665.58	11.72	0.000E+00	2.612E+01
22	62	701.50	727.43	-25.93	0.000E+00	1.318E+01
23	62	707.30	727.43	-20.13	0.000E+00	1.606E+01
24	63	773.50	768.55	4.95	0.000E+00	2.865E+01
25	68	873.80	860.51	13.29	0.000E+00	3.137E+01
26	71	944.10	935.00	9.10	0.000E+00	2.704E+01
27	71	948.00	935.00	13.00	0.000E+00	2.166E+01
28	72	958.50	964.87	-6.37	0.000E+00	9.213E+00
29	73	975.90	969.20	6.70	0.000E+00	5.070E+01
30	74	988.10	1001.20	-13.10	0.000E+00	1.450E+01
31	75	1065.10	1120.50	-55.40	0.000E+00	2.085E+01
32	75	1095.70	1120.50	-24.80	0.000E+00	2.333E+01
33	75	1110.60	1120.50	-9.90	0.000E+00	9.098E+00
34	76	1153.60	1155.53	-1.93	0.000E+00	2.386E+01
35	77	1245.10	1238.43	6.67	0.000E+00	3.751E+01
36	78	1287.50	1281.26	6.24	0.000E+00	2.708E+01
37	86	1685.90	1661.60	24.30	0.000E+00	2.211E+01
38	89	1887.40	1847.96	39.44	0.000E+00	1.893E+01

5.958E+00

Th-227A

1	3	20.27	15.83	4.44	0.000E+00	4.638E+01
2	5	50.20	50.17	.03	6.082E-01	5.059E-01
3	5	50.88	50.17	.71	0.000E+00	2.832E+02
4	7	62.50	63.35	-.85	0.000E+00	2.410E+01
5	8	72.90	74.90	-2.00	0.000E+00	1.301E+02
6	8	73.70	74.90	-1.20	0.000E+00	2.074E+02
7	8	75.15	74.90	.25	5.341E+03	3.441E+02
8	9	77.40	77.17	.23	8.176E+03	2.910E+02
9	10	79.77	79.40	.37	1.318E+00	1.304E+00
10	13	85.44	84.38	1.06	0.000E+00	1.712E+00
11	15	88.48	87.60	.88	0.000E+00	1.006E+00
12	19	94.00	94.60	-.60	4.648E+00	1.438E+00
13	19	95.00	94.60	.40	5.403E+02	1.672E+02
14	19	96.10	94.60	1.50	0.000E+00	3.524E+01
15	20	99.70	98.55	1.15	0.000E+00	1.606E+02
16	20	100.00	98.55	1.45	0.000E+00	1.971E+00
17	20	100.30	98.55	1.75	0.000E+00	2.357E+01
18	20	105.00	98.55	6.45	0.000E+00	5.075E+01
19	21	113.20	112.66	.54	3.616E+00	2.424E+00
20	22	141.30	143.87	-2.57	0.000E+00	1.498E+01
21	23	154.20	154.22	-.02	3.676E+01	1.866E+01
22	28	204.30	205.49	-1.19	0.000E+00	9.817E+00
23	28	205.00	205.49	-.49	3.163E+01	1.249E+01
	28	206.10	205.49	.61	2.070E+01	8.176E+00
	28	206.40	205.49	.91	0.000E+00	1.941E+02

26	29	210.65	209.37	1.28	0.000E+00	1.918E+00
27	30	234.90	234.64	.26	2.301E+00	4.181E+00
28	31	236.00	236.09	-.09	6.572E-01	1.671E-01
	35	252.55	256.32	-3.77	0.000E+00	1.839E+01
30	35	254.70	256.32	-1.62	0.000E+00	2.493E+00
31	35	256.25	256.32	-.07	5.445E-01	2.723E-01
32	40	273.00	274.39	-1.39	0.000E+00	4.268E+00
33	41	286.15	277.62	8.53	0.000E+00	1.312E+00
34	42	296.60	295.34	1.26	0.000E+00	1.066E+01
35	43	299.90	300.17	-.27	3.810E+00	8.546E-01
36	43	300.30	300.17	.13	3.813E+01	8.553E+00
37	44	304.44	302.73	1.71	0.000E+00	2.017E+00
38	47	329.82	329.91	-.09	7.259E-01	6.676E-01
39	48	334.40	338.43	-4.03	0.000E+00	2.034E+00

1.671E-01

Th-228T

1	13	84.40	84.38	.02	4.864E+00	2.044E+00
2	22	131.62	143.87	-12.25	0.000E+00	1.599E+01
3	29	215.94	209.37	6.57	0.000E+00	7.823E+00

2.044E+00

Th-230U

1	7	67.73	63.35	4.38	0.000E+00	9.710E+00
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9.710E+00

Th-231A

1	3	26.64	15.83	10.81	0.000E+00	5.879E-01
2	7	58.57	63.35	-4.78	0.000E+00	7.552E+00
3	8	72.78	74.90	-2.12	0.000E+00	1.454E+01
4	11	81.24	81.16	.08	8.208E+00	2.954E+00
5	11	82.11	81.16	.95	0.000E+00	7.207E+00
6	13	84.21	84.38	-.17	7.257E-01	3.050E-01
7	16	89.95	90.01	-.06	1.060E+01	1.718E+00
8	17	92.29	92.54	-.25	1.162E+02	4.919E+00
9	18	93.02	93.10	-.08	4.988E+02	4.661E+01
10	19	95.87	94.60	1.27	0.000E+00	2.785E+00
11	20	99.28	98.55	.73	0.000E+00	1.842E+01
12	20	102.27	98.55	3.72	0.000E+00	3.807E+00
13	21	105.81	112.66	-6.85	0.000E+00	2.843E+02
14	21	108.00	112.66	-4.66	0.000E+00	6.837E+00
15	22	145.06	143.87	1.19	0.000E+00	3.725E+02
16	22	145.94	143.87	2.07	0.000E+00	5.757E+01
17	25	163.12	163.43	-.31	3.117E+01	1.163E+01

3.050E-01

Th-232

1	7	59.00	63.35	-4.35	0.000E+00	2.262E+01
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2.262E+01

Th-234U

1	7	62.86	63.35	-.49	3.288E+03	2.134E+02
2	7	63.29	63.35	-.06	1.479E+01	9.598E-01
3	8	73.92	74.90	-.98	0.000E+00	3.981E+02
	8	74.00	74.90	-.90	0.000E+00	1.055E+02

5	12	83.30	83.87	-.57	2.186E+02	3.543E+01
6	14	87.02	87.05	-.03	1.944E+03	3.103E+02
7	17	92.38	92.54	-.16	1.944E+01	8.228E-01
	17	92.80	92.54	.26	1.663E+01	7.038E-01
9	21	112.81	112.66	.15	1.076E+01	7.212E+00
10	26	184.80	185.78	-.98	0.000E+00	3.366E+02

7.038E-01

Pa-231A

1	20	102.70	98.55	4.15	0.000E+00	6.577E+00
2	41	283.67	277.62	6.05	0.000E+00	1.300E+00
3	43	300.08	300.17	-.09	3.314E+00	7.434E-01
4	44	302.67	302.73	-.06	9.047E-01	7.560E-01
5	47	330.07	329.91	.16	1.536E+00	1.413E+00

7.434E-01

Pa-234mU

1	74	1001.03	1001.20	-.17	2.333E+01	4.391E+00
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4.391E+00

U-234U

1	6	53.10	53.33	-.23	6.048E+01	3.493E+01
2	16	89.96	90.01	-.05	6.623E+03	1.074E+03
3	18	93.35	93.10	.25	5.605E+03	5.237E+02
4	20	105.00	98.55	6.45	0.000E+00	1.353E+03

3.493E+01

-235

1	16	89.96	90.01	-.05	8.830E+00	1.432E+00
2	18	93.35	93.10	.25	8.967E+00	8.379E-01
3	20	105.00	98.55	6.45	0.000E+00	2.030E+00
4	21	108.60	112.66	-4.06	0.000E+00	6.736E+00
5	21	109.14	112.66	-3.52	0.000E+00	1.362E+00
6	22	143.76	143.87	-.11	7.915E-01	1.672E-01
7	25	163.35	163.43	-.08	1.029E+00	3.838E-01
8	26	182.70	185.78	-3.08	0.000E+00	5.478E+00
9	26	185.72	185.78	-.06	6.581E-01	3.808E-02
10	27	194.94	186.24	8.70	0.000E+00	3.530E+00
11	28	202.12	205.49	-3.37	0.000E+00	2.214E+00
12	28	205.31	205.49	-.18	1.010E+00	3.991E-01

3.808E-02

Am-241

1	3	26.36	15.83	10.53	0.000E+00	4.105E+00
2	7	59.54	63.35	-3.81	0.000E+00	1.213E-01

1.213E-01

G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV94078

Rockwell Int'l/ Rocketdyne Environmental Lab T100
Sample description: SITE SURVEY - SOIL M22,N137,E198, ENV940078, 9/14/94
Spectrum file name: ENV94078
Sample identifier : A4002
Sample size : 4.370E+02 g
Measured by : FCD

Date of Activity Calculation : 14-Sep-1994 at 16:30:12
Collect started on : 14-Sep-1994 at 16:30:12
Collect ended on : 15-Sep-1994 at 6:27:23

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 5.000E+04 s real time: 5.023E+04 s dead time: .46 %

Calibration Files

Shape calibration requested : CL032894
Shape calibration used : CL032894
Created : 28-Mar-1994 11:11:55
Modified : 28-Mar-1994 11:40:16

Energy calibration requested : CL032894
Energy calibration used : CL032894
Created : 28-Mar-1994 11:12:27
Modified : 28-Mar-1994 11:42:37

Efficiency calibration requested : CL032894
Efficiency calibration used : CL032894
Created : 28-Mar-1994 11:12:54
Modified : 28-Mar-1994 11:44:18

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\LIB40693.ILF
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

Peaked background file: C:\SAMPO\SPECTRA\BW032894.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:


RF&HPS

Date: 9/15/94

Spectrum file: ENV94078

Date: 15-Sep-1994

Time: 6:27:23

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----		
			measured		decay corrected saturation
1	K-40	.9797	1.965E+01 +- 2.46%		1.163E+01 5.195E+00
2	CS-137	.9964	1.802E-01 +- 3.14%		1.802E-01 5.257E+00
3	Tl-208T	.9816	3.204E-01 +- 4.18%		3.204E-01 5.319E+00
4	Pb-210U	.9997	2.411E+01 +- 4.41%		2.411E+01 5.381E+00
5	Pb-211A	.9892	5.701E-01 +- 43.30%		5.701E-01 5.443E+00
6	Pb-212T	.9978	1.240E+00 +- 2.83%		1.240E+00 5.504E+00
7	Pb-214U	.8691	2.269E+01 +- 1.26%		2.269E+01 5.566E+00
8	Bi-211A	.9889	2.443E+00 +- 7.26%		2.443E+00 5.628E+00
9	Bi-214U	.6338	2.120E+01 +- .57%		2.120E+01 5.690E+00
10	Rn-219A	.9934	2.335E+00 +- 3.91%		2.335E+00 6.061E+00
11	Ra-223A	.9569	2.522E+00 +- 3.18%		2.522E+00 6.123E+00
12	Ra-224T	1.0000	1.321E+00 +- 7.49%		1.321E+00 6.247E+00
13	Ac-228T	.8526	9.587E-01 +- 1.62%		9.587E-01 6.556E+00
14	Th-227A	.9476	2.487E+00 +- 1.86%		2.487E+00 6.618E+00
15	Th-230U	1.0000	3.830E+01 +- 5.06%		3.830E+01 6.803E+00
C 16	Th-232	.9396	2.022E+01 +- 15.52%		2.022E+01 6.865E+00
17	Th-234U	.9985	6.190E+01 +- 2.52%		6.190E+01 6.927E+00
18	Pa-231A	.9919	1.930E+00 +- 6.74%		1.930E+00 6.989E+00
19	Pa-234mU	.9899	6.764E+01 +- 2.35%		6.764E+01 7.236E+00
20	U-234U	.9946	5.055E+01 +- 9.42%		5.055E+01 7.298E+00
21	U-235	.9865	3.361E+00 +- 2.21%		3.361E+00 7.360E+00
22	Am-241	.9999	1.059E-01 +- 15.52%		1.059E-01 7.545E+00
			-----	-----	-----
			3.460E+02		3.380E+02 1.376E+02

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94078

Date: 15-Sep-1994

Time: 6:27:23

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	23.87	.09	4.36	.10	.0
2	54.17	.14	12.14	.11	13.8
3	56.84	.24	12.83	.12	1000000.0
4	65.35	.19	15.01	.11	1000000.0
5	68.46	.07	15.81	.10	19.0
6	71.71	.24	16.65	.12	1000000.0
7	79.08	.28	18.54	.12	1000000.0
8	81.72	.23	19.21	.12	5.7
9	106.05	.12	25.46	.11	6.9
10	113.02	.11	27.25	.10	5.7
11	131.70	.14	32.05	.11	4.2
12	189.36	.02	46.55	.11	53.9
13	203.32	.05	50.07	.11	13.0
14	215.92	.03	53.24	.10	24.6
15	240.88	.41	59.52	.14	1000000.0
16	244.53	.25	60.44	.12	1000000.0
17	248.35	.32	61.40	.13	1000000.0
18	251.68	.26	62.24	.12	1000000.0
19	256.04	.01	63.33	.10	131.3
20	273.59	.07	67.74	.10	13.3
21	294.62	.26	73.03	.12	3.4
22	301.71	.02	74.81	.10	103.3
23	303.16	.11	75.17	.10	1000000.0
24	309.70	.12	76.81	.10	1000000.0
25	311.15	.01	77.18	.10	150.0
26	320.01	.08	79.40	.10	28.3
27	326.91	.05	81.14	.10	43.8
28	337.46	.05	83.79	.10	69.3
29	339.09	.11	84.20	.10	1000000.0
30	350.35	.10	87.03	.10	1000000.0
31	352.36	.11	87.53	.10	60.4
32	357.74	.60	88.88	.18	1000000.0
33	362.04	.05	89.96	.10	43.7
34	372.12	.04	92.50	.10	147.8
35	374.14	.07	93.00	.10	1000000.0
36	380.92	.07	94.71	.10	23.2
37	392.44	.21	97.60	.11	1000000.0
38	395.92	.05	98.47	.10	26.9
39	424.00	.14	105.52	.11	7.2
40	436.52	.35	108.67	.13	1000000.0
41	439.13	.24	109.32	.12	6.5
42	443.48	.29	110.41	.12	1000000.0
43	447.33	.14	111.38	.11	3.4
44	453.28	.03	112.88	.10	27.9
45	462.27	.46	115.13	.15	1000000.0
46	485.37	.16	120.93	.11	4.1
47	491.07	.15	122.37	.11	5.3
48	518.26	.17	129.17	.11	4.6
49	524.58	.40	130.75	.14	4.5
50	527.08	.19	131.37	.11	1000000.0
51	576.52	.06	143.79	.10	54.4
52	578.21	.18	144.22	.11	1000000.0
53	618.07	.03	154.25	.10	26.8

54	635.69	.26	158.69	.12	4.6
55	654.61	.05	163.44	.10	26.3
56	743.60	.02	185.79	.10	147.3
	745.52	.03	186.27	.10	1000000.0
58	780.83	.31	195.14	.13	4.4
59	808.93	.14	202.20	.11	8.4
60	821.70	.04	205.40	.10	25.5
61	837.46	.16	209.36	.11	6.5
62	842.74	.22	210.69	.11	3.3
63	885.49	.24	221.43	.12	3.4
64	938.73	.32	234.80	.13	1000000.0
65	943.89	.02	236.09	.10	43.3
66	954.33	.01	238.72	.10	62.6
67	963.48	.16	241.01	.11	1000000.0
68	967.71	.01	242.08	.10	126.7
69	1017.14	.38	254.49	.14	1000000.0
70	1024.55	.03	256.35	.10	25.0
71	1032.48	.30	258.34	.13	1000000.0
72	1034.68	.10	258.89	.10	20.6
73	1077.13	.03	269.56	.10	39.7
74	1080.63	.42	270.43	.15	1000000.0
75	1084.18	.04	271.33	.10	29.6
76	1093.71	.33	273.72	.13	1000000.0
77	1098.32	.10	274.88	.10	10.8
78	1108.56	.31	277.45	.13	3.6
79	1133.94	.14	283.82	.11	9.2
80	1143.22	.13	286.15	.11	8.9
81	1179.69	.00	295.31	.10	196.0
82	1198.89	.03	300.13	.10	25.6
83	1209.35	.08	302.76	.10	11.1
84	1216.81	.14	304.64	.11	5.1
	1255.77	.22	314.42	.11	4.9
	1293.78	.05	323.97	.10	17.4
87	1309.11	.24	327.82	.12	3.5
88	1313.24	.40	328.85	.14	1000000.0
89	1317.84	.06	330.01	.10	15.2
90	1333.64	.37	333.98	.14	3.9
91	1351.33	.03	338.42	.10	1000000.0
92	1337.90	3.71	335.05	.94	28.8
93	1368.50	.33	342.73	.13	3.3
94	1401.96	.11	351.14	.10	1000000.0
95	1405.51	.01	352.03	.10	243.8
96	1485.81	.95	372.20	.26	.0
97	1544.71	.10	386.99	.10	8.6
98	1552.87	.06	389.04	.10	12.8
99	1604.24	.04	401.93	.10	23.2
100	1616.03	.15	404.89	.11	11.6
101	1619.54	.27	405.77	.12	1000000.0
102	1634.29	.29	409.47	.13	3.8
103	1704.91	.20	427.19	.11	6.4
104	1776.13	.15	445.06	.11	7.3
105	1815.24	.10	454.88	.11	10.7
106	1843.46	.22	461.96	.12	1000000.0
107	1847.80	.21	463.05	.12	5.0
108	1875.14	.27	469.91	.13	5.6
109	1893.37	.33	474.48	.14	3.7
110	1917.90	.05	480.64	.11	13.7
111	1943.79	.07	487.14	.11	13.3
112	2033.35	.47	509.61	.16	1000000.0
	2038.11	.20	510.81	.12	13.6

114	2042.97	.81	512.03	.23	1000000.0
115	2129.34	.11	533.72	.11	8.3
116	2314.56	.10	580.23	.11	12.4
	2326.58	.03	583.25	.11	34.3
	2430.70	.00	609.40	.10	218.8
119	2525.88	.32	633.31	.13	3.5
120	2588.27	.44	648.98	.15	3.1
121	2598.25	.53	651.48	.17	3.3
122	2639.20	.04	661.77	.10	22.4
123	2654.30	.03	665.56	.10	32.1
124	2724.73	.35	683.24	.13	3.2
125	2803.94	.10	703.13	.10	10.8
126	2809.71	.42	704.58	.15	1000000.0
127	2870.98	.07	719.96	.10	12.0
128	2900.69	.06	727.42	.10	12.5
129	2961.77	.15	742.76	.11	10.6
130	3002.21	.30	752.91	.13	3.3
131	3056.29	.07	766.49	.10	.0
132	3064.21	.02	768.48	.10	56.9
133	3118.67	.66	782.15	.19	3.5
134	3134.29	.05	786.08	.10	25.7
135	3170.38	.17	795.14	.11	8.0
136	3214.94	.05	806.33	.10	27.0
137	3274.39	.29	821.25	.12	.0
138	3294.87	.25	826.39	.12	5.5
139	3317.27	.06	832.02	.10	12.0
140	3345.95	.01	839.22	.10	16.0
141	3431.56	.28	860.72	.12	5.6
142	3521.72	.46	883.35	.15	3.3
143	3606.01	.33	904.52	.13	3.3
144	3633.25	.04	911.35	.10	27.3
	3724.35	.05	934.22	.10	43.7
	3772.83	.37	946.39	.14	4.2
147	3844.95	.12	964.50	.10	12.4
148	3863.52	.10	969.16	.10	19.8
149	3991.32	.03	1001.24	.10	41.3
150	4194.44	.06	1052.23	.10	10.3
151	4265.62	.23	1070.10	.12	6.0
152	4402.04	.34	1104.34	.13	3.8
153	4466.45	.01	1120.51	.10	98.4
154	4519.84	.11	1133.92	.10	7.5
155	4605.52	.04	1155.42	.10	28.9
156	4712.58	.23	1182.30	.12	7.1
157	4814.89	.14	1207.97	.11	11.9
158	4936.04	.02	1238.38	.10	57.6
159	4997.34	.50	1253.77	.16	4.6
160	5106.83	.05	1281.25	.10	24.9
161	5196.58	.29	1303.77	.12	3.9
162	5321.86	1.91	1335.21	.49	3.0
163	5330.98	.64	1337.50	.19	1000000.0
164	5492.19	.03	1377.94	.10	49.8
165	5522.78	.04	1385.61	.10	17.2
166	5587.06	.05	1401.73	.10	24.7
167	5612.98	.03	1408.23	.10	33.4
168	5683.61	.28	1425.95	.12	3.9
169	5823.57	.02	1461.05	.10	71.1
170	6016.53	.04	1509.45	.10	29.9
171	6133.61	.11	1538.81	.10	10.8
172	6153.12	.14	1543.71	.11	12.4
	6311.39	.10	1583.40	.10	15.8

174	6330.93	.28	1588.31	.12	6.3
175	6348.31	.43	1592.66	.15	1000000.0
176	6357.25	.16	1594.90	.11	6.8
177	6375.86	.21	1599.57	.11	7.8
178	6500.74	.45	1630.89	.15	4.1
179	6622.92	.08	1661.54	.10	20.0
180	6653.31	.50	1669.16	.16	.0
181	6713.59	.21	1684.28	.11	7.6
182	6749.19	.48	1693.21	.16	.0
183	6895.30	.05	1729.86	.10	40.4
184	6927.32	.52	1737.89	.16	3.6
185	7034.57	.02	1764.79	.10	87.6
186	7329.01	.15	1838.64	.11	11.0
187	7365.24	.02	1847.73	.10	30.2
188	7468.11	.14	1873.53	.11	8.8
189	7536.11	.24	1890.58	.12	6.0
190	7558.19	.38	1896.12	.14	4.6
191	7720.92	.86	1936.94	.24	.0
192	8017.88	.47	2011.42	.16	3.9
193	8042.25	.44	2017.53	.15	3.3

Spectrum file: ENV94078

Date: 15-Sep-1994

Time: 6:27:23

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
m	2	54.17	12.14	4.8017E+03	9.0	2.3848E+04	2.4651E+01	9.6	2.8
B			12.60	1.4242E+03	2.9				
M	3	56.84	12.83	2.6251E+03	16.4	2.3334E+04	1.2549E+01	16.8	2.8
B			12.60	1.4242E+03	2.9				
m	4	65.35	15.01	1.9042E+03	9.3	2.2553E+04	7.4231E+00	9.9	.6
B			14.88	2.9576E+02	12.7				
m	5	68.46	15.81	7.3223E+03	2.5	2.2120E+04	2.6690E+01	4.2	.6
B			15.78	1.5571E+03	3.6				
B			16.46	4.9054E+02	13.7				
m	6	71.71	16.65	1.3961E+03	11.5	2.1677E+04	4.7599E+00	12.0	.6
B			16.46	4.9054E+02	13.7				
m	7	79.08	18.54	1.4253E+03	15.1	2.0716E+04	4.2262E+00	15.4	.6
B			18.55	3.3421E+02	8.6				
M	8	81.72	19.21	1.6577E+03	13.3	2.0386E+04	4.6918E+00	13.8	.6
B			18.55	3.3421E+02	8.6				
B			19.42	2.0535E+02	13.8				
m	9	106.05	25.46	1.7337E+03	7.8	1.7923E+04	3.4055E+00	8.5	1.1
B			25.57	1.1655E+02	12.5				
M	10	113.02	27.25	1.3238E+03	9.1	1.7564E+04	2.3811E+00	9.7	1.1
	11	131.70	32.05	1.1545E+03	7.7	1.7013E+04	1.6828E+00	8.4	.7
	12	189.36	46.55	1.7681E+04	1.1	1.7954E+04	1.5746E+01	4.4	1.8
B			46.60	1.7517E+02	7.4				
m	13	203.32	50.07	3.5607E+03	3.2	1.9027E+04	2.8784E+00	5.2	.8
	14	215.92	53.24	6.8817E+03	1.8	2.0303E+04	5.1266E+00	4.4	.8
	15	240.88	59.52	9.6744E+02	15.0	2.2787E+04	6.2131E-01	15.5	1.1
m	16	244.53	60.44	1.9102E+03	9.2	2.2896E+04	1.2020E+00	9.9	1.1
m	17	248.35	61.40	1.6772E+03	12.0	2.3060E+04	1.0335E+00	12.6	1.1
m	18	251.68	62.24	2.0345E+03	9.6	2.3244E+04	1.2313E+00	10.3	1.1
m	19	256.04	63.33	6.9936E+04	.4	2.3543E+04	4.1356E+01	3.7	1.1
B			63.38	9.3213E+02	1.3				
M	20	273.59	67.74	4.3521E+03	3.6	2.5416E+04	2.3531E+00	5.1	1.1
m	21	294.62	73.03	2.8486E+03	8.5	2.7268E+04	1.3937E+00	9.1	5.6
m	22	301.71	74.81	4.6283E+04	2.2	2.6552E+04	2.1931E+01	4.0	5.6
B			74.93	1.1673E+02	15.9				
m	23	303.16	75.17	1.0991E+04	7.8	2.6408E+04	5.1743E+00	8.5	5.6
B			74.93	1.1673E+02	15.9				
m	24	309.70	76.81	9.8240E+03	7.4	2.5760E+04	4.4938E+00	8.1	5.6
m	25	311.15	77.18	8.6982E+04	1.1	2.5618E+04	3.9539E+01	3.4	5.6
m	26	320.01	79.40	7.7232E+03	4.7	2.4759E+04	3.3804E+00	5.6	5.6
m	27	326.91	81.14	1.4025E+04	2.8	2.4104E+04	5.9647E+00	4.1	5.6
m	28	337.46	83.79	2.2502E+04	5.1	2.3124E+04	9.1691E+00	5.9	5.6
B			84.46	1.2897E+02	12.4				
m	29	339.09	84.20	1.2218E+04	8.7	2.2975E+04	4.9466E+00	9.2	5.6
B			84.46	1.2897E+02	12.4				
m	30	350.35	87.03	1.7767E+04	7.8	2.1962E+04	6.8836E+00	8.3	5.6
m	31	352.36	87.53	1.6350E+04	8.5	2.1785E+04	6.2860E+00	9.0	5.6
m	32	357.74	88.88	1.8338E+03	14.4	2.1314E+04	6.9740E-01	14.6	5.6
m	33	362.04	89.96	1.6980E+04	2.3	2.0941E+04	6.4313E+00	3.7	5.6
m	34	372.12	92.50	8.7815E+04	3.2	2.0086E+04	3.2954E+01	4.2	5.6
B			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				
	35	374.14	93.00	4.3879E+04	6.2	1.9918E+04	1.6436E+01	6.8	5.6
			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				

M	36	380.92	94.71	1.0290E+04	3.6	1.9361E+04	3.8310E+00	4.6	5.6
m	37	392.44	97.60	2.0356E+03	10.3	1.5317E+04	7.5031E-01	10.7	1.6
M	38	395.92	98.47	7.7676E+03	2.8	1.5686E+04	2.8545E+00	3.9	1.6
	39	424.00	105.52	1.5164E+03	7.1	1.4527E+04	5.4450E-01	7.6	1.0
m	40	436.52	108.67	1.1524E+03	20.5	1.4624E+04	4.0976E-01	20.7	1.0
m	41	439.13	109.32	1.9491E+03	11.8	1.4633E+04	6.9167E-01	12.1	1.0
m	42	443.48	110.41	1.0195E+03	12.6	1.4638E+04	3.6060E-01	12.8	1.0
m	43	447.33	111.38	2.0504E+03	6.2	1.4634E+04	7.2308E-01	6.7	1.0
m	44	453.28	112.88	7.8065E+03	1.7	1.4610E+04	2.7407E+00	3.0	1.0
B			112.85	9.3529E+01	14.4				
M	45	462.27	115.13	7.3050E+02	14.4	1.4534E+04	2.5478E-01	14.6	1.0
m	46	485.37	120.93	9.5243E+02	10.2	1.4029E+04	3.2676E-01	10.5	1.0
M	47	491.07	122.37	1.3184E+03	8.0	1.3995E+04	4.5065E-01	8.3	1.0
m	48	518.26	129.17	1.0523E+03	2.8	1.4369E+04	3.5506E-01	3.8	.8
m	49	524.58	130.75	1.7445E+02	51.3	1.4425E+04	5.8693E-02	51.4	.8
M	50	527.08	131.37	7.9303E+02	8.9	1.4440E+04	2.6651E-01	9.2	.8
m	51	576.52	143.79	1.5321E+04	5.7	1.4431E+04	5.3599E+00	6.3	.7
B			143.80	1.4294E+02	11.0				
M	52	578.21	144.22	4.5085E+03	19.2	1.4382E+04	1.5816E+00	19.4	.7
B			143.80	1.4294E+02	11.0				
	53	618.07	154.25	6.6429E+03	2.1	1.5121E+04	2.4819E+00	3.4	1.5
	54	635.69	158.69	1.0234E+03	10.1	1.4171E+04	3.9264E-01	10.5	.9
	55	654.61	163.44	6.5387E+03	1.9	1.3688E+04	2.5575E+00	3.2	1.2
B			163.56	8.9334E+01	13.2				
m	56	743.60	185.79	6.9632E+04	2.0	1.2501E+04	2.9531E+01	3.3	1.0
B			185.82	6.9396E+02	2.4				
M	57	745.52	186.27	5.7091E+04	2.4	1.2327E+04	2.4252E+01	3.6	1.0
B			185.82	6.9396E+02	2.4				
	58	780.83	195.14	7.2731E+02	15.5	1.1494E+04	3.1816E-01	15.7	1.7
m	59	808.93	202.20	1.3719E+03	7.5	1.0914E+04	6.1376E-01	8.0	1.2
M	60	821.70	205.40	5.9519E+03	1.9	1.0389E+04	2.6893E+00	3.3	1.2
			205.28	9.0475E+01	16.0				
	61	837.46	209.36	1.5946E+03	8.7	9.5540E+03	7.2927E-01	9.1	1.7
M	62	842.74	210.69	1.1235E+03	12.2	9.4595E+03	5.1583E-01	12.5	1.7
	63	885.49	221.43	5.1606E+02	16.8	8.7164E+03	2.4451E-01	17.0	.8
m	64	938.73	234.80	5.7949E+02	13.5	8.3897E+03	2.8491E-01	13.8	.9
m	65	943.89	236.09	1.0156E+04	1.1	8.2972E+03	5.0108E+00	3.0	.9
m	66	954.33	238.72	1.7596E+04	.7	8.0891E+03	8.7419E+00	2.9	.9
B			238.70	3.6604E+02	5.4				
m	67	963.48	241.01	1.6670E+03	7.0	7.8840E+03	8.3321E-01	7.5	.9
M	68	967.71	242.08	5.7738E+04	.4	7.7821E+03	2.8940E+01	2.8	.9
m	69	1017.14	254.49	2.8965E+02	21.2	7.2219E+03	1.4984E-01	21.4	.5
m	70	1024.55	256.35	5.0853E+03	1.4	7.1698E+03	2.6428E+00	3.1	.5
m	71	1032.48	258.34	1.2240E+03	23.1	7.1122E+03	6.3922E-01	23.3	.5
M	72	1034.68	258.89	3.6163E+03	7.9	7.0959E+03	1.8911E+00	8.4	.5
m	73	1077.13	269.56	1.0199E+04	1.2	6.7907E+03	5.4711E+00	3.1	1.0
m	74	1080.63	270.43	8.9878E+02	13.8	6.7805E+03	4.8313E-01	14.1	1.0
m	75	1084.18	271.33	8.0411E+03	1.7	6.7692E+03	4.3315E+00	3.3	1.0
m	76	1093.71	273.72	6.3121E+02	11.1	6.7347E+03	3.4190E-01	11.5	1.0
m	77	1098.32	274.88	2.1165E+03	4.0	6.7158E+03	1.1495E+00	4.9	1.0
M	78	1108.56	277.45	4.2888E+02	13.3	6.6685E+03	2.3430E-01	13.6	1.0
m	79	1133.94	283.82	1.3111E+03	8.2	6.2741E+03	7.2662E-01	8.7	1.5
M	80	1143.22	286.15	1.5086E+03	6.8	6.2506E+03	8.4040E-01	7.3	1.5
	81	1179.69	295.31	1.2627E+05	.2	5.8507E+03	7.1753E+01	2.9	1.0
m	82	1198.89	300.13	4.0605E+03	1.7	5.6100E+03	2.3312E+00	3.4	.7
m	83	1209.35	302.76	1.6024E+03	4.2	5.4973E+03	9.2500E-01	5.1	.7
M	84	1216.81	304.64	8.7411E+02	6.8	5.4116E+03	5.0657E-01	7.4	.7
	85	1255.77	314.42	6.5967E+02	10.0	5.3908E+03	3.9000E-01	10.4	1.1
m	86	1293.78	323.97	2.5285E+03	2.5	5.2274E+03	1.5234E+00	3.9	.8
	87	1309.11	327.82	6.7603E+02	10.1	5.2381E+03	4.1035E-01	10.5	.8

m	88	1313.24	328.85	4.5785E+02	15.6	5.2606E+03	2.7847E-01	15.9	.8
M	89	1317.84	330.01	2.3836E+03	2.9	5.2955E+03	1.4529E+00	4.2	.8
m	90	1333.64	333.98	6.9475E+02	22.4	5.3144E+03	4.2670E-01	22.6	1.0
	91	1351.33	338.42	4.9730E+03	2.0	5.1157E+03	3.0799E+00	3.6	1.2
	92	1337.90	335.05	2.2779E+02	26.2	5.2719E+03	1.4019E-01	26.3	1.2
	93	1368.50	342.73	4.0739E+02	16.2	5.1705E+03	2.5433E-01	16.5	1.1
m	94	1401.96	351.14	7.6024E+03	6.6	4.5416E+03	4.8193E+00	7.3	1.9
M	95	1405.51	352.03	2.1161E+05	.3	4.0835E+03	1.3435E+02	3.0	1.9
B			352.09	7.7292E+01	13.0				
m	97	1544.71	386.99	1.3904E+03	4.2	4.3684E+03	9.3718E-01	5.3	1.0
M	98	1552.87	389.04	1.8507E+03	3.3	4.4041E+03	1.2516E+00	4.5	1.0
m	99	1604.24	401.93	3.5974E+03	1.9	4.4721E+03	2.4895E+00	3.9	1.0
m	100	1616.03	404.89	1.8580E+03	5.7	4.4920E+03	1.2926E+00	6.7	1.0
m	101	1619.54	405.77	8.9327E+02	12.8	4.4964E+03	6.2244E-01	13.3	1.0
M	102	1634.29	409.47	5.0341E+02	10.7	4.5071E+03	3.5310E-01	11.3	1.0
	103	1704.91	427.19	8.0315E+02	6.0	4.5302E+03	5.8091E-01	7.3	1.2
	104	1776.13	445.06	7.2440E+02	6.6	3.4044E+03	5.3975E-01	8.1	.9
	105	1815.24	454.88	1.1165E+03	5.3	3.2842E+03	8.4514E-01	7.2	1.0
m	106	1843.46	461.96	7.7163E+02	8.8	3.2165E+03	5.9068E-01	10.2	.8
M	107	1847.80	463.05	8.5293E+02	7.8	3.1926E+03	6.5403E-01	9.4	.8
m	108	1875.14	469.91	4.9209E+02	9.1	3.1245E+03	3.8138E-01	10.6	1.1
M	109	1893.37	474.48	3.9603E+02	12.3	3.0288E+03	3.0910E-01	13.5	1.1
	110	1917.90	480.64	1.5545E+03	3.1	2.9506E+03	1.2246E+00	6.5	.7
	111	1943.79	487.14	1.6981E+03	2.8	2.8477E+03	1.3508E+00	6.6	.8
m	112	2033.35	509.61	5.9714E+02	17.2	2.9259E+03	4.9082E-01	18.4	1.1
m	113	2038.11	510.81	2.2062E+03	4.5	2.9538E+03	1.8165E+00	8.1	1.1
B			511.01	0.0000E+00	.0				
M	114	2042.97	512.03	3.7931E+02	22.0	2.9303E+03	3.1284E-01	23.0	1.1
	115	2129.34	533.72	8.0134E+02	6.6	2.5850E+03	6.8329E-01	9.0	.9
m	116	2314.56	580.23	1.2546E+03	4.0	2.3594E+03	1.1447E+00	6.2	.9
M	117	2326.58	583.25	5.2755E+03	1.3	2.2948E+03	4.8338E+00	4.8	.9
			583.24	1.0913E+02	8.2				
	118	2430.70	609.40	1.5218E+05	.2	2.0443E+03	1.4448E+02	3.8	1.5
	119	2525.88	633.31	2.6687E+02	16.3	1.8216E+03	2.6139E-01	16.6	1.1
m	120	2588.27	648.98	2.3803E+02	22.0	1.7812E+03	2.3781E-01	22.2	1.2
M	121	2598.25	651.48	1.6985E+02	30.6	1.8124E+03	1.7023E-01	30.7	1.2
m	122	2639.20	661.77	2.5745E+03	2.0	1.8487E+03	2.6133E+00	3.0	1.0
M	123	2654.30	665.56	4.2479E+03	1.4	1.8296E+03	4.3389E+00	2.6	1.0
	124	2724.73	683.24	2.0085E+02	15.1	1.8588E+03	2.1113E-01	15.3	.6
m	125	2803.94	703.13	1.2404E+03	3.4	1.9363E+03	1.3455E+00	4.1	.7
M	126	2809.71	704.58	2.9959E+02	11.9	1.9490E+03	3.2571E-01	12.1	.7
	127	2870.98	719.96	1.0834E+03	3.3	1.8328E+03	1.2061E+00	4.0	.7
	128	2900.69	727.42	1.1419E+03	4.4	1.8282E+03	1.2856E+00	4.9	1.4
	129	2961.77	742.76	1.0088E+03	5.9	2.0669E+03	1.1619E+00	6.3	1.6
	130	3002.21	752.91	2.4965E+02	12.0	1.8966E+03	2.9186E-01	12.2	.5
m	131	3056.29	766.49	3.1193E+03	2.3	1.8658E+03	3.7189E+00	3.1	1.3
M	132	3064.21	768.48	1.3528E+04	.9	1.8976E+03	1.6174E+01	2.3	1.3
m	133	3118.67	782.15	1.5083E+02	22.6	1.7328E+03	1.8385E-01	22.7	1.7
M	134	3134.29	786.08	3.6511E+03	1.9	1.7956E+03	4.4748E+00	2.8	1.7
	135	3170.38	795.14	5.8310E+02	7.7	1.7268E+03	7.2367E-01	8.0	1.0
	136	3214.94	806.33	3.2500E+03	1.6	1.7240E+03	4.0957E+00	2.6	1.0
m	137	3274.39	821.25	4.2154E+02	11.6	1.7694E+03	5.4200E-01	11.8	1.0
M	138	3294.87	826.39	4.2494E+02	11.6	1.7781E+03	5.5012E-01	11.8	1.0
	139	3317.27	832.02	1.1974E+03	3.2	1.7905E+03	1.5617E+00	3.8	.8
	140	3345.95	839.22	1.7238E+03	2.1	1.8335E+03	2.2696E+00	3.0	1.0
	141	3431.56	860.72	5.1795E+02	9.8	1.8457E+03	7.0108E-01	10.0	1.3
	142	3521.72	883.35	2.4393E+02	19.0	1.8206E+03	3.3970E-01	19.2	1.2
	143	3606.01	904.52	2.0787E+02	14.5	1.8779E+03	2.9628E-01	14.7	.6
	144	3633.25	911.35	3.4637E+03	1.7	1.7900E+03	4.9635E+00	2.6	1.0
			911.28	4.6172E+01	15.4				

	145	3724.35	934.22	7.2582E+03	.7	1.6078E+03	1.0588E+01	2.1	1.0
	146	3772.83	946.39	3.1424E+02	19.9	1.5339E+03	4.6268E-01	20.0	1.4
	147	3844.95	964.50	1.3111E+03	2.9	1.6433E+03	1.9569E+00	3.5	.9
	148	3863.52	969.16	1.9953E+03	2.2	1.6198E+03	2.9883E+00	2.9	.9
	149	3991.32	1001.24	6.0924E+03	1.4	1.5021E+03	9.3403E+00	2.3	1.6
B			1001.12	6.4691E+01	12.9				
	150	4194.44	1052.23	7.3027E+02	4.1	1.3451E+03	1.1602E+00	4.5	.7
	151	4265.62	1070.10	4.3663E+02	7.4	1.4268E+03	7.0212E-01	7.6	.9
	152	4402.04	1104.34	3.1316E+02	9.3	1.4037E+03	5.1510E-01	9.5	.8
	153	4466.45	1120.51	3.1309E+04	.3	1.3833E+03	5.2039E+01	1.7	1.3
	154	4519.84	1133.92	5.9315E+02	4.9	1.3019E+03	9.9433E-01	5.2	.6
	155	4605.52	1155.42	3.4969E+03	1.6	1.3964E+03	5.9416E+00	2.3	1.0
	156	4712.58	1182.30	4.9839E+02	7.0	1.2920E+03	8.6137E-01	7.1	1.0
	157	4814.89	1207.97	9.1628E+02	5.3	1.2676E+03	1.6106E+00	5.6	1.3
	158	4936.04	1238.38	1.1276E+04	.8	1.2990E+03	2.0212E+01	2.1	1.3
	159	4997.34	1253.77	3.8622E+02	11.8	1.3031E+03	6.9907E-01	12.0	2.0
	160	5106.83	1281.25	2.7119E+03	1.6	1.1491E+03	4.9932E+00	2.7	.8
	161	5196.58	1303.77	2.0240E+02	11.4	1.0037E+03	3.7781E-01	11.6	.7
m	162	5321.86	1335.21	7.5077E+01	33.8	9.2616E+02	1.4279E-01	33.9	.9
M	163	5330.98	1337.50	1.6072E+02	17.5	9.1099E+02	3.0609E-01	17.7	.9
	164	5492.19	1377.94	8.1214E+03	1.0	9.7037E+02	1.5829E+01	2.7	1.4
	165	5522.78	1385.61	1.4620E+03	2.4	9.0497E+02	2.8618E+00	3.4	.7
m	166	5587.06	1401.73	2.4914E+03	1.4	9.2521E+02	4.9207E+00	2.8	.7
M	167	5612.98	1408.23	4.1181E+03	1.1	9.4257E+02	8.1628E+00	2.7	.7
	168	5683.61	1425.95	2.1263E+02	10.7	9.1614E+02	4.2558E-01	10.9	.7
	169	5823.57	1461.05	1.6896E+04	.6	9.6330E+02	3.4463E+01	2.5	1.0
B			1460.92	2.2909E+02	7.5				
	170	6016.53	1509.45	3.5891E+03	1.4	1.0911E+03	7.5079E+00	2.7	1.1
m	171	6133.61	1538.81	7.5845E+02	4.1	9.3764E+02	1.6105E+00	4.7	1.2
M	172	6153.12	1543.71	8.3969E+02	4.1	8.5554E+02	1.7874E+00	4.7	1.2
	173	6311.39	1583.40	1.1122E+03	2.7	6.6258E+02	2.4145E+00	3.6	.9
	174	6330.93	1588.31	3.4363E+02	6.6	6.3983E+02	7.4780E-01	7.0	.9
	175	6348.31	1592.66	2.1353E+02	9.7	6.2982E+02	4.6568E-01	10.0	.9
m	176	6357.25	1594.90	4.5143E+02	5.5	6.2843E+02	9.8557E-01	5.9	.9
M	177	6375.86	1599.57	4.7507E+02	5.1	6.3374E+02	1.0395E+00	5.6	.9
	178	6500.74	1630.89	1.4198E+02	14.8	5.1080E+02	3.1537E-01	15.0	1.0
	179	6622.92	1661.54	1.6661E+03	2.8	4.0038E+02	3.7547E+00	3.5	1.6
	181	6713.59	1684.28	3.1155E+02	7.1	3.6516E+02	7.0957E-01	7.4	1.2
	183	6895.30	1729.86	5.4967E+03	1.3	3.0291E+02	1.2781E+01	2.5	1.3
	184	6927.32	1737.89	1.5431E+02	17.2	2.4952E+02	3.6010E-01	17.3	1.6
	185	7034.57	1764.79	2.5257E+04	.6	2.2634E+02	5.9647E+01	2.2	1.7
	186	7329.01	1838.64	5.9533E+02	4.1	2.3023E+02	1.4514E+00	4.6	1.1
	187	7365.24	1847.73	3.3890E+03	1.5	2.8053E+02	8.2939E+00	2.5	1.3
	188	7468.11	1873.53	4.1374E+02	5.5	2.3170E+02	1.0235E+00	5.8	1.3
m	189	7536.11	1890.58	2.1033E+02	7.7	2.4260E+02	5.2398E-01	8.0	.9
M	190	7558.19	1896.12	1.5338E+02	10.3	2.7507E+02	3.8296E-01	10.5	.9
m	192	8017.88	2011.42	1.1685E+02	12.0	1.8519E+02	3.0542E-01	12.2	1.0
M	193	8042.25	2017.53	1.3605E+02	11.0	1.5414E+02	3.5645E-01	11.1	1.0

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

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se peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
2	54.2	12.14	1.734E+01 +- 13.25%
3	56.8	12.83	5.741E+00 +- 36.26%
4	65.3	15.01	6.270E+00 +- 11.74%
5	68.5	15.81	2.101E+01 +- 4.74%
6	71.7	16.65	3.087E+00 +- 19.51%
7	79.1	18.54	3.235E+00 +- 20.13%
8	81.7	19.21	3.746E+00 +- 17.18%
9	106.1	25.46	3.177E+00 +- 9.07%
11	131.7	32.05	1.683E+00 +- 8.36%
16	244.5	60.44	1.202E+00 +- 9.94%
17	248.3	61.40	1.034E+00 +- 12.55%
18	251.7	62.24	1.231E+00 +- 10.28%
21	294.6	73.03	1.394E+00 +- 9.13%
22	301.7	74.81	2.188E+01 +- 3.97%
23	303.2	75.17	5.119E+00 +- 8.54%
24	309.7	76.81	4.494E+00 +- 8.06%
25	311.1	77.18	3.954E+01 +- 3.41%
26	320.0	79.40	3.380E+00 +- 5.65%
27	326.9	81.14	5.965E+00 +- 4.13%
28	337.5	83.79	9.117E+00 +- 5.93%
29	339.1	84.20	4.894E+00 +- 9.26%
30	350.4	87.03	6.884E+00 +- 8.29%
31	352.4	87.53	6.286E+00 +- 8.95%
32	357.7	88.88	6.974E-01 +- 14.64%
33	362.0	89.96	6.431E+00 +- 3.66%
34	372.1	92.50	3.261E+01 +- 4.25%
35	374.1	93.00	1.610E+01 +- 6.95%
36	380.9	94.71	3.831E+00 +- 4.57%
37	392.4	97.60	7.503E-01 +- 10.69%
38	395.9	98.47	2.855E+00 +- 3.91%
39	424.0	105.52	5.445E-01 +- 7.56%
40	436.5	108.67	4.098E-01 +- 20.69%
41	439.1	109.32	6.917E-01 +- 12.08%
42	443.5	110.41	3.606E-01 +- 12.85%
43	447.3	111.38	7.231E-01 +- 6.73%
47	491.1	122.37	4.506E-01 +- 8.33%
50	527.1	131.37	2.665E-01 +- 9.22%
51	576.5	143.79	5.310E+00 +- 6.31%
52	578.2	144.22	1.531E+00 +- 20.02%
57	745.5	186.27	2.396E+01 +- 3.61%
60	821.7	205.40	2.648E+00 +- 3.33%
62	842.7	210.69	5.158E-01 +- 12.54%
63	885.5	221.43	2.445E-01 +- 17.01%
71	1032.5	258.34	6.392E-01 +- 23.31%
73	1077.1	269.56	5.471E+00 +- 3.11%
74	1080.6	270.43	4.831E-01 +- 14.11%
75	1084.2	271.33	4.331E+00 +- 3.34%
76	1093.7	273.72	3.419E-01 +- 11.46%
82	1198.9	300.13	2.331E+00 +- 3.39%
83	1209.4	302.76	9.250E-01 +- 5.11%
85	1255.8	314.42	3.900E-01 +- 10.38%
86	1293.8	323.97	1.523E+00 +- 3.89%
7	1309.1	327.82	4.103E-01 +- 10.55%
38	1313.2	328.85	2.785E-01 +- 15.89%

89	1317.8	330.01	1.453E+00 +- 4.15%
90	1333.6	333.98	4.267E-01 +- 22.56%
91	1351.3	338.42	3.080E+00 +- 3.61%
92	1337.9	335.05	1.402E-01 +- 26.33%
93	1368.5	342.73	2.543E-01 +- 16.50%
100	1616.0	404.89	1.293E+00 +- 6.69%
101	1619.5	405.77	6.224E-01 +- 13.33%
103	1704.9	427.19	5.809E-01 +- 7.34%
108	1875.1	469.91	3.814E-01 +- 10.58%
109	1893.4	474.48	3.091E-01 +- 13.48%
112	2033.4	509.61	4.908E-01 +- 18.42%
113	2038.1	510.81	1.816E+00 +- 8.05%
114	2043.0	512.03	3.128E-01 +- 22.99%
115	2129.3	533.72	6.833E-01 +- 9.02%
119	2525.9	633.31	2.614E-01 +- 16.63%
120	2588.3	648.98	2.378E-01 +- 22.16%
121	2598.3	651.48	1.702E-01 +- 30.72%
124	2724.7	683.24	2.111E-01 +- 15.27%
125	2803.9	703.13	1.345E+00 +- 4.07%
126	2809.7	704.58	3.257E-01 +- 12.09%
128	2900.7	727.42	1.286E+00 +- 4.87%
129	2961.8	742.76	1.162E+00 +- 6.27%
130	3002.2	752.91	2.919E-01 +- 12.20%
131	3056.3	766.49	3.719E+00 +- 3.12%
132	3064.2	768.48	1.617E+01 +- 2.32%
134	3134.3	786.08	4.475E+00 +- 2.85%
135	3170.4	795.14	7.237E-01 +- 8.02%
137	3274.4	821.25	5.420E-01 +- 11.81%
138	3294.9	826.39	5.501E-01 +- 11.80%
142	3521.7	883.35	3.397E-01 +- 19.16%
146	3772.8	946.39	4.627E-01 +- 20.04%
147	3844.9	964.50	1.957E+00 +- 3.53%
151	4265.6	1070.10	7.021E-01 +- 7.64%
152	4402.0	1104.34	5.151E-01 +- 9.51%
156	4712.6	1182.30	8.614E-01 +- 7.15%
159	4997.3	1253.77	6.991E-01 +- 11.96%
161	5196.6	1303.77	3.778E-01 +- 11.62%
162	5321.9	1335.21	1.428E-01 +- 33.86%
163	5331.0	1337.50	3.061E-01 +- 17.66%
167	5613.0	1408.23	8.163E+00 +- 2.66%
168	5683.6	1425.95	4.256E-01 +- 10.94%
175	6348.3	1592.66	4.657E-01 +- 9.99%
176	6357.2	1594.90	9.856E-01 +- 5.95%
184	6927.3	1737.89	3.601E-01 +- 17.28%
189	7536.1	1890.58	5.240E-01 +- 7.97%
192	8017.9	2011.42	3.054E-01 +- 12.18%
193	8042.3	2017.53	3.564E-01 +- 11.13%

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	169	5823.57	1461.05	100.00%
CS-137	122	2639.20	661.77	100.00%
Tl-208T	78	1108.56	277.45	143.73%
	117	2326.58	583.25	94.12%
	141	3431.56	860.72	88.68%
Pb-210U	12	189.36	46.55	100.00%
Pb-211A	139	3317.27	832.02	100.00%
Pb-212T	45	462.27	115.13	45.64%
	66	954.33	238.72	100.95%
Pb-214U	14	215.92	53.24	97.52%
	68	967.71	242.08	94.68%
	72	1034.68	258.89	106.68%
	77	1098.32	274.88	102.12%
	81	1179.69	295.31	98.16%
	95	1405.51	352.03	101.33%
	106	1843.46	461.96	105.57%
	110	1917.90	480.64	101.84%
	111	1943.79	487.14	119.48%
	116	2314.56	580.23	115.36%
	140	3345.95	839.22	95.36%
Bi-211A	94	1401.96	351.14	100.00%
	139	3317.27	832.02	100.00%
Bi-214U	97	1544.71	386.99	133.01%
	98	1552.87	389.04	113.07%
	105	1815.24	454.88	129.16%
	118	2430.70	609.40	109.36%
	122	2639.20	661.77	100.00%
	123	2654.30	665.56	123.50%
	127	2870.98	719.96	114.53%
	136	3214.94	806.33	102.79%
	145	3724.35	934.22	102.48%
	150	4194.44	1052.23	93.23%
	153	4466.45	1120.51	99.08%
	154	4519.84	1133.92	87.75%
	155	4605.52	1155.42	97.51%
	157	4814.89	1207.97	97.91%
	158	4936.04	1238.38	100.34%
	160	5106.83	1281.25	101.20%
	164	5492.19	1377.94	87.07%
	165	5522.78	1385.61	93.01%
	166	5587.06	1401.73	96.56%
	170	6016.53	1509.45	100.09%
	171	6133.61	1538.81	87.87%
	172	6153.12	1543.71	67.86%

	173	6311.39	1583.40	101.86%
	177	6375.86	1599.57	110.22%
	179	6622.92	1661.54	105.00%
	181	6713.59	1684.28	113.97%
	183	6895.30	1729.86	81.73%
	185	7034.57	1764.79	91.50%
	186	7329.01	1838.64	90.54%
	187	7365.24	1847.73	87.75%
	188	7468.11	1873.53	75.70%
	190	7558.19	1896.12	158.36%
Rn-219A	49	524.58	130.75	80.41%
	99	1604.24	401.93	100.09%
Ra-223A	53	618.07	154.25	99.47%
	54	635.69	158.69	70.94%
	104	1776.13	445.06	113.34%
Ra-224T	67	963.48	241.01	100.00%
Ac-228T	48	518.26	129.17	127.88%
	53	618.07	154.25	99.47%
	61	837.46	209.36	96.78%
	102	1634.29	409.47	98.03%
	107	1847.80	463.05	109.98%
	133	3118.67	782.15	45.97%
	143	3606.01	904.52	45.52%
	144	3633.25	911.35	91.80%
	148	3863.52	969.16	90.57%
	174	6330.93	1588.31	76.95%
	178	6500.74	1630.89	95.80%
Th-227A	13	203.32	50.07	118.73%
	44	453.28	112.88	103.02%
	53	618.07	154.25	99.47%
	64	938.73	234.80	63.51%
	65	943.89	236.09	89.87%
	69	1017.14	254.49	214.67%
	70	1024.55	256.35	103.46%
	80	1143.22	286.15	75.59%
	84	1216.81	304.64	83.34%
Th-230U	20	273.59	67.74	100.00%
C Th-232	15	240.88	59.52	
Th-234U	19	256.04	63.33	95.66%
	44	453.28	112.88	103.02%
Pa-231A	10	113.02	27.25	121.86%
	79	1133.94	283.82	68.70%
Pa-234mU	149	3991.32	1001.24	100.00%
U-234U	14	215.92	53.24	97.52%
	46	485.37	120.93	102.56%
U-235	55	654.61	163.44	101.26%
	56	743.60	185.79	100.38%
	58	780.83	195.14	100.79%

	59	808.93	202.20	88.55%
Am-241	15	240.88	59.52	

Flags: C = check; nuclide is a part of an underdetermined solution

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7						
1	110	477.59	480.64	-3.05	0.000E+00	1.274E-01
						----- 1.274E-01
NA-22						
1	160	1274.54	1281.25	-6.71	0.000E+00	1.986E-02
						----- 1.986E-02
K-40						
1	169	1460.75	1461.05	-.30	1.992E+01	1.925E-01
						----- 1.925E-01
CO-60						
1	156	1173.23	1182.30	-9.07	0.000E+00	2.024E-02
2	162	1332.51	1335.21	-2.70	0.000E+00	1.859E-02
						----- 1.859E-02
SB-125						
1	11	35.46	32.05	3.41	0.000E+00	9.151E-01
2	27	81.80	81.14	.66	3.650E+01	1.886E+00
3	56	176.29	185.79	-9.50	0.000E+00	2.240E-01
4	97	380.51	386.99	-6.48	0.000E+00	9.945E-01
5	103	427.95	427.19	.76	0.000E+00	5.374E-02
6	107	463.51	463.05	.46	4.049E-01	1.260E-01
7	118	600.77	609.40	-8.63	0.000E+00	7.787E-02
8	118	606.82	609.40	-2.58	0.000E+00	3.387E-01
9	119	636.15	633.31	2.84	0.000E+00	1.194E-01
10	123	671.66	665.56	6.10	0.000E+00	7.577E-01
						----- 5.374E-02
CS-134						
1	109	475.35	474.48	.87	0.000E+00	9.304E-01
2	116	563.26	580.23	-16.97	0.000E+00	1.622E-01
3	116	569.29	580.23	-10.94	0.000E+00	9.003E-02
4	118	604.66	609.40	-4.74	0.000E+00	1.521E-02
5	135	795.76	795.14	.62	5.247E-02	1.764E-02
6	136	801.84	806.33	-4.49	0.000E+00	1.906E-01
7	150	1038.50	1052.23	-13.73	0.000E+00	1.767E+00
8	155	1167.86	1155.42	12.44	0.000E+00	1.085E+00
9	164	1365.13	1377.94	-12.81	0.000E+00	5.930E-01
						----- 1.521E-02
CS-136						
1	20	66.91	67.74	-.83	0.000E+00	2.318E-01
	30	86.29	87.03	-.74	0.000E+00	3.526E-01

3	41	109.66	109.32	.34	1.059E+01	3.070E+00
4	53	153.22	154.25	-1.03	0.000E+00	2.032E-01
5	55	163.89	163.44	.45	3.476E+00	2.916E-01
6	56	176.56	185.79	-9.23	0.000E+00	1.050E-01
7	76	273.65	273.72	-.07	1.691E-01	1.030E-01
8	91	340.57	338.42	2.15	0.000E+00	3.167E-02
9	112	507.21	509.61	-2.40	0.000E+00	1.338E+00
10	137	818.50	821.25	-2.75	0.000E+00	1.616E-02
11	150	1048.07	1052.23	-4.16	0.000E+00	2.241E-02
12	158	1235.34	1238.38	-3.04	0.000E+00	1.130E-01

						1.616E-02

CS-137

1	122	661.64	661.77	-.13	1.910E-01	1.503E-02

						1.503E-02

BA-133

1	11	30.63	32.05	-1.42	0.000E+00	1.905E-01
2	11	30.97	32.05	-1.08	0.000E+00	9.437E-02
3	11	35.00	32.05	2.95	0.000E+00	2.898E-01
4	11	35.80	32.05	3.75	0.000E+00	1.311E+00
5	14	53.17	53.24	-.07	1.444E+01	1.396E+00
6	26	79.59	79.40	.19	8.577E+00	8.158E-01
7	27	81.01	81.14	-.13	1.129E+00	5.834E-02
8	78	276.29	277.45	-1.16	0.000E+00	1.976E-01
9	83	302.71	302.76	-.05	3.072E-01	6.664E-02
10	95	355.86	352.03	3.83	0.000E+00	2.054E-02
11	97	383.70	386.99	-3.29	0.000E+00	1.487E-01

						2.054E-02

EU-152

1	47	121.78	122.37	-.59	9.545E-02	4.003E-02
2	68	244.67	242.08	2.59	0.000E+00	1.689E-01
3	93	344.30	342.73	1.57	0.000E+00	5.053E-02
4	102	411.09	409.47	1.62	0.000E+00	6.563E-01
5	104	444.00	445.06	-1.06	0.000E+00	4.509E-01
6	133	778.90	782.15	-3.25	0.000E+00	1.175E-01
7	141	867.39	860.72	6.67	0.000E+00	4.346E-01
8	147	964.00	964.50	-.50	8.298E-01	1.210E-01
9	151	1085.83	1070.10	15.73	0.000E+00	1.820E-01
10	152	1112.07	1104.34	7.73	0.000E+00	1.399E-01
11	167	1408.08	1408.23	-.15	2.380E+00	8.410E-02

						4.003E-02

EU-154

1	47	123.07	122.37	.70	0.000E+00	3.161E-02
2	68	248.04	242.08	5.96	0.000E+00	2.069E-01
3	117	591.70	583.25	8.45	0.000E+00	3.032E-01
4	124	692.50	683.24	9.26	0.000E+00	8.609E-01
5	127	723.30	719.96	3.34	0.000E+00	7.504E-02
6	130	756.70	752.91	3.79	0.000E+00	3.704E-01
7	142	873.20	883.35	-10.15	0.000E+00	1.634E-01
8	149	996.30	1001.24	-4.94	0.000E+00	1.747E-01
9	149	1004.80	1001.24	3.56	0.000E+00	1.068E-01
10	160	1274.80	1281.25	-6.45	0.000E+00	5.623E-02
	166	1397.80	1401.73	-3.93	0.000E+00	1.087E+00

12	177	1597.30	1599.57	-2.27	0.000E+00	1.104E+00

						3.161E-02

IR-192

1	17	61.49	61.40	.09	5.201E+00	2.199E+00
2	19	63.00	63.33	-.33	1.133E+02	1.183E+00
3	19	65.12	63.33	1.79	0.000E+00	1.053E+00
4	20	66.83	67.74	-.91	0.000E+00	5.846E-01
5	23	75.70	75.17	.53	1.892E+01	1.309E+00
6	60	205.78	205.40	.38	4.784E+00	3.849E-01
7	81	295.95	295.31	.64	1.477E+01	4.194E-02
8	84	308.44	304.64	3.80	0.000E+00	4.349E-02
9	85	316.49	314.42	2.07	0.000E+00	1.605E-02
10	96	374.51	372.20	2.31	0.000E+00	1.873E+00
11	108	468.06	469.91	-1.85	0.000E+00	2.597E-02
12	111	484.54	487.14	-2.60	0.000E+00	4.069E-01
13	117	588.60	583.25	5.35	0.000E+00	2.895E-01
14	118	604.40	609.40	-5.00	0.000E+00	1.664E-01
15	118	612.45	609.40	3.05	0.000E+00	2.390E-01

						1.605E-02

Tl-208T

1	21	72.80	73.03	-.23	4.328E+00	1.171E+00
2	22	74.97	74.81	.16	3.864E+01	6.364E-01
3	29	84.80	84.20	.60	2.525E+01	1.467E+00
4	31	87.30	87.53	-.23	1.115E+02	4.699E+00
5	62	211.50	210.69	.81	0.000E+00	8.071E+00
6	64	233.50	234.80	-1.30	0.000E+00	4.770E+00
7	69	252.60	254.49	-1.89	0.000E+00	1.953E+00
8	78	277.36	277.45	-.09	2.229E-01	1.988E-01
9	113	510.72	510.81	-.09	4.992E-01	5.782E-02
10	117	583.14	583.25	-.11	3.476E-01	1.520E-02
11	131	763.30	766.49	-3.19	0.000E+00	9.093E-01
12	137	821.10	821.25	-.15	3.351E+01	1.577E+01
13	141	860.47	860.72	-.25	3.612E-01	1.412E-01
14	145	927.70	934.22	-6.52	0.000E+00	1.435E+01
15	148	982.80	969.16	13.64	0.000E+00	9.040E+00
16	152	1093.90	1104.34	-10.44	0.000E+00	4.964E+00

						1.520E-02

Tl-210U

1	37	97.00	97.60	-.60	1.162E+00	3.303E-01
2	81	296.00	295.31	.69	5.555E+00	1.577E-02
3	135	795.00	795.14	-.14	4.475E-02	1.504E-02

						1.504E-02

Pb-210U

1	12	46.52	46.55	-.03	2.437E+01	8.669E-01

						8.669E-01

Pb-211A

1	24	76.86	76.81	.05	1.634E+02	1.246E+01
2	26	79.29	79.40	-.11	6.757E+01	6.427E+00
3	33	89.60	89.96	-.36	3.621E+02	1.441E+01
	34	92.40	92.50	-.10	5.825E+03	4.455E+01

5	100	404.80	404.89	-.09	2.664E+00	4.509E-01
6	103	427.10	427.19	-.09	2.566E+00	1.009E+00
7	118	610.00	609.40	.60	2.236E+04	3.129E+01
	125	703.30	703.13	.17	2.522E+01	4.217E+00
	131	766.20	766.49	-.29	4.598E+01	3.001E+00
10	139	831.80	832.02	-.22	3.448E+00	5.746E-01

4.509E-01

Pb-212T

1	22	74.81	74.81	.00	1.413E+01	2.327E-01
2	25	77.11	77.18	-.07	1.399E+01	1.202E-01
3	30	87.20	87.03	.17	6.740E+00	2.625E-01
4	33	89.80	89.96	-.16	2.274E+01	9.052E-01
5	45	115.18	115.13	.05	2.716E+00	2.095E+00
6	66	238.63	238.72	-.09	1.254E+00	3.068E-02
7	82	300.09	300.13	-.04	4.409E+00	3.812E-01

3.068E-02

Pb-214U

1	14	53.20	53.24	-.04	2.885E+01	2.790E+00
2	22	74.81	74.81	.00	2.143E+01	3.529E-01
3	25	77.11	77.18	-.07	2.288E+01	1.965E-01
4	30	87.20	87.03	.17	1.148E+01	4.470E-01
5	33	89.80	89.96	-.16	3.864E+01	1.538E+00
6	51	141.30	143.79	-2.49	0.000E+00	3.448E+01
7	60	205.59	205.40	.19	1.109E+03	8.926E+01
8	68	241.92	242.08	-.16	2.395E+01	1.713E-01
9	72	258.82	258.89	-.07	2.126E+01	2.320E+00
10	77	274.53	274.88	-.35	2.220E+01	4.026E+00
11	81	295.92	295.31	.61	2.314E+01	6.571E-02
12	86	324.30	323.97	.33	4.714E+02	6.320E+01
13	95	351.99	352.03	-.04	2.240E+01	3.204E-02
14	106	462.10	461.96	.14	2.149E+01	7.423E+00
15	110	480.50	480.64	-.14	2.227E+01	3.659E+00
16	111	487.25	487.14	.11	1.899E+01	2.806E+00
17	113	511.03	510.81	.22	3.746E+02	4.338E+01
18	116	580.30	580.23	.07	1.967E+01	3.584E+00
19	132	768.40	768.48	-.08	1.250E+03	1.898E+01
20	134	785.95	786.08	-.13	2.539E+01	1.389E+00
21	140	839.03	839.22	-.19	2.378E+01	2.785E+00

3.204E-02

Bi-211A

1	21	70.83	73.03	-2.20	0.000E+00	3.803E+00
2	21	72.87	73.03	-.16	7.203E+00	1.949E+00
3	28	82.50	83.79	-1.29	0.000E+00	5.183E+00
4	29	84.90	84.20	.70	0.000E+00	1.940E+01
5	94	351.10	351.14	-.04	2.443E+00	1.016E-01
6	100	404.80	404.89	-.09	1.950E+00	3.299E-01
7	103	426.90	427.19	-.29	1.890E+00	7.431E-01
8	118	609.30	609.40	-.10	2.553E+04	3.573E+01
9	126	704.30	704.58	-.28	4.027E+00	2.797E+00
10	131	766.40	766.49	-.09	3.382E+01	2.208E+00
11	139	831.80	832.02	-.22	2.926E+00	4.876E-01
12	143	897.30	904.52	-7.22	0.000E+00	6.081E+00
13	152	1109.10	1104.34	4.76	0.000E+00	1.677E+01

1.016E-01

Bi-212T

1	12	39.86	46.55	-6.69	0.000E+00	4.170E+00
	21	70.83	73.03	-2.20	0.000E+00	5.095E+01
3	21	72.87	73.03	-.16	8.912E+01	2.411E+01
4	22	74.81	74.81	.00	3.308E+03	5.448E+01
5	25	77.11	77.18	-.07	3.354E+03	2.881E+01
6	28	82.50	83.79	-1.29	0.000E+00	6.250E+01
7	29	84.90	84.20	.70	0.000E+00	2.328E+02
8	30	87.20	87.03	.17	1.633E+03	6.361E+01
9	33	89.80	89.96	-.16	5.686E+03	2.263E+02
10	52	144.90	144.22	.68	9.825E+02	1.228E+02
11	80	288.08	286.15	1.93	0.000E+00	4.209E+00
12	81	295.10	295.31	-.21	1.929E+04	5.475E+01
13	87	327.96	327.82	.14	1.813E+01	9.102E+00
14	105	452.83	454.88	-2.05	0.000E+00	3.888E+00
15	109	473.50	474.48	-.98	0.000E+00	2.930E+01
16	128	727.17	727.42	-.25	6.735E-01	1.189E-01
17	134	785.42	786.08	-.66	1.383E+01	7.566E-01
18	142	893.39	883.35	10.04	0.000E+00	2.881E+00
19	146	952.10	946.39	5.71	0.000E+00	5.979E+00
20	151	1078.62	1070.10	8.52	0.000E+00	1.908E+00
21	170	1512.75	1509.45	3.30	0.000E+00	3.726E+00
22	178	1620.56	1630.89	-10.33	0.000E+00	6.488E-01
23	186	1806.00	1838.64	-32.64	0.000E+00	5.653E+00

1.189E-01

Bi-214U

1	24	76.86	76.81	.05	7.894E+01	6.020E+00
2	26	79.29	79.40	-.11	3.552E+01	3.379E+00
3	33	89.60	89.96	-.36	1.930E+02	7.680E+00
4	34	92.40	92.50	-.10	3.294E+03	2.519E+01
5	97	387.00	386.99	.01	1.594E+01	3.556E+00
6	98	389.10	389.04	.06	1.875E+01	3.155E+00
7	105	454.77	454.88	-.11	1.641E+01	3.958E+00
8	118	609.30	609.40	-.10	1.939E+01	2.713E-02
9	122	661.40	661.77	-.37	3.739E+02	2.944E+01
10	123	665.45	665.56	-.11	1.717E+01	8.149E-01
11	123	665.45	665.56	-.11	1.717E+01	8.149E-01
12	125	703.20	703.13	.07	1.771E+01	2.960E+00
13	127	719.86	719.96	-.10	1.851E+01	3.448E+00
14	132	768.36	768.48	-.12	2.047E+01	3.107E-01
15	134	786.10	786.08	.02	8.800E+01	4.816E+00
16	136	806.17	806.33	-.16	2.062E+01	1.243E+00
17	145	934.05	934.22	-.17	2.069E+01	5.393E-01
18	147	964.08	964.50	-.42	3.157E+01	4.604E+00
19	150	1051.96	1052.23	-.27	2.274E+01	5.396E+00
20	153	1120.28	1120.51	-.23	2.140E+01	1.201E-01
21	154	1133.66	1133.92	-.26	2.416E+01	6.946E+00
22	155	1155.19	1155.42	-.23	2.174E+01	1.097E+00
23	157	1207.68	1207.97	-.29	2.165E+01	3.977E+00
24	158	1238.11	1238.38	-.27	2.113E+01	3.192E-01
25	160	1280.96	1281.25	-.29	2.095E+01	1.239E+00
26	164	1377.65	1377.94	-.29	2.435E+01	4.425E-01
27	165	1385.31	1385.61	-.30	2.279E+01	2.224E+00
28	166	1401.50	1401.73	-.23	2.195E+01	1.271E+00
29	167	1407.98	1408.23	-.25	2.038E+01	7.200E-01
30	170	1509.19	1509.45	-.26	2.118E+01	9.227E-01
	171	1538.50	1538.81	-.31	2.412E+01	4.616E+00

32	172	1543.32	1543.71	-.39	3.124E+01	5.162E+00
33	173	1583.22	1583.40	-.18	2.081E+01	2.291E+00
	179	1661.28	1661.54	-.26	2.019E+01	1.161E+00
	181	1683.99	1684.28	-.29	1.860E+01	5.468E+00
36	183	1729.60	1729.86	-.26	2.594E+01	3.948E-01
37	185	1764.51	1764.79	-.28	2.317E+01	6.667E-02
38	186	1838.36	1838.64	-.28	2.342E+01	2.882E+00
39	187	1847.44	1847.73	-.29	2.416E+01	5.746E-01
40	190	1896.30	1896.12	.18	1.339E+01	6.971E+00

2.713E-02

Rn-219A

1	75	271.23	271.33	-.10	2.705E+00	1.297E-01
2	99	401.78	401.93	-.15	2.332E+00	2.034E-01

1.297E-01

Rn-220T

1	115	549.70	533.72	15.98	0.000E+00	1.301E+01
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1.301E+01

Ra-223A

1	27	81.07	81.14	-.07	2.462E+00	1.272E-01
2	28	83.78	83.79	-.01	2.278E+00	7.207E-02
3	36	94.70	94.71	-.01	2.723E+00	1.720E-01
4	37	97.60	97.60	.00	1.785E+00	5.071E-01
5	47	122.40	122.37	.03	2.342E+00	9.823E-01
6	52	144.30	144.22	.08	3.021E+00	3.774E-01
7	53	154.30	154.25	.05	2.752E+00	2.380E-01
	54	158.70	158.69	.01	3.556E+00	1.933E+00
9	70	256.00	256.35	-.35	4.083E+02	3.184E+01
10	73	269.60	269.56	.04	2.488E+00	9.417E-02
11	80	288.30	286.15	2.15	0.000E+00	8.804E+00
12	86	324.10	323.97	.13	2.356E+00	3.159E-01
13	88	328.70	328.85	-.15	8.317E+00	6.178E+00
14	90	334.40	333.98	.42	2.564E+01	1.261E+01
15	91	338.60	338.42	.18	6.616E+00	4.462E-01
16	104	445.50	445.06	.44	2.227E+00	8.427E-01
17	118	609.20	609.40	-.20	1.224E+04	1.713E+01

7.207E-02

Ra-224T

1	27	81.07	81.14	-.07	3.078E+02	1.591E+01
2	28	83.78	83.79	-.01	2.701E+02	8.545E+00
3	36	94.70	94.71	-.01	2.962E+02	1.871E+01
4	37	97.60	97.60	.00	2.018E+02	5.732E+01
5	67	241.00	241.01	-.01	1.321E+00	3.295E-01
6	102	410.00	409.47	.53	5.465E+02	3.419E+02

3.295E-01

Ra-226U

1	56	186.00	185.79	.21	5.572E+01	4.297E-01
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4.297E-01

-227A

1	27	81.08	81.14	-.06	5.275E+04	2.726E+03
2	28	83.96	83.79	.17	2.559E+03	8.097E+01
	31	87.50	87.53	-.03	3.137E+03	1.322E+02
	38	100.00	98.47	1.53	0.000E+00	4.502E+01
5	54	160.40	158.69	1.71	0.000E+00	7.683E+01

						4.502E+01

Ac-228T

1	15	57.76	59.52	-1.76	0.000E+00	6.067E+00
2	38	99.45	98.47	.98	0.000E+00	1.122E+00
3	48	129.10	129.17	-.07	7.498E-01	3.992E-01
4	52	145.90	144.22	1.68	0.000E+00	5.912E+00
5	53	154.20	154.25	-.05	1.556E+01	1.346E+00
6	56	184.60	185.79	-1.19	0.000E+00	2.182E+01
7	60	204.10	205.40	-1.30	0.000E+00	9.124E+00
8	61	209.40	209.36	.04	9.907E-01	2.841E-01
9	74	270.30	270.43	-.13	7.923E-01	3.400E-01
10	90	332.40	333.98	-1.58	0.000E+00	2.903E+00
11	91	338.40	338.42	-.02	1.586E+00	1.070E-01
12	93	340.90	342.73	-1.83	0.000E+00	3.287E+00
13	102	409.40	409.47	-.07	9.778E-01	6.118E-01
14	107	463.00	463.05	-.05	8.717E-01	2.714E-01
15	109	474.60	474.48	.12	6.593E+01	4.307E+01
16	112	509.60	509.61	-.01	6.157E+00	2.622E+00
17	116	562.30	580.23	-17.93	0.000E+00	1.388E+00
18	128	727.00	727.42	-.42	9.963E+00	1.759E+00
19	130	755.20	752.91	2.29	0.000E+00	1.406E+00
20	132	772.10	768.48	3.62	0.000E+00	9.872E-01
21	133	782.00	782.15	-.15	2.085E+00	2.714E+00
22	135	794.80	795.14	-.34	9.237E-01	3.105E-01
23	139	830.40	832.02	-1.62	0.000E+00	3.074E+00
24	139	835.60	832.02	3.58	0.000E+00	9.534E-01
25	140	840.20	839.22	.98	0.000E+00	2.222E+00
26	143	904.20	904.52	-.32	2.106E+00	2.069E+00
27	144	911.07	911.35	-.28	1.058E+00	6.172E-02
28	147	964.60	964.50	.10	2.220E+00	3.238E-01
29	148	968.90	969.16	-.26	1.058E+00	1.007E-01
30	159	1247.10	1253.77	-6.67	0.000E+00	3.425E+00
31	169	1459.20	1461.05	-1.85	0.000E+00	4.804E+00
32	170	1495.80	1509.45	-13.65	0.000E+00	1.973E+00
33	170	1501.50	1509.45	-7.95	0.000E+00	3.582E+00
34	172	1556.90	1543.71	13.19	0.000E+00	8.898E+00
35	173	1580.20	1583.40	-3.20	0.000E+00	2.617E+00
36	174	1587.90	1588.31	-.41	1.246E+00	4.363E-01
37	178	1624.70	1630.89	-6.19	0.000E+00	4.963E+00
38	178	1630.40	1630.89	-.49	1.001E+00	7.599E-01
39	178	1638.00	1630.89	7.11	0.000E+00	2.849E+00
40	180	1666.40	1669.16	-2.76	0.000E+00	6.731E+00

						6.172E-02

Ac-228Tw

1	51	141.00	143.79	-2.79	0.000E+00	2.797E+01
2	55	174.10	163.44	10.66	0.000E+00	4.388E+01
3	58	191.50	195.14	-3.64	0.000E+00	1.237E+01
4	59	199.50	202.20	-2.70	0.000E+00	4.012E+00
5	70	257.30	256.35	.95	0.000E+00	5.151E+01
	78	279.00	277.45	1.55	0.000E+00	5.982E+00
	86	321.70	323.97	-2.27	0.000E+00	5.289E+00

8	96	372.20	372.20	.00	0.000E+00	1.622E+02
9	99	396.80	401.93	-5.13	0.000E+00	4.466E+01
	99	398.60	401.93	-3.33	0.000E+00	3.950E+01
	104	440.30	445.06	-4.76	0.000E+00	9.511E+00
12	112	503.70	509.61	-5.91	0.000E+00	5.942E+00
13	115	523.00	533.72	-10.72	0.000E+00	1.115E+01
14	115	546.30	533.72	12.58	0.000E+00	6.396E+00
15	116	570.70	580.23	-9.53	0.000E+00	7.820E+00
16	116	572.10	580.23	-8.13	0.000E+00	8.698E+00
17	117	583.00	583.25	-.25	1.982E+02	8.669E+00
18	118	620.30	609.40	10.90	0.000E+00	1.321E+01
19	121	651.40	651.48	-.08	1.037E+01	1.226E+01
20	124	674.60	683.24	-8.64	0.000E+00	1.338E+01
21	124	677.30	683.24	-5.94	0.000E+00	1.648E+01
22	125	701.50	703.13	-1.63	0.000E+00	7.934E+00
23	126	707.30	704.58	2.72	0.000E+00	9.564E+00
24	132	773.50	768.48	5.02	0.000E+00	1.800E+01
25	142	873.80	883.35	-9.55	0.000E+00	2.080E+01
26	146	944.10	946.39	-2.29	0.000E+00	1.707E+01
27	146	948.00	946.39	1.61	0.000E+00	1.545E+01
28	147	958.50	964.50	-6.00	0.000E+00	5.714E+00
29	148	975.90	969.16	6.74	0.000E+00	3.467E+01
30	149	988.10	1001.24	-13.14	0.000E+00	9.566E+00
31	151	1065.10	1070.10	-5.00	0.000E+00	1.298E+01
32	152	1095.70	1104.34	-8.64	0.000E+00	1.422E+01
33	152	1110.60	1104.34	6.26	0.000E+00	5.340E+00
34	155	1153.60	1155.42	-1.82	0.000E+00	1.621E+01
35	158	1245.10	1238.38	6.72	0.000E+00	2.191E+01
36	160	1287.50	1281.25	6.25	0.000E+00	1.546E+01
37	181	1685.90	1684.28	1.62	0.000E+00	1.503E+01
38	189	1887.40	1890.58	-3.18	0.000E+00	1.134E+01

						4.012E+00

Th-227A

1	8	20.27	19.21	1.06	0.000E+00	3.420E+01
2	13	50.20	50.07	.13	2.087E+00	3.776E-01
3	13	50.88	50.07	.81	0.000E+00	2.115E+02
4	18	62.50	62.24	.26	3.155E+01	1.104E+01
5	21	72.90	73.03	-.13	3.086E+02	8.349E+01
6	21	73.70	73.03	.67	4.482E+02	1.213E+02
7	23	75.15	75.17	-.02	3.557E+03	2.460E+02
8	25	77.40	77.18	.22	2.436E+04	2.093E+02
9	26	79.77	79.40	.37	9.895E+00	9.411E-01
10	29	85.44	84.20	1.24	0.000E+00	1.257E+00
11	32	88.48	88.88	-.40	1.532E+00	5.695E-01
12	36	94.00	94.71	-.71	0.000E+00	1.753E+00
13	36	95.00	94.71	.29	1.972E+03	1.246E+02
14	36	96.10	94.71	1.39	0.000E+00	2.630E+01
15	38	99.70	98.47	1.23	0.000E+00	1.129E+02
16	38	100.00	98.47	1.53	0.000E+00	1.372E+00
17	38	100.30	98.47	1.83	0.000E+00	1.629E+01
18	39	105.00	105.52	-.52	8.433E+01	3.133E+01
19	44	113.20	112.88	.32	2.288E+01	1.661E+00
20	51	141.30	143.79	-2.49	0.000E+00	1.061E+01
21	53	154.20	154.25	-.05	1.535E+02	1.327E+01
22	60	204.30	205.40	-1.10	0.000E+00	7.070E+00
23	60	205.00	205.40	-.40	1.107E+02	8.910E+00
24	60	206.10	205.40	.70	7.247E+01	5.831E+00
25	60	206.40	205.40	1.00	0.000E+00	1.358E+02

26	62	210.65	210.69	-.04	2.823E+00	1.144E+00
27	64	234.90	234.80	.10	3.917E+00	2.898E+00
28	65	236.00	236.09	-.09	2.766E+00	1.161E-01
29	69	252.55	254.49	-1.94	0.000E+00	1.243E+01
30	69	254.70	254.49	.21	1.159E+00	1.592E+00
31	70	256.25	256.35	-.10	2.403E+00	1.874E-01
32	76	273.00	273.72	-.72	0.000E+00	3.026E+00
33	80	286.15	286.15	.00	3.290E+00	8.078E-01
34	81	296.60	295.31	1.29	0.000E+00	8.272E+00
35	82	299.90	300.13	-.23	7.205E+00	6.230E-01
36	82	300.30	300.13	.17	7.211E+01	6.235E+00
37	84	304.44	304.64	-.20	2.983E+00	1.177E+00
38	89	329.82	330.01	-.19	3.266E+00	4.675E-01
39	90	334.40	333.98	.42	2.641E+00	1.299E+00

						1.161E-01

Th-228T

1	29	84.40	84.20	.20	2.563E+01	1.489E+00
2	50	131.62	131.37	.25	1.471E+01	1.042E+01
3	62	215.94	210.69	5.25	0.000E+00	5.262E+00

						1.489E+00

Th-230U

1	20	67.73	67.74	-.01	3.831E+01	6.551E+00

						6.551E+00

Th-231A

1	10	26.64	27.25	-.61	8.110E-01	3.793E-01
2	15	58.57	59.52	-.95	0.000E+00	5.679E+00
3	21	72.78	73.03	-.25	3.450E+01	9.334E+00
4	27	81.24	81.14	.10	4.138E+01	2.139E+00
5	27	82.11	81.14	.97	0.000E+00	5.458E+00
6	29	84.21	84.20	.01	3.823E+00	2.221E-01
7	33	89.95	89.96	-.01	3.182E+01	1.267E+00
8	34	92.29	92.50	-.21	4.743E+02	3.628E+00
9	35	93.02	93.00	.02	2.259E+03	3.443E+01
10	36	95.87	94.71	1.16	0.000E+00	2.078E+00
11	38	99.28	98.47	.81	0.000E+00	1.343E+01
12	39	102.27	105.52	-3.25	0.000E+00	2.668E+00
13	39	105.81	105.52	.29	4.739E+02	1.760E+02
14	40	108.00	108.67	-.67	8.757E+00	4.295E+00
15	52	145.06	144.22	.84	0.000E+00	2.799E+02
16	52	145.94	144.22	1.72	0.000E+00	4.073E+01
17	55	163.12	163.44	-.32	1.019E+02	8.552E+00

						2.221E-01

Th-232

1	15	59.00	59.52	-.52	2.046E+01	1.491E+01

						1.491E+01

Th-234U

1	19	62.86	63.33	-.47	1.460E+04	1.524E+02
2	19	63.29	63.33	-.04	6.564E+01	6.855E-01
3	22	73.92	74.81	-.89	0.000E+00	3.014E+02
	22	74.00	74.81	-.81	0.000E+00	8.007E+01

5	28	83.30	83.79	-.49	8.141E+02	2.576E+01
6	30	87.02	87.03	-.01	5.833E+03	2.272E+02
7	34	92.38	92.50	-.12	7.934E+01	6.068E-01
	35	92.80	93.00	-.20	3.391E+01	5.169E-01
9	44	112.81	112.88	-.07	6.809E+01	4.943E+00
10	56	184.80	185.79	-.99	0.000E+00	2.752E+02

5.169E-01

Pa-231A

1	39	102.70	105.52	-2.82	0.000E+00	4.548E+00
2	79	283.67	283.82	-.15	2.808E+00	7.948E-01
3	82	300.08	300.13	-.05	6.268E+00	5.419E-01
4	83	302.67	302.76	-.09	2.487E+00	5.394E-01
5	89	330.07	330.01	.06	6.913E+00	9.895E-01

5.394E-01

Pa-234mU

1	149	1001.03	1001.24	-.21	9.789E+01	3.002E+00
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3.002E+00

U-234U

1	14	53.10	53.24	-.14	2.696E+02	2.607E+01
2	33	89.96	89.96	.00	1.989E+04	7.916E+02
3	35	93.35	93.00	.35	2.538E+04	3.869E+02
4	39	105.00	105.52	-.52	2.249E+03	8.354E+02

2.607E+01

U-235

1	33	89.96	89.96	.00	2.652E+01	1.055E+00
2	35	93.35	93.00	.35	4.061E+01	6.191E-01
3	39	105.00	105.52	-.52	3.373E+00	1.253E+00
4	40	108.60	108.67	-.07	8.449E+00	4.144E+00
5	41	109.14	109.32	-.18	2.853E+00	8.277E-01
6	51	143.76	143.79	-.03	3.156E+00	1.162E-01
7	55	163.35	163.44	-.09	3.364E+00	2.823E-01
8	56	182.70	185.79	-3.09	0.000E+00	3.928E+00
9	56	185.72	185.79	-.07	3.381E+00	2.608E-02
10	58	194.94	195.14	-.20	3.333E+00	2.298E+00
11	59	202.12	202.20	-.08	3.795E+00	1.352E+00
12	60	205.31	205.40	-.09	3.538E+00	2.846E-01

2.608E-02

Am-241

1	10	26.36	27.25	-.89	0.000E+00	3.046E+00
2	15	59.54	59.52	.02	1.058E-01	7.709E-02

7.709E-02



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***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9955	1.802E+01 +- 4.65%		1.802E+01	0.000E+00
2	CS-137	1.0000	1.527E-01 +- 6.39%		1.527E-01	0.000E+00
3	Tl-208T	.9729	5.977E-01 +- 3.60%		5.977E-01	0.000E+00
4	Pb-210U	.9967	1.211E+00 +- 12.08%		1.211E+00	0.000E+00
5	Pb-212T	.9997	1.967E+00 +- 5.24%		1.967E+00	0.000E+00
6	Pb-214U	.8931	1.398E+00 +- 3.05%		1.398E+00	0.000E+00
7	Bi-214U	.9294	1.354E+00 +- 2.78%		1.354E+00	0.000E+00
8	Ra-223A	.9840	1.837E-01 +- 30.21%		1.837E-01	0.000E+00
9	Ra-224T	.9988	2.518E+00 +- 7.53%		2.518E+00	0.000E+00
C 10	Ra-226U	.9994	2.994E+00 +- 6.20%		2.994E+00	0.000E+00
11	Ac-228T	.9397	1.552E+00 +- 2.48%		1.552E+00	0.000E+00
12	Th-234U	.9995	1.124E+00 +- 13.63%		1.124E+00	0.000E+00
13	Pa-234mU	.9938	2.724E+00 +- 22.64%		2.724E+00	0.000E+00
C 14	U-235	.9751	1.819E-01 +- 6.20%		1.819E-01	0.000E+00
			-----		-----	-----
			3.598E+01		3.598E+01	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

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***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	68.94	.11	16.25	.10	5.4
2	189.77	.14	46.64	.11	4.5
3	256.16	.10	63.34	.10	7.5
4	302.23	.04	74.91	.10	20.1
5	311.23	.03	77.17	.10	27.7
6	338.17	.27	83.93	.12	4.0
7	340.92	.28	84.62	.12	1000000.0
8	350.09	.18	86.93	.11	1000000.0
9	352.43	.17	87.52	.11	11.2
10	362.31	.09	90.00	.10	10.4
11	372.87	.15	92.65	.11	9.4
12	375.59	.17	93.33	.11	1000000.0
13	400.89	.19	99.69	.11	3.2
14	517.79	.11	129.02	.10	6.7
15	617.45	.17	154.03	.11	5.1
16	744.93	.08	186.05	.10	12.0
17	837.37	.07	209.26	.10	9.5
18	954.49	.02	238.67	.10	41.9
19	964.07	.12	241.07	.10	1000000.0
20	968.05	.11	242.07	.10	.0
21	1079.87	.20	270.15	.11	1000000.0
22	1084.02	1.08	271.19	.29	7.8
23	1096.69	.38	274.37	.14	1000000.0
24	1104.25	.61	276.27	.18	1000000.0
25	1109.52	.17	277.59	.11	5.5
26	1179.85	.03	295.25	.10	22.4
27	1198.98	.14	300.06	.11	9.0
28	1310.16	.09	327.98	.10	8.4
29	1351.44	.06	338.35	.10	17.2
30	1405.72	.03	351.98	.10	30.0
31	1634.61	.15	409.46	.11	5.4
32	1847.93	.05	463.01	.10	9.1
33	2038.60	.11	510.88	.10	11.4
34	2326.88	.02	583.25	.10	24.5
35	2430.98	.02	609.38	.10	25.6
36	2639.18	.14	661.64	.11	9.4
37	2654.51	.66	665.49	.19	1000000.0
38	2900.48	.10	727.23	.10	9.3
39	3044.57	.41	763.41	.14	3.5
40	3064.61	.17	768.44	.11	6.6
41	3079.61	.38	772.20	.14	3.6
42	3170.69	.20	795.07	.11	5.6
43	3215.87	.32	806.41	.13	4.4
44	3312.88	.26	830.76	.12	3.4
45	3332.39	.36	835.66	.13	3.9
46	3432.06	.16	860.68	.11	9.5
47	3633.42	.06	911.23	.10	19.6
48	3724.68	.25	934.13	.12	4.6
49	3846.70	.24	964.76	.12	6.9
50	3863.71	.10	969.03	.10	15.2
51	3990.54	.46	1000.86	.15	3.0
52	4381.26	.36	1098.93	.13	3.6
53	4466.87	.10	1120.42	.10	12.1

54	4604.39	.71	1154.94	.20	3.5
55	4936.76	.29	1238.34	.12	5.8
56	5184.17	.35	1300.42	.13	.0
57	5492.12	.21	1377.67	.11	5.8
58	5823.97	.06	1460.89	.10	32.6
59	6331.96	.33	1588.28	.13	5.3
60	6350.81	.39	1593.01	.14	4.5
61	6500.35	.46	1630.51	.15	4.2
62	6895.97	.37	1729.72	.14	5.0
63	7034.65	.15	1764.50	.11	11.6
64	7364.61	.46	1847.25	.15	3.7

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***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	1	68.94	16.25	2.4891E+02	7.4	7.7843E+02	5.2892E+00	8.9	.9
B			15.91	8.7388E+02	18.4				
B			16.42	1.0959E+03	14.7				
	2	189.77	46.64	2.5248E+02	9.8	5.4377E+02	1.3954E+00	11.0	1.0
B			46.61	1.8364E+02	8.7				
	3	256.16	63.34	4.2813E+02	8.8	8.9281E+02	1.6226E+00	10.1	1.3
B			63.35	9.2105E+02	2.9				
m	4	302.23	74.91	1.9839E+03	2.8	1.0896E+03	6.2970E+00	5.7	1.3
B			75.03	1.8060E+02	9.2				
M	5	311.23	77.17	3.4002E+03	1.9	1.0055E+03	1.0458E+01	5.3	1.3
B			77.17	1.6775E+02	10.3				
m	6	338.17	83.93	2.7944E+02	16.9	7.5997E+02	7.8641E-01	17.6	1.3
B			84.45	1.4321E+02	9.3				
m	7	340.92	84.62	2.5849E+02	18.0	7.4989E+02	7.2117E-01	18.6	1.3
B			84.45	1.4321E+02	9.3				
m	8	350.09	86.93	6.5306E+02	14.9	7.1858E+02	1.7710E+00	15.7	1.3
B			87.22	9.5010E+01	12.4				
m	9	352.43	87.52	8.0648E+02	10.1	7.1119E+02	2.1715E+00	11.2	1.3
B			87.22	9.5010E+01	12.4				
m	10	362.31	90.00	8.0997E+02	4.5	6.8239E+02	2.1545E+00	6.6	1.3
m	11	372.87	92.65	7.7113E+02	8.8	6.5636E+02	2.0353E+00	10.0	1.3
B			92.52	9.6822E+02	9.2				
B			93.03	4.7534E+02	18.2				
	12	375.59	93.33	6.5726E+02	10.1	6.5047E+02	1.7314E+00	11.2	1.3
			93.03	4.7534E+02	18.2				
	13	400.89	99.69	1.6564E+02	10.2	5.9966E+02	4.2871E-01	11.2	.6
	14	517.79	129.02	3.4739E+02	8.1	6.1467E+02	8.5083E-01	9.1	1.4
	15	617.45	154.03	2.5030E+02	11.2	5.4267E+02	6.6088E-01	12.0	1.5
	16	744.93	186.05	9.5194E+02	3.6	5.6117E+02	2.8335E+00	5.9	1.7
B			185.79	7.0402E+02	3.2				
	17	837.37	209.26	5.7029E+02	3.3	4.3305E+02	1.8300E+00	5.9	.6
m	18	954.49	238.67	6.3241E+03	1.1	3.8902E+02	2.2072E+01	5.2	1.1
B			238.67	3.0191E+02	5.3				
m	19	964.07	241.07	7.2318E+02	5.5	3.4567E+02	2.5403E+00	7.5	1.1
M	20	968.05	242.07	7.8305E+02	5.2	3.3151E+02	2.7578E+00	7.3	1.1
m	21	1079.87	270.15	4.3416E+02	7.6	2.7041E+02	1.5766E+00	9.0	.9
m	22	1084.02	271.19	8.6545E+01	29.5	2.6168E+02	3.1423E-01	29.9	.9
m	23	1096.69	274.37	7.5693E+01	20.4	2.4985E+02	2.7467E-01	21.0	.9
m	24	1104.25	276.27	4.8161E+01	30.9	2.5352E+02	1.7471E-01	31.2	.9
M	25	1109.52	277.59	2.2830E+02	7.8	2.6084E+02	8.2797E-01	9.0	.9
	26	1179.85	295.25	1.9068E+03	1.6	2.2109E+02	7.2360E+00	4.8	.9
B			295.17	1.6573E+02	7.8				
	27	1198.98	300.06	3.9497E+02	6.7	2.3583E+02	1.5187E+00	8.1	1.7
	28	1310.16	327.98	3.4615E+02	4.2	2.3844E+02	1.4309E+00	6.2	.9
	29	1351.44	338.35	1.2019E+03	3.2	2.2868E+02	5.0956E+00	5.5	1.5
	30	1405.72	351.98	2.9710E+03	1.7	2.5637E+02	1.3008E+01	4.7	1.3
B			352.03	2.9805E+02	6.1				
	31	1634.61	409.46	1.6522E+02	8.8	1.5017E+02	8.1636E-01	9.9	.8
	32	1847.93	463.01	3.5552E+02	3.9	1.4657E+02	1.9299E+00	6.2	.7
	33	2038.60	510.88	5.6649E+02	5.0	1.8826E+02	3.3158E+00	7.1	1.7
B			510.34	3.5624E+02	7.8				
			511.57	4.7412E+02	7.1				
	34	2326.88	583.25	1.9452E+03	1.4	1.3986E+02	1.2560E+01	4.9	.7

B			583.34	1.0336E+02	9.4					
	35	2430.98	609.38	2.2200E+03	1.6	1.0691E+02	1.4807E+01	4.8	1.0	
R			609.34	2.1623E+02	5.6					
	36	2639.18	661.64	4.7369E+02	4.7	1.2155E+02	3.3578E+00	6.4	1.5	
	37	2654.51	665.49	4.8794E+01	15.6	1.2738E+02	3.4818E-01	16.2	1.5	
	38	2900.48	727.23	3.9417E+02	4.5	7.8289E+01	3.1139E+00	6.2	1.1	
B			727.05	5.8665E+01	13.4					
m	39	3044.57	763.41	5.4521E+01	15.6	8.6144E+01	4.5536E-01	16.3	.9	
m	40	3064.61	768.44	1.9981E+02	6.3	9.6546E+01	1.6814E+00	7.7	.9	
M	41	3079.61	772.20	6.2296E+01	17.1	1.0503E+02	5.2717E-01	17.6	.9	
	42	3170.69	795.07	1.9798E+02	6.1	9.5659E+01	1.7324E+00	7.5	.9	
	43	3215.87	806.41	6.0662E+01	13.9	4.8991E+01	5.3950E-01	14.6	1.2	
m	44	3312.88	830.76	5.5960E+01	16.1	6.6188E+01	5.1495E-01	16.7	1.2	
M	45	3332.39	835.66	7.6086E+01	12.3	7.5491E+01	7.0488E-01	13.1	1.2	
	46	3432.06	860.68	2.8976E+02	4.7	6.3691E+01	2.7768E+00	6.5	.9	
	47	3633.42	911.23	1.3026E+03	2.2	7.0513E+01	1.3241E+01	5.0	1.1	
	48	3724.68	934.13	1.3583E+02	9.6	5.2868E+01	1.4051E+00	10.6	1.4	
m	49	3846.70	964.76	2.3755E+02	7.5	7.0178E+01	2.5138E+00	8.7	1.7	
M	50	3863.71	969.03	7.4244E+02	3.7	6.6843E+01	7.8811E+00	5.8	1.7	
	51	3990.54	1000.86	6.4737E+01	18.6	4.9956E+01	7.0302E-01	19.1	1.0	
B			1001.07	7.0890E+01	17.5					
	52	4381.26	1098.93	5.7501E+01	17.9	3.6424E+01	6.6693E-01	18.4	1.1	
	53	4466.87	1120.42	4.8082E+02	4.4	5.3737E+01	5.6534E+00	6.2	1.3	
B			1120.31	5.2112E+01	17.1					
	54	4604.39	1154.94	6.1642E+01	32.3	6.1310E+01	7.4044E-01	32.6	2.3	
	55	4936.76	1238.34	1.8026E+02	11.1	8.6437E+01	2.2664E+00	11.9	1.0	
	57	5492.12	1377.67	1.2586E+02	7.6	2.8185E+01	1.7102E+00	8.8	1.0	
	58	5823.97	1460.89	3.5157E+03	1.7	2.3518E+01	5.0418E+01	4.6	1.3	
B			1460.76	2.6941E+02	4.8					
m	59	6331.96	1588.28	1.0000E+02	11.8	1.8213E+01	1.5488E+00	12.6	1.5	
M	60	6350.81	1593.01	7.1380E+01	14.7	1.4832E+01	1.1085E+00	15.3	1.5	
	61	6500.35	1630.51	5.3909E+01	17.2	1.3220E+01	8.5528E-01	17.7	.9	
	62	6895.97	1729.72	7.2397E+01	13.6	1.1234E+01	1.2127E+00	14.2	.7	
	63	7034.65	1764.50	3.6596E+02	5.6	4.4895E+00	6.2435E+00	7.1	.8	
B			1764.42	5.9809E+01	6.9					
	64	7364.61	1847.25	4.6104E+01	21.8	8.4270E+00	8.2043E-01	22.2	.9	

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

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These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	68.9	16.25	2.689E+00 +- 23.44%
4	302.2	74.91	6.217E+00 +- 5.71%
5	311.2	77.17	1.039E+01 +- 5.31%
6	338.2	83.93	7.300E-01 +- 18.88%
7	340.9	84.62	6.652E-01 +- 20.10%
8	350.1	86.93	1.735E+00 +- 16.03%
9	352.4	87.52	2.136E+00 +- 11.38%
10	362.3	90.00	2.154E+00 +- 6.62%
11	372.9	92.65	1.678E+00 +- 11.87%
12	375.6	93.33	1.556E+00 +- 12.42%
13	400.9	99.69	4.287E-01 +- 11.18%
21	1079.9	270.15	1.577E+00 +- 9.01%
22	1084.0	271.19	3.142E-01 +- 29.92%
24	1104.3	276.27	1.747E-01 +- 31.21%
27	1199.0	300.06	1.519E+00 +- 8.10%
28	1310.2	327.98	1.431E+00 +- 6.16%
29	1351.4	338.35	5.096E+00 +- 5.50%
33	2038.6	510.88	3.024E+00 +- 7.45%
38	2900.5	727.23	3.049E+00 +- 6.32%
40	3064.6	768.44	1.681E+00 +- 7.68%
42	3170.7	795.07	1.732E+00 +- 7.50%
44	3312.9	830.76	5.149E-01 +- 16.69%
49	3846.7	964.76	2.514E+00 +- 8.73%
52	4381.3	1098.93	6.669E-01 +- 18.45%
50	6350.8	1593.01	1.108E+00 +- 15.30%

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	58	5823.97	1460.89	100.00%
CS-137	36	2639.18	661.64	100.00%
Tl-208T	25	1109.52	277.59	121.36%
	34	2326.88	583.25	106.65%
	39	3044.57	763.41	57.71%
	46	3432.06	860.68	66.81%
Pb-210U	2	189.77	46.64	100.00%
Pb-212T	18	954.49	238.67	100.00%
Pb-214U	20	968.05	242.07	97.96%
	23	1096.69	274.37	42.13%
	26	1179.85	295.25	97.14%
	30	1405.72	351.98	104.62%
Bi-214U	35	2430.98	609.38	110.54%
	36	2639.18	661.64	100.00%
	37	2654.51	665.49	157.24%
	43	3215.87	806.41	79.73%
	48	3724.68	934.13	78.90%
	53	4466.87	1120.42	94.62%
	54	4604.39	1154.94	79.95%
	55	4936.76	1238.34	91.43%
	57	5492.12	1377.67	82.34%
	62	6895.97	1729.72	88.01%
	63	7034.65	1764.50	91.41%
	64	7364.61	1847.25	90.64%
Ra-223A	15	617.45	154.03	100.00%
Ra-224T	19	964.07	241.07	100.00%
C Ra-226U	16	744.93	186.05	
Ac-228T	14	517.79	129.02	138.17%
	15	617.45	154.03	100.00%
	17	837.37	209.26	99.86%
	31	1634.61	409.46	109.79%
	32	1847.93	463.01	96.50%
	41	3079.61	772.20	123.65%
	45	3332.39	835.66	103.69%
	47	3633.42	911.23	87.91%
	50	3863.71	969.03	88.92%
	59	6331.96	1588.28	96.20%
	61	6500.35	1630.51	91.46%
Th-234U	3	256.16	63.34	100.00%
Pa-234mU	51	3990.54	1000.86	100.00%
C U-235	16	744.93	186.05	

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94095

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7 1	32	477.59	463.01	14.58	0.000E+00	1.226E-01 ----- 1.226E-01
NA-22 1	56	1274.54	1300.42	-25.88	0.000E+00	2.296E-02 ----- 2.296E-02
K-40 1	58	1460.75	1460.89	-.14	1.822E+01	1.757E-01 ----- 1.757E-01
MN-54 1	45	834.81	835.66	-.85	0.000E+00	2.067E-02 ----- 2.067E-02
CO-57 1 2	14 14	122.06 136.43	129.02 129.02	-6.96 7.41	0.000E+00 0.000E+00	1.348E-02 1.096E-01 ----- 1.348E-02
CO-58 1 2	43 46	810.75 863.94	806.41 860.68	4.34 3.26	0.000E+00 0.000E+00	1.737E-02 2.579E+00 ----- 1.737E-02
CO-60 1 2	54 56	1173.23 1332.51	1154.94 1300.42	18.29 32.09	0.000E+00 0.000E+00	2.503E-02 1.912E-02 ----- 1.912E-02
ZN-65 1	53	1115.52	1120.42	-4.90	0.000E+00	4.697E-02 ----- 4.697E-02
NB-94 1 2	38 46	702.50 871.10	727.23 860.68	-24.73 10.42	0.000E+00 0.000E+00	1.849E-02 1.722E-02 ----- 1.722E-02
SB-125 1	16	176.29	186.05	-9.76	0.000E+00	1.985E-01

2	31	427.95	409.46	18.49	0.000E+00	5.120E-02
3	32	463.51	463.01	.50	7.468E-01	1.240E-01
4	35	600.77	609.38	-8.61	0.000E+00	7.953E-02
	36	636.15	661.64	-25.49	0.000E+00	1.270E-01

						5.120E-02

I-131

1	5	80.18	77.17	3.01	0.000E+00	6.642E-01
2	25	284.29	277.59	6.70	0.000E+00	2.025E-01
3	30	364.48	351.98	12.50	0.000E+00	1.549E-02
4	36	636.97	661.64	-24.67	0.000E+00	1.886E-01
5	38	722.89	727.23	-4.34	0.000E+00	9.474E-01

						1.549E-02

CS-134

1	34	563.26	583.25	-19.99	0.000E+00	1.935E-01
2	34	569.29	583.25	-13.96	0.000E+00	9.393E-02
3	35	604.66	609.38	-4.72	0.000E+00	1.364E-02
4	42	795.76	795.07	.69	7.852E-02	1.911E-02
5	43	801.84	806.41	-4.57	0.000E+00	2.041E-01

						1.364E-02

CS-136

1	16	176.56	186.05	-9.49	0.000E+00	9.241E-02
2	29	340.57	338.35	2.22	0.000E+00	2.851E-02
3	43	818.50	806.41	12.09	0.000E+00	1.571E-02
4	51	1048.07	1000.86	47.21	0.000E+00	2.291E-02
5	55	1235.34	1238.34	-3.00	0.000E+00	1.349E-01

						1.571E-02

CS-137

1	36	661.64	661.64	.00	1.534E-01	1.749E-02

						1.749E-02

BA-133

1	6	81.01	83.93	-2.92	0.000E+00	4.812E-02
2	24	276.29	276.27	.02	9.254E-02	1.475E-01
3	27	302.71	300.06	2.65	0.000E+00	6.685E-02
4	30	355.86	351.98	3.88	0.000E+00	2.030E-02
5	31	383.70	409.46	-25.76	0.000E+00	1.539E-01

						2.030E-02

EU-152

1	14	121.78	129.02	-7.24	0.000E+00	3.944E-02
2	29	344.30	338.35	5.95	0.000E+00	5.153E-02
3	49	964.00	964.76	-.76	0.000E+00	2.328E-01
4	53	1112.07	1120.42	-8.35	0.000E+00	1.600E-01
5	57	1408.08	1377.67	30.41	0.000E+00	1.226E-01

						3.944E-02

EU-154

1	14	123.07	129.02	-5.95	0.000E+00	2.926E-02
	38	723.30	727.23	-3.93	0.000E+00	8.651E-02

3	46	873.20	860.68	12.52	0.000E+00	1.664E-01
4	51	1004.80	1000.86	3.94	0.000E+00	1.183E-01
5	56	1274.80	1300.42	-25.62	0.000E+00	6.499E-02

						2.926E-02

IR-192

1	26	295.95	295.25	.70	9.298E-01	3.604E-02
2	27	308.44	300.06	8.38	0.000E+00	3.825E-02
3	28	316.49	327.98	-11.49	0.000E+00	1.379E-02
4	32	468.06	463.01	5.05	0.000E+00	2.671E-02
5	35	612.45	609.38	3.07	0.000E+00	2.470E-01

						1.379E-02

Tl-208T

1	4	74.97	74.91	.06	6.950E+00	5.509E-01
2	25	277.36	277.59	-.23	4.925E-01	1.679E-01
3	33	510.72	510.88	-.16	5.697E-01	7.305E-02
4	34	583.14	583.25	-.11	5.646E-01	1.722E-02
5	46	860.47	860.68	-.21	8.945E-01	1.229E-01

						1.722E-02

Tl-210U

1	13	97.00	99.69	-2.69	0.000E+00	3.147E-01
2	26	296.00	295.25	.75	0.000E+00	3.600E-02
3	42	795.00	795.07	-.07	6.698E-02	1.630E-02

						1.630E-02

Pb-210U

1	2	46.52	46.64	-.12	1.353E+00	6.036E-01

						6.036E-01

Pb-211A

1	5	79.29	77.17	2.12	0.000E+00	5.617E+00
2	31	404.80	409.46	-4.66	0.000E+00	4.987E-01
3	31	427.10	409.46	17.64	0.000E+00	1.026E+00
4	40	766.20	768.44	-2.24	0.000E+00	3.575E+00
5	44	831.80	830.76	1.04	0.000E+00	7.221E-01

						4.987E-01

Pb-212T

1	4	74.81	74.91	-.10	2.540E+00	2.013E-01
2	5	77.11	77.17	-.06	2.312E+00	1.028E-01
3	8	87.20	86.93	.27	1.083E+00	2.124E-01
4	18	238.63	238.67	-.04	1.980E+00	3.044E-02
5	27	300.09	300.06	.03	1.796E+00	3.371E-01

						3.044E-02

Pb-214U

1	4	74.81	74.91	-.10	3.852E+00	3.053E-01
2	5	77.11	77.17	-.06	3.782E+00	1.682E-01
3	20	241.92	242.07	-.15	1.427E+00	1.593E-01
4	26	295.92	295.25	.67	1.460E+00	5.658E-02
	30	351.99	351.98	.01	1.356E+00	3.676E-02

3.676E-02

Bi-211A

1	4	72.87	74.91	-2.04	0.000E+00	1.823E+00
2	30	351.10	351.98	-.88	0.000E+00	3.112E-01
3	31	404.80	409.46	-4.66	0.000E+00	3.649E-01
4	31	426.90	409.46	17.44	0.000E+00	7.394E-01
5	44	831.80	830.76	1.04	0.000E+00	6.127E-01

3.112E-01

Bi-212T

1	2	39.86	46.64	-6.78	0.000E+00	3.111E+00
2	38	727.17	727.23	-.06	1.020E+00	1.167E-01
3	42	785.42	795.07	-9.65	0.000E+00	1.117E+00
4	52	1078.62	1098.93	-20.31	0.000E+00	2.349E+00
5	61	1620.56	1630.51	-9.95	0.000E+00	8.982E-01

1.167E-01

Bi-214U

1	35	609.30	609.38	-.08	1.242E+00	3.051E-02
2	40	768.36	768.44	-.08	1.331E+00	3.224E-01
3	53	1120.28	1120.42	-.14	1.453E+00	1.151E-01
4	55	1238.11	1238.34	-.23	1.481E+00	3.775E-01
5	63	1764.51	1764.50	.01	1.516E+00	6.986E-02

3.051E-02

Bi-214Uw

1	23	273.70	274.37	-.67	6.004E+00	6.047E+00
2	31	405.74	409.46	-3.72	0.000E+00	8.806E+00
3	44	821.18	830.76	-9.58	0.000E+00	1.181E+01
4	52	1069.96	1098.93	-28.97	0.000E+00	7.307E+00
5	60	1594.73	1593.01	1.72	0.000E+00	9.551E+00

6.047E+00

Po-210U

1	43	803.00	806.41	-3.41	0.000E+00	1.715E+03
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1.715E+03

Po-211A

1	34	570.00	583.25	-13.25	0.000E+00	2.844E+00
2	47	900.00	911.23	-11.23	0.000E+00	3.649E+00

2.844E+00

Po-212mT

1	34	570.00	583.25	-13.25	0.000E+00	7.110E-01
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7.110E-01

Po-214U

1	42	799.00	795.07	3.93	0.000E+00	1.213E+02
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1.213E+02

Po-215A

1	32	438.80	463.01	-24.21	0.000E+00	3.465E+01

						3.465E+01
Rn-219A						
1	5	76.86	77.17	-.31	7.962E+01	3.540E+00
2	5	79.29	77.17	2.12	0.000E+00	2.025E+00
3	10	89.60	90.00	-.40	2.876E+01	4.410E+00
4	22	271.23	271.19	.04	1.227E-01	1.105E-01
5	31	401.78	409.46	-7.68	0.000E+00	2.205E-01

						1.105E-01
Rn-220T						
1	34	549.70	583.25	-33.55	0.000E+00	1.453E+01

						1.453E+01
Rn-222U						
1	33	510.00	510.88	-.88	0.000E+00	3.450E+01

						3.450E+01
Fr-223A						
1	2	50.80	46.64	4.16	0.000E+00	6.932E-02
2	5	80.00	77.17	2.83	0.000E+00	1.594E-01
3	6	81.52	83.93	-2.41	0.000E+00	2.070E-01
4	9	88.60	87.52	1.08	0.000E+00	2.232E-01
5	18	234.60	238.67	-4.07	0.000E+00	4.033E-01

						6.932E-02
Ra-223A						
1	6	83.78	83.93	-.15	1.224E-01	5.775E-02
2	15	144.30	154.03	-9.73	0.000E+00	4.041E-01
3	15	154.30	154.03	.27	4.584E-01	2.034E-01
4	21	269.60	270.15	-.55	4.483E-01	8.177E-02
5	32	445.50	463.01	-17.51	0.000E+00	9.304E-01

						5.775E-02
Ra-224T						
1	6	81.07	83.93	-2.86	0.000E+00	1.416E+01
2	6	83.78	83.93	-.15	1.451E+01	6.847E+00
3	12	94.70	93.33	1.37	0.000E+00	1.799E+01
4	13	97.60	99.69	-2.09	0.000E+00	5.496E+01
5	19	241.00	241.07	-.07	2.518E+00	3.105E-01

						3.105E-01
Ra-226U						
1	6	81.07	83.93	-2.86	0.000E+00	9.995E+00
2	6	83.78	83.93	-.15	9.828E+00	4.638E+00
3	12	94.70	93.33	1.37	0.000E+00	1.308E+01
4	13	97.60	99.69	-2.09	0.000E+00	4.213E+01
5	16	185.99	186.05	-.06	3.339E+00	4.149E-01

						4.149E-01
Ac-227A						

1	6	81.08	83.93	-2.85	0.000E+00	2.427E+03
2	6	83.96	83.93	.03	1.375E+02	6.492E+01
3	9	87.50	87.52	-.02	6.773E+02	1.070E+02
4	13	100.00	99.69	.31	5.225E+01	3.678E+01
5	15	160.40	154.03	6.37	0.000E+00	6.339E+01

						3.678E+01

Ac-228T

1	17	209.40	209.26	.14	1.555E+00	2.712E-01
2	29	338.40	338.35	.05	1.641E+00	9.971E-02
3	47	911.07	911.23	-.16	1.765E+00	5.659E-02
4	50	968.90	969.03	-.13	1.745E+00	9.574E-02
5	59	1587.90	1588.28	-.38	1.613E+00	3.638E-01

						5.659E-02

Ac-228Tw

1	17	199.50	209.26	-9.76	0.000E+00	3.984E+00
2	25	279.00	277.59	1.41	0.000E+00	5.548E+00
3	28	321.70	327.98	-6.28	0.000E+00	4.979E+00
4	33	503.70	510.88	-7.18	0.000E+00	6.719E+00
5	51	988.10	1000.86	-12.76	0.000E+00	1.007E+01

						3.984E+00

Th-227A

1	2	50.20	46.64	3.56	0.000E+00	2.998E-01
2	9	88.48	87.52	.96	0.000E+00	6.227E-01
3	18	236.00	238.67	-2.67	0.000E+00	1.334E-01
4	21	256.25	270.15	-13.90	0.000E+00	1.950E-01
5	28	329.82	327.98	1.84	0.000E+00	4.970E-01

						1.334E-01

Th-228T

1	7	84.40	84.62	-.22	2.350E+00	1.191E+00
2	14	131.62	129.02	2.60	0.000E+00	1.079E+01
3	17	215.94	209.26	6.68	0.000E+00	4.934E+00

						1.191E+00

Th-230U

1	3	67.73	63.34	4.39	0.000E+00	5.684E+00

						5.684E+00

Th-231A

1	1	26.64	16.25	10.39	0.000E+00	3.040E-01
2	6	84.21	83.93	.28	3.788E-01	1.788E-01
3	10	89.95	90.00	-.05	6.665E+00	1.022E+00
4	12	95.87	93.33	2.54	0.000E+00	1.725E+00
5	15	163.12	154.03	9.09	0.000E+00	8.829E+00

						1.788E-01

Th-232

1	3	59.00	63.34	-4.34	0.000E+00	1.239E+01

						1.239E+01

Th-234U

1	3	63.29	63.34	-.05	1.610E+00	5.539E-01
2	11	92.38	92.65	-.27	3.064E+00	4.978E-01
3	11	92.80	92.65	.15	2.622E+00	4.259E-01
4	13	112.81	99.69	13.12	0.000E+00	4.894E+00
5	16	184.80	186.05	-1.25	0.000E+00	1.499E+02

						4.259E-01

Pa-231A

1	1	27.36	16.25	11.11	0.000E+00	5.930E-01
2	25	283.67	277.59	6.08	0.000E+00	8.063E-01
3	27	300.08	300.06	.02	2.553E+00	4.792E-01
4	27	302.67	300.06	2.61	0.000E+00	5.412E-01
5	28	330.07	327.98	2.09	0.000E+00	1.021E+00

						4.792E-01

Pa-234U

1	12	94.67	93.33	1.34	0.000E+00	9.286E-02
2	13	98.44	99.69	-1.25	0.000E+00	5.238E-02
3	14	131.28	129.02	2.26	0.000E+00	6.117E-02
4	48	926.70	934.13	-7.43	0.000E+00	1.181E-01
5	48	946.00	934.13	11.87	0.000E+00	8.673E-02

						5.238E-02

Pa-234mU

1	12	94.66	93.33	1.33	0.000E+00	1.241E+01
2	13	98.44	99.69	-1.25	0.000E+00	6.993E+00
3	38	743.00	727.23	15.77	0.000E+00	2.944E+01
4	40	766.60	768.44	-1.84	0.000E+00	9.413E+00
5	51	1001.03	1000.86	.17	3.217E+00	1.858E+00

						1.858E+00

U-234U

1	2	53.10	46.64	6.46	0.000E+00	1.993E+01
2	10	89.96	90.00	-.04	4.166E+03	6.388E+02
3	12	93.35	93.33	.02	1.674E+03	3.176E+02
4	13	105.00	99.69	5.31	0.000E+00	9.111E+02

						1.993E+01

U-235

1	12	93.35	93.33	.02	2.678E+00	5.082E-01
2	13	109.14	99.69	9.45	0.000E+00	8.679E-01
3	15	143.76	154.03	-10.27	0.000E+00	1.319E-01
4	15	163.35	154.03	9.32	0.000E+00	2.899E-01
5	16	185.72	186.05	-.33	2.027E-01	2.518E-02
6	17	202.12	209.26	-7.14	0.000E+00	1.335E+00
7	17	205.31	209.26	-3.95	0.000E+00	2.992E-01

						2.518E-02

U-238

1	2	48.00	46.64	1.36	0.000E+00	3.672E+01

						3.672E+01

Am-241

1

1
3

26.36
59.54

16.25
63.34

10.11
-3.80

0.000E+00
0.000E+00

2.296E+00
6.401E-02

6.401E-02



G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV94079

Rockwell Int'l/ Rocketdyne Environmental Lab T100
Sample description: SITE SURVEY - SOIL ~140 uR/hr, ENV940079, 9/14/94
Spectrum file name: ENV94079
Sample identifier : A4003
Sample size : 3.430E+02 g
Measured by : FCD

Date of Activity Calculation : 14-Sep-1994 at 15: 8:58
Collect started on : 14-Sep-1994 at 15: 8:58
Collect ended on : 14-Sep-1994 at 16: 9:37

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 3.600E+03 s real time: 3.639E+03 s dead time: 1.07 %

Calibration Files

Shape calibration requested : CL032894
Shape calibration used : CL032894
Created : 28-Mar-1994 11:11:55
Modified : 28-Mar-1994 11:40:16

Energy calibration requested : CL032894
Energy calibration used : CL032894
Created : 28-Mar-1994 11:12:27
Modified : ~~28-Mar-1994~~ 11:42:37

Efficiency calibration requested : CM090794
Efficiency calibration used : ~~CL032894~~
Created : 28-Mar-1994 11:12:54
Modified : 28-Mar-1994 11:44:18

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1.ILF
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

3

Peaked background file: C:\SAMPO\SPECTRA\BW032894.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N001OP000028 By:

RP&HPS

Date:

OK
Good Data

Calibration Eff file wrong
Requested, Right one Used

Spectrum file: ENV94079

Date: 14-Sep-1994

Time: 16: 9:37

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number	nuclide	conf.value	Activity (pCi/g)		
			measured		decay corrected saturation
1	K-40	.9894	1.292E+01 +- 4.61%		1.292E+01 6.934E+00
2	CS-137	.9997	1.395E-01 +- 14.13%		1.395E-01 7.013E+00
3	Tl-208T	.9971	2.356E-01 +- 9.94%		2.356E-01 7.092E+00
4	Pb-210U	.9995	1.087E+02 +- 4.48%		1.087E+02 7.170E+00
5	Pb-211A	.9725	4.842E+00 +- 25.57%		4.842E+00 7.249E+00
6	Pb-212T	.9751	1.088E+00 +- 5.11%		1.088E+00 7.328E+00
7	Pb-214U	.8692	7.527E+01 +- 1.53%		7.527E+01 7.486E+00
8	Bi-211A	.9719	7.561E+00 +- 9.09%		7.561E+00 7.880E+00
9	Bi-214U	.7528	7.049E+01 +- .79%		7.049E+01 8.195E+00
10	Rn-219A	.9915	9.143E+00 +- 5.29%		9.143E+00 8.746E+00
11	Ra-223A	.9811	1.017E+01 +- 3.60%		1.017E+01 9.062E+00
12	Ac-228T	.9390	9.959E-01 +- 7.90%		9.959E-01 9.219E+00
13	Th-227A	.9670	1.035E+01 +- 2.48%		1.035E+01 9.377E+00
14	Th-230U	.9998	1.485E+02 +- 9.16%		1.485E+02 9.692E+00
15	Th-234U	.9989	2.575E+02 +- 2.79%		2.575E+02 0.000E+00
16	Pa-231A	.9880	8.444E+00 +- 8.74%		8.444E+00 0.000E+00
17	Pa-234mU	.9951	2.520E+02 +- 2.85%		2.520E+02 0.000E+00
18	U-234U	.9934	4.983E+02 +- 11.53%		4.983E+02 0.000E+00
19	U-235	.9884	1.364E+01 +- 2.95%		1.364E+01 0.000E+00
			-----		-----
			1.490E+03		1.490E+03 1.124E+02

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94079

Date: 14-Sep-1994

Time: 16: 9:37

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	55.30	.13	12.43	.11	8.6
2	66.70	.23	15.36	.12	1000000.0
3	69.37	.17	16.04	.11	9.0
4	80.18	.24	18.82	.12	3.6
5	105.95	.18	25.44	.11	3.6
6	112.59	.19	27.14	.11	3.7
7	189.42	.02	46.57	.11	27.2
8	203.41	.08	50.09	.11	7.4
9	216.04	.04	53.27	.10	13.9
10	256.04	.01	63.33	.10	65.7
11	273.66	.08	67.76	.10	6.7
12	302.00	.14	74.88	.11	45.2
13	311.03	.07	77.15	.10	67.0
14	319.86	.14	79.37	.11	12.3
15	326.92	.15	81.14	.11	21.9
16	337.98	.10	83.92	.10	34.2
17	350.63	.45	87.10	.15	1000000.0
18	352.76	.45	87.63	.15	24.3
19	361.97	.10	89.95	.10	18.7
20	372.13	.09	92.50	.10	1000000.0
21	373.92	.77	92.95	.22	72.0
22	380.95	.16	94.71	.11	12.9
23	392.87	.22	97.71	.11	1000000.0
24	396.03	.07	98.50	.10	13.4
25	414.61	.50	103.17	.16	1000000.0
26	421.38	.31	104.87	.13	1000000.0
27	425.10	.24	105.80	.12	1000000.0
28	435.01	.40	108.29	.14	1000000.0
29	438.30	.18	109.11	.11	4.5
30	443.01	.28	110.30	.12	1000000.0
31	446.79	.14	111.25	.11	3.8
32	453.24	.05	112.87	.10	15.3
33	459.92	.38	114.54	.14	1000000.0
34	463.73	.60	115.50	.18	1000000.0
35	576.20	.17	143.71	.11	1000000.0
36	577.74	.20	144.10	.11	25.0
37	618.07	.05	154.25	.10	13.1
38	635.70	.23	158.69	.12	3.1
39	654.68	.07	163.46	.10	13.6
40	743.69	.04	185.81	.10	68.6
41	745.71	.06	186.32	.10	1000000.0
42	804.61	.37	201.11	.14	1000000.0
43	809.33	.18	202.30	.11	3.9
44	816.33	.25	204.06	.12	1000000.0
45	821.40	.08	205.33	.10	12.8
46	824.74	.31	206.17	.13	1000000.0
47	943.78	.04	236.07	.10	21.9
48	954.35	.06	238.72	.10	11.3
49	967.70	.01	242.07	.10	55.5
50	1024.61	.08	256.36	.10	12.0
51	1034.57	.11	258.87	.10	9.0
52	1077.13	.04	269.55	.10	20.0
53	1084.03	.05	271.29	.10	15.2

54	1098.61	.21	274.95	.11	4.9
55	1133.58	.21	283.73	.11	4.6
56	1142.97	.19	286.09	.11	4.2
57	1179.67	.01	295.31	.10	83.8
58	1198.88	.07	300.13	.10	11.4
59	1209.34	.15	302.76	.11	5.4
60	1255.86	.31	314.44	.13	3.3
61	1293.68	.11	323.94	.10	7.6
62	1317.45	.11	329.91	.10	8.6
63	1330.50	.46	333.19	.15	1000000.0
64	1335.34	.27	334.40	.12	3.1
65	1350.86	.09	338.30	.10	9.2
66	1401.61	.16	351.05	.11	1000000.0
67	1405.46	.01	352.02	.10	106.6
68	1544.83	.16	387.02	.11	5.8
69	1552.58	.18	388.96	.11	5.1
70	1604.41	.09	401.97	.10	10.3
71	1616.23	.18	404.94	.11	7.7
72	1620.39	.68	405.98	.20	1000000.0
73	1704.40	.23	427.06	.12	3.6
74	1776.73	.25	445.22	.12	3.1
75	1815.80	.28	455.02	.13	4.1
76	1917.42	.17	480.52	.12	6.1
77	1944.26	.23	487.26	.12	4.0
78	2034.94	.83	510.01	.24	.0
79	2130.01	.34	533.88	.14	3.5
80	2286.53	.47	573.19	.16	3.0
81	2314.13	.20	580.13	.12	5.3
82	2326.58	.20	583.25	.12	6.0
83	2430.61	.01	609.38	.10	94.4
84	2638.84	.35	661.68	.13	3.3
85	2654.13	.07	665.52	.10	13.9
86	2724.74	.45	683.24	.15	3.2
87	2804.06	.23	703.16	.12	5.2
88	2871.19	.23	720.02	.12	5.7
89	2959.68	.35	742.24	.13	4.5
90	2963.62	.50	743.22	.16	1000000.0
91	3056.23	.10	766.48	.10	.0
92	3064.13	.03	768.46	.10	24.3
93	3131.56	.80	785.39	.22	1000000.0
94	3134.96	.27	786.24	.12	10.8
95	3214.67	.11	806.26	.10	10.4
96	3294.85	.55	826.39	.17	3.1
97	3317.79	.70	832.15	.20	6.6
98	3345.38	.13	839.08	.11	7.8
99	3633.53	.20	911.42	.11	4.5
100	3724.27	.06	934.20	.10	19.2
101	3843.98	.23	964.25	.12	6.3
102	3864.02	.40	969.28	.14	3.4
103	3991.07	.06	1001.18	.10	17.3
104	4194.79	.37	1052.32	.14	4.2
105	4266.04	.38	1070.20	.14	4.6
106	4466.19	.10	1120.45	.10	42.8
107	4518.96	.34	1133.70	.13	4.5
108	4605.31	.10	1155.37	.10	12.3
109	4699.09	.42	1178.91	.15	.0
110	4813.95	.29	1207.74	.12	4.4
111	4935.85	.05	1238.33	.10	23.9
112	5106.69	.08	1281.21	.10	11.6
113	5326.85	.56	1336.46	.17	3.3

114	5491.96	.02	1377.88	.10	21.4
115	5521.89	.17	1385.38	.11	7.7
116	5587.29	.13	1401.79	.11	10.4
117	5612.76	.09	1408.18	.10	14.7
118	5823.23	.08	1460.97	.10	11.9
119	5990.69	.71	1502.97	.20	3.5
120	6016.32	.11	1509.40	.10	13.7
121	6042.10	1.31	1515.86	.34	.0
122	6132.56	.28	1538.55	.12	4.3
123	6152.26	.23	1543.49	.12	5.0
124	6311.32	.21	1583.39	.11	6.7
125	6357.22	.19	1594.90	.11	4.3
126	6375.29	.38	1599.43	.14	4.5
127	6622.59	.14	1661.46	.11	10.0
128	6894.81	.14	1729.73	.11	17.3
129	7034.26	.03	1764.71	.10	38.6
130	7329.35	.34	1838.73	.13	4.0
131	7365.38	.12	1847.76	.10	14.2
132	7557.48	.45	1895.94	.15	3.7

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***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	1	55.30	12.43	1.3000E+03	7.8	4.3585E+03	1.1556E+02	10.3	2.1
B			12.60	1.4242E+03	2.9				
m	2	66.70	15.36	1.1530E+03	11.6	4.1314E+03	7.5128E+01	13.4	1.3
B			14.88	2.9576E+02	12.7				
B			15.78	1.5571E+03	3.6				
m	3	69.37	16.04	1.4347E+03	9.8	4.0690E+03	8.7661E+01	11.9	1.3
B			15.78	1.5571E+03	3.6				
B			16.46	4.9054E+02	13.7				
M	4	80.18	18.82	5.4565E+02	11.4	3.7796E+03	2.6370E+01	13.3	1.3
B			18.55	3.3421E+02	8.6				
B			19.42	2.0535E+02	13.8				
m	5	105.95	25.44	4.7855E+02	9.3	3.1550E+03	1.4852E+01	11.5	.8
B			25.57	1.1655E+02	12.5				
M	6	112.59	27.14	3.7687E+02	11.4	3.1097E+03	1.0633E+01	13.3	.8
	7	189.42	46.57	4.4738E+03	1.4	3.2772E+03	5.7076E+01	6.9	.9
B			46.60	1.7517E+02	7.4				
m	8	203.41	50.09	9.5303E+02	4.0	3.5174E+03	1.0923E+01	7.7	.5
M	9	216.04	53.27	1.7381E+03	2.4	3.7280E+03	1.8197E+01	6.7	.5
	10	256.04	63.33	1.5903E+04	.9	4.5763E+03	1.3173E+02	5.9	1.4
B			63.38	9.3213E+02	1.3				
	11	273.66	67.76	9.5418E+02	8.4	4.6310E+03	7.3164E+00	10.3	1.5
m	12	302.00	74.88	1.0092E+04	1.8	5.1989E+03	6.9023E+01	6.1	3.2
B			74.93	1.1673E+02	15.9				
	13	311.03	77.15	1.8241E+04	1.2	5.0263E+03	1.2058E+02	5.9	3.2
	14	319.86	79.37	1.3877E+03	8.3	4.8594E+03	8.8803E+00	10.1	3.2
m	15	326.92	81.14	3.0377E+03	4.4	4.7273E+03	1.8954E+01	7.3	3.2
m	16	337.98	83.92	7.2215E+03	2.8	4.5225E+03	4.3355E+01	6.5	3.2
B			84.46	1.2897E+02	12.4				
m	17	350.63	87.10	3.6337E+03	39.3	4.2923E+03	2.0908E+01	39.7	3.2
m	18	352.76	87.63	2.4159E+03	47.2	4.2539E+03	1.3804E+01	47.6	3.2
m	19	361.97	89.95	2.8447E+03	6.8	4.0884E+03	1.6084E+01	8.9	3.2
m	20	372.13	92.50	1.7834E+04	38.9	3.9083E+03	1.0016E+02	39.4	3.2
B			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				
m	21	373.92	92.95	1.0458E+04	64.5	3.8768E+03	5.8666E+01	64.7	3.2
B			92.51	9.0626E+02	16.0				
B			92.96	5.9740E+02	24.0				
M	22	380.95	94.71	2.2387E+03	6.4	3.7541E+03	1.2502E+01	8.6	3.2
m	23	392.87	97.71	5.8802E+02	10.7	2.6514E+03	3.2591E+00	12.1	.7
M	24	396.03	98.50	1.7981E+03	3.5	2.6506E+03	9.9464E+00	6.6	.7
m	25	414.61	103.17	1.4933E+02	24.6	2.4414E+03	8.1687E-01	25.2	.7
m	26	421.38	104.87	2.3894E+02	17.3	2.4205E+03	1.3019E+00	18.1	.7
m	27	425.10	105.80	3.6004E+02	11.6	2.4112E+03	1.9576E+00	12.8	.7
m	28	435.01	108.29	2.4278E+02	20.7	2.3939E+03	1.3127E+00	21.4	.7
m	29	438.30	109.11	6.2838E+02	8.4	2.3906E+03	3.3913E+00	9.9	.7
m	30	443.01	110.30	3.5146E+02	13.0	2.3881E+03	1.8918E+00	14.0	.7
m	31	446.79	111.25	6.8003E+02	6.7	2.3879E+03	3.6530E+00	8.6	.7
m	32	453.24	112.87	1.8373E+03	2.7	2.3912E+03	9.8353E+00	5.9	.7
B			112.85	9.3529E+01	14.4				
m	33	459.92	114.54	2.8476E+02	14.5	2.3998E+03	1.5189E+00	15.5	.7
M	34	463.73	115.50	1.3709E+02	30.9	2.4069E+03	7.2976E-01	31.4	.7
	35	576.20	143.71	2.3156E+03	19.6	2.5943E+03	1.3118E+01	20.2	.6
			143.80	1.4294E+02	11.0				

M	36	577.74	144.10	1.9225E+03	23.6	2.5820E+03	1.0901E+01	24.2	.6
B			143.80	1.4294E+02	11.0				
	37	618.07	154.25	1.4534E+03	2.7	2.6501E+03	8.4267E+00	5.7	.6
	38	635.70	158.69	2.9634E+02	13.9	2.4389E+03	1.7343E+00	14.8	.8
	39	654.68	163.46	1.4118E+03	3.5	2.3930E+03	8.3428E+00	6.1	1.1
B			163.56	8.9334E+01	13.2				
m	40	743.69	185.81	1.6461E+04	3.3	2.0952E+03	1.0371E+02	6.2	1.0
B			185.82	6.9396E+02	2.4				
M	41	745.71	186.32	9.3119E+03	5.8	2.0546E+03	5.8751E+01	7.8	1.0
B			185.82	6.9396E+02	2.4				
m	42	804.61	201.11	1.8815E+02	19.6	1.6827E+03	1.2353E+00	20.3	.5
m	43	809.33	202.30	4.0449E+02	10.3	1.5551E+03	2.6639E+00	11.7	.5
m	44	816.33	204.06	2.6380E+02	17.0	1.4604E+03	1.7452E+00	17.8	.5
m	45	821.40	205.33	1.4448E+03	3.8	1.4627E+03	9.5897E+00	6.6	.5
B			205.28	9.0475E+01	16.0				
M	46	824.74	206.17	2.7470E+02	18.1	1.4969E+03	1.8271E+00	18.9	.5
m	47	943.78	236.07	2.2770E+03	2.1	1.4622E+03	1.6253E+01	6.1	1.0
m	48	954.35	238.72	8.8624E+02	4.2	1.4360E+03	6.3631E+00	7.1	1.0
B			238.70	3.6604E+02	5.4				
M	49	967.70	242.07	1.0844E+04	.8	1.3647E+03	7.8425E+01	5.9	1.0
m	50	1024.61	256.36	1.1231E+03	4.1	1.3127E+03	8.3572E+00	7.2	1.2
M	51	1034.57	258.87	7.5367E+02	5.6	1.2730E+03	5.6215E+00	8.0	1.2
m	52	1077.13	269.55	2.2344E+03	2.0	1.2097E+03	1.6831E+01	5.7	.9
m	53	1084.03	271.29	1.6679E+03	2.6	1.2412E+03	1.2584E+01	5.9	.9
M	54	1098.61	274.95	2.9008E+02	10.2	1.1982E+03	2.1958E+00	11.4	.9
m	55	1133.58	283.73	2.3963E+02	12.5	1.0536E+03	1.8419E+00	13.5	.8
M	56	1142.97	286.09	3.2516E+02	9.5	1.0057E+03	2.5143E+00	10.7	.8
	57	1179.67	295.31	2.3587E+04	.6	1.0417E+03	1.8659E+02	5.0	1.3
m	58	1198.88	300.13	8.1685E+02	3.6	8.6428E+02	6.5376E+00	6.1	.7
M	59	1209.34	302.76	3.8385E+02	6.4	9.4893E+02	3.0915E+00	8.0	.7
	60	1255.86	314.44	1.7171E+02	19.3	8.9976E+02	1.4210E+00	20.0	1.1
	61	1293.68	323.94	5.1516E+02	7.1	9.3256E+02	4.3556E+00	8.6	1.2
	62	1317.45	329.91	5.9735E+02	5.7	8.7473E+02	5.1172E+00	7.5	1.1
m	63	1330.50	333.19	1.0090E+02	23.4	8.3879E+02	8.7056E-01	23.9	.7
m	64	1335.34	334.40	2.2522E+02	10.0	8.5272E+02	1.9482E+00	11.1	.7
M	65	1350.86	338.30	5.5231E+02	4.6	8.8975E+02	4.8176E+00	6.7	.7
m	66	1401.61	351.05	1.3299E+03	8.6	8.5779E+02	1.1912E+01	9.9	.9
M	67	1405.46	352.02	3.9985E+04	.5	8.2333E+02	3.5888E+02	4.9	.9
B			352.09	7.7292E+01	13.0				
m	68	1544.83	387.02	3.2601E+02	9.4	7.4437E+02	3.1323E+00	10.5	.9
M	69	1552.58	388.96	3.3125E+02	9.2	7.6118E+02	3.1942E+00	10.4	.9
	70	1604.41	401.97	7.9673E+02	4.0	7.6367E+02	7.8783E+00	6.3	1.1
m	71	1616.23	404.94	5.2179E+02	6.9	7.8105E+02	5.1892E+00	8.4	1.1
M	72	1620.39	405.98	1.1264E+02	28.8	7.8438E+02	1.1224E+00	29.2	1.1
	73	1704.40	427.06	2.2451E+02	9.0	7.7647E+02	2.3269E+00	10.2	.6
	74	1776.73	445.22	1.5679E+02	9.7	5.7172E+02	1.6784E+00	10.9	.5
	75	1815.80	455.02	2.1915E+02	9.9	5.6207E+02	2.3860E+00	11.1	1.1
	76	1917.42	480.52	2.9411E+02	7.6	4.8630E+02	3.3407E+00	9.2	.8
	77	1944.26	487.26	2.7279E+02	7.6	4.7584E+02	3.1323E+00	9.1	1.0
	79	2130.01	533.88	1.3234E+02	14.8	4.6811E+02	1.6274E+00	15.6	.9
	80	2286.53	573.19	8.6738E+01	26.4	3.7914E+02	1.1221E+00	26.8	1.3
m	81	2314.13	580.13	2.5288E+02	7.3	3.7959E+02	3.2997E+00	8.8	.9
M	82	2326.58	583.25	2.0989E+02	8.5	3.8530E+02	2.7493E+00	9.8	.9
B			583.24	1.0913E+02	8.2				
	83	2430.61	609.38	2.8838E+04	.4	3.3799E+02	3.8975E+02	4.8	1.0
m	84	2638.84	661.68	1.3373E+02	11.0	2.9656E+02	1.9168E+00	11.9	.9
M	85	2654.13	665.52	7.7655E+02	3.0	2.9738E+02	1.1203E+01	5.4	.9
	86	2724.74	683.24	7.0892E+01	23.0	2.8661E+02	1.0534E+00	23.4	1.0
	87	2804.06	703.16	2.1385E+02	5.9	3.6072E+02	3.2817E+00	7.4	.9
	88	2871.19	720.02	2.2698E+02	8.9	2.8068E+02	3.5770E+00	10.0	1.0

m	89	2959.68	742.24	1.9299E+02	9.6	2.9074E+02	3.1470E+00	10.6	.9
M	90	2963.62	743.22	1.5168E+02	19.3	2.8709E+02	2.4769E+00	19.8	.9
m	91	3056.23	766.48	7.0371E+02	4.2	3.0390E+02	1.1896E+01	6.2	.9
	92	3064.13	768.46	2.5021E+03	1.7	3.1141E+02	4.2420E+01	4.9	.9
	93	3131.56	785.39	1.7376E+02	42.6	2.7052E+02	3.0189E+00	42.9	1.7
M	94	3134.96	786.24	5.6645E+02	13.2	2.6982E+02	9.8533E+00	14.0	1.7
	95	3214.67	806.26	5.7003E+02	4.3	2.9825E+02	1.0199E+01	6.3	.8
	96	3294.85	826.39	6.6907E+01	23.2	2.9635E+02	1.2307E+00	23.7	1.0
	97	3317.79	832.15	2.6975E+02	6.5	2.6322E+02	5.0008E+00	7.9	.6
	98	3345.38	839.08	3.7855E+02	6.0	2.8353E+02	7.0835E+00	7.5	.7
	99	3633.53	911.42	1.9070E+02	8.9	2.6864E+02	3.8868E+00	10.0	.8
B			911.28	4.6172E+01	15.4				
	100	3724.27	934.20	1.3819E+03	2.1	2.8283E+02	2.8605E+01	5.0	.9
m	101	3843.98	964.25	1.9271E+02	8.9	2.3026E+02	4.0690E+00	10.0	1.1
M	102	3864.02	969.28	1.0150E+02	14.9	2.3777E+02	2.1501E+00	15.6	1.1
	103	3991.07	1001.18	1.2739E+03	2.1	2.4751E+02	2.7538E+01	5.0	.9
B			1001.12	6.4691E+01	12.9				
	104	4194.79	1052.32	1.5903E+02	16.3	1.5367E+02	3.5469E+00	16.9	1.5
	105	4266.04	1070.20	1.3783E+02	12.7	1.8285E+02	3.1069E+00	13.5	1.3
	106	4466.19	1120.45	5.8504E+03	1.0	2.0439E+02	1.3572E+02	4.6	1.0
	107	4518.96	1133.70	1.8320E+02	13.2	1.3139E+02	4.2814E+00	13.9	1.3
	108	4605.31	1155.37	6.7140E+02	3.3	1.9611E+02	1.5878E+01	5.5	.9
	110	4813.95	1207.74	1.5393E+02	9.4	1.9586E+02	3.7708E+00	10.3	.8
	111	4935.85	1238.33	2.0305E+03	1.6	1.7215E+02	5.0851E+01	4.7	.9
	112	5106.69	1281.21	4.8116E+02	2.4	1.4991E+02	1.2418E+01	5.0	.5
	113	5326.85	1336.46	5.8481E+01	32.6	1.4031E+02	1.5664E+00	32.9	2.0
	114	5491.96	1377.88	1.5644E+03	2.2	1.2084E+02	4.2984E+01	4.9	1.0
	115	5521.89	1385.38	2.8004E+02	5.6	1.5025E+02	7.7292E+00	7.0	.9
m	116	5587.29	1401.79	4.4370E+02	4.1	1.4684E+02	1.2367E+01	6.0	1.0
M	117	5612.76	1408.18	7.7742E+02	2.9	1.4511E+02	2.1752E+01	5.2	1.0
	118	5823.23	1460.97	6.3601E+02	3.8	1.7518E+02	1.8351E+01	5.8	1.3
			1460.92	2.2909E+02	7.5				
	119	5990.69	1502.97	4.2935E+01	10.9	1.5199E+02	1.2685E+00	11.7	1.2
m	120	6016.32	1509.40	7.4326E+02	3.2	1.5680E+02	2.2038E+01	5.4	1.2
M	121	6042.10	1515.86	1.4889E+01	10.8	1.5735E+02	4.4305E-01	11.6	1.2
m	122	6132.56	1538.55	1.3567E+02	8.4	1.7749E+02	4.0876E+00	9.4	.6
M	123	6152.26	1543.49	1.7828E+02	6.8	1.5543E+02	5.3857E+00	8.1	.6
	124	6311.32	1583.39	1.8948E+02	7.0	1.3048E+02	5.8476E+00	8.2	.8
m	125	6357.22	1594.90	1.2642E+02	9.3	9.9691E+01	3.9252E+00	10.2	.9
M	126	6375.29	1599.43	8.6298E+01	12.0	1.0972E+02	2.6858E+00	12.8	.9
	127	6622.59	1661.46	3.2223E+02	4.8	8.4648E+01	1.0353E+01	6.5	1.1
	128	6894.81	1729.73	9.8884E+02	2.8	4.2798E+01	3.2856E+01	5.2	1.5
	129	7034.26	1764.71	4.8241E+03	.6	2.4290E+01	1.6300E+02	4.4	.9
	130	7329.35	1838.73	8.1102E+01	11.0	2.6370E+01	2.8360E+00	11.8	1.0
	131	7365.38	1847.76	6.6450E+02	4.1	2.1457E+01	2.3332E+01	6.0	1.3
	132	7557.48	1895.94	4.5335E+01	23.6	3.2109E+01	1.6264E+00	24.0	2.2

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

Spectrum file: ENV94079

Date: 14-Sep-1994

Time: 16: 9:37

These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	55.3	12.43	1.064E+02 +- 10.84%
2	66.7	15.36	7.374E+01 +- 13.61%
3	69.4	16.04	8.081E+01 +- 12.58%
4	80.2	18.82	2.521E+01 +- 13.73%
5	106.0	25.44	1.459E+01 +- 11.66%
12	302.0	74.88	6.897E+01 +- 6.10%
13	311.0	77.15	1.206E+02 +- 5.95%
14	319.9	79.37	8.880E+00 +- 10.12%
15	326.9	81.14	1.895E+01 +- 7.29%
16	338.0	83.92	4.330E+01 +- 6.49%
17	350.6	87.10	2.091E+01 +- 39.74%
18	352.8	87.63	1.380E+01 +- 47.56%
19	362.0	89.95	1.608E+01 +- 8.95%
20	372.1	92.50	9.979E+01 +- 39.50%
21	373.9	92.95	5.830E+01 +- 65.12%
22	380.9	94.71	1.250E+01 +- 8.58%
23	392.9	97.71	3.259E+00 +- 12.13%
24	396.0	98.50	9.946E+00 +- 6.61%
25	414.6	103.17	8.169E-01 +- 25.22%
26	421.4	104.87	1.302E+00 +- 18.13%
27	425.1	105.80	1.958E+00 +- 12.78%
28	435.0	108.29	1.313E+00 +- 21.43%
29	438.3	109.11	3.391E+00 +- 9.93%
30	443.0	110.30	1.892E+00 +- 14.02%
31	446.8	111.25	3.653E+00 +- 8.59%
33	459.9	114.54	1.519E+00 +- 15.45%
35	576.2	143.71	1.306E+01 +- 20.31%
36	577.7	144.10	1.084E+01 +- 24.29%
41	745.7	186.32	5.844E+01 +- 7.84%
42	804.6	201.11	1.235E+00 +- 20.28%
44	816.3	204.06	1.745E+00 +- 17.85%
45	821.4	205.33	9.546E+00 +- 6.61%
46	824.7	206.17	1.827E+00 +- 18.87%
52	1077.1	269.55	1.683E+01 +- 5.74%
53	1084.0	271.29	1.258E+01 +- 5.92%
58	1198.9	300.13	6.538E+00 +- 6.12%
59	1209.3	302.76	3.091E+00 +- 8.05%
60	1255.9	314.44	1.421E+00 +- 19.96%
61	1293.7	323.94	4.356E+00 +- 8.61%
62	1317.5	329.91	5.117E+00 +- 7.50%
63	1330.5	333.19	8.706E-01 +- 23.91%
64	1335.3	334.40	1.948E+00 +- 11.10%
65	1350.9	338.30	4.818E+00 +- 6.72%
71	1616.2	404.94	5.189E+00 +- 8.42%
72	1620.4	405.98	1.122E+00 +- 29.22%
73	1704.4	427.06	2.327E+00 +- 10.21%
79	2130.0	533.88	1.627E+00 +- 15.62%
80	2286.5	573.19	1.122E+00 +- 26.85%
86	2724.7	683.24	1.053E+00 +- 23.44%
87	2804.1	703.16	3.282E+00 +- 7.43%
89	2959.7	742.24	3.147E+00 +- 10.58%
90	2963.6	743.22	2.477E+00 +- 19.84%
91	3056.2	766.48	1.190E+01 +- 6.16%
92	3064.1	768.46	4.242E+01 +- 4.87%

93	3131.6	785.39	3.019E+00	+ -	42.88%
94	3135.0	786.24	9.853E+00	+ -	14.00%
96	3294.9	826.39	1.231E+00	+ -	23.65%
101	3844.0	964.25	4.069E+00	+ -	10.04%
105	4266.0	1070.20	3.107E+00	+ -	13.48%
113	5326.8	1336.46	1.566E+00	+ -	32.86%
117	5612.8	1408.18	2.175E+01	+ -	5.22%
119	5990.7	1502.97	1.269E+00	+ -	11.74%
121	6042.1	1515.86	4.431E-01	+ -	11.60%
125	6357.2	1594.90	3.925E+00	+ -	10.23%

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	118	5823.23	1460.97	100.00%
CS-137	84	2638.84	661.68	100.00%
Tl-208T	82	2326.58	583.25	100.00%
Pb-210U	7	189.42	46.57	100.00%
Pb-211A	97	3317.79	832.15	100.00%
Pb-212T	34	463.73	115.50	11.45%
	48	954.35	238.72	100.53%
Pb-214U	9	216.04	53.27	100.00%
	49	967.70	242.07	89.77%
	51	1034.57	258.87	92.21%
	54	1098.61	274.95	137.36%
	57	1179.67	295.31	96.98%
	67	1405.46	352.02	97.45%
	76	1917.42	480.52	95.92%
	77	1944.26	487.26	132.40%
	81	2314.13	580.13	102.83%
	98	3345.38	839.08	78.50%
Bi-211A	66	1401.61	351.05	100.00%
	97	3317.79	832.15	100.00%
Bi-214U	68	1544.83	387.02	104.78%
	69	1552.58	388.96	116.66%
	75	1815.80	455.02	120.46%
	83	2430.61	609.38	106.75%
	84	2638.84	661.68	100.00%
	85	2654.13	665.52	125.94%
	88	2871.19	720.02	101.68%
	95	3214.67	806.26	108.68%
	100	3724.27	934.20	99.88%
	104	4194.79	1052.32	80.30%
	106	4466.19	1120.45	100.03%
	107	4518.96	1133.70	53.66%
	108	4605.31	1155.37	96.08%
	110	4813.95	1207.74	110.12%
	111	4935.85	1238.33	105.02%
	112	5106.69	1281.21	107.15%
	114	5491.96	1377.88	84.42%
	115	5521.89	1385.38	90.68%
	116	5587.29	1401.79	101.16%
	120	6016.32	1509.40	89.79%
	122	6132.56	1538.55	91.16%
	123	6152.26	1543.49	59.30%
	124	6311.32	1583.39	110.75%
	126	6375.29	1599.43	112.33%
	127	6622.59	1661.46	100.27%

	128	6894.81	1729.73	83.71%
	129	7034.26	1764.71	88.17%
	130	7329.35	1838.73	122.01%
	131	7365.38	1847.76	82.14%
	132	7557.48	1895.94	98.19%
Rn-219A	70	1604.41	401.97	100.00%
Ra-223A	37	618.07	154.25	95.05%
	38	635.70	158.69	54.68%
	74	1776.73	445.22	124.08%
Ac-228T	37	618.07	154.25	95.05%
	99	3633.53	911.42	98.04%
	102	3864.02	969.28	104.84%
Th-227A	8	203.41	50.09	105.01%
	32	453.24	112.87	97.46%
	37	618.07	154.25	95.05%
	47	943.78	236.07	92.99%
	50	1024.61	256.36	109.80%
	56	1142.97	286.09	84.80%
Th-230U	11	273.66	67.76	100.00%
Th-234U	10	256.04	63.33	102.12%
	32	453.24	112.87	97.46%
Pa-231A	6	112.59	27.14	100.33%
	55	1133.58	283.73	99.65%
Pa-234mU	103	3991.07	1001.18	100.00%
U-234U	9	216.04	53.27	100.00%
U-235	39	654.68	163.46	106.72%
	40	743.69	185.81	98.49%
	43	809.33	202.30	70.79%

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94079

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7 1	76	477.59	480.52	-2.93	0.000E+00	9.523E-01 ----- 9.523E-01
NA-22 1	112	1274.54	1281.21	-6.67	0.000E+00	1.455E-01 ----- 1.455E-01
K-40 1	118	1460.75	1460.97	-.22	1.351E+01	1.398E+00 ----- 1.398E+00
MN-54 1	97	834.81	832.15	2.66	0.000E+00	1.209E-01 ----- 1.209E-01
CO-57 1 2	34 35	122.06 136.43	115.50 143.71	6.56 -7.28	0.000E+00 0.000E+00	1.238E-01 1.031E+00 ----- 1.238E-01
CO-58 1 2	95 98	810.75 863.94	806.26 839.08	4.49 24.86	0.000E+00 0.000E+00	1.196E-01 1.917E+01 ----- 1.196E-01
CO-60 1 2	109 113	1173.23 1332.51	1178.91 1336.46	-5.68 -3.95	0.000E+00 0.000E+00	1.423E-01 1.349E-01 ----- 1.349E-01
ZN-65 1	106	1115.52	1120.45	-4.93	0.000E+00	2.642E-01 ----- 2.642E-01
NB-94 1 2	87 98	702.50 871.10	703.16 839.08	-.66 32.02	2.583E-01 0.000E+00	1.100E-01 1.397E-01 ----- 1.100E-01
SB-125 1	40	176.29	185.81	-9.52	0.000E+00	1.748E+00

2	73	427.95	427.06	.89	0.000E+00	4.166E-01
3	75	463.51	455.02	8.49	0.000E+00	1.053E+00
4	83	600.77	609.38	-8.61	0.000E+00	5.877E-01
	84	636.15	661.68	-25.53	0.000E+00	8.537E-01

						4.166E-01

I-131

1	14	80.18	79.37	.81	0.000E+00	7.778E+00
2	55	284.29	283.73	.56	2.404E+00	1.541E+00
3	67	364.48	352.02	12.46	0.000E+00	1.257E-01
4	84	636.97	661.68	-24.71	0.000E+00	1.363E+00
5	88	722.89	720.02	2.87	0.000E+00	6.385E+00

						1.257E-01

CS-134

1	80	563.26	573.19	-9.93	0.000E+00	1.237E+00
2	80	569.29	573.19	-3.90	0.000E+00	6.912E-01
3	83	604.66	609.38	-4.72	0.000E+00	1.142E-01
4	94	795.76	786.24	9.52	0.000E+00	1.462E-01
5	95	801.84	806.26	-4.42	0.000E+00	1.468E+00

						1.142E-01

CS-136

1	40	176.56	185.81	-9.25	0.000E+00	8.145E-01
2	65	340.57	338.30	2.27	0.000E+00	2.334E-01
3	96	818.50	826.39	-7.89	0.000E+00	1.213E-01
4	104	1048.07	1052.32	-4.25	0.000E+00	1.617E-01
5	111	1235.34	1238.33	-2.99	0.000E+00	8.005E-01

						1.213E-01

CS-137

1	84	661.64	661.68	-.04	1.785E-01	1.105E-01

						1.105E-01

BA-133

1	15	81.01	81.14	-.13	4.569E+00	4.850E-01
2	54	276.29	274.95	1.34	0.000E+00	1.436E+00
3	59	302.71	302.76	-.05	1.308E+00	4.975E-01
4	67	355.86	352.02	3.84	0.000E+00	1.549E-01
5	68	383.70	387.02	-3.32	0.000E+00	1.122E+00

						1.549E-01

EU-152

1	34	121.78	115.50	6.28	0.000E+00	3.626E-01
2	65	344.30	338.30	6.00	0.000E+00	3.862E-01
3	101	964.00	964.25	-.25	2.199E+00	8.361E-01
4	106	1112.07	1120.45	-8.38	0.000E+00	1.045E+00
5	117	1408.08	1408.18	-.10	8.081E+00	6.105E-01

						3.626E-01

EU-154

1	34	123.07	115.50	7.57	0.000E+00	2.557E-01
	88	723.30	720.02	3.28	0.000E+00	5.809E-01

3	98	873.20	839.08	34.12	0.000E+00	1.244E+00
4	103	1004.80	1001.18	3.62	0.000E+00	7.880E-01
5	112	1274.80	1281.21	-6.41	0.000E+00	4.098E-01

						2.557E-01

IR-192

1	57	295.95	295.31	.64	4.884E+01	3.164E-01
2	59	308.44	302.76	5.68	0.000E+00	3.264E-01
3	60	316.49	314.44	2.05	0.000E+00	1.200E-01
4	76	468.06	480.52	-12.46	0.000E+00	1.980E-01
5	83	612.45	609.38	3.07	0.000E+00	1.817E+00

						1.200E-01

Tl-208T

1	12	74.97	74.88	.09	1.552E+02	5.201E+00
2	54	277.36	274.95	2.41	0.000E+00	1.541E+00
3	78	510.72	510.01	.71	0.000E+00	5.404E-01
4	82	583.14	583.25	-.11	2.519E-01	1.134E-01
5	98	860.47	839.08	21.39	0.000E+00	1.112E+00

						1.134E-01

Tl-210U

1	23	97.00	97.71	-.71	0.000E+00	3.094E+00
2	57	296.00	295.31	.69	1.841E+01	1.193E-01
3	94	795.00	786.24	8.76	0.000E+00	1.219E-01

						1.193E-01

b-210U

1	7	46.52	46.57	-.05	1.126E+02	6.777E+00

						6.777E+00

Pb-211A

1	14	79.29	79.37	-.08	2.260E+02	5.324E+01
2	71	404.80	404.94	-.14	1.363E+01	3.465E+00
3	73	427.10	427.06	.04	1.310E+01	7.719E+00
4	91	766.20	766.48	-.28	1.874E+02	2.231E+01
5	97	831.80	832.15	-.35	1.407E+01	4.076E+00

						3.465E+00

Pb-212T

1	12	74.81	74.88	-.07	5.671E+01	1.901E+00
2	13	77.11	77.15	-.04	5.432E+01	9.901E-01
3	17	87.20	87.10	.10	2.612E+01	2.210E+00
4	48	238.63	238.72	-.09	1.163E+00	2.360E-01
5	58	300.09	300.13	-.04	1.575E+01	2.689E+00

						2.360E-01

Pb-214U

1	12	74.81	74.88	-.07	8.601E+01	2.883E+00
2	13	77.11	77.15	-.04	8.884E+01	1.619E+00
3	49	241.92	242.07	-.15	8.270E+01	1.331E+00
4	57	295.92	295.31	.61	7.669E+01	4.969E-01
5	67	351.99	352.02	-.03	7.622E+01	2.600E-01

2.600E-01

Po-211A

1	12	72.87	74.88	-2.01	0.000E+00	1.764E+01
2	66	351.10	351.05	.05	7.695E+00	8.039E-01
3	71	404.80	404.94	-.14	9.970E+00	2.536E+00
4	73	426.90	427.06	-.16	9.647E+00	5.686E+00
5	97	831.80	832.15	-.35	1.194E+01	3.459E+00

8.039E-01

Po-212T

1	7	39.86	46.57	-6.71	0.000E+00	3.311E+01
2	88	727.17	720.02	7.15	0.000E+00	1.050E+00
3	93	785.42	785.39	.03	1.189E+01	5.422E+00
4	105	1078.62	1070.20	8.42	0.000E+00	1.414E+01
5	126	1620.56	1599.43	21.13	0.000E+00	4.760E+00

1.050E+00

Po-214U

1	83	609.30	609.38	-.08	6.663E+01	2.038E-01
2	92	768.36	768.46	-.10	6.841E+01	2.318E+00
3	106	1120.28	1120.45	-.17	7.110E+01	8.410E-01
4	111	1238.11	1238.33	-.22	6.772E+01	2.126E+00
5	129	1764.51	1764.71	-.20	8.067E+01	4.286E-01

2.038E-01

Po-214Uw

1	54	273.70	274.95	-1.25	0.000E+00	6.166E+01
2	72	405.74	405.98	-.24	5.290E+01	6.245E+01
3	96	821.18	826.39	-5.21	0.000E+00	9.380E+01
4	105	1069.96	1070.20	-.24	8.589E+01	4.088E+01
5	125	1594.73	1594.90	-.17	1.165E+02	4.530E+01

4.088E+01

Po-210U

1	95	803.00	806.26	-3.26	0.000E+00	1.069E+04
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1.069E+04

Po-211A

1	80	570.00	573.19	-3.19	0.000E+00	2.124E+01
2	99	900.00	911.42	-11.42	0.000E+00	2.847E+01

2.124E+01

Po-212mT

1	80	570.00	573.19	-3.19	0.000E+00	5.311E+00
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5.311E+00

Po-214U

1	95	799.00	806.26	-7.26	0.000E+00	8.857E+02
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8.857E+02

Po-215A

1	74	438.80	445.22	-6.42	0.000E+00	2.582E+02

						2.582E+02
Rn-219A						
1	13	76.86	77.15	-.29	1.871E+03	3.410E+01
2	14	79.29	79.37	-.08	8.145E+01	1.919E+01
3	19	89.60	89.95	-.35	4.374E+02	4.615E+01
4	53	271.23	271.29	-.06	1.002E+01	1.000E+00
5	70	401.78	401.97	-.19	9.402E+00	1.549E+00

						1.000E+00
Rn-220T						
1	79	549.70	533.88	15.82	0.000E+00	1.023E+02

						1.023E+02
Rn-222U						
1	78	510.00	510.01	-.01	0.000E+00	1.587E+02

						1.587E+02
Fr-223A						
1	8	50.80	50.09	.71	0.000E+00	8.183E-01
2	14	80.00	79.37	.63	6.934E+00	1.634E+00
3	15	81.52	81.14	.38	1.955E+01	2.075E+00
4	18	88.60	87.63	.97	0.000E+00	2.268E+00
5	47	234.60	236.07	-1.47	0.000E+00	3.090E+00

						8.183E-01
a-223A						
1	16	83.78	83.92	-.14	1.375E+01	6.009E-01
2	36	144.30	144.10	.20	2.652E+01	3.302E+00
3	37	154.30	154.25	.05	1.190E+01	1.983E+00
4	52	269.60	269.55	.05	9.752E+00	7.179E-01
5	74	445.50	445.22	.28	8.821E+00	6.409E+00

						6.009E-01
Ra-224T						
1	15	81.07	81.14	-.07	1.246E+03	1.323E+02
2	16	83.78	83.92	-.14	1.630E+03	7.125E+01
3	22	94.70	94.71	-.01	1.231E+03	1.582E+02
4	23	97.60	97.71	-.11	1.117E+03	4.600E+02
5	49	241.00	242.07	-1.07	0.000E+00	5.534E+00

						5.534E+00
Ra-226U						
1	15	81.07	81.14	-.07	8.794E+02	9.336E+01
2	16	83.78	83.92	-.14	1.104E+03	4.827E+01
3	22	94.70	94.71	-.01	8.955E+02	1.151E+02
4	23	97.60	97.71	-.11	8.562E+02	3.527E+02
5	40	185.99	185.81	.18	2.493E+02	3.285E+00

						3.285E+00
-227A						

1	15	81.08	81.14	-.06	2.135E+05	2.267E+04
2	16	83.96	83.92	.04	1.545E+04	6.754E+02
3	18	87.50	87.63	-.13	8.787E+03	1.113E+03
4	24	100.00	98.50	1.50	0.000E+00	3.618E+02
5	38	160.40	158.69	1.71	0.000E+00	6.213E+02

						3.618E+02

Ac-228T

1	46	209.40	206.17	3.23	0.000E+00	2.532E+00
2	65	338.40	338.30	.10	3.161E+00	8.096E-01
3	99	911.07	911.42	-.35	1.056E+00	4.385E-01
4	102	968.90	969.28	-.38	9.701E-01	7.114E-01
5	124	1587.90	1583.39	4.51	0.000E+00	3.660E+00

						4.385E-01

Ac-228Tw

1	42	199.50	201.11	-1.61	0.000E+00	3.110E+01
2	54	279.00	274.95	4.05	0.000E+00	4.367E+01
3	61	321.70	323.94	-2.24	0.000E+00	3.901E+01
4	78	503.70	510.01	-6.31	0.000E+00	4.630E+01
5	103	988.10	1001.18	-13.08	0.000E+00	7.158E+01

						3.110E+01

Th-227A

1	8	50.20	50.09	.11	1.009E+01	2.950E+00
2	18	88.48	87.63	.85	0.000E+00	6.218E+00
3	47	236.00	236.07	-.07	1.143E+01	9.067E-01
4	50	256.25	256.36	-.11	9.683E+00	1.476E+00
5	62	329.82	329.91	-.09	1.466E+01	3.442E+00

						9.067E-01

Th-228T

1	16	84.40	83.92	.48	2.852E+02	1.247E+01
2	35	131.62	143.71	-12.09	0.000E+00	9.785E+01
3	46	215.94	206.17	9.77	0.000E+00	4.071E+01

						1.247E+01

Th-230U

1	11	67.73	67.76	-.03	1.518E+02	5.078E+01

						5.078E+01

Th-231A

1	6	26.64	27.14	-.50	4.604E+00	3.202E+00
2	16	84.21	83.92	.29	4.254E+01	1.859E+00
3	19	89.95	89.95	.00	1.014E+02	1.070E+01
4	22	95.87	94.71	1.16	0.000E+00	1.725E+01
5	39	163.12	163.46	-.34	4.238E+02	6.917E+01

						1.859E+00

Th-232

1	10	59.00	63.33	-4.33	0.000E+00	1.285E+02

						1.285E+02

Th-234U

1	10	63.29	63.33	-.04	2.664E+02	5.336E+00
	20	92.38	92.50	-.12	3.072E+02	5.070E+00
3	21	92.80	92.95	-.15	1.541E+02	4.321E+00
4	32	112.81	112.87	-.06	3.113E+02	3.902E+01
5	40	184.80	185.81	-1.01	0.000E+00	2.334E+03

						4.321E+00

Pa-231A

1	6	27.36	27.14	.22	8.902E+00	6.191E+00
2	55	283.67	283.73	-.06	9.070E+00	5.817E+00
3	58	300.08	300.13	-.05	2.239E+01	3.823E+00
4	59	302.67	302.76	-.09	1.059E+01	4.027E+00
5	62	330.07	329.91	.16	3.103E+01	7.286E+00

						3.823E+00

Pa-234U

1	22	94.67	94.71	-.04	6.356E+00	8.168E-01
2	24	98.44	98.50	-.06	3.123E+00	4.206E-01
3	35	131.28	143.71	-12.43	0.000E+00	5.444E-01
4	100	926.70	934.20	-7.50	0.000E+00	8.567E-01
5	100	946.00	934.20	11.80	0.000E+00	7.365E-01

						4.206E-01

Pa-234mU

1	22	94.66	94.71	-.05	8.493E+02	1.091E+02
2	24	98.44	98.50	-.06	4.169E+02	5.616E+01
3	90	743.00	743.22	-.22	3.447E+02	1.853E+02
4	91	766.60	766.48	.12	4.529E+02	5.393E+01
5	103	1001.03	1001.18	-.15	2.568E+02	1.537E+01

						1.537E+01

U-234U

1	9	53.10	53.27	-.17	1.221E+03	2.014E+02
2	19	89.96	89.95	.01	6.337E+04	6.685E+03
3	21	93.35	92.95	.40	1.154E+05	3.236E+03
4	26	105.00	104.87	.13	6.837E+03	6.625E+03

						2.014E+02

U-235

1	21	93.35	92.95	.40	1.847E+02	5.178E+00
2	29	109.14	109.11	.03	1.781E+01	6.524E+00
3	35	143.76	143.71	.05	9.845E+00	1.020E+00
4	39	163.35	163.46	-.11	1.398E+01	2.282E+00
5	40	185.72	185.81	-.09	1.513E+01	1.994E-01
6	43	202.12	202.30	-.18	2.098E+01	9.654E+00
7	45	205.31	205.33	-.02	1.608E+01	2.012E+00

						1.994E-01

U-238

1	7	48.00	46.57	1.43	0.000E+00	3.949E+02

						3.949E+02

Am-241

1

6
10

26.36
59.54

27.14
63.33

-.78
-3.79

0.000E+00
0.000E+00

2.635E+01
6.690E-01

6.690E-01

G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV94096

Rockwell Int'l/ Rocketdyne Environmental Lab T100
Sample description: ENVSS - SOIL #4012 7-12" DEPTH, ENV940096, 9/28/94
Spectrum file name: ENV94096
Sample identifier : SITESURV
Sample size : 7.190E+02 g
Measured by : FCD

Date of Activity Calculation : 30-Sep-1994 at 12:50:32
Collect started on : 30-Sep-1994 at 12:50:32
Collect ended on : 30-Sep-1994 at 14:47:24

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 7.000E+03 s real time: 7.012E+03 s dead time: .17 %

Calibration Files

Shape calibration requested : CM091594
Shape calibration used : CM091594
Created : 15-Sep-1994 16: 8: 5
Modified : 15-Sep-1994 16:32:32

Energy calibration requested : CM091594
Energy calibration used : CM091594
Created : 15-Sep-1994 16: 7:38
Modified : 15-Sep-1994 16:44:18

Efficiency calibration requested : CM091594
Efficiency calibration used : CM091594
Created : 15-Sep-1994 16: 7:11
Modified : 15-Sep-1994 16:45:18

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1.ILF
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

Peaked background file: C:\SAMPO\SPECTRA\BM091594.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N001OP000028 By:


RP&HPS

Date:



Spectrum file: ENV94096

Date: 30-Sep-1994

Time: 14:47:24

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9986	1.759E+01 +- 4.65%		1.759E+01	0.000E+00
2	CS-137	.9994	1.277E-01 +- 6.00%		1.277E-01	0.000E+00
3	Tl-208T	.9921	5.268E-01 +- 3.75%		5.268E-01	0.000E+00
4	Pb-210U	.9946	1.121E+00 +- 10.74%		1.121E+00	0.000E+00
5	Pb-212T	.9997	1.935E+00 +- 5.21%		1.935E+00	0.000E+00
6	Pb-214U	.9060	1.305E+00 +- 3.04%		1.305E+00	0.000E+00
7	Bi-212T	.9711	1.350E+00 +- 17.36%		1.350E+00	0.000E+00
8	Bi-214U	.8916	1.316E+00 +- 2.58%		1.316E+00	0.000E+00
9	Ra-224T	.9990	1.838E+00 +- 7.16%		1.838E+00	0.000E+00
C 10	Ra-226U	1.0000	3.244E+00 +- 5.55%		3.244E+00	0.000E+00
11	Ac-228T	.9463	1.571E+00 +- 2.44%		1.571E+00	0.000E+00
12	Th-228T	.9672	3.031E+00 +- 34.60%		3.031E+00	0.000E+00
13	Th-234U	.9977	1.250E+00 +- 8.17%		1.250E+00	0.000E+00
C 14	U-235	.9811	1.971E-01 +- 5.55%		1.971E-01	0.000E+00
			-----		-----	-----
			3.640E+01		3.640E+01	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94096

Date: 30-Sep-1994

Time: 14:47:24

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	55.47	.16	12.86	.11	3.4
2	68.91	.14	16.24	.11	5.0
3	182.40	.57	44.79	.17	1000000.0
4	189.90	.18	46.67	.11	3.9
5	216.13	.49	53.27	.16	1000000.0
6	256.38	.05	63.39	.10	6.9
7	302.16	.05	74.89	.10	20.4
8	311.21	.03	77.16	.10	27.6
9	339.21	.15	84.19	.11	5.2
10	349.21	.32	86.71	.13	1000000.0
11	351.84	.08	87.37	.10	13.5
12	362.31	.09	90.00	.10	9.8
13	372.47	.13	92.55	.11	1000000.0
14	375.55	.12	93.32	.10	.0
15	424.05	.21	105.50	.11	3.6
16	518.00	.10	129.07	.10	6.6
17	576.73	.18	143.80	.11	4.1
18	744.75	.03	186.01	.10	13.9
19	837.35	.07	209.26	.10	10.0
20	865.49	.50	216.32	.16	3.0
21	954.49	.01	238.67	.10	42.4
22	964.05	.11	241.07	.10	1000000.0
23	967.92	.08	242.04	.10	9.1
24	1077.71	.93	269.60	.25	1000000.0
25	1080.39	.22	270.28	.11	9.0
26	1108.85	.15	277.42	.11	5.2
27	1179.95	.20	295.28	.11	24.1
28	1199.41	.12	300.17	.10	8.1
29	1310.25	.13	328.00	.11	6.7
30	1351.53	.05	338.37	.10	18.1
31	1405.74	.03	351.99	.10	27.7
32	1634.31	.17	409.39	.11	5.4
33	1848.08	.11	463.05	.10	10.2
34	2031.78	.35	509.17	.13	1000000.0
35	2038.41	.07	510.83	.10	12.2
36	2243.95	.37	562.43	.14	3.1
37	2326.84	.04	583.24	.10	23.3
38	2430.90	.04	609.36	.10	26.2
39	2639.38	.10	661.69	.10	10.7
40	2656.23	.40	665.92	.14	3.1
41	2900.87	.14	727.33	.11	9.4
42	3064.51	.24	768.41	.12	5.8
43	3133.01	.15	785.61	.11	4.8
44	3170.40	.12	794.99	.10	7.2
45	3332.26	.35	835.63	.13	4.6
46	3431.81	.14	860.62	.11	8.8
47	3633.39	.06	911.22	.10	19.5
48	3723.76	.25	933.90	.12	5.7
49	3846.74	.12	964.77	.10	8.0
50	3863.71	.07	969.03	.10	14.1
51	4466.89	.08	1120.43	.10	11.0
	4936.42	.20	1238.26	.11	5.6
	5492.17	.16	1377.68	.11	5.9

54	5613.76	.30	1408.17	.12	5.1
55	5823.72	.05	1460.83	.10	33.7
56	6016.06	.43	1509.06	.15	4.0
57	6331.32	.32	1588.12	.13	5.3
58	6349.57	.37	1592.70	.14	4.7
59	6461.90	.38	1620.87	.14	4.2
60	6501.33	.38	1630.76	.14	4.6
61	6894.55	.48	1729.37	.16	3.9
62	7034.98	.17	1764.58	.11	10.0
63	7366.29	.39	1847.67	.14	4.2

Spectrum file: ENV94096

Date: 30-Sep-1994

Time: 14:47:24

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	1	55.47	12.86	2.3743E+02	10.4	8.8932E+02	6.8012E+00	11.5	.6
B			13.00	1.2197E+03	3.6				
	2	68.91	16.24	3.0313E+02	9.3	7.1737E+02	6.4454E+00	10.6	.9
B			15.91	8.7388E+02	18.4				
B			16.42	1.0959E+03	14.7				
m	3	182.40	44.79	5.2221E+01	18.1	5.6306E+02	3.0394E-01	18.8	1.0
m	4	189.90	46.67	2.4166E+02	8.4	5.7121E+02	1.3343E+00	9.8	1.0
B			46.61	1.8364E+02	8.7				
M	5	216.13	53.27	9.9559E+01	19.9	6.5226E+02	4.6429E-01	20.6	1.0
B			53.44	8.3701E+01	15.3				
	6	256.38	63.39	4.7152E+02	4.6	8.9665E+02	1.7854E+00	6.8	.6
B			63.35	9.2105E+02	2.9				
m	7	302.16	74.89	2.0882E+03	2.7	1.0231E+03	6.6293E+00	5.6	1.6
B			75.03	1.8060E+02	9.2				
M	8	311.21	77.16	3.3833E+03	2.0	9.3282E+02	1.0407E+01	5.3	1.6
B			77.17	1.6775E+02	10.3				
m	9	339.21	84.19	4.3693E+02	6.9	7.9412E+02	1.2256E+00	8.5	1.2
B			84.45	1.4321E+02	9.3				
m	10	349.21	86.71	2.7281E+02	14.1	7.8672E+02	7.4182E-01	14.9	1.2
B			87.22	9.5010E+01	12.4				
m	11	351.84	87.37	1.0832E+03	4.3	7.8197E+02	2.9219E+00	6.5	1.2
B			87.22	9.5010E+01	12.4				
m	12	362.31	90.00	7.2787E+02	4.8	7.5128E+02	1.9361E+00	6.8	1.2
	13	372.47	92.55	7.1852E+02	7.0	7.0357E+02	1.8970E+00	8.5	1.2
			92.52	9.6822E+02	9.2				
B			93.03	4.7534E+02	18.2				
M	14	375.55	93.32	7.9042E+02	6.3	6.8566E+02	2.0822E+00	7.9	1.2
B			93.03	4.7534E+02	18.2				
	15	424.05	105.50	2.2502E+02	10.8	5.6184E+02	5.7362E-01	11.7	1.1
	16	518.00	129.07	3.7618E+02	5.4	5.7721E+02	9.2134E-01	6.9	.7
	17	576.73	143.80	1.7965E+02	10.3	6.0269E+02	4.5429E-01	11.2	.7
B			143.67	1.1999E+02	12.7				
	18	744.75	186.01	1.0498E+03	2.7	5.3432E+02	3.1242E+00	5.4	.9
B			185.79	7.0402E+02	3.2				
	19	837.35	209.26	5.6265E+02	3.8	4.8123E+02	1.8054E+00	6.2	.7
	20	865.49	216.32	6.7161E+01	34.2	3.9014E+02	2.2013E-01	34.6	2.2
m	21	954.49	238.67	6.3975E+03	.9	4.0204E+02	2.2328E+01	5.2	1.1
B			238.67	3.0191E+02	5.3				
m	22	964.05	241.07	5.4297E+02	5.0	3.6947E+02	1.9072E+00	7.2	1.1
M	23	967.92	242.04	8.0332E+02	4.1	3.5221E+02	2.8290E+00	6.6	1.1
m	24	1077.71	269.60	9.4378E+01	61.3	3.0795E+02	3.4276E-01	61.5	.6
M	25	1080.39	270.28	4.4210E+02	13.1	3.1499E+02	1.6054E+00	13.9	.6
	26	1108.85	277.42	2.0327E+02	6.8	2.9439E+02	7.3725E-01	8.2	.6
	27	1179.95	295.28	1.7292E+03	2.4	2.4318E+02	6.5623E+00	5.1	1.3
B			295.17	1.6573E+02	7.8				
	28	1199.41	300.17	4.1169E+02	5.0	2.2669E+02	1.5834E+00	6.7	1.1
	29	1310.25	328.00	2.5882E+02	6.5	2.7060E+02	1.0699E+00	7.9	.8
	30	1351.53	338.37	1.2119E+03	2.8	2.3253E+02	5.1385E+00	5.3	1.4
	31	1405.74	351.99	2.9386E+03	1.4	2.0536E+02	1.2866E+01	4.7	1.4
B			352.03	2.9805E+02	6.1				
	32	1634.31	409.39	1.8594E+02	7.9	1.6572E+02	9.1865E-01	9.1	.7
	33	1848.08	463.05	3.8729E+02	5.4	1.4290E+02	2.1026E+00	7.2	1.4
	34	2031.78	509.17	4.8733E+01	27.8	1.3825E+02	2.8451E-01	28.3	1.4

M	35	2038.41	510.83	6.4589E+02	3.3	1.4581E+02	3.7802E+00	6.0	1.4
B			510.34	3.5624E+02	7.8				
	36	2243.95	562.43	7.2029E+01	14.7	1.2463E+02	4.5274E-01	15.4	.9
	37	2326.84	583.24	1.8813E+03	1.8	1.4511E+02	1.2147E+01	5.0	1.1
			583.34	1.0336E+02	9.4				
	38	2430.90	609.36	2.2271E+03	1.7	1.0558E+02	1.4854E+01	4.9	1.0
B			609.34	2.1623E+02	5.6				
m	39	2639.38	661.69	4.0776E+02	4.1	1.1465E+02	2.8906E+00	6.0	.9
M	40	2656.23	665.92	6.2499E+01	14.0	1.0231E+02	4.4631E-01	14.7	.9
	41	2900.87	727.33	3.8459E+02	4.8	1.0462E+02	3.0387E+00	6.5	1.3
B			727.05	5.8665E+01	13.4				
	42	3064.51	768.41	1.6210E+02	9.6	1.1613E+02	1.3640E+00	10.5	1.3
	43	3133.01	785.61	1.2040E+02	8.6	7.2670E+01	1.0392E+00	9.7	.9
	44	3170.40	794.99	1.9155E+02	6.9	1.0351E+02	1.6759E+00	8.2	.9
	45	3332.26	835.63	8.5937E+01	17.0	8.0090E+01	7.9612E-01	17.6	1.2
	46	3431.81	860.62	2.6159E+02	5.6	6.2021E+01	2.5066E+00	7.1	1.1
	47	3633.39	911.22	1.3540E+03	2.1	6.0008E+01	1.3764E+01	5.0	1.1
	48	3723.76	933.90	1.2340E+02	8.9	5.3976E+01	1.2762E+00	10.0	1.1
m	49	3846.74	964.77	2.7239E+02	4.3	6.7187E+01	2.8825E+00	6.2	.7
M	50	3863.71	969.03	7.8560E+02	2.3	6.7737E+01	8.3393E+00	5.0	.7
	51	4466.89	1120.43	4.4154E+02	3.9	8.0559E+01	5.1916E+00	5.8	1.0
B			1120.31	5.2112E+01	17.1				
	52	4936.42	1238.26	1.7648E+02	6.1	8.7418E+01	2.2188E+00	7.5	.7
	53	5492.17	1377.68	1.2701E+02	6.0	2.0519E+01	1.7257E+00	7.4	.9
	54	5613.76	1408.17	5.9893E+01	17.4	2.4801E+01	8.3036E-01	18.0	1.0
	55	5823.72	1460.83	3.5296E+03	1.7	1.8318E+01	5.0615E+01	4.6	1.1
B			1460.76	2.6941E+02	4.8				
	56	6016.06	1509.06	5.8189E+01	16.3	1.7686E+01	8.5974E-01	16.9	.9
m	57	6331.32	1588.12	9.6253E+01	12.2	1.7961E+01	1.4905E+00	12.9	1.8
M	58	6349.57	1592.70	4.2580E+01	21.4	1.8695E+01	6.6113E-01	21.8	1.8
	59	6461.90	1620.87	4.8994E+01	21.9	1.2179E+01	7.7307E-01	22.3	1.4
	60	6501.33	1630.76	7.1114E+01	13.6	9.0680E+00	1.1284E+00	14.3	.5
	61	6894.55	1729.37	5.8480E+01	16.2	7.6974E+00	9.7942E-01	16.7	.8
	62	7034.98	1764.58	3.5351E+02	5.7	1.2264E+01	6.0314E+00	7.1	.7
B			1764.42	5.9809E+01	6.9				
	63	7366.29	1847.67	6.1783E+01	15.2	1.2018E+01	1.0997E+00	15.8	.7

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

Spectrum file: ENV94096

Date: 30-Sep-1994

Time: 14:47:24

These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	55.5	12.86	1.910E+00 +- 38.38%
2	68.9	16.24	3.844E+00 +- 20.57%
3	182.4	44.79	3.039E-01 +- 18.82%
7	302.2	74.89	6.549E+00 +- 5.66%
8	311.2	77.16	1.033E+01 +- 5.33%
9	339.2	84.19	1.169E+00 +- 8.80%
10	349.2	86.71	7.057E-01 +- 15.62%
11	351.8	87.37	2.886E+00 +- 6.55%
12	362.3	90.00	1.936E+00 +- 6.82%
13	372.5	92.55	1.539E+00 +- 10.11%
14	375.5	93.32	1.907E+00 +- 8.55%
15	424.1	105.50	5.736E-01 +- 11.71%
17	576.7	143.80	4.118E-01 +- 12.25%
24	1077.7	269.60	3.428E-01 +- 61.49%
25	1080.4	270.28	1.605E+00 +- 13.91%
28	1199.4	300.17	1.583E+00 +- 6.72%
30	1351.5	338.37	5.138E+00 +- 5.26%
34	2031.8	509.17	2.845E-01 +- 28.27%
35	2038.4	510.83	3.488E+00 +- 6.19%
36	2243.9	562.43	4.527E-01 +- 15.44%
41	2900.9	727.33	2.974E+00 +- 6.60%
42	3064.5	768.41	1.364E+00 +- 10.54%
43	3133.0	785.61	1.039E+00 +- 9.69%
44	3170.4	794.99	1.676E+00 +- 8.17%
49	3846.7	964.77	2.883E+00 +- 6.23%
54	5613.8	1408.17	8.304E-01 +- 17.96%
58	6349.6	1592.70	6.611E-01 +- 21.79%

Spectrum file: ENV94096

Date: 30-Sep-1994

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	55	5823.72	1460.83	100.00%
CS-137	39	2639.38	661.69	100.00%
Tl-208T	26	1108.85	277.42	123.56%
	37	2326.84	583.24	99.98%
	46	3431.81	860.62	67.09%
Pb-210U	4	189.90	46.67	100.00%
Pb-212T	21	954.49	238.67	100.00%
Pb-214U	5	216.13	53.27	93.20%
	23	967.92	242.04	91.65%
	27	1179.95	295.28	103.06%
	31	1405.74	351.99	101.53%
Bi-212T	27	1179.95	295.28	103.06%
	29	1310.25	328.00	4.70%
	59	6461.90	1620.87	127.76%
Bi-214U	38	2430.90	609.36	110.09%
	39	2639.38	661.69	100.00%
	40	2656.23	665.92	122.57%
	48	3723.76	933.90	86.80%
	51	4466.89	1120.43	103.09%
	52	4936.42	1238.26	93.32%
	53	5492.17	1377.68	81.53%
	56	6016.06	1509.06	89.23%
	61	6894.55	1729.37	108.88%
	62	7034.98	1764.58	94.62%
	63	7366.29	1847.67	67.57%
Ra-224T	22	964.05	241.07	100.00%
C Ra-226U	18	744.75	186.01	
Ac-228T	16	518.00	129.07	132.88%
	19	837.35	209.26	105.41%
	32	1634.31	409.39	101.60%
	33	1848.08	463.05	92.24%
	45	3332.26	835.63	95.61%
	47	3633.39	911.22	88.07%
	50	3863.71	969.03	87.52%
	57	6331.32	1588.12	104.10%
	60	6501.33	1630.76	72.20%
Th-228T	20	865.49	216.32	100.00%
Th-234U	6	256.38	63.39	100.00%
J-235	18	744.75	186.01	

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94096

Date: 30-Sep-1994

Time: 14:47:24

***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7						
1	33	477.59	463.05	14.54	0.000E+00	1.307E-01
						1.307E-01
NA-22						
1	52	1274.54	1238.26	36.28	0.000E+00	2.134E-02
						2.134E-02
K-40						
1	55	1460.75	1460.83	-.08	1.778E+01	1.615E-01
						1.615E-01
MN-54						
1	45	834.81	835.63	-.82	0.000E+00	2.128E-02
						2.128E-02
CO-57						
1	16	122.06	129.07	-7.01	0.000E+00	1.311E-02
2	16	136.43	129.07	7.36	0.000E+00	1.037E-01
						1.311E-02
CO-58						
1	44	810.75	794.99	15.76	0.000E+00	1.719E-02
2	46	863.94	860.62	3.32	0.000E+00	2.606E+00
						1.719E-02
CO-60						
1	51	1173.23	1120.43	52.80	0.000E+00	2.292E-02
2	53	1332.51	1377.68	-45.17	0.000E+00	2.195E-02
						2.195E-02
ZN-65						
1	51	1115.52	1120.43	-4.91	0.000E+00	3.914E-02
						3.914E-02
NB-94						
1	41	702.50	727.33	-24.83	0.000E+00	1.725E-02
2	46	871.10	860.62	10.48	0.000E+00	1.656E-02
						1.656E-02
SB-125						
	18	176.29	186.01	-9.72	0.000E+00	1.922E-01

2	32	427.95	409.39	18.56	0.000E+00	4.359E-02
3	33	463.51	463.05	.46	7.910E-01	1.191E-01
4	38	600.77	609.36	-8.59	0.000E+00	7.597E-02
	39	636.15	661.69	-25.54	0.000E+00	1.288E-01

						4.359E-02

I-131

1	8	80.18	77.16	3.02	0.000E+00	6.399E-01
2	26	284.29	277.42	6.87	0.000E+00	1.864E-01
3	31	364.48	351.99	12.49	0.000E+00	1.422E-02
4	39	636.97	661.69	-24.72	0.000E+00	1.896E-01
5	41	722.89	727.33	-4.44	0.000E+00	9.009E-01

						1.422E-02

CS-134

1	36	563.26	562.43	.83	0.000E+00	1.914E-01
2	36	569.29	562.43	6.86	0.000E+00	9.593E-02
3	38	604.66	609.36	-4.70	0.000E+00	1.505E-02
4	44	795.76	794.99	.77	0.000E+00	3.040E-02
5	44	801.84	794.99	6.85	0.000E+00	1.782E-01

						1.505E-02

CS-136

1	18	176.56	186.01	-9.45	0.000E+00	8.984E-02
2	30	340.57	338.37	2.20	0.000E+00	2.795E-02
3	45	818.50	835.63	-17.13	0.000E+00	1.579E-02
4	51	1048.07	1120.43	-72.36	0.000E+00	2.474E-02
5	52	1235.34	1238.26	-2.92	0.000E+00	1.224E-01

						1.579E-02

CS-137

1	39	661.64	661.69	-.05	1.284E-01	1.653E-02

						1.653E-02

BA-133

1	9	81.01	84.19	-3.18	0.000E+00	4.710E-02
2	26	276.29	277.42	-1.13	0.000E+00	1.865E-01
3	28	302.71	300.17	2.54	0.000E+00	6.307E-02
4	31	355.86	351.99	3.87	0.000E+00	2.068E-02
5	32	383.70	409.39	-25.69	0.000E+00	1.552E-01

						2.068E-02

EU-152

1	16	121.78	129.07	-7.29	0.000E+00	3.822E-02
2	30	344.30	338.37	5.93	0.000E+00	4.738E-02
3	49	964.00	964.77	-.77	0.000E+00	2.307E-01
4	51	1112.07	1120.43	-8.36	0.000E+00	1.508E-01
5	54	1408.08	1408.17	-.09	1.472E-01	6.356E-02

						3.822E-02

EU-154

1	16	123.07	129.07	-6.00	0.000E+00	2.756E-02
2	41	723.30	727.33	-4.03	0.000E+00	7.779E-02

3	46	873.20	860.62	12.58	0.000E+00	1.428E-01
4	50	1004.80	969.03	35.77	0.000E+00	1.155E-01
5	52	1274.80	1238.26	36.54	0.000E+00	5.757E-02

						2.756E-02

IR-192

1	27	295.95	295.28	.67	8.197E-01	3.659E-02
2	28	308.44	300.17	8.27	0.000E+00	3.672E-02
3	29	316.49	328.00	-11.51	0.000E+00	1.335E-02
4	33	468.06	463.05	5.01	0.000E+00	2.448E-02
5	38	612.45	609.36	3.09	0.000E+00	2.338E-01

						1.335E-02

Tl-208T

1	7	74.97	74.89	.08	7.112E+00	5.195E-01
2	26	277.36	277.42	-.06	4.264E-01	1.731E-01
3	35	510.72	510.83	-.11	6.314E-01	6.267E-02
4	37	583.14	583.24	-.10	5.309E-01	1.702E-02
5	46	860.47	860.62	-.15	7.850E-01	1.180E-01

						1.702E-02

Tl-210U

1	14	97.00	93.32	3.68	0.000E+00	3.131E-01
2	27	296.00	295.28	.72	0.000E+00	3.454E-02
3	44	795.00	794.99	.01	6.300E-02	1.645E-02

						1.645E-02

Pb-210U

1	4	46.52	46.67	-.15	1.259E+00	6.007E-01

						6.007E-01

Pb-211A

1	8	79.29	77.16	2.13	0.000E+00	5.334E+00
2	32	404.80	409.39	-4.59	0.000E+00	4.760E-01
3	32	427.10	409.39	17.71	0.000E+00	9.361E-01
4	42	766.20	768.41	-2.21	0.000E+00	3.834E+00
5	45	831.80	835.63	-3.83	0.000E+00	6.971E-01

						4.760E-01

Pb-212T

1	7	74.81	74.89	-.08	2.599E+00	1.898E-01
2	8	77.11	77.16	-.05	2.237E+00	9.639E-02
3	11	87.20	87.37	-.17	1.747E+00	2.151E-01
4	21	238.63	238.67	-.04	1.947E+00	3.005E-02
5	28	300.09	300.17	-.08	1.820E+00	3.215E-01

						3.005E-02

Pb-214U

1	7	74.81	74.89	-.08	3.941E+00	2.879E-01
2	8	77.11	77.16	-.05	3.659E+00	1.576E-01
3	23	241.92	242.04	-.12	1.423E+00	1.594E-01
4	27	295.92	295.28	.64	1.287E+00	5.745E-02
5	31	351.99	351.99	.00	1.304E+00	3.243E-02

3.243E-02

-211A

1	7	72.87	74.89	-2.02	0.000E+00	1.730E+00
2	31	351.10	351.99	-.89	0.000E+00	2.928E-01
3	32	404.80	409.39	-4.59	0.000E+00	3.483E-01
4	32	426.90	409.39	17.51	0.000E+00	6.961E-01
5	45	831.80	835.63	-3.83	0.000E+00	5.915E-01

2.928E-01

Bi-212T

1	3	39.86	44.79	-4.93	0.000E+00	3.049E+00
2	41	727.17	727.33	-.16	9.677E-01	1.292E-01
3	43	785.42	785.61	-.19	1.953E+00	6.869E-01
4	51	1078.62	1120.43	-41.81	0.000E+00	2.163E+00
5	59	1620.56	1620.87	-.31	1.057E+00	4.084E-01

1.292E-01

Bi-214U

1	38	609.30	609.36	-.06	1.211E+00	2.951E-02
2	42	768.36	768.41	-.05	1.050E+00	3.421E-01
3	51	1120.28	1120.43	-.15	1.297E+00	1.337E-01
4	52	1238.11	1238.26	-.15	1.410E+00	3.690E-01
5	62	1764.51	1764.58	-.07	1.424E+00	8.823E-02

2.951E-02

Bi-214Uw

1	25	273.70	270.28	3.42	0.000E+00	7.319E+00
2	32	405.74	409.39	-3.65	0.000E+00	8.202E+00
3	45	821.18	835.63	-14.45	0.000E+00	1.174E+01
4	51	1069.96	1120.43	-50.47	0.000E+00	7.389E+00
5	58	1594.73	1592.70	2.03	0.000E+00	8.395E+00

7.319E+00

Po-210U

1	44	803.00	794.99	8.01	0.000E+00	1.481E+03
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1.481E+03

Po-211A

1	36	570.00	562.43	7.57	0.000E+00	2.893E+00
2	47	900.00	911.22	-11.22	0.000E+00	3.415E+00

2.893E+00

Po-212mT

1	36	570.00	562.43	7.57	0.000E+00	7.232E-01
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7.232E-01

Po-214U

1	44	799.00	794.99	4.01	0.000E+00	1.053E+02
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1.053E+02

Po-215A

1	33	438.80	463.05	-24.25	0.000E+00	3.312E+01

						3.312E+01
Xn-219A						
1	8	76.86	77.16	-.30	7.702E+01	3.319E+00
2	8	79.29	77.16	2.13	0.000E+00	1.923E+00
3	12	89.60	90.00	-.40	2.513E+01	4.494E+00
4	25	271.23	270.28	.95	0.000E+00	1.605E-01
5	32	401.78	409.39	-7.61	0.000E+00	2.123E-01

						1.605E-01
Rn-220T						
1	36	549.70	562.43	-12.73	0.000E+00	1.438E+01

						1.438E+01
Rn-222U						
1	35	510.00	510.83	-.83	0.000E+00	3.485E+01

						3.485E+01
Fr-223A						
1	5	50.80	53.27	-2.47	0.000E+00	6.972E-02
2	8	80.00	77.16	2.84	0.000E+00	1.539E-01
3	9	81.52	84.19	-2.67	0.000E+00	1.972E-01
4	11	88.60	87.37	1.23	0.000E+00	2.153E-01
5	21	234.60	238.67	-4.07	0.000E+00	3.782E-01

						6.972E-02
Ra-223A						
1	9	83.78	84.19	-.41	1.860E-01	5.735E-02
2	17	144.30	143.80	.50	5.282E-01	3.464E-01
3	17	154.30	143.80	10.50	0.000E+00	2.567E-01
4	24	269.60	269.60	.00	9.474E-02	8.465E-02
5	33	445.50	463.05	-17.55	0.000E+00	8.826E-01

						5.735E-02
Ra-224T						
1	9	81.07	84.19	-3.12	0.000E+00	1.378E+01
2	9	83.78	84.19	-.41	2.205E+01	6.800E+00
3	14	94.70	93.32	1.38	0.000E+00	1.720E+01
4	14	97.60	93.32	4.28	0.000E+00	5.627E+01
5	22	241.00	241.07	-.07	1.838E+00	3.118E-01

						3.118E-01
Ra-226U						
1	9	81.07	84.19	-3.12	0.000E+00	9.726E+00
2	9	83.78	84.19	-.41	1.494E+01	4.606E+00
3	14	94.70	93.32	1.38	0.000E+00	1.251E+01
4	14	97.60	93.32	4.28	0.000E+00	4.314E+01
5	18	185.99	186.01	-.02	3.580E+00	3.947E-01

						3.947E-01

-227A

1	9	81.08	84.19	-3.11	0.000E+00	2.362E+03
2	9	83.96	84.19	-.23	2.091E+02	6.447E+01
3	11	87.50	87.37	.13	8.843E+02	1.089E+02
	15	100.00	105.50	-5.50	0.000E+00	4.172E+01
5	17	160.40	143.80	16.60	0.000E+00	6.051E+01

						4.172E+01

Ac-228T

1	19	209.40	209.26	.14	1.491E+00	2.776E-01
2	30	338.40	338.37	.03	1.608E+00	9.772E-02
3	47	911.07	911.22	-.15	1.784E+00	5.103E-02
4	50	968.90	969.03	-.13	1.795E+00	9.366E-02
5	57	1587.90	1588.12	-.22	1.509E+00	3.515E-01

						5.103E-02

Ac-228Tw

1	19	199.50	209.26	-9.76	0.000E+00	3.908E+00
2	26	279.00	277.42	1.58	0.000E+00	5.242E+00
3	29	321.70	328.00	-6.30	0.000E+00	4.754E+00
4	34	503.70	509.17	-5.47	0.000E+00	6.334E+00
5	50	988.10	969.03	19.07	0.000E+00	8.619E+00

						3.908E+00

Th-227A

1	5	50.20	53.27	-3.07	0.000E+00	2.911E-01
2	11	88.48	87.37	1.11	0.000E+00	5.979E-01
3	21	236.00	238.67	-2.67	0.000E+00	1.247E-01
4	24	256.25	269.60	-13.35	0.000E+00	1.845E-01
5	29	329.82	328.00	1.82	0.000E+00	4.779E-01

						1.247E-01

Th-228T

1	9	84.40	84.19	.21	3.861E+00	1.191E+00
2	16	131.62	129.07	2.55	0.000E+00	1.028E+01
3	20	215.94	216.32	-.38	3.028E+00	4.263E+00

						1.191E+00

Th-230U

1	6	67.73	63.39	4.34	0.000E+00	5.759E+00

						5.759E+00

Th-231A

1	2	26.64	16.24	10.40	0.000E+00	2.889E-01
2	9	84.21	84.19	.02	5.758E-01	1.775E-01
3	12	89.95	90.00	-.05	5.823E+00	1.042E+00
4	14	95.87	93.32	2.55	0.000E+00	1.649E+00
5	17	163.12	143.80	19.32	0.000E+00	8.418E+00

						1.775E-01

Th-232

1	6	59.00	63.39	-4.39	0.000E+00	1.169E+01

						1.169E+01

Th-234U

1	6	63.29	63.39	-.10	1.724E+00	5.395E-01
2	13	92.38	92.55	-.17	2.776E+00	4.998E-01
3	13	92.80	92.55	.25	2.375E+00	4.276E-01
4	15	112.81	105.50	7.31	0.000E+00	4.761E+00
5	18	184.80	186.01	-1.21	0.000E+00	1.470E+02

4.276E-01

Pa-231A

1	2	27.36	16.24	11.12	0.000E+00	5.671E-01
2	26	283.67	277.42	6.25	0.000E+00	7.010E-01
3	28	300.08	300.17	-.09	2.587E+00	4.571E-01
4	28	302.67	300.17	2.50	0.000E+00	5.106E-01
5	29	330.07	328.00	2.07	0.000E+00	9.972E-01

4.571E-01

Pa-234U

1	14	94.67	93.32	1.35	0.000E+00	8.878E-02
2	14	98.44	93.32	5.12	0.000E+00	5.382E-02
3	16	131.28	129.07	2.21	0.000E+00	5.796E-02
4	48	926.70	933.90	-7.20	0.000E+00	1.142E-01
5	48	946.00	933.90	12.10	0.000E+00	9.138E-02

5.382E-02

Pa-234mU

1	14	94.66	93.32	1.34	0.000E+00	1.186E+01
2	14	98.44	93.32	5.12	0.000E+00	7.186E+00
3	41	743.00	727.33	15.67	0.000E+00	2.671E+01
4	42	766.60	768.41	-1.81	0.000E+00	9.843E+00
5	50	1001.03	969.03	32.00	0.000E+00	2.874E+00

2.874E+00

U-234U

1	5	53.10	53.27	-.17	1.485E+01	1.821E+01
2	12	89.96	90.00	-.04	3.639E+03	6.510E+02
3	14	93.35	93.32	.03	1.957E+03	3.164E+02
4	15	105.00	105.50	-.50	1.439E+03	7.225E+02

1.821E+01

U-235

1	14	93.35	93.32	.03	3.130E+00	5.063E-01
2	15	109.14	105.50	3.64	0.000E+00	8.187E-01
3	17	143.76	143.80	-.04	1.626E-01	1.066E-01
4	17	163.35	143.80	19.55	0.000E+00	2.767E-01
5	18	185.72	186.01	-.29	2.173E-01	2.395E-02
6	19	202.12	209.26	-7.14	0.000E+00	1.256E+00
7	19	205.31	209.26	-3.95	0.000E+00	2.967E-01

2.395E-02

U-238

1	4	48.00	46.67	1.33	0.000E+00	3.512E+01
---	---	-------	-------	------	-----------	-----------

3.512E+01

Am-241

1

2
6

26.36
59.54

16.24
63.39

10.12
-3.85

0.000E+00
0.000E+00

2.215E+00
6.132E-02

6.132E-02



G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV94097

Rockwell Int'l/ Rocketdyne Environmental Lab T100

Sample description: ENVSS - SOIL #4013 MIX 0-12", ENV940097, 9/28/94

Spectrum file name: ENV94097

Sample identifier : SITESURV

Sample size : 6.750E+02 g

Measured by : FCD

Date of Activity Calculation : 30-Sep-1994 at 15:15:16

Collect started on : 30-Sep-1994 at 15:15:16

Collect ended on : 1-Oct-1994 at 5:10:11

Decay time : 0 years 0 days 0 hours 0 minutes

Live time: 5.000E+04 s real time: 5.010E+04 s dead time: .19 %

Calibration Files

Shape calibration requested : CM091594
Shape calibration used : CM091594
Created : 15-Sep-1994 16: 8: 5
Modified : 15-Sep-1994 16:32:32

Energy calibration requested : CM091594
Energy calibration used : CM091594
Created : 15-Sep-1994 16: 7:38
Modified : 15-Sep-1994 16:44:18

Efficiency calibration requested : CM091594
Efficiency calibration used : CM091594
Created : 15-Sep-1994 16: 7:11
Modified : 15-Sep-1994 16:45:18

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1.ILF

3

MDA energy tolerance: .70 keV

MDA decision limit 1-alpha: 95.00 %

MDA detection limit 1-beta: 95.00 %

Peaked background file: C:\SAMPO\SPECTRA\BM091594.PTF

Energy tolerance for peaked background subtraction: .70 keV

Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:

Handwritten signature
RE&HPS

Date: *10/4/94*

Spectrum file: ENV94097

Date: 1-Oct-1994

Time: 5:10:11

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----		
			measured		decay corrected saturation
1	K-40	.9990	1.787E+01 +- 4.35%		1.787E+01 0.000E+00
2	CS-137	.9998	1.473E-01 +- 4.57%		1.473E-01 0.000E+00
3	Tl-208T	.9172	5.903E-01 +- 2.82%		5.903E-01 0.000E+00
4	Pb-210U	.9990	1.229E+00 +- 6.53%		1.229E+00 0.000E+00
5	Pb-212T	.9978	1.924E+00 +- 4.37%		1.924E+00 0.000E+00
6	Pb-214U	.8720	1.411E+00 +- 2.53%		1.411E+00 0.000E+00
7	Bi-212T	.9740	1.428E+00 +- 4.36%		1.428E+00 0.000E+00
8	Bi-214U	.9552	1.395E+00 +- 1.70%		1.395E+00 0.000E+00
9	Rn-219A	.9910	9.118E-02 +- 10.21%		9.118E-02 0.000E+00
10	Ra-224T	.9996	2.024E+00 +- 5.43%		2.024E+00 0.000E+00
C 11	Ra-226U	1.0000	3.075E+00 +- 5.35%		3.075E+00 0.000E+00
12	Ac-228T	.9318	1.554E+00 +- 1.52%		1.554E+00 0.000E+00
13	Th-227A	.9064	8.988E-02 +- 6.82%		8.988E-02 0.000E+00
14	Th-228T	.9969	2.710E+00 +- 11.09%		2.710E+00 0.000E+00
15	Th-230U	.9964	1.620E+00 +- 23.02%		1.620E+00 0.000E+00
16	Th-234U	.9953	1.512E+00 +- 5.24%		1.512E+00 0.000E+00
17	Pa-234mU	1.0000	2.018E+00 +- 9.78%		2.018E+00 0.000E+00
C 18	U-235	.9811	1.868E-01 +- 5.35%		1.868E-01 0.000E+00
			-----		-----
			4.087E+01		4.087E+01 0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV94097

Date: 1-Oct-1994

Time: 5:10:11

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	45.31	.26	10.31	.12	1000000.0
2	54.84	.37	12.70	.14	1000000.0
3	56.39	.40	13.09	.14	8.7
4	68.06	.17	16.03	.11	10.3
5	70.39	.55	16.61	.17	1000000.0
6	80.65	.27	19.19	.12	3.2
7	162.49	.67	39.78	.20	.0
8	189.55	.06	46.59	.10	13.4
9	201.70	.61	49.64	.18	1000000.0
10	216.09	.22	53.26	.11	3.8
11	256.34	.03	63.38	.10	20.2
12	273.16	.41	67.60	.14	1000000.0
13	294.36	.13	72.93	.11	4.8
14	301.55	.19	74.74	.11	54.8
15	302.59	.14	75.00	.11	1000000.0
16	309.76	.44	76.80	.15	1000000.0
17	311.33	.04	77.19	.10	74.6
18	320.26	.19	79.44	.11	6.0
19	327.24	.15	81.19	.11	6.5
20	337.61	.28	83.79	.12	11.8
21	340.33	.25	84.48	.12	1000000.0
22	350.25	.16	86.97	.11	31.0
23	352.31	.11	87.49	.10	1000000.0
24	362.29	.05	89.99	.10	27.5
25	372.71	.08	92.61	.10	20.6
26	375.76	.09	93.37	.10	1000000.0
27	395.96	.50	98.45	.16	1000000.0
28	400.56	.13	99.60	.11	8.1
29	421.70	.35	104.91	.13	1000000.0
30	424.94	.17	105.73	.11	6.8
31	435.93	.32	108.49	.13	1000000.0
32	439.01	.35	109.26	.13	1000000.0
33	453.60	.21	112.92	.11	4.9
34	462.95	.14	115.27	.11	6.8
35	518.13	.05	129.10	.10	16.5
36	576.80	.16	143.82	.11	6.9
37	617.56	.09	154.06	.10	8.5
38	744.75	.04	186.01	.10	32.6
39	797.60	.24	199.28	.12	3.7
40	822.33	.37	205.49	.14	3.1
41	837.52	.03	209.30	.10	25.5
42	864.43	.22	216.06	.11	4.0
43	943.98	.16	236.03	.11	5.6
44	954.48	.01	238.67	.10	112.3
45	963.94	.03	241.04	.10	1000000.0
46	967.88	.02	242.03	.10	25.1
47	1010.22	.31	252.66	.13	3.0
48	1025.12	.30	256.40	.13	3.2
49	1034.15	.24	258.67	.12	3.8
50	1079.07	.26	269.94	.12	1000000.0
51	1081.29	.16	270.50	.11	20.1
52	1098.69	.31	274.87	.13	4.0
53	1108.75	.07	277.40	.10	15.4

54	1151.60	.62	288.16	.19	4.6
55	1179.86	.01	295.26	.10	59.3
56	1199.31	.03	300.14	.10	21.1
58	1310.31	.05	328.02	.10	18.4
58	1351.42	.19	338.34	.11	50.1
59	1362.01	.28	341.00	.12	4.4
60	1405.63	.01	351.96	.10	77.8
61	1604.80	.26	401.98	.12	3.9
62	1634.86	.07	409.52	.10	13.8
63	1806.75	.41	452.68	.14	4.4
64	1848.01	.00	463.03	.10	23.0
65	1944.62	.47	487.29	.16	3.7
66	2032.07	.33	509.24	.13	1000000.0
67	2038.14	.06	510.77	.10	29.1
68	2043.16	.62	512.02	.18	1000000.0
69	2180.03	.41	546.38	.14	3.5
70	2244.62	.22	562.60	.11	6.4
71	2326.80	.01	583.22	.10	63.2
72	2430.79	.01	609.33	.10	68.8
73	2596.03	.51	650.81	.16	3.1
74	2639.29	.05	661.67	.10	28.3
75	2654.82	.19	665.57	.11	7.7
76	2900.73	.04	727.30	.10	26.9
77	3012.10	.10	755.26	.10	7.6
78	3044.03	.25	763.27	.12	5.1
79	3055.73	.10	766.21	.10	1000000.0
80	3064.36	.04	768.37	.10	17.8
81	3079.93	.13	772.28	.11	9.4
82	3119.49	.30	782.22	.13	4.7
83	3133.36	.16	785.70	.11	10.1
84	3170.34	.07	794.98	.10	18.4
85	3215.14	.18	806.23	.11	6.2
86	3311.77	.27	830.48	.12	4.7
87	3332.69	.10	835.74	.10	11.9
88	3345.92	.47	839.06	.15	1000000.0
89	3351.13	.34	840.37	.13	.0
90	3431.77	.05	860.61	.10	19.9
91	3605.58	.25	904.24	.12	5.8
92	3633.42	.02	911.23	.10	51.3
93	3724.41	.20	934.07	.11	13.8
94	3846.73	.06	964.77	.10	20.1
95	3863.53	.03	968.99	.10	38.4
96	3991.18	.14	1001.02	.11	7.5
97	4301.21	.16	1078.84	.11	4.5
98	4363.56	.59	1094.49	.18	3.0
99	4427.07	.52	1110.43	.16	3.1
100	4466.74	.04	1120.39	.10	30.2
101	4605.64	.19	1155.25	.11	6.3
102	4936.26	.08	1238.22	.10	16.4
103	4971.77	.44	1247.13	.15	4.0
104	5106.56	.35	1280.95	.13	4.9
105	5492.49	.11	1377.76	.10	14.6
106	5522.81	.33	1385.37	.13	5.3
107	5587.13	.27	1401.50	.12	6.1
108	5612.99	.16	1407.98	.11	11.7
109	5823.68	.02	1460.82	.10	85.8
110	5963.43	.33	1495.86	.13	6.8
111	6016.50	.19	1509.17	.11	8.4
112	6031.17	.35	1512.85	.13	4.7
	6153.20	.47	1543.45	.15	3.5

114	6312.14	.63	1583.31	.19	3.1
115	6331.35	.11	1588.13	.10	14.0
116	6349.05	.13	1592.57	.11	9.9
117	6376.68	.52	1599.50	.16	3.7
118	6460.94	.12	1620.63	.10	9.5
119	6500.58	.16	1630.57	.11	9.0
120	6530.66	.38	1638.11	.14	5.5
121	6622.98	.21	1661.26	.11	5.9
122	6895.44	.07	1729.59	.10	11.7
123	7034.66	.55	1764.50	.17	29.7
124	7328.78	.46	1838.26	.15	.0
125	7365.67	.10	1847.51	.10	9.4

Spectrum file: ENV94097

Date: 1-Oct-1994

Time: 5:10:11

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
m	1	45.31	10.31	4.5724E+02	17.9	6.7798E+03	2.4334E+00	18.6	1.0
B			10.28	4.6336E+02	9.2				
m	2	54.84	12.70	9.2641E+02	41.4	6.1789E+03	3.7746E+00	41.7	1.0
B			13.00	1.2197E+03	3.6				
m	3	56.39	13.09	8.7467E+02	43.3	6.0861E+03	3.4294E+00	43.6	1.0
B			13.00	1.2197E+03	3.6				
m	4	68.06	16.03	1.6318E+03	10.8	5.4253E+03	4.9408E+00	11.9	1.0
B			15.91	8.7388E+02	18.4				
B			16.42	1.0959E+03	14.7				
m	5	70.39	16.61	4.8281E+02	35.7	5.3020E+03	1.3963E+00	36.0	1.0
B			16.42	1.0959E+03	14.7				
M	6	80.65	19.19	3.9338E+02	14.4	4.7932E+03	9.4598E-01	15.2	1.0
B			18.91	2.7083E+02	12.0				
B			19.76	2.6374E+02	11.7				
m	8	189.55	46.59	1.7678E+03	3.6	3.9975E+03	1.3698E+00	6.2	1.2
B			46.61	1.8364E+02	8.7				
m	9	201.70	49.64	2.1001E+02	24.2	4.1366E+03	1.5004E-01	24.7	1.2
B			49.32	4.8325E+01	20.6				
M	10	216.09	53.26	5.1279E+02	11.4	4.4496E+03	3.3487E-01	12.4	1.2
B			53.44	8.3701E+01	15.3				
	11	256.34	63.38	3.5887E+03	1.8	6.0859E+03	1.9028E+00	5.3	.7
B			63.35	9.2105E+02	2.9				
m	12	273.16	67.60	3.1041E+02	22.5	6.4538E+03	1.5373E-01	23.0	1.1
	13	294.36	72.93	1.1881E+03	6.6	6.5315E+03	5.4307E-01	8.3	1.1
	14	301.55	74.74	6.3745E+03	35.2	6.3722E+03	2.8394E+00	35.5	1.1
B			75.03	1.8060E+02	9.2				
m	15	302.59	75.00	9.0287E+03	24.5	6.3412E+03	4.0068E+00	25.0	1.1
B			75.03	1.8060E+02	9.2				
m	16	309.76	76.80	2.2045E+03	51.3	6.0738E+03	9.5406E-01	51.6	1.1
B			77.17	1.6775E+02	10.3				
m	17	311.33	77.19	2.2441E+04	5.1	6.0026E+03	9.6597E+00	7.1	1.1
B			77.17	1.6775E+02	10.3				
m	18	320.26	79.44	4.9528E+02	14.0	5.5103E+03	2.0683E-01	14.9	1.1
M	19	327.24	81.19	7.8201E+02	10.1	5.0221E+03	3.1913E-01	11.2	1.1
m	20	337.61	83.79	1.7907E+03	14.0	5.0354E+03	7.0677E-01	14.8	2.4
B			84.45	1.4321E+02	9.3				
m	21	340.33	84.48	1.9160E+03	13.5	5.0427E+03	7.4977E-01	14.4	2.4
B			84.45	1.4321E+02	9.3				
m	22	350.25	86.97	3.8065E+03	12.8	5.0359E+03	1.4445E+00	13.7	2.4
B			87.22	9.5010E+01	12.4				
m	23	352.31	87.49	5.4513E+03	9.0	5.0278E+03	2.0557E+00	10.2	2.4
B			87.22	9.5010E+01	12.4				
m	24	362.29	89.99	5.2295E+03	2.7	4.9550E+03	1.9475E+00	5.5	2.4
m	25	372.71	92.61	5.2363E+03	4.2	4.8210E+03	1.9351E+00	6.4	2.4
B			92.52	9.6822E+02	9.2				
B			93.03	4.7534E+02	18.2				
M	26	375.76	93.37	5.0186E+03	4.2	4.7707E+03	1.8506E+00	6.4	2.4
B			93.03	4.7534E+02	18.2				
m	27	395.96	98.45	4.3146E+02	20.8	4.0151E+03	1.5686E-01	21.4	1.6
M	28	400.56	99.60	1.3236E+03	18.6	3.9606E+03	4.7971E-01	19.2	1.6
m	29	421.70	104.91	6.0068E+02	14.1	4.0218E+03	2.1470E-01	14.8	1.1
	30	424.94	105.73	1.1600E+03	7.5	4.0203E+03	4.1378E-01	8.8	1.1
	31	435.93	108.49	4.1402E+02	15.2	4.0058E+03	1.4666E-01	15.8	1.1

m	32	439.01	109.26	3.4832E+02	16.5	3.9991E+03	1.2316E-01	17.1	1.1
m	33	453.60	112.92	4.7601E+02	11.0	3.9514E+03	1.6683E-01	11.8	1.1
M	34	462.95	115.27	7.6373E+02	7.1	3.9069E+03	2.6619E-01	8.3	1.1
	35	518.13	129.10	2.3897E+03	2.5	4.2938E+03	8.1939E-01	5.0	.8
	36	576.80	143.82	8.7884E+02	8.4	4.0488E+03	3.1116E-01	9.5	1.7
B			143.67	1.1999E+02	12.7				
	37	617.56	154.06	1.0789E+03	5.9	3.9102E+03	3.9885E-01	7.4	.9
	38	744.75	186.01	6.7507E+03	2.3	3.8229E+03	2.8127E+00	5.2	3.4
B			185.79	7.0402E+02	3.2				
	39	797.60	199.28	3.1936E+02	14.0	3.2801E+03	1.3905E-01	14.8	.9
m	40	822.33	205.49	2.0164E+02	16.7	3.2000E+03	8.9536E-02	17.4	1.1
B			205.30	5.7238E+01	24.7				
M	41	837.52	209.30	3.8035E+03	1.3	3.0929E+03	1.7089E+00	5.0	1.1
	42	864.43	216.06	4.0302E+02	9.9	2.9133E+03	1.8479E-01	11.1	1.0
m	43	943.98	236.03	5.8917E+02	6.0	2.7828E+03	2.8585E-01	7.9	.9
m	44	954.48	238.67	4.3513E+04	.3	2.6570E+03	2.1261E+01	5.1	.9
B			238.67	3.0191E+02	5.3				
m	45	963.94	241.04	4.0093E+03	1.7	2.4958E+03	1.9715E+00	5.4	.9
M	46	967.88	242.03	5.8510E+03	1.1	2.4153E+03	2.8846E+00	5.3	.9
m	47	1010.22	252.66	2.8160E+02	13.3	2.1150E+03	1.4270E-01	14.3	1.0
m	48	1025.12	256.40	2.5566E+02	13.8	2.0726E+03	1.3030E-01	14.7	1.0
M	49	1034.15	258.67	3.8115E+02	9.8	2.0540E+03	1.9418E-01	11.1	1.0
m	50	1079.07	269.94	1.5883E+03	14.8	2.1596E+03	8.0753E-01	15.5	1.2
M	51	1081.29	270.50	1.7275E+03	13.9	2.1636E+03	8.7823E-01	14.7	1.2
m	52	1098.69	274.87	2.3119E+02	21.4	2.0219E+03	1.1744E-01	21.9	1.2
M	53	1108.75	277.40	1.6655E+03	3.3	2.0000E+03	8.4567E-01	5.7	1.2
	54	1151.60	288.16	3.0774E+02	16.2	1.8710E+03	1.6029E-01	16.8	.7
	55	1179.86	295.26	1.2684E+04	.7	1.8571E+03	6.7386E+00	4.6	1.1
B			295.17	1.6573E+02	7.8				
	56	1199.31	300.14	2.6167E+03	1.5	1.7024E+03	1.4089E+00	4.7	1.3
	57	1310.31	328.02	2.0725E+03	2.2	1.6903E+03	1.1995E+00	5.0	1.0
	58	1351.42	338.34	8.8062E+03	5.7	1.4999E+03	5.2270E+00	7.2	1.3
	59	1362.01	341.00	3.3348E+02	28.2	1.4730E+03	1.9921E-01	28.6	1.3
	60	1405.63	351.96	2.1707E+04	.5	1.5952E+03	1.3305E+01	4.5	.9
B			352.03	2.9805E+02	6.1				
	61	1604.80	401.98	2.2035E+02	9.2	1.3510E+03	1.5029E-01	10.2	.9
	62	1634.86	409.52	1.1573E+03	3.6	1.2409E+03	8.0063E-01	5.7	.9
	63	1806.75	452.68	2.0738E+02	20.9	1.1099E+03	1.5491E-01	21.4	1.9
	64	1848.01	463.03	2.3217E+03	2.1	1.0927E+03	1.7646E+00	5.2	1.0
	65	1944.62	487.29	1.8832E+02	12.9	9.2958E+02	1.4883E-01	13.8	.5
m	66	2032.07	509.24	3.4707E+02	12.0	1.0898E+03	2.8370E-01	13.0	1.0
B	67	2038.14	510.77	4.0146E+03	2.0	1.1053E+03	3.2891E+00	5.4	1.0
B			510.34	3.5624E+02	7.8				
M	68	2043.16	512.02	2.9043E+02	17.5	1.0905E+03	2.3840E-01	18.2	1.0
B			511.57	4.7412E+02	7.1				
	69	2180.03	546.38	2.1992E+02	21.4	8.3099E+02	1.8942E-01	21.9	1.3
	70	2244.62	562.60	3.5365E+02	12.0	9.4267E+02	3.1127E-01	12.9	1.4
	71	2326.80	583.22	1.3330E+04	.7	8.6717E+02	1.2050E+01	4.7	1.0
B			583.34	1.0336E+02	9.4				
	72	2430.79	609.33	1.5834E+04	.6	7.8106E+02	1.4784E+01	4.6	1.0
B			609.34	2.1623E+02	5.6				
	73	2596.03	650.81	1.0072E+02	25.0	7.6536E+02	9.8742E-02	25.4	1.1
m	74	2639.29	661.67	3.1515E+03	1.4	7.9798E+02	3.1277E+00	4.6	1.0
M	75	2654.82	665.57	4.4435E+02	16.9	7.6560E+02	4.4397E-01	17.4	1.0
	76	2900.73	727.30	2.9696E+03	1.5	7.0460E+02	3.2846E+00	4.6	1.3
B			727.05	5.8665E+01	13.4				
	77	3012.10	755.26	4.4370E+02	5.9	6.3276E+02	5.1246E-01	7.3	.6
m	78	3044.03	763.27	2.4363E+02	10.1	6.7139E+02	2.8481E-01	11.0	.9
m	79	3055.73	766.21	1.8649E+02	14.1	6.4275E+02	2.1897E-01	14.8	.9
	80	3064.36	768.37	1.4659E+03	2.6	6.3338E+02	1.7269E+00	5.1	.9

M	81	3079.93	772.28	6.2498E+02	4.6	6.4185E+02	7.4053E-01	6.3	.9
m	82	3119.49	782.22	2.0709E+02	5.7	6.3997E+02	2.4900E-01	7.2	1.3
M	83	3133.36	785.70	6.8869E+02	1.8	6.3018E+02	8.3228E-01	4.8	1.3
	84	3170.34	794.98	1.4943E+03	2.5	6.0455E+02	1.8303E+00	5.1	1.1
	85	3215.14	806.23	3.2398E+02	6.7	5.7379E+02	4.0329E-01	8.0	.6
m	86	3311.77	830.48	2.0772E+02	9.9	5.9819E+02	2.6750E-01	10.8	.8
m	87	3332.69	835.74	5.7791E+02	4.6	6.0393E+02	7.4964E-01	6.4	.8
m	88	3345.92	839.06	1.7943E+02	15.1	5.8693E+02	2.3380E-01	15.7	.8
M	89	3351.13	840.37	2.5375E+02	10.7	5.7581E+02	3.3125E-01	11.6	.8
	90	3431.77	860.61	1.6067E+03	1.9	5.6538E+02	2.1554E+00	4.9	.7
	91	3605.58	904.24	2.4438E+02	8.9	5.5872E+02	3.4590E-01	10.0	.8
	92	3633.42	911.23	9.0894E+03	.5	5.4461E+02	1.2935E+01	4.5	.9
	93	3724.41	934.07	6.8439E+02	6.1	5.2473E+02	9.9110E-01	7.6	2.1
m	94	3846.73	964.77	1.6844E+03	1.5	5.3728E+02	2.4955E+00	4.7	.9
M	95	3863.53	968.99	5.1842E+03	.9	5.1800E+02	7.7041E+00	4.6	.9
	96	3991.18	1001.02	3.5098E+02	6.0	4.7672E+02	5.3367E-01	7.5	.6
B			1001.07	7.0890E+01	17.5				
	97	4301.21	1078.84	2.1973E+02	6.4	5.1398E+02	3.5219E-01	7.8	.4
	98	4363.56	1094.49	1.0860E+02	21.1	5.7411E+02	1.7584E-01	21.6	1.0
	99	4427.07	1110.43	1.5119E+02	20.5	5.2453E+02	2.4731E-01	21.0	1.3
	100	4466.74	1120.39	3.0972E+03	1.7	6.3063E+02	5.0983E+00	4.7	1.3
B			1120.31	5.2112E+01	17.1				
	101	4605.64	1155.25	3.4920E+02	7.0	6.2768E+02	5.8736E-01	8.2	.8
	102	4936.26	1238.22	1.2348E+03	2.6	7.5216E+02	2.1735E+00	5.1	.9
	103	4971.77	1247.13	1.4404E+02	15.3	6.0233E+02	2.5469E-01	15.9	.9
	104	5106.56	1280.95	2.2918E+02	9.9	4.8341E+02	4.1225E-01	10.8	1.2
	105	5492.49	1377.76	8.2989E+02	3.2	2.4889E+02	1.5788E+00	5.4	1.1
	106	5522.81	1385.37	1.7030E+02	17.0	2.2900E+02	3.2562E-01	17.6	1.2
m	107	5587.13	1401.50	2.3144E+02	8.0	2.5453E+02	4.4726E-01	9.1	1.2
M	108	5612.99	1407.98	4.2834E+02	5.1	2.6228E+02	8.3128E-01	6.7	1.2
	109	5823.68	1460.82	2.4050E+04	.5	2.4418E+02	4.8283E+01	4.3	1.3
			1460.76	2.6941E+02	4.8				
	110	5963.43	1495.86	2.4378E+02	7.9	1.4110E+02	5.0019E-01	9.0	1.1
m	111	6016.50	1509.17	3.9437E+02	5.6	1.3733E+02	8.1581E-01	7.1	1.0
M	112	6031.17	1512.85	1.2703E+02	14.7	1.3966E+02	2.6337E-01	15.3	1.0
	113	6153.20	1543.45	1.0164E+02	17.3	1.4605E+02	2.1466E-01	17.8	1.4
m	114	6312.14	1583.31	6.9591E+01	15.3	2.3047E+02	1.5045E-01	15.9	1.1
m	115	6331.35	1588.13	6.9419E+02	3.6	1.8208E+02	1.5050E+00	5.6	1.1
m	116	6349.05	1592.57	4.6467E+02	4.5	1.5091E+02	1.0100E+00	6.2	1.1
M	117	6376.68	1599.50	6.2607E+01	24.7	1.2806E+02	1.3662E-01	25.1	1.1
	118	6460.94	1620.63	4.0359E+02	4.3	1.1762E+02	8.9143E-01	6.1	.9
	119	6500.58	1630.57	3.8056E+02	5.0	9.3813E+01	8.4530E-01	6.6	1.1
	120	6530.66	1638.11	1.3131E+02	12.6	8.7442E+01	2.9291E-01	13.3	1.8
	121	6622.98	1661.26	1.9029E+02	7.5	9.6722E+01	4.3000E-01	8.7	.9
	122	6895.44	1729.59	5.5834E+02	2.9	9.5212E+01	1.3093E+00	5.2	.7
	123	7034.66	1764.50	2.6582E+03	15.7	1.0255E+02	6.3491E+00	16.3	1.0
B			1764.42	5.9809E+01	6.9				
	125	7365.67	1847.51	3.7216E+02	3.8	8.5625E+01	9.2728E-01	5.8	.9

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

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These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
4	68.1	16.03	2.295E+00 +- 31.80%
6	80.7	19.19	2.947E-01 +- 53.42%
13	294.4	72.93	5.431E-01 +- 8.25%
14	301.5	74.74	2.759E+00 +- 36.52%
15	302.6	75.00	3.927E+00 +- 25.49%
16	309.8	76.80	8.815E-01 +- 55.78%
17	311.3	77.19	9.587E+00 +- 7.14%
18	320.3	79.44	2.068E-01 +- 14.88%
19	327.2	81.19	3.191E-01 +- 11.23%
20	337.6	83.79	6.502E-01 +- 15.97%
21	340.3	84.48	6.937E-01 +- 15.43%
22	350.2	86.97	1.408E+00 +- 13.99%
23	352.3	87.49	2.020E+00 +- 10.38%
24	362.3	89.99	1.947E+00 +- 5.55%
25	372.7	92.61	1.577E+00 +- 7.35%
26	375.8	93.37	1.675E+00 +- 6.98%
27	396.0	98.45	1.569E-01 +- 21.37%
28	400.6	99.60	4.797E-01 +- 19.20%
29	421.7	104.91	2.147E-01 +- 14.83%
30	424.9	105.73	4.138E-01 +- 8.80%
31	435.9	108.49	1.467E-01 +- 15.82%
32	439.0	109.26	1.232E-01 +- 17.09%
36	576.8	143.82	2.687E-01 +- 10.90%
39	797.6	199.28	1.391E-01 +- 14.81%
40	822.3	205.49	6.412E-02 +- 25.73%
47	1010.2	252.66	1.427E-01 +- 14.26%
50	1079.1	269.94	8.075E-01 +- 15.54%
51	1081.3	270.50	8.782E-01 +- 14.75%
54	1151.6	288.16	1.603E-01 +- 16.80%
56	1199.3	300.14	1.409E+00 +- 4.75%
58	1351.4	338.34	5.227E+00 +- 7.24%
59	1362.0	341.00	1.992E-01 +- 28.58%
66	2032.1	509.24	2.837E-01 +- 13.00%
67	2038.1	510.77	2.997E+00 +- 5.49%
69	2180.0	546.38	1.894E-01 +- 21.92%
70	2244.6	562.60	3.113E-01 +- 12.88%
73	2596.0	650.81	9.874E-02 +- 25.38%
76	2900.7	727.30	3.220E+00 +- 4.65%
79	3055.7	766.21	2.190E-01 +- 14.77%
80	3064.4	768.37	1.727E+00 +- 5.10%
83	3133.4	785.70	8.323E-01 +- 4.78%
84	3170.3	794.98	1.830E+00 +- 5.08%
86	3311.8	830.48	2.675E-01 +- 10.83%
94	3846.7	964.77	2.495E+00 +- 4.70%
99	4427.1	1110.43	2.473E-01 +- 20.97%
108	5613.0	1407.98	8.313E-01 +- 6.71%
116	6349.0	1592.57	1.010E+00 +- 6.24%

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	109	5823.68	1460.82	100.00%
CS-137	74	2639.29	661.67	100.00%
Tl-208T	53	1108.75	277.40	113.31%
	71	2326.80	583.22	106.04%
	78	3044.03	763.27	88.00%
	90	3431.77	860.61	82.08%
	98	4363.56	1094.49	31.86%
Pb-210U	8	189.55	46.59	100.00%
Pb-212T	34	462.95	115.27	104.69%
	44	954.48	238.67	98.08%
Pb-214U	10	216.09	53.26	138.32%
	46	967.88	242.03	91.25%
	49	1034.15	258.67	99.80%
	52	1098.69	274.87	96.01%
	55	1179.86	295.26	101.85%
	60	1405.63	351.96	99.62%
	65	1944.62	487.29	104.17%
	88	3345.92	839.06	88.92%
Bi-212T	55	1179.86	295.26	101.85%
	57	1310.31	328.02	4.16%
	63	1806.75	452.68	80.60%
	97	4301.21	1078.84	98.25%
	112	6031.17	1512.85	77.21%
	118	6460.94	1620.63	110.05%
Bi-214U	72	2430.79	609.33	110.15%
	74	2639.29	661.67	100.00%
	75	2654.82	665.57	122.69%
	85	3215.14	806.23	106.12%
	93	3724.41	934.07	111.29%
	100	4466.74	1120.39	104.57%
	101	4605.64	1155.25	100.28%
	102	4936.26	1238.22	94.86%
	104	5106.56	1280.95	124.61%
	105	5492.49	1377.76	88.74%
	106	5522.81	1385.37	83.10%
	107	5587.13	1401.50	108.00%
	111	6016.50	1509.17	93.64%
	113	6153.20	1543.45	57.44%
	114	6312.14	1583.31	166.18%
	117	6376.68	1599.50	85.25%
	121	6622.98	1661.26	93.21%
	122	6895.44	1729.59	81.11%
	123	7034.66	1764.50	89.40%
	125	7365.67	1847.51	79.79%
Rn-219A	61	1604.80	401.98	100.00%
Ra-224T	45	963.94	241.04	100.00%

C Ra-226U	38	744.75	186.01	
Ac-228T	35	518.13	129.10	138.73%
	37	617.56	154.06	96.50%
	41	837.52	209.30	103.40%
	62	1634.86	409.52	108.24%
	64	1848.01	463.03	102.05%
	77	3012.10	755.26	83.46%
	81	3079.93	772.28	85.11%
	82	3119.49	782.22	84.97%
	87	3332.69	835.74	94.28%
	89	3351.13	840.37	115.52%
	91	3605.58	904.24	97.61%
	92	3633.42	911.23	87.01%
	95	3863.53	968.99	87.95%
	103	4971.77	1247.13	86.17%
	110	5963.43	1495.86	81.47%
	115	6331.35	1588.13	95.72%
	119	6500.58	1630.57	89.48%
	120	6530.66	1638.11	71.85%
Th-227A	9	201.70	49.64	165.17%
	33	453.60	112.92	66.33%
	37	617.56	154.06	96.50%
	43	943.98	236.03	87.95%
	48	1025.12	256.40	117.14%
Th-228T	42	864.43	216.06	100.00%
Th-230U	12	273.16	67.60	100.00%
Th-234U	11	256.34	63.38	104.15%
	33	453.60	112.92	66.33%
Pa-234mU	96	3991.18	1001.02	100.00%
C U-235	38	744.75	186.01	

Flags: C = check; nuclide is a part of an underdetermined solution

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7						
1	65	477.59	487.29	-9.70	0.000E+00	5.050E-02

						5.050E-02
NA-22						
1	104	1274.54	1280.95	-6.41	0.000E+00	8.284E-03

						8.284E-03
K-40						
1	109	1460.75	1460.82	-.07	1.807E+01	8.122E-02

						8.122E-02
MN-54						
1	87	834.81	835.74	-.93	0.000E+00	8.372E-03

						8.372E-03
CO-57						
1	34	122.06	115.27	6.79	0.000E+00	5.051E-03
?	35	136.43	129.10	7.33	0.000E+00	4.174E-02

						5.051E-03
CO-58						
1	85	810.75	806.23	4.52	0.000E+00	6.445E-03
2	90	863.94	860.61	3.33	0.000E+00	9.453E-01

						6.445E-03
CO-60						
1	101	1173.23	1155.25	17.98	0.000E+00	8.683E-03
2	105	1332.51	1377.76	-45.25	0.000E+00	7.167E-03

						7.167E-03
ZN-65						
1	100	1115.52	1120.39	-4.87	0.000E+00	1.643E-02

						1.643E-02
NB-94						
1	76	702.50	727.30	-24.80	0.000E+00	6.557E-03
2	90	871.10	860.61	10.49	0.000E+00	6.285E-03

						6.285E-03
SB-125						
	38	176.29	186.01	-9.72	0.000E+00	7.466E-02

2	62	427.95	409.52	18.43	0.000E+00	1.764E-02
3	64	463.51	463.03	.48	7.072E-01	4.766E-02
4	72	600.77	609.33	-8.56	0.000E+00	2.954E-02
5	73	636.15	650.81	-14.66	0.000E+00	4.919E-02

						1.764E-02

I-131

1	18	80.18	79.44	.74	0.000E+00	2.529E-01
2	54	284.29	288.16	-3.87	0.000E+00	7.875E-02
3	60	364.48	351.96	12.52	0.000E+00	5.836E-03
4	73	636.97	650.81	-13.84	0.000E+00	7.388E-02
5	76	722.89	727.30	-4.41	0.000E+00	3.453E-01

						5.836E-03

CS-134

1	70	563.26	562.60	.66	1.489E-01	6.127E-02
2	70	569.29	562.60	6.69	0.000E+00	3.577E-02
3	72	604.66	609.33	-4.67	0.000E+00	5.524E-03
4	84	795.76	794.98	.78	0.000E+00	1.154E-02
5	85	801.84	806.23	-4.39	0.000E+00	6.852E-02

						5.524E-03

CS-136

1	38	176.56	186.01	-9.45	0.000E+00	3.525E-02
2	59	340.57	341.00	-.43	1.725E-02	9.376E-03
3	86	818.50	830.48	-11.98	0.000E+00	6.228E-03
4	97	1048.07	1078.84	-30.77	0.000E+00	9.204E-03
5	102	1235.34	1238.22	-2.88	0.000E+00	5.103E-02

						6.228E-03

CS-137

1	74	661.64	661.67	-.03	1.480E-01	6.297E-03

						6.297E-03

BA-133

1	19	81.01	81.19	-.18	3.911E-02	1.662E-02
2	53	276.29	277.40	-1.11	0.000E+00	7.221E-02
3	56	302.71	300.14	2.57	0.000E+00	2.470E-02
4	60	355.86	351.96	3.90	0.000E+00	7.628E-03
5	61	383.70	401.98	-18.28	0.000E+00	5.720E-02

						7.628E-03

EU-152

1	34	121.78	115.27	6.51	0.000E+00	1.480E-02
2	59	344.30	341.00	3.30	0.000E+00	1.830E-02
3	94	964.00	964.77	-.77	0.000E+00	8.666E-02
4	99	1112.07	1110.43	1.64	0.000E+00	5.852E-02
5	108	1408.08	1407.98	.10	1.569E-01	2.859E-02

						1.480E-02

EU-154

1	35	123.07	129.10	-6.03	0.000E+00	1.072E-02
2	76	723.30	727.30	-4.00	0.000E+00	3.108E-02

3	90	873.20	860.61	12.59	0.000E+00	5.765E-02
4	96	1004.80	1001.02	3.78	0.000E+00	4.026E-02
5	104	1274.80	1280.95	-6.15	0.000E+00	2.326E-02

						1.072E-02

IR-192

1	55	295.95	295.26	.69	8.988E-01	1.502E-02
2	56	308.44	300.14	8.30	0.000E+00	1.421E-02
3	57	316.49	328.02	-11.53	0.000E+00	5.235E-03
4	64	468.06	463.03	5.03	0.000E+00	9.494E-03
5	72	612.45	609.33	3.12	0.000E+00	9.535E-02

						5.235E-03

Tl-208T

1	15	74.97	75.00	-.03	4.586E+00	1.922E-01
2	53	277.36	277.40	-.04	5.209E-01	6.591E-02
3	67	510.72	510.77	-.05	5.853E-01	2.632E-02
4	71	583.14	583.22	-.08	5.610E-01	6.212E-03
5	90	860.47	860.61	-.14	7.190E-01	5.071E-02

						6.212E-03

Tl-210U

1	27	97.00	98.45	-1.45	0.000E+00	1.200E-01
2	55	296.00	295.26	.74	0.000E+00	1.365E-02
3	84	795.00	794.98	.02	7.329E-02	5.742E-03

						5.742E-03

b-210U

1	8	46.52	46.59	-.07	1.374E+00	2.358E-01

						2.358E-01

Pb-211A

1	18	79.29	79.44	-.15	2.677E+00	1.881E+00
2	61	404.80	401.98	2.82	0.000E+00	1.796E-01
3	62	427.10	409.52	17.58	0.000E+00	3.638E-01
4	79	766.20	766.21	-.01	1.754E+00	1.134E+00
5	86	831.80	830.48	1.32	0.000E+00	2.522E-01

						1.796E-01

Pb-212T

1	14	74.81	74.74	.07	1.183E+00	7.038E-02
2	17	77.11	77.19	-.08	2.213E+00	3.629E-02
3	22	87.20	86.97	.23	9.155E-01	8.078E-02
4	44	238.63	238.67	-.04	1.975E+00	1.161E-02
5	56	300.09	300.14	-.05	1.725E+00	1.283E-01

						1.161E-02

Pb-214U

1	14	74.81	74.74	.07	1.794E+00	1.067E-01
2	17	77.11	77.19	-.08	3.619E+00	5.936E-02
3	46	241.92	242.03	-.11	1.546E+00	6.110E-02
4	55	295.92	295.26	.66	1.408E+00	2.352E-02
5	60	351.99	351.96	.03	1.436E+00	1.357E-02

1.357E-02

-211A

1	13	72.87	72.93	-.06	1.814E+00	5.780E-01
2	60	351.10	351.96	-.86	0.000E+00	1.207E-01
3	61	404.80	401.98	2.82	0.000E+00	1.314E-01
4	62	426.90	409.52	17.38	0.000E+00	2.698E-01
5	86	831.80	830.48	1.32	0.000E+00	2.140E-01

1.207E-01

Bi-212T

1	7	39.86	39.78	.08	0.000E+00	1.186E+00
2	76	727.17	727.30	-.13	1.114E+00	4.924E-02
3	83	785.42	785.70	-.28	1.666E+00	2.889E-01
4	97	1078.62	1078.84	-.22	1.454E+00	7.155E-01
5	118	1620.56	1620.63	-.07	1.298E+00	1.709E-01

4.924E-02

Bi-214U

1	72	609.30	609.33	-.03	1.284E+00	1.213E-02
2	80	768.36	768.37	-.01	1.415E+00	1.156E-01
3	100	1120.28	1120.39	-.11	1.357E+00	5.444E-02
4	102	1238.11	1238.22	-.11	1.471E+00	1.552E-01
5	123	1764.51	1764.50	.01	1.597E+00	3.723E-02

1.213E-02

Bi-214Uw

1	52	273.70	274.87	-1.17	0.000E+00	2.683E+00
2	61	405.74	401.98	3.76	0.000E+00	3.253E+00
3	86	821.18	830.48	-9.30	0.000E+00	4.295E+00
4	97	1069.96	1078.84	-8.88	0.000E+00	2.647E+00
5	116	1594.73	1592.57	2.16	0.000E+00	2.962E+00

2.647E+00

Po-210U

1	85	803.00	806.23	-3.23	0.000E+00	5.507E+02
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5.507E+02

Po-211A

1	70	570.00	562.60	7.40	0.000E+00	1.079E+00
2	91	900.00	904.24	-4.24	0.000E+00	1.421E+00

1.079E+00

Po-212mT

1	70	570.00	562.60	7.40	0.000E+00	2.698E-01
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2.698E-01

Po-214U

1	84	799.00	794.98	4.02	0.000E+00	4.277E+01
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4.277E+01

po-215A

1	63	438.80	452.68	-13.88	0.000E+00	1.232E+01

						1.232E+01
Rn-219A						
1	16	76.86	76.80	.06	7.484E+00	1.257E+00
2	18	79.29	79.44	-.15	9.649E-01	6.779E-01
3	24	89.60	89.99	-.39	2.692E+01	1.699E+00
4	51	271.23	270.50	.73	0.000E+00	6.085E-02
5	61	401.78	401.98	-.20	9.114E-02	7.183E-02

						6.085E-02
Rn-220T						
1	69	549.70	546.38	3.32	0.000E+00	5.403E+00

						5.403E+00
Rn-222U						
1	66	510.00	509.24	.76	0.000E+00	1.320E+01

						1.320E+01
Fr-223A						
1	9	50.80	49.64	1.16	0.000E+00	2.661E-02
2	18	80.00	79.44	.56	8.220E-02	5.775E-02
3	19	81.52	81.19	.33	1.674E-01	7.114E-02
4	23	88.60	87.49	1.11	0.000E+00	8.331E-02
5	43	234.60	236.03	-1.43	0.000E+00	1.486E-01

						2.661E-02
Ra-223A						
1	20	83.78	83.79	-.01	1.137E-01	2.142E-02
2	36	144.30	143.82	.48	3.853E-01	1.329E-01
3	37	154.30	154.06	.24	2.865E-01	7.795E-02
4	50	269.60	269.94	-.34	2.378E-01	3.276E-02
5	63	445.50	452.68	-7.18	0.000E+00	3.309E-01

						2.142E-02
Ra-224T						
1	19	81.07	81.19	-.12	1.066E+01	4.532E+00
2	20	83.78	83.79	-.01	1.348E+01	2.540E+00
3	26	94.70	93.37	1.33	0.000E+00	6.869E+00
4	27	97.60	98.45	-.85	0.000E+00	2.132E+01
5	45	241.00	241.04	-.04	2.024E+00	1.187E-01

						1.187E-01
Ra-226U						
1	19	81.07	81.19	-.12	7.528E+00	3.199E+00
2	20	83.78	83.79	-.01	9.130E+00	1.720E+00
3	26	94.70	93.37	1.33	0.000E+00	4.996E+00
4	27	97.60	98.45	-.85	0.000E+00	1.635E+01
5	38	185.99	186.01	-.02	3.433E+00	1.605E-01

						1.605E-01

-227A

1	19	81.08	81.19	-.11	1.828E+03	7.769E+02
2	20	83.96	83.79	.17	1.278E+02	2.408E+01
3	23	87.50	87.49	.01	6.637E+02	4.086E+01
4	28	100.00	99.60	.40	6.053E+01	1.351E+01
5	37	160.40	154.06	6.34	0.000E+00	2.375E+01

						1.351E+01

Ac-228T

1	41	209.40	209.30	.10	1.503E+00	1.033E-01
2	58	338.40	338.34	.06	1.743E+00	3.619E-02
3	92	911.07	911.23	-.16	1.786E+00	2.186E-02
4	95	968.90	968.99	-.09	1.767E+00	3.700E-02
5	115	1587.90	1588.13	-.23	1.623E+00	1.531E-01

						2.186E-02

Ac-228Tw

1	39	199.50	199.28	.22	1.588E+00	1.338E+00
2	53	279.00	277.40	1.60	0.000E+00	2.029E+00
3	57	321.70	328.02	-6.32	0.000E+00	1.905E+00
4	66	503.70	509.24	-5.54	0.000E+00	2.368E+00
5	96	988.10	1001.02	-12.92	0.000E+00	3.771E+00

						1.338E+00

Th-227A

1	9	50.20	49.64	.56	6.968E-02	1.007E-01
2	23	88.48	87.49	.99	0.000E+00	2.324E-01
3	43	236.00	236.03	-.03	1.022E-01	4.302E-02
4	48	256.25	256.40	-.15	7.673E-02	6.436E-02
5	57	329.82	328.02	1.80	0.000E+00	1.790E-01

						4.302E-02

Th-228T

1	21	84.40	84.48	-.08	2.525E+00	4.450E-01
2	35	131.62	129.10	2.52	0.000E+00	4.065E+00
3	42	215.94	216.06	-.12	2.709E+00	1.706E+00

						4.450E-01

Th-230U

1	12	67.73	67.60	.13	1.617E+00	1.960E+00

						1.960E+00

Th-231A

1	6	26.64	19.19	7.45	0.000E+00	1.163E-01
2	21	84.21	84.48	-.27	3.765E-01	6.635E-02
3	24	89.95	89.99	-.04	6.239E+00	3.938E-01
4	26	95.87	93.37	2.50	0.000E+00	6.412E-01
5	37	163.12	154.06	9.06	0.000E+00	3.272E+00

						6.635E-02

Th-232

1	11	59.00	63.38	-4.38	0.000E+00	4.626E+00

						4.626E+00

Th-234U

1	11	63.29	63.38	-.09	1.956E+00	2.137E-01
2	25	92.38	92.61	-.23	3.017E+00	1.966E-01
3	25	92.80	92.61	.19	2.581E+00	1.682E-01
4	33	112.81	112.92	-.11	2.683E+00	1.663E+00
5	38	184.80	186.01	-1.21	0.000E+00	5.694E+01

1.682E-01

Pa-231A

1	6	27.36	19.19	8.17	0.000E+00	2.230E-01
2	54	283.67	288.16	-4.49	0.000E+00	2.877E-01
3	56	300.08	300.14	-.06	2.452E+00	1.824E-01
4	56	302.67	300.14	2.53	0.000E+00	1.999E-01
5	57	330.07	328.02	2.05	0.000E+00	3.729E-01

1.824E-01

Pa-234U

1	26	94.67	93.37	1.30	0.000E+00	3.546E-02
2	27	98.44	98.45	-.01	2.502E-02	1.725E-02
3	35	131.28	129.10	2.18	0.000E+00	2.283E-02
4	93	926.70	934.07	-7.37	0.000E+00	4.278E-02
5	93	946.00	934.07	11.93	0.000E+00	3.529E-02

1.725E-02

Pa-234mU

1	26	94.66	93.37	1.29	0.000E+00	4.738E+00
2	27	98.44	98.45	-.01	3.341E+00	2.303E+00
3	77	743.00	755.26	-12.26	0.000E+00	1.123E+01
4	79	766.60	766.21	.39	4.238E+00	2.741E+00
5	96	1001.03	1001.02	.01	2.529E+00	8.037E-01

8.037E-01

U-234U

1	10	53.10	53.26	-.16	1.141E+01	7.027E+00
2	24	89.96	89.99	-.03	3.899E+03	2.461E+02
3	26	93.35	93.37	-.02	1.853E+03	1.254E+02
4	29	105.00	104.91	.09	5.730E+02	2.840E+02

7.027E+00

U-235

1	26	93.35	93.37	-.02	2.964E+00	2.006E-01
2	32	109.14	109.26	-.12	3.288E-01	2.802E-01
3	36	143.76	143.82	-.06	1.186E-01	4.090E-02
4	37	163.35	154.06	9.29	0.000E+00	1.074E-01
5	38	185.72	186.01	-.29	2.084E-01	9.742E-03
6	39	202.12	199.28	2.84	0.000E+00	4.924E-01
7	40	205.31	205.49	-.18	7.624E-02	1.014E-01

9.742E-03

U-238

1	8	48.00	46.59	1.41	0.000E+00	1.325E+01
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1.325E+01

Am-241

1
2

6
11

26.36
59.54

19.19
63.38

7.17
-3.84

0.000E+00
0.000E+00

8.847E-01
2.415E-02

2.415E-02



GAMMA SPECTRUM ANALYSIS REPORT

FOR ENV95102

Rockwell Int'l/ Rocketdyne Environmental Lab T100

Sample description: AREA IV HSPOT T100(K10), ENV950102, 8/10/95

Spectrum file name: ENV95102

Sample identifier : MCGINNIS

Sample size : 6.770E+02 g

Measured by : FCD

Date of Activity Calculation : 10-Aug-1995 at 10:31:46

Collect started on : 10-Aug-1995 at 10:31:46

Collect ended on : 10-Aug-1995 at 12:28:39

Decay time : 0 years 0 days 0 hours 0 minutes

Live time: 7.000E+03 s real time: 7.013E+03 s dead time: .19 %

Calibration Files

Shape calibration requested : CM010495

Shape calibration used : CM010495

Created : 5-Jan-1995 9:39:36

Modified : 5-Jan-1995 10:13:15

Energy calibration requested : CM010495

Energy calibration used : CM010495

Created : 5-Jan-1995 9:39: 3

Modified : 5-Jan-1995 9:48:50

Efficiency calibration requested : CM010495

Efficiency calibration used : CM010495

Created : 5-Jan-1995 9:38:20

Modified : 5-Jan-1995 9:49:53

Last search discrimination level: 3.00

Last search FROM channel 12 TO channel 8180

Last fitting discrimination level: 1.64

Last fit FROM channel 1 TO channel 8192

Identification energy tolerance : .70

Minimum intensity conv. factor : 10.00

Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF

with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1A.ILF

3

MDA energy tolerance: .70 keV

MDA decision limit 1-alpha: 95.00 %

MDA detection limit 1-beta: 95.00 %

Peaked background file: C:\SAMPO\SPECTRA\BM020895.PTF

Energy tolerance for peaked background subtraction: .70 keV

Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:

RPG/HPS

Date: 8/18/95

0.41 pCi/g Cs-137
4 pCi/g Nat Uranium
1.4 pCi/g Nat Thorium

Spectrum file: ENV95102

Date: 10-Aug-1995

Time: 12:28:39

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9994	5.526E+00	+- 4.62%	5.526E+00	0.000E+00
2	CS-137	.9991	4.038E-01	+- 4.74%	4.038E-01	0.000E+00
3	Tl-208T	.9868	3.870E-01	+- 4.12%	3.870E-01	0.000E+00
4	Pb-210U	.9999	2.901E+00	+- 8.00%	2.901E+00	0.000E+00
5	Pb-212T	.9983	1.332E+00	+- 5.31%	1.332E+00	0.000E+00
6	Pb-214U	.8723	4.142E+00	+- 2.68%	4.142E+00	0.000E+00
7	Bi-214U	.9146	3.947E+00	+- 1.71%	3.947E+00	0.000E+00
8	Rn-219A	.9887	2.756E-01	+- 13.23%	2.756E-01	0.000E+00
9	Ra-223A	.9819	3.219E-01	+- 22.85%	3.219E-01	0.000E+00
10	Ra-224T	.9965	1.465E+00	+- 9.07%	1.465E+00	0.000E+00
C 11	Ra-226U	.9998	7.508E+00	+- 5.07%	7.508E+00	0.000E+00
12	Ac-228T	.9374	1.051E+00	+- 3.01%	1.051E+00	0.000E+00
13	Th-227A	.9055	2.511E-01	+- 11.54%	2.511E-01	0.000E+00
14	Th-234U	.9921	3.478E+00	+- 6.24%	3.478E+00	0.000E+00
15	Pa-234mU	.9941	4.260E+00	+- 21.17%	4.260E+00	0.000E+00
C 16	U-235	.9859	4.560E-01	+- 5.07%	4.560E-01	0.000E+00
			-----		-----	-----
			3.770E+01		3.770E+01	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95102

Date: 10-Aug-1995

Time: 12:28:39

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	55.30	.14	12.85	.11	4.8
2	68.01	.16	16.05	.11	4.7
3	189.34	.09	46.54	.10	9.0
4	215.67	.14	53.16	.11	3.9
5	256.04	.06	63.30	.10	13.1
6	302.01	.04	74.85	.10	24.4
7	311.00	.03	77.10	.10	32.2
8	320.04	.26	79.37	.12	4.7
9	326.96	.26	81.11	.12	4.9
10	338.63	.11	84.04	.10	8.1
11	349.95	.20	86.88	.11	1000000.0
12	352.08	.12	87.42	.10	13.7
13	362.02	.09	89.91	.10	11.0
14	371.85	.19	92.38	.11	1000000.0
15	374.18	.18	92.97	.11	14.6
16	452.48	.19	112.62	.11	3.8
17	517.72	.13	128.97	.11	4.5
18	576.48	.11	143.70	.10	5.7
19	617.53	.25	154.02	.12	3.9
20	667.91	.19	166.68	.11	3.9
21	744.84	.06	185.97	.10	18.6
22	837.32	.13	209.16	.11	6.1
23	943.74	.48	235.85	.16	1000000.0
24	946.36	1.03	236.50	.28	3.6
25	954.49	.02	238.54	.10	33.6
26	963.80	.16	240.88	.11	1000000.0
27	968.00	.04	241.93	.10	23.4
28	1024.23	.26	256.03	.12	3.3
29	1079.55	.71	269.96	.20	.0
30	1109.58	.33	277.52	.13	3.4
31	1179.97	.01	295.20	.10	39.9
32	1199.57	.12	300.12	.10	6.7
33	1310.84	.13	328.06	.11	5.6
34	1351.62	.05	338.29	.10	14.5
35	1405.78	.01	351.89	.10	51.4
36	1553.04	.33	388.87	.13	4.9
37	1603.60	.19	401.56	.11	4.0
38	1634.29	.27	409.26	.12	3.3
39	1848.58	.18	463.04	.11	5.4
40	2038.31	.10	510.65	.10	8.3
41	2327.24	.04	583.15	.10	18.9
42	2431.26	.03	609.25	.10	44.4
43	2639.79	.05	661.58	.10	18.3
44	2654.97	.15	665.39	.11	7.4
45	2805.43	3.60	703.15	.91	4.6
46	2901.26	.17	727.20	.11	8.1
47	3064.68	.10	768.21	.10	12.7
48	3134.29	.15	785.68	.11	6.2
49	3170.79	.19	794.84	.11	5.1
50	3215.57	.29	806.07	.12	4.7
51	3274.64	.40	820.90	.14	3.4
52	3333.72	.46	835.72	.15	4.0
53	3347.93	.66	839.29	.19	1000000.0



54	3431.61	.25	860.29	.12	4.6
55	3634.17	.09	911.12	.10	14.3
56	3725.51	.08	934.04	.10	8.3
57	3847.22	.18	964.58	.11	6.1
58	3864.34	.10	968.87	.10	11.5
59	3991.86	.31	1000.87	.13	4.6
60	4467.46	.07	1120.20	.10	19.6
61	4606.69	.21	1155.14	.11	6.0
62	4937.33	.13	1238.08	.11	10.9
63	5108.54	.29	1281.03	.12	3.8
64	5493.22	.06	1377.50	.10	9.8
65	5525.27	.35	1385.54	.13	3.5
66	5588.17	.28	1401.31	.12	3.9
67	5614.07	.22	1407.80	.11	6.1
68	5800.82	.65	1454.62	.19	.0
69	5825.07	.04	1460.70	.10	17.4
70	6018.65	.24	1509.23	.12	5.7
71	6134.47	.45	1538.27	.15	3.1
72	6332.50	.58	1587.91	.18	3.1
73	6350.09	.81	1592.32	.23	.0
74	6503.44	.38	1630.77	.14	4.2
75	6625.66	.30	1661.41	.13	3.9
76	6896.84	.16	1729.39	.11	8.0
77	7036.19	.10	1764.33	.10	17.3
78	7367.27	.30	1847.33	.13	6.5



Spectrum file: ENV95102

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***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
m	1	55.30	12.85	3.2436E+02	9.8	1.6686E+03	9.7426E+00	11.0	1.1
B			12.98	1.3240E+03	4.8				
M	2	68.01	16.05	3.4210E+02	9.3	1.4888E+03	7.6947E+00	10.6	1.1
B			16.08	1.2469E+03	****				
B			16.56	5.7536E+02	****				
	3	189.34	46.54	5.3325E+02	6.0	1.0841E+03	2.9973E+00	7.8	1.0
B			46.49	1.1493E+02	14.2				
	4	215.67	53.16	2.2994E+02	9.3	1.2208E+03	1.0870E+00	10.6	.6
	5	256.04	63.30	9.9891E+02	3.7	1.5728E+03	3.8131E+00	6.2	.9
B			63.30	9.6575E+02	3.0				
m	6	302.01	74.85	2.8253E+03	2.2	1.8604E+03	8.9990E+00	5.4	1.5
B			74.94	1.1184E+02	16.3				
m	7	311.00	77.10	4.6950E+03	1.6	1.7300E+03	1.4482E+01	5.2	1.5
B			77.12	1.3439E+02	14.1				
m	8	320.04	79.37	2.0981E+02	9.0	1.6202E+03	6.2720E-01	10.3	1.5
m	9	326.96	81.11	1.9857E+02	9.1	1.5506E+03	5.7984E-01	10.4	1.5
m	10	338.63	84.04	7.5907E+02	5.2	1.4623E+03	2.1332E+00	7.2	1.5
B			84.45	1.4322E+02	12.1				
m	11	349.95	86.88	7.1781E+02	11.7	1.4117E+03	1.9460E+00	12.7	1.5
B			87.27	9.4966E+01	17.3				
m	12	352.08	87.42	1.0176E+03	9.2	1.4061E+03	2.7405E+00	10.4	1.5
B			87.27	9.4966E+01	17.3				
m	13	362.02	89.91	9.4217E+02	4.5	1.3946E+03	2.5036E+00	6.7	1.5
	14	371.85	92.38	1.0166E+03	13.3	1.4095E+03	2.6814E+00	14.1	1.5
B			92.35	7.6132E+02	12.4				
B			92.88	7.5406E+02	12.7				
M	15	374.18	92.97	1.1208E+03	12.1	1.4170E+03	2.9512E+00	13.0	1.5
B			92.35	7.6132E+02	12.4				
B			92.88	7.5406E+02	12.7				
	16	452.48	112.62	1.7066E+02	14.4	1.1140E+03	4.2649E-01	15.0	.6
B			112.55	7.4286E+01	18.7				
	17	517.72	128.97	2.5369E+02	12.0	1.1725E+03	6.1967E-01	12.7	1.4
	18	576.48	143.70	3.3578E+02	6.3	1.1493E+03	8.4634E-01	7.7	.5
B			143.73	2.0238E+02	8.1				
	19	617.53	154.02	2.7195E+02	13.6	1.1211E+03	7.1572E-01	14.3	1.5
	20	667.91	166.68	1.2767E+02	26.0	9.6811E+02	3.5287E-01	26.4	1.4
	21	744.84	185.97	2.1848E+03	1.8	1.1643E+03	6.4430E+00	5.0	2.4
B			185.69	6.6545E+02	3.6				
	22	837.32	209.16	3.4477E+02	7.1	8.8266E+02	1.0900E+00	8.6	.8
m	23	943.74	235.85	1.7699E+02	29.9	7.2807E+02	6.0077E-01	30.3	.7
m	24	946.36	236.50	8.6316E+01	59.2	7.0477E+02	2.9348E-01	59.5	.7
m	25	954.49	238.54	4.2496E+03	1.2	6.5119E+02	1.4522E+01	5.3	.7
B			238.49	3.0014E+02	5.3				
m	26	963.80	240.88	4.1634E+02	7.4	6.2501E+02	1.4310E+00	9.1	.7
M	27	968.00	241.93	2.3799E+03	1.8	6.2552E+02	8.2011E+00	5.5	.7
	28	1024.23	256.03	1.2155E+02	11.7	6.4763E+02	4.3242E-01	12.8	1.1
	30	1109.58	277.52	1.7171E+02	11.4	5.7504E+02	6.1903E-01	12.3	.8
	31	1179.97	295.20	5.2909E+03	1.3	4.5262E+02	1.9955E+01	4.7	1.6
	32	1199.57	300.12	2.9570E+02	6.1	5.0735E+02	1.1299E+00	7.6	.8
	33	1310.84	328.06	1.6369E+02	11.8	4.9376E+02	6.7114E-01	12.6	1.2
	34	1351.62	338.29	8.3365E+02	3.1	4.8112E+02	3.5022E+00	5.5	1.0
	35	1405.78	351.89	8.4916E+03	.8	4.6727E+02	3.6803E+01	4.5	1.1
B			351.89	7.3573E+01	13.7				



	36	1553.04	388.87	1.1129E+02	19.5	3.7059E+02	5.2204E-01	20.0	2.0
	37	1603.60	401.56	9.4571E+01	12.5	3.9251E+02	4.5557E-01	13.2	.6
	38	1634.29	409.26	1.1467E+02	13.8	3.7711E+02	5.6126E-01	14.5	.7
	39	1848.58	463.04	1.9449E+02	8.0	3.0552E+02	1.0561E+00	9.4	1.0
	40	2038.31	510.65	3.8487E+02	5.6	3.4287E+02	2.2691E+00	7.5	1.0
B			510.62	0.0000E+00	.0				
	41	2327.24	583.15	1.2717E+03	1.3	1.8409E+02	8.2547E+00	4.9	.8
B			583.00	9.7827E+01	11.3				
	42	2431.26	609.25	6.2496E+03	1.4	1.8031E+02	4.1864E+01	4.8	2.0
m	43	2639.79	661.58	1.2103E+03	1.9	1.5720E+02	8.6017E+00	4.7	.9
M	44	2654.97	665.39	1.8244E+02	6.7	1.5005E+02	1.3051E+00	7.9	.9
	45	2805.43	703.15	9.7580E+01	17.8	1.4132E+02	7.4335E-01	18.4	1.2
	46	2901.26	727.20	3.1410E+02	5.0	1.3874E+02	2.4862E+00	6.6	1.0
	47	3064.68	768.21	5.5426E+02	4.7	1.6285E+02	4.6700E+00	6.5	1.8
	48	3134.29	785.68	1.4232E+02	7.1	1.6147E+02	1.2302E+00	8.4	.8
	49	3170.79	794.84	1.6893E+02	7.5	1.1537E+02	1.4796E+00	8.7	.8
	50	3215.57	806.07	1.3139E+02	11.4	1.1948E+02	1.1694E+00	12.2	1.3
	51	3274.64	820.90	5.7524E+01	19.1	1.0600E+02	5.2270E-01	19.6	1.3
m	52	3333.72	835.72	6.0453E+01	20.6	1.3013E+02	5.6063E-01	21.0	1.6
M	53	3347.93	839.29	9.1180E+01	12.9	1.0869E+02	8.4970E-01	13.7	1.6
	54	3431.61	860.29	1.3704E+02	8.9	1.1917E+02	1.3135E+00	9.9	1.1
	55	3634.17	911.12	8.2336E+02	2.7	1.6444E+02	8.3672E+00	5.3	1.2
	56	3725.51	934.04	2.9218E+02	5.0	1.1507E+02	3.0187E+00	6.7	.9
m	57	3847.22	964.58	1.8811E+02	6.7	1.2534E+02	1.9854E+00	8.1	1.0
M	58	3864.34	968.87	5.0922E+02	3.6	1.3690E+02	5.3904E+00	5.7	1.0
	59	3991.86	1000.87	9.0566E+01	19.0	9.1390E+01	9.7960E-01	19.5	1.5
B			1000.90	5.1426E+01	11.6				
	60	4467.46	1120.20	1.3113E+03	1.9	1.1082E+02	1.5285E+01	4.8	.7
	61	4606.69	1155.14	1.6654E+02	6.6	1.0795E+02	1.9812E+00	7.9	.8
	62	4937.33	1238.08	4.5533E+02	4.5	9.6342E+01	5.7214E+00	6.2	1.4
	63	5108.54	1281.03	9.9204E+01	6.9	1.0378E+02	1.2821E+00	8.1	.6
	64	5493.22	1377.50	3.1049E+02	3.1	5.3021E+01	4.2711E+00	5.3	.8
	65	5525.27	1385.54	7.4335E+01	10.9	6.9490E+01	1.0280E+00	11.8	.8
m	66	5588.17	1401.31	9.5464E+01	9.3	7.6335E+01	1.3337E+00	10.3	.9
M	67	5614.07	1407.80	1.7680E+02	6.2	7.1282E+01	2.4803E+00	7.5	.9
m	68	5800.82	1454.62	2.8879E+01	20.2	3.2552E+01	4.1726E-01	20.7	1.0
M	69	5825.07	1460.70	1.0554E+03	1.6	5.4890E+01	1.5306E+01	4.6	1.0
B			1460.45	2.4458E+02	5.6				
	70	6018.65	1509.23	1.5150E+02	6.2	7.9720E+01	2.2629E+00	7.6	.7
	71	6134.47	1538.27	4.8171E+01	11.3	5.9996E+01	7.3199E-01	12.1	.6
m	72	6332.50	1587.91	4.0876E+01	17.2	5.9533E+01	6.3918E-01	17.7	.9
M	73	6350.09	1592.32	2.3651E+01	20.1	7.5935E+01	3.7076E-01	20.5	.9
	74	6503.44	1630.77	4.9758E+01	11.2	3.1183E+01	7.9699E-01	12.0	.6
B			1631.03	2.7915E+01	27.2				
	75	6625.66	1661.41	5.3343E+01	9.2	3.2718E+01	8.6886E-01	10.1	.4
	76	6896.84	1729.39	2.0117E+02	4.7	2.3915E+01	3.3973E+00	6.4	.7
	77	7036.19	1764.33	9.8560E+02	3.3	2.3388E+01	1.6948E+01	5.4	.5
	78	7367.27	1847.33	1.4692E+02	9.6	2.8561E+01	2.6332E+00	10.6	.3

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
B = background peak - will be subtracted from the peak above.

Spectrum file: ENV95102

Date: 10-Aug-1995

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These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	55.3	12.85	4.175E+00 +- 24.18%
6	302.0	74.85	8.949E+00 +- 5.45%
7	311.0	77.10	1.442E+01 +- 5.21%
8	320.0	79.37	6.272E-01 +- 10.28%
9	327.0	81.11	5.798E-01 +- 10.39%
10	338.6	84.04	2.077E+00 +- 7.32%
11	350.0	86.88	1.910E+00 +- 12.93%
12	352.1	87.42	2.705E+00 +- 10.52%
13	362.0	89.91	2.504E+00 +- 6.68%
14	371.9	92.38	2.400E+00 +- 15.66%
15	374.2	92.97	2.671E+00 +- 14.29%
18	576.5	143.70	7.749E-01 +- 8.21%
20	667.9	166.68	3.529E-01 +- 26.37%
24	946.4	236.50	2.935E-01 +- 59.47%
32	1199.6	300.12	1.130E+00 +- 7.57%
33	1310.8	328.06	6.711E-01 +- 12.62%
34	1351.6	338.29	3.502E+00 +- 5.48%
40	2038.3	510.65	2.269E+00 +- 7.52%
45	2805.4	703.15	7.434E-01 +- 18.37%
46	2901.3	727.20	2.486E+00 +- 6.64%
47	3064.7	768.21	4.670E+00 +- 6.45%
48	3134.3	785.68	1.230E+00 +- 8.36%
49	3170.8	794.84	1.480E+00 +- 8.69%
51	3274.6	820.90	5.227E-01 +- 19.58%
57	3847.2	964.58	1.985E+00 +- 8.07%
67	5614.1	1407.80	2.480E+00 +- 7.55%
68	5800.8	1454.62	4.173E-01 +- 20.66%
73	6350.1	1592.32	3.708E-01 +- 20.52%

Spectrum file: ENV95102

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***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	69	5825.07	1460.70	100.00%
CS-137	43	2639.79	661.58	100.00%
Tl-208T	30	1109.58	277.52	101.79%
	41	2327.24	583.15	102.09%
	54	3431.61	860.29	88.56%
Pb-210U	3	189.34	46.54	100.00%
Pb-212T	25	954.49	238.54	100.00%
Pb-214U	4	215.67	53.16	105.00%
	27	968.00	241.93	94.51%
	31	1179.97	295.20	99.83%
	35	1405.78	351.89	104.72%
	53	3347.93	839.29	72.05%
Bi-214U	36	1553.04	388.87	78.18%
	42	2431.26	609.25	108.84%
	43	2639.79	661.58	100.00%
	44	2654.97	665.39	118.40%
	50	3215.57	806.07	103.82%
	56	3725.51	934.04	103.66%
	60	4467.46	1120.20	97.28%
	61	4606.69	1155.14	84.33%
	62	4937.33	1238.08	102.23%
	63	5108.54	1281.03	113.66%
	64	5493.22	1377.50	93.05%
	65	5525.27	1385.54	74.67%
	66	5588.17	1401.31	102.74%
	70	6018.65	1509.23	95.76%
	71	6134.47	1538.27	55.75%
	75	6625.66	1661.41	130.85%
	76	6896.84	1729.39	88.67%
	77	7036.19	1764.33	92.87%
	78	7367.27	1847.33	79.71%
Rn-219A	37	1603.60	401.56	100.00%
Ra-223A	19	617.53	154.02	100.00%
Ra-224T	26	963.80	240.88	100.00%
C Ra-226U	21	744.84	185.97	
Ac-228T	17	517.72	128.97	124.43%
	19	617.53	154.02	100.00%
	22	837.32	209.16	109.96%
	38	1634.29	409.26	104.73%
	39	1848.58	463.04	115.66%
	52	3333.72	835.72	85.50%

	55	3634.17	911.12	91.24%
	58	3864.34	968.87	85.27%
	72	6332.50	1587.91	152.88%
	74	6503.44	1630.77	69.86%
Th-227A	16	452.48	112.62	65.78%
	19	617.53	154.02	100.00%
	23	943.74	235.85	117.28%
	28	1024.23	256.03	98.93%
Th-234U	5	256.04	63.30	103.04%
	16	452.48	112.62	65.78%
Pa-234mU	59	3991.86	1000.87	100.00%
C U-235	21	744.84	185.97	

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95102

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***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7						
1	39	477.59	463.04	14.55	0.000E+00	1.898E-01
						1.898E-01
NA-22						
1	63	1274.54	1281.03	-6.49	0.000E+00	2.494E-02
						2.494E-02
K-40						
1	69	1460.75	1460.70	.05	5.711E+00	2.317E-01
						2.317E-01
CO-60						
1	61	1173.23	1155.14	18.09	0.000E+00	2.578E-02
2	64	1332.51	1377.50	-44.99	0.000E+00	2.390E-02
						2.390E-02
SB-125						
1	38	427.95	409.26	18.69	0.000E+00	6.941E-02
2	42	600.77	609.25	-8.48	0.000E+00	1.084E-01
						6.941E-02
CS-134						
1	42	604.66	609.25	-4.59	0.000E+00	2.017E-02
2	49	795.76	794.84	.92	0.000E+00	3.458E-02
						2.017E-02
CS-136						
1	51	818.50	820.90	-2.40	0.000E+00	2.295E-02
2	59	1048.07	1000.87	47.20	0.000E+00	3.242E-02
						2.295E-02
CS-137						
1	43	661.64	661.58	.06	4.058E-01	2.046E-02
						2.046E-02
BA-133						
1	2	30.97	16.05	14.92	0.000E+00	1.039E-01
2	35	355.86	351.89	3.97	0.000E+00	2.614E-02
						2.614E-02

J-152

1	17	121.78	128.97	-7.19	0.000E+00	5.965E-02
2	34	344.30	338.29	6.01	0.000E+00	6.656E-02
3	67	1408.08	1407.80	.28	4.669E-01	1.109E-01

						5.965E-02

EU-154

1	17	123.07	128.97	-5.90	0.000E+00	4.013E-02
2	63	1274.80	1281.03	-6.23	0.000E+00	7.225E-02

						4.013E-02

IR-192

1	32	308.44	300.12	8.32	0.000E+00	5.597E-02
2	33	316.49	328.06	-11.57	0.000E+00	1.981E-02
3	39	468.06	463.04	5.02	0.000E+00	3.704E-02

						1.981E-02

Tl-208T

1	30	277.36	277.52	-.16	3.802E-01	2.529E-01
2	41	583.14	583.15	-.01	3.832E-01	2.023E-02
3	54	860.47	860.29	.18	4.371E-01	1.706E-01

						2.023E-02

Tl-210U

1	49	795.00	794.84	.16	5.908E-02	1.842E-02

						1.842E-02

Po-210U

1	3	46.52	46.54	-.02	2.993E+00	8.785E-01

						8.785E-01

Pb-211A

1	37	404.80	401.56	3.24	0.000E+00	6.696E-01
2	52	831.80	835.72	-3.92	0.000E+00	8.654E-01

						6.696E-01

Pb-212T

1	25	238.63	238.54	.09	1.345E+00	3.912E-02
2	32	300.09	300.12	-.03	1.379E+00	5.013E-01

						3.912E-02

Pb-214U

1	31	295.92	295.20	.72	0.000E+00	2.769E-01
2	35	351.99	351.89	.10	3.961E+00	4.846E-02

						4.846E-02

Bi-211A

1	35	351.10	351.89	-.79	0.000E+00	6.072E-01
2	37	404.80	401.56	3.24	0.000E+00	4.900E-01
3	52	831.80	835.72	-3.92	0.000E+00	7.342E-01

						4.900E-01

Bi-212T						
	3	39.86	46.54	-6.68	0.000E+00	4.010E+00
	46	727.17	727.20	-.03	8.411E-01	1.540E-01
	3	74	1620.56	1630.77	-10.21	0.000E+00

						1.540E-01

Bi-214U						
	1	42	609.30	609.25	.05	3.626E+00
	2	60	1120.28	1120.20	.08	4.057E+00

						3.781E-02

Rn-219A						
	1	29	271.23	269.96	1.27	0.000E+00
	2	37	401.78	401.56	.22	2.757E-01

						2.272E-01

Rn-220T						
	1	41	549.70	583.15	-33.45	0.000E+00

						1.701E+01

Ra-223A						
	1	17	122.40	128.97	-6.57	0.000E+00
	2	18	144.30	143.70	.60	1.046E+00
	3	19	154.30	154.02	.28	5.126E-01
	4	29	269.60	269.96	-.36	0.000E+00

						1.647E-01

Ra-224T						
	1	26	241.00	240.88	.12	1.465E+00

						4.188E-01

Ra-226U						
	1	21	186.00	185.97	.03	7.843E+00

						5.923E-01

Ac-227A						
	1	20	160.40	166.68	-6.28	0.000E+00

						9.431E+01

Ac-228T						
	1	39	463.00	463.04	-.04	9.086E-01
	2	55	911.07	911.12	-.05	1.152E+00

						8.722E-02

Th-227A						
	1	23	236.00	235.85	.15	2.142E-01
	2	28	256.25	256.03	.22	2.539E-01

						1.552E-01

Rn-228T

1	17	131.62	128.97	2.65	0.000E+00	1.480E+01
2	22	215.94	209.16	6.78	0.000E+00	6.860E+00

						6.860E+00
Th-230U						
1	5	67.73	63.30	4.43	0.000E+00	8.174E+00

						8.174E+00
Th-231A						
1	2	26.64	16.05	10.59	0.000E+00	4.179E-01
2	5	58.57	63.30	-4.73	0.000E+00	5.593E+00
3	20	163.12	166.68	-3.56	0.000E+00	1.228E+01

						4.179E-01
Th-232						
1	5	59.00	63.30	-4.30	0.000E+00	1.665E+01

						1.665E+01
Th-234U						
1	5	63.29	63.30	-.01	3.904E+00	7.490E-01
2	16	112.81	112.62	.19	6.835E+00	6.342E+00

						7.490E-01
Pa-231A						
1	30	283.67	277.52	6.15	0.000E+00	1.100E+00
2	32	302.67	300.12	2.55	0.000E+00	7.744E-01

						7.744E-01
Pa-234mU						
1	59	1001.03	1000.87	.16	4.629E+00	2.461E+00

						2.461E+00
U-234U						
1	4	53.10	53.16	-.06	3.683E+01	2.646E+01

						2.646E+01
U-235						
1	16	105.00	112.62	-7.62	0.000E+00	1.846E+00
2	18	143.76	143.70	.06	3.219E-01	1.548E-01
3	20	163.35	166.68	-3.33	0.000E+00	3.862E-01
4	21	182.70	185.97	-3.27	0.000E+00	4.984E+00
5	21	185.72	185.97	-.25	4.760E-01	3.594E-02
6	21	194.94	185.97	8.97	0.000E+00	3.305E+00
7	22	202.12	209.16	-7.04	0.000E+00	1.902E+00
8	22	205.31	209.16	-3.85	0.000E+00	4.199E-01

						3.594E-02
Am-241						
1	2	26.36	16.05	10.31	0.000E+00	3.162E+00
2	5	59.54	63.30	-3.76	0.000E+00	8.673E-02

						8.673E-02



G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV95104

Rockwell Int'l/ Rocketdyne Environmental Lab T100

Sample description: AREA IV HSPOT T064 10KDPM SURF, ENV950104, 8/15/95
Spectrum file name: ENV95104
Sample identifier : PRITCHET
Sample size : 7.220E+02 g
Measured by : FCD

Date of Activity Calculation : 16-Aug-1995 at 11:14:28
Collect started on : 16-Aug-1995 at 11:14:28
Collect ended on : 16-Aug-1995 at 13:14: 6

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 7.000E+03 s real time: 7.178E+03 s dead time: 2.48 %

Calibration Files

Shape calibration requested : CM010495
Shape calibration used : CM010495
Created : 5-Jan-1995 9:39:36
Modified : 5-Jan-1995 10:13:15

Energy calibration requested : CM010495
Energy calibration used : CM010495
Created : 5-Jan-1995 9:39: 3
Modified : 5-Jan-1995 9:48:50

Efficiency calibration requested : CM010495
Efficiency calibration used : CM010495
Created : 5-Jan-1995 9:38:20
Modified : 5-Jan-1995 9:49:53

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1A.ILF
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

3

Peaked background file: C:\SAMPO\SPECTRA\BM020895.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:


RP&HPS

Date: 8/17/95

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number	nuclide	conf.value	----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9791	1.776E+01 +- 4.42%		1.776E+01	0.000E+00
2	CS-137	.9940	2.709E+02 +- 4.33%		2.709E+02	0.000E+00
3	Tl-208T	.9853	2.924E-01 +- 5.81%		2.924E-01	0.000E+00
4	Pb-212T	.9956	1.126E+00 +- 5.88%		1.126E+00	0.000E+00
5	Pb-214U	.9945	6.246E-01 +- 7.75%		6.246E-01	0.000E+00
6	Bi-214U	.8332	6.399E-01 +- 3.60%		6.399E-01	0.000E+00
C 7	Ra-226U	.9823	6.103E+00 +- 10.56%		6.103E+00	0.000E+00
8	Ac-228T	.8728	9.919E-01 +- 3.33%		9.919E-01	0.000E+00
C 9	U-235	1.0000	3.707E-01 +- 10.56%		3.707E-01	0.000E+00
			-----		-----	-----
			2.988E+02		2.988E+02	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	53.80	.18	12.48	.11	7.5
2	92.69	4.91	22.25	1.24	3.5
3	130.49	.30	31.75	.12	1000000.0
4	132.11	.11	32.16	.10	65.4
5	148.73	.10	36.34	.10	26.0
6	152.06	.61	37.17	.18	1000000.0
7	302.03	.11	74.85	.10	9.4
8	308.18	.75	76.40	.21	1000000.0
9	311.40	.19	77.20	.11	8.0
10	351.44	.25	87.26	.12	3.3
11	362.11	.21	89.94	.11	3.0
12	373.16	.16	92.71	.11	4.4
13	743.84	.15	185.72	.11	8.7
14	954.29	.04	238.49	.10	17.2
15	1179.79	.12	295.15	.10	4.3
16	1259.45	.73	315.16	.21	3.0
17	1279.63	1.87	320.22	.48	3.2
18	1351.60	.16	338.29	.11	5.2
19	1405.54	.11	351.83	.10	8.0
20	1635.02	.27	409.44	.12	4.4
21	2326.80	.15	583.04	.11	11.1
22	2430.82	.12	609.14	.10	10.7
23	2639.39	.01	661.48	.10	514.5
24	2900.87	.14	727.10	.11	7.4
25	3013.47	.38	755.35	.14	3.2
26	3065.29	.29	768.36	.12	3.8
27	3079.34	.29	771.89	.12	3.6
28	3170.73	.26	794.82	.12	6.2
29	3333.50	.30	835.67	.12	3.5
30	3431.39	.19	860.24	.11	4.9
31	3633.56	.05	910.97	.10	15.0
32	3724.38	.32	933.76	.13	3.1
33	3846.41	.22	964.38	.11	5.4
34	3863.87	.09	968.76	.10	10.4
35	4466.65	.17	1120.00	.11	7.2
36	4935.17	.40	1237.54	.14	4.1
37	5008.98	.35	1256.06	.13	.0
38	5492.59	.30	1377.35	.13	4.1
39	5824.06	.02	1460.45	.10	32.5
40	6331.48	.38	1587.65	.14	3.9
41	6353.00	.50	1593.05	.16	1000000.0
42	6499.69	.43	1629.83	.15	4.1
43	6531.04	.45	1637.69	.15	3.1
44	7035.20	.22	1764.08	.11	7.7

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	1	53.80	12.48	1.0318E+03	12.0	1.7057E+04	3.2215E+01	13.0	2.0
B			12.98	1.3240E+03	4.8				
	2	92.69	22.25	6.6402E+02	51.2	1.5721E+04	9.7599E+00	51.4	.5
m	3	130.49	31.75	7.3460E+03	29.8	1.6051E+04	6.7950E+01	30.2	2.0
M	4	132.11	32.16	1.9027E+04	13.4	1.5973E+04	1.7310E+02	14.3	2.0
m	5	148.73	36.34	6.7874E+03	12.5	1.4913E+04	5.2668E+01	13.5	.8
M	6	152.06	37.17	1.9286E+03	13.4	1.4750E+04	1.4528E+01	14.3	.8
m	7	302.03	74.85	1.7634E+03	7.6	1.4878E+04	5.6163E+00	9.1	1.3
B			74.94	1.1184E+02	16.3				
m	8	308.18	76.40	4.0994E+02	40.0	1.4804E+04	1.2771E+00	40.3	1.3
M	9	311.40	77.20	1.7605E+03	9.3	1.4861E+04	5.4226E+00	10.5	1.3
B			77.12	1.3439E+02	14.1				
m	10	351.44	87.26	6.2418E+02	12.8	1.6067E+04	1.6843E+00	13.7	.9
B			87.27	9.4966E+01	17.3				
m	11	362.11	89.94	5.1960E+02	14.9	1.6050E+04	1.3806E+00	15.7	.9
M	12	373.16	92.71	1.1607E+03	7.0	1.6001E+04	3.0585E+00	8.5	.9
B			92.35	7.6132E+02	12.4				
B			92.88	7.5406E+02	12.7				
	13	743.84	185.72	1.9080E+03	9.0	2.2258E+04	5.6225E+00	10.1	1.8
B			185.69	6.6545E+02	3.6				
	14	954.29	238.49	3.8369E+03	2.8	1.8184E+04	1.3110E+01	5.9	1.1
B			238.49	3.0014E+02	5.3				
	15	1179.79	295.15	6.2778E+02	13.1	1.5047E+04	2.3674E+00	13.9	.9
	16	1259.45	315.16	2.1015E+02	59.4	1.4733E+04	8.3470E-01	59.6	1.2
	17	1279.63	320.22	4.1240E+02	91.6	1.4260E+04	1.6588E+00	91.8	1.1
	18	1351.60	338.29	1.0178E+03	8.4	1.4326E+04	4.2756E+00	9.5	.7
	19	1405.54	351.83	1.4388E+03	6.3	1.4760E+04	6.2352E+00	7.7	.9
B			351.89	7.3573E+01	13.7				
	20	1635.02	409.44	4.7766E+02	14.6	1.6413E+04	2.3389E+00	15.3	.9
	21	2326.80	583.04	1.0404E+03	6.4	4.1659E+03	6.7525E+00	7.9	1.4
B			583.00	9.7827E+01	11.3				
	22	2430.82	609.14	1.1225E+03	4.3	3.4984E+03	7.5186E+00	6.3	1.2
	23	2639.39	661.48	8.6175E+05	.3	1.7650E+03	6.1241E+03	4.3	12.7
	24	2900.87	727.10	2.2104E+02	5.6	1.3574E+02	1.7493E+00	7.1	.8
	25	3013.47	755.35	5.5698E+01	17.2	8.8831E+01	4.6036E-01	17.7	1.2
m	26	3065.29	768.36	8.1242E+01	11.3	1.2726E+02	6.8466E-01	12.2	.7
M	27	3079.34	771.89	7.0061E+01	11.7	1.0763E+02	5.9353E-01	12.5	.7
	28	3170.73	794.82	1.3322E+02	12.5	8.2715E+01	1.1668E+00	13.3	1.5
	29	3333.50	835.67	5.9996E+01	13.1	8.8036E+01	5.5635E-01	13.8	.6
	30	3431.39	860.24	9.8752E+01	7.2	9.0345E+01	9.4646E-01	8.5	.6
	31	3633.56	910.97	7.3107E+02	1.7	8.3269E+01	7.4286E+00	4.8	.6
	32	3724.38	933.76	6.0275E+01	11.2	8.4219E+01	6.2260E-01	12.0	.6
m	33	3846.41	964.38	1.3355E+02	8.1	1.0116E+02	1.4094E+00	9.3	1.0
M	34	3863.87	968.76	4.2071E+02	4.0	1.0182E+02	4.4531E+00	6.0	1.0
	35	4466.65	1120.00	1.9330E+02	9.2	1.0913E+02	2.2529E+00	10.1	1.6
	36	4935.17	1237.54	7.4569E+01	14.7	1.1245E+02	9.3665E-01	15.3	1.1
	38	5492.59	1377.35	5.3592E+01	5.3	4.7943E+01	7.3715E-01	6.8	.6
	39	5824.06	1460.45	3.5355E+03	.9	4.8388E+01	5.1268E+01	4.4	.6
B			1460.45	2.4458E+02	5.6				
m	40	6331.48	1587.65	4.9366E+01	19.4	2.8833E+01	7.7184E-01	19.9	.5
	41	6353.00	1593.05	2.3909E+01	38.7	2.7082E+01	3.7495E-01	38.9	.5
	42	6499.69	1629.83	3.1403E+01	30.1	9.4990E+00	5.0272E-01	30.4	.3
	43	6531.04	1637.69	2.1672E+01	42.8	7.5266E+00	3.4846E-01	43.0	.2

44 7035.20 1764.08 1.7860E+02 8.8 1.1761E+01 3.0707E+00 9.8 .3

Flags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
= background peak - will be subtracted from the peak above.

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

These peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	53.8	12.48	2.643E+01 +- 15.51%
2	92.7	22.25	9.760E+00 +- 51.44%
3	130.5	31.75	6.795E+01 +- 30.19%
4	132.1	32.16	1.731E+02 +- 14.35%
5	148.7	36.34	5.267E+01 +- 13.49%
6	152.1	37.17	1.453E+01 +- 14.30%
7	302.0	74.85	5.566E+00 +- 9.12%
8	308.2	76.40	1.277E+00 +- 40.27%
9	311.4	77.20	5.365E+00 +- 10.61%
10	351.4	87.26	1.648E+00 +- 13.94%
11	362.1	89.94	1.381E+00 +- 15.67%
12	373.2	92.71	2.778E+00 +- 9.14%
15	1179.8	295.15	2.367E+00 +- 13.89%
16	1259.5	315.16	8.347E-01 +- 59.58%
17	1279.6	320.22	1.659E+00 +- 91.76%
18	1351.6	338.29	4.276E+00 +- 9.53%
24	2900.9	727.10	1.749E+00 +- 7.14%
26	3065.3	768.36	6.847E-01 +- 12.15%
28	3170.7	794.82	1.167E+00 +- 13.30%
33	3846.4	964.38	1.409E+00 +- 9.29%
41	6353.0	1593.05	3.750E-01 +- 38.92%

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	39	5824.06	1460.45	100.00%
CS-137	23	2639.39	661.48	100.00%
Tl-208T	21	2326.80	583.04	100.83%
	30	3431.39	860.24	99.05%
Pb-212T	14	954.29	238.49	100.00%
Pb-214U	19	1405.54	351.83	100.00%
Bi-214U	22	2430.82	609.14	104.78%
	23	2639.39	661.48	100.00%
	32	3724.38	933.76	86.89%
	35	4466.65	1120.00	114.11%
	36	4935.17	1237.54	107.96%
	38	5492.59	1377.35	93.22%
	44	7035.20	1764.08	88.62%
C Ra-226U	13	743.84	185.72	
Ac-228T	20	1635.02	409.44	25.30%
	25	3013.47	755.35	63.43%
	27	3079.34	771.89	72.50%
	29	3333.50	835.67	86.73%
	31	3633.56	910.97	103.44%
	34	3863.87	968.76	103.89%
	40	6331.48	1587.65	127.43%
	42	6499.69	1629.83	102.73%
	43	6531.04	1637.69	41.24%
C U-235	13	743.84	185.72	

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95104

Date: 16-Aug-1995

Time: 13:14: 6

***** M D A R E P O R T *****

peak #	spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7 1	20	477.59	409.44	68.15	0.000E+00	1.305E+00 ----- 1.305E+00
NA-22 1	37	1274.54	1256.06	18.48	0.000E+00	2.373E-02 ----- 2.373E-02
K-40 1	39	1460.75	1460.45	.30	1.794E+01	2.082E-01 ----- 2.082E-01
CO-60 1	35	1173.23	1120.00	53.23	0.000E+00	2.427E-02
2	38	1332.51	1377.35	-44.84	0.000E+00	1.995E-02 ----- 1.995E-02
CB-125 2	20 22	427.95 600.77	409.44 609.14	18.51 -8.37	0.000E+00 0.000E+00	4.281E-01 4.033E-01 ----- 4.033E-01
CS-134 1	22	604.66	609.14	-4.48	0.000E+00	7.364E-02
2	28	795.76	794.82	.94	0.000E+00	2.880E-02 ----- 2.880E-02
CS-136 1	29	818.50	835.67	-17.17	0.000E+00	1.734E-02
2	35	1048.07	1120.00	-71.93	0.000E+00	2.537E-02 ----- 1.734E-02
CS-137 1	23	661.64	661.48	.16	2.710E+02	6.230E-02 ----- 6.230E-02
BA-133 1	3	30.97	31.75	-.78	0.000E+00	5.149E-01
2	19	355.86	351.83	4.03	0.000E+00	1.564E-01 ----- 1.564E-01

1	12	121.78	92.71	29.07	0.000E+00	2.161E-01
2	18	344.30	338.29	6.01	0.000E+00	3.477E-01
	38	1408.08	1377.35	30.73	0.000E+00	1.110E-01

						1.110E-01
EU-154						
1	12	123.07	92.71	30.36	0.000E+00	1.486E-01
2	37	1274.80	1256.06	18.74	0.000E+00	6.649E-02

						6.649E-02
IR-192						
1	16	308.44	315.16	-6.72	0.000E+00	2.762E-01
2	16	316.49	315.16	1.33	0.000E+00	1.025E-01
3	20	468.06	409.44	58.62	0.000E+00	2.834E-01

						1.025E-01
Tl-208T						
1	15	277.36	295.15	-17.79	0.000E+00	1.248E+00
2	21	583.14	583.04	.10	2.940E-01	8.567E-02
3	30	860.47	860.24	.23	2.953E-01	1.403E-01

						8.567E-02
Tl-210U						
1	28	795.00	794.82	.18	4.369E-02	1.476E-02

						1.476E-02
Po-210U						
1	6	46.52	37.17	9.35	0.000E+00	2.975E+00

						2.975E+00
Pb-211A						
1	20	404.80	409.44	-4.64	0.000E+00	3.719E+00
2	29	831.80	835.67	-3.87	0.000E+00	6.127E-01

						6.127E-01
Pb-212T						
1	14	238.63	238.49	.14	1.139E+00	1.871E-01
2	15	300.09	295.15	4.94	0.000E+00	2.673E+00

						1.871E-01
Pb-214U						
1	15	295.92	295.15	.77	0.000E+00	4.546E-01
2	19	351.99	351.83	.16	6.293E-01	2.484E-01

						2.484E-01
Bi-211A						
1	19	351.10	351.83	-.73	0.000E+00	8.162E-01
2	20	404.80	409.44	-4.64	0.000E+00	2.721E+00
3	29	831.80	835.67	-3.87	0.000E+00	5.198E-01

						5.198E-01

Bi-212T

1	6	39.86	37.17	2.69	0.000E+00	1.337E+01
2	24	727.17	727.10	.07	5.550E-01	1.429E-01
3	42	1620.56	1629.83	-9.27	0.000E+00	6.884E-01

						1.429E-01

Bi-214U

1	22	609.30	609.14	.16	6.108E-01	1.512E-01
2	35	1120.28	1120.00	.28	5.608E-01	1.488E-01

						1.488E-01

Rn-219A

1	15	271.23	295.15	-23.92	0.000E+00	8.652E-01
2	20	401.78	409.44	-7.66	0.000E+00	1.669E+00

						8.652E-01

Rn-220T

1	21	549.70	583.04	-33.34	0.000E+00	8.215E+01

						8.215E+01

Ra-223A

1	12	122.40	92.71	29.69	0.000E+00	5.065E+00
2	13	144.30	185.72	-41.42	0.000E+00	1.976E+00
3	13	154.30	185.72	-31.42	0.000E+00	1.114E+00
4	15	269.60	295.15	-25.55	0.000E+00	6.034E-01

						6.034E-01

Ra-224T

1	14	241.00	238.49	2.51	0.000E+00	2.192E+00

						2.192E+00

Ra-226U

1	13	186.00	185.72	.28	6.422E+00	2.348E+00

						2.348E+00

Ac-227A

1	13	160.40	185.72	-25.32	0.000E+00	3.458E+02

						3.458E+02

Ac-228T

1	20	463.00	409.44	53.56	0.000E+00	3.031E+00
2	31	911.07	910.97	.10	9.590E-01	5.922E-02

						5.922E-02

Th-227A

1	14	236.00	238.49	-2.49	0.000E+00	7.524E-01
2	14	256.25	238.49	17.76	0.000E+00	1.230E+00

						7.524E-01

Th-228T

1	12	131.62	92.71	38.91	0.000E+00	5.344E+01
2	14	215.94	238.49	-22.55	0.000E+00	3.128E+01

						3.128E+01

Th-230U

1	7	67.73	74.85	-7.12	0.000E+00	2.120E+01

						2.120E+01

Th-231A

1	2	26.64	22.25	4.39	0.000E+00	1.383E+00
2	7	58.57	74.85	-16.28	0.000E+00	1.586E+01
3	13	163.12	185.72	-22.60	0.000E+00	4.323E+01

						1.383E+00

Th-232

1	7	59.00	74.85	-15.85	0.000E+00	4.638E+01

						4.638E+01

Th-234U

1	7	63.29	74.85	-11.56	0.000E+00	2.139E+00
2	12	112.81	92.71	20.10	0.000E+00	2.403E+01

						2.139E+00

Pa-231A

1	15	283.67	295.15	-11.48	0.000E+00	5.051E+00
2	15	302.67	295.15	7.52	0.000E+00	3.786E+00

						3.786E+00

Pa-234mU

1	34	1001.03	968.76	32.27	0.000E+00	2.860E+00

						2.860E+00

U-234U

1	6	53.10	37.17	15.93	0.000E+00	8.975E+01

						8.975E+01

U-235

1	12	105.00	92.71	12.29	0.000E+00	5.955E+00
2	13	143.76	185.72	-41.96	0.000E+00	5.800E-01
3	13	163.35	185.72	-22.37	0.000E+00	1.364E+00
4	13	182.70	185.72	-3.02	0.000E+00	1.890E+01
5	13	185.72	185.72	.00	3.898E-01	1.425E-01
6	13	194.94	185.72	9.22	0.000E+00	1.446E+01
7	13	202.12	185.72	16.40	0.000E+00	8.525E+00
8	13	205.31	185.72	19.59	0.000E+00	1.826E+00

						1.425E-01

Am-241

1	2	26.36	22.25	4.11	0.000E+00	1.047E+01
2	7	59.54	74.85	-15.31	0.000E+00	2.402E-01

						2.402E-01



G A M M A S P E C T R U M A N A L Y S I S R E P O R T

FOR ENV95105

Rockwell Int'l/ Rocketdyne Environmental Lab T100
Sample description: A4-SOIL HS GRID#R25 SURF, ENV950105, 8/30/95
Spectrum file name: ENV95105
Sample identifier : RSL61
Sample size : 4.890E+02 g
Measured by : FCD

Date of Activity Calculation : 30-Aug-1995 at 13:55:12
Collect started on : 30-Aug-1995 at 13:55:12
Collect ended on : 30-Aug-1995 at 15:53: 1

Decay time : 0 years 0 days 0 hours 0 minutes
Live time: 7.000E+03 s real time: 7.069E+03 s dead time: .98 %

Calibration Files

Shape calibration requested : CM010495
Shape calibration used : CM010495
Created : 5-Jan-1995 9:39:36
Modified : 5-Jan-1995 10:13:15

Energy calibration requested : CM010495
Energy calibration used : CM010495
Created : 5-Jan-1995 9:39: 3
Modified : 5-Jan-1995 9:48:50

Efficiency calibration requested : CM010495
Efficiency calibration used : CM010495
Created : 5-Jan-1995 9:38:20
Modified : 5-Jan-1995 9:49:53

Last search discrimination level: 3.00
Last search FROM channel 12 TO channel 8180
Last fitting discrimination level: 1.64
Last fit FROM channel 1 TO channel 8192
Identification energy tolerance : .70
Minimum intensity conv. factor : 10.00
Gamma reference library : C:\SAMPO\LIBRARY\LIBRARY.ILF
with 38 isotopes and 191 gamma lines.

MDA library name: C:\SAMPO\LIBRARY\MDALIB1A.ILF 3
MDA energy tolerance: .70 keV
MDA decision limit 1-alpha: 95.00 %
MDA detection limit 1-beta: 95.00 %

Peaked background file: C:\SAMPO\SPECTRA\BM020895.PTF
Energy tolerance for peaked background subtraction: .70 keV
Threshold factor for peak areas: 1.00

Report Reviewed and
Conforms to N0010P000028 By:


RE&HPS

Date: 9/18/95

Spectrum file: ENV95105

Date: 30-Aug-1995

Time: 15:53: 1

***** P E A K S E A R C H R E P O R T *****

peak no	centroid channel	error channel	energy keV	error keV	significance
1	54.10	.18	12.55	.11	6.2
2	129.95	.25	31.62	.12	1000000.0
3	132.06	.06	32.14	.10	37.1
4	148.84	.07	36.36	.10	14.1
5	152.25	.27	37.22	.12	1000000.0
6	256.52	.17	63.42	.11	3.4
7	302.10	.10	74.87	.10	9.5
8	311.15	.07	77.14	.10	13.1
9	351.42	.20	87.25	.11	4.7
10	373.77	.28	92.86	.12	3.9
11	740.24	.44	184.82	.15	1000000.0
12	745.23	.23	186.07	.12	3.8
13	954.40	.04	238.52	.10	22.5
14	1179.39	.17	295.05	.11	7.5
15	1324.82	.81	331.57	.23	3.8
16	1351.38	.15	338.23	.11	6.0
17	1405.50	.08	351.82	.10	11.9
18	1574.00	.37	394.13	.14	3.3
19	1795.35	.45	449.68	.15	3.8
20	2089.08	.64	523.39	.19	3.4
21	2326.58	.10	582.98	.10	11.8
22	2430.95	.06	609.17	.10	13.2
23	2639.27	.01	661.45	.10	326.2
	2900.75	.11	727.07	.10	8.0
	3080.56	.26	772.19	.12	3.8
26	3170.51	.18	794.77	.11	5.8
27	3216.70	.35	806.36	.13	3.3
28	3432.59	.15	860.54	.11	5.2
29	3633.40	.08	910.93	.10	14.0
30	3846.74	.20	964.46	.11	5.2
31	3863.51	.09	968.67	.10	11.3
32	4466.72	.11	1120.01	.10	7.9
33	5491.12	.36	1376.98	.13	3.7
34	5612.97	.36	1407.53	.14	3.7
35	5823.66	.03	1460.34	.10	30.6
36	6331.08	.36	1587.56	.13	3.7
37	6348.43	.56	1591.91	.17	3.1
38	6460.34	.49	1619.96	.16	3.2
39	7034.65	.23	1763.94	.12	7.8

Spectrum file: ENV95105

Date: 30-Aug-1995

Time: 15:53: 1

***** P E A K F I T R E P O R T *****

	peak no	centroid channel	energy keV	area counts	error %	background counts	intensity gps	error %	gfit
	1	54.10	12.55	5.5727E+02	12.4	6.9549E+03	1.7262E+01	13.4	1.3
B			12.98	1.3240E+03	4.8				
m	2	129.95	31.62	1.3196E+03	22.2	6.0333E+03	1.2274E+01	22.8	1.5
M	3	132.06	32.14	7.0590E+03	3.6	5.9799E+03	6.4254E+01	6.2	1.5
m	4	148.84	36.36	2.1309E+03	3.8	5.4144E+03	1.6519E+01	6.3	1.0
M	5	152.25	37.22	5.4586E+02	13.2	5.3854E+03	4.1052E+00	14.1	1.0
	6	256.52	63.42	3.1620E+02	12.7	5.3079E+03	1.2046E+00	13.6	.8
B			63.30	9.6575E+02	3.0				
m	7	302.10	74.87	1.1080E+03	5.1	5.7559E+03	3.5282E+00	7.1	1.1
B			74.94	1.1184E+02	16.3				
M	8	311.15	77.14	1.7160E+03	3.7	5.6984E+03	5.2903E+00	6.2	1.1
B			77.12	1.3439E+02	14.1				
	9	351.42	87.25	6.1647E+02	11.7	5.6190E+03	1.6636E+00	12.7	1.4
B			87.27	9.4966E+01	17.3				
	10	373.77	92.86	5.8274E+02	12.7	5.8604E+03	1.5349E+00	13.6	1.8
B			92.35	7.6132E+02	12.4				
B			92.88	7.5406E+02	12.7				
m	11	740.24	184.82	3.1207E+02	26.2	7.3225E+03	9.1694E-01	26.6	1.2
M	12	745.23	186.07	7.5279E+02	11.2	7.6718E+03	2.2207E+00	12.2	1.2
B			185.69	6.6545E+02	3.6				
	13	954.40	238.52	3.4531E+03	2.3	6.5980E+03	1.1800E+01	5.7	.9
B			238.49	3.0014E+02	5.3				
	14	1179.39	295.05	9.2526E+02	7.2	5.4381E+03	3.4883E+00	8.5	1.5
	15	1324.82	331.57	3.1075E+02	38.8	5.3698E+03	1.2849E+00	39.0	1.6
	16	1351.38	338.23	6.2767E+02	7.1	5.4512E+03	2.6365E+00	8.4	.7
	17	1405.50	351.82	1.4868E+03	3.4	5.5599E+03	6.4431E+00	5.6	.8
B			351.89	7.3573E+01	13.7				
	18	1574.00	394.13	3.2584E+02	27.9	5.7481E+03	1.5452E+00	28.2	1.5
	19	1795.35	449.68	2.9990E+02	22.2	7.7018E+03	1.5888E+00	22.6	1.5
	20	2089.08	523.39	1.5635E+02	34.1	2.8214E+03	9.3900E-01	34.5	2.1
	21	2326.58	582.98	8.7573E+02	3.1	1.6848E+03	5.6833E+00	5.6	.9
B			583.00	9.7827E+01	11.3				
	22	2430.95	609.17	1.1475E+03	2.8	1.3461E+03	7.6857E+00	5.4	.8
	23	2639.27	661.45	3.3936E+05	.2	6.9349E+02	2.4116E+03	4.3	9.3
	24	2900.75	727.07	1.8792E+02	7.5	1.3315E+02	1.4872E+00	8.7	.8
	25	3080.56	772.19	7.5174E+01	10.8	7.3965E+01	6.3713E-01	11.7	1.0
	26	3170.51	794.77	1.1954E+02	7.4	9.4889E+01	1.0469E+00	8.6	.7
	27	3216.70	806.36	3.8214E+01	16.2	6.1292E+01	3.4024E-01	16.8	.6
	28	3432.59	860.54	1.1737E+02	6.3	7.2613E+01	1.1254E+00	7.7	.6
	29	3633.40	910.93	6.9358E+02	3.0	6.8167E+01	7.0473E+00	5.4	1.1
m	30	3846.74	964.46	1.2554E+02	7.3	8.4593E+01	1.3249E+00	8.6	.7
M	31	3863.51	968.67	3.9554E+02	3.8	9.0073E+01	4.1864E+00	5.9	.7
	32	4466.72	1120.01	2.0967E+02	6.7	8.5450E+01	2.4438E+00	8.0	1.0
	33	5491.12	1376.98	4.0836E+01	13.1	3.8119E+01	5.6155E-01	13.8	.5
	34	5612.97	1407.53	4.1048E+01	10.9	2.2866E+01	5.7575E-01	11.7	.4
	35	5823.66	1460.34	3.0737E+03	1.1	3.0896E+01	4.4569E+01	4.5	.7
B			1460.45	2.4458E+02	5.6				
m	36	6331.08	1587.56	5.4437E+01	9.3	2.6742E+01	8.5107E-01	10.2	.6
M	37	6348.43	1591.91	2.7133E+01	13.0	2.2347E+01	4.2524E-01	13.7	.6
	38	6460.34	1619.96	2.8785E+01	31.4	1.7852E+01	4.5830E-01	31.7	.2
	39	7034.65	1763.94	1.6837E+02	10.5	2.5736E+01	2.8947E+00	11.3	.5

ags: m = a peak in a multiplet, M = last peak in a multiplet, ? = bad fit
 B = background peak - will be subtracted from the peak above.

Spectrum file: ENV95105

Date: 30-Aug-1995

Time: 15:53: 1

***** R A D I O N U C L I D E A N A L Y S I S R E P O R T *****

number nuclide conf.value			----- Activity (pCi/g) -----			
			measured		decay corrected	saturation
1	K-40	.9632	2.277E+01	+- 4.46%	2.277E+01	0.000E+00
2	CS-137	.9916	1.575E+02	+- 4.32%	1.575E+02	0.000E+00
3	Tl-208T	.9935	3.921E-01	+- 4.62%	3.921E-01	0.000E+00
4	Pb-212T	.9973	1.495E+00	+- 5.66%	1.495E+00	0.000E+00
5	Pb-214U	.9938	9.532E-01	+- 5.63%	9.532E-01	0.000E+00
6	Bi-212T	.9207	9.351E-01	+- 31.19%	9.351E-01	0.000E+00
7	Bi-214U	.8139	9.190E-01	+- 3.89%	9.190E-01	0.000E+00
C 8	Ra-226U	.9989	3.279E+00	+- 13.65%	3.279E+00	0.000E+00
9	Ac-228T	.9450	1.356E+00	+- 3.56%	1.356E+00	0.000E+00
10	Th-234U	.9959	9.785E-01	+- 22.77%	9.785E-01	0.000E+00
C 11	U-235	.9726	1.992E-01	+- 13.65%	1.992E-01	0.000E+00
			-----		-----	-----
			1.908E+02		1.908E+02	0.000E+00

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95105

Date: 30-Aug-1995

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7 e peaks were identified, but not used in the activity analysis:

number	channel	energy	peak intensity (gps)
1	54.1	12.55	1.152E+01 +- 19.47%
2	130.0	31.62	1.227E+01 +- 22.75%
3	132.1	32.14	6.425E+01 +- 6.21%
4	148.8	36.36	1.652E+01 +- 6.33%
5	152.2	37.22	4.105E+00 +- 14.14%
7	302.1	74.87	3.478E+00 +- 7.17%
8	311.1	77.14	5.232E+00 +- 6.24%
9	351.4	87.25	1.628E+00 +- 12.90%
10	373.8	92.86	1.254E+00 +- 16.56%
15	1324.8	331.57	1.285E+00 +- 39.02%
16	1351.4	338.23	2.636E+00 +- 8.37%
18	1574.0	394.13	1.545E+00 +- 28.24%
19	1795.4	449.68	1.589E+00 +- 22.65%
20	2089.1	523.39	9.390E-01 +- 34.48%
24	2900.8	727.07	1.487E+00 +- 8.68%
26	3170.5	794.77	1.047E+00 +- 8.60%
30	3846.7	964.46	1.325E+00 +- 8.56%
34	5613.0	1407.53	5.758E-01 +- 11.69%
37	6348.4	1591.91	4.252E-01 +- 13.66%

Spectrum file: ENV95105

Date: 30-Aug-1995

Time: 15:53: 1

***** P E A K A S S O C I A T I O N R E P O R T *****

nuclide	peak number	peak channel	peak energy	peak usage
K-40	35	5823.66	1460.34	100.00%
CS-137	23	2639.27	661.45	100.00%
Tl-208T	21	2326.58	582.98	109.05%
	28	3432.59	860.54	75.64%
Pb-212T	13	954.40	238.52	100.00%
Pb-214U	17	1405.50	351.82	100.00%
Bi-212T	14	1179.39	295.05	.11%
	38	6460.34	1619.96	101.53%
Bi-214U	22	2430.95	609.17	99.71%
	23	2639.27	661.45	100.00%
	27	3216.70	806.36	60.01%
	32	4466.72	1120.01	102.33%
	33	5491.12	1376.98	119.03%
	39	7034.65	1763.94	91.44%
C Ra-226U	12	745.23	186.07	
C-228T	11	740.24	184.82	2.92%
	25	3080.56	772.19	62.55%
	29	3633.40	910.93	100.98%
	31	3863.51	968.67	102.35%
	36	6331.08	1587.56	107.03%
Th-234U	6	256.52	63.42	100.14%
	11	740.24	184.82	2.92%
C U-235	12	745.23	186.07	

Flags: C = check; nuclide is a part of an underdetermined solution

Spectrum file: ENV95105

Date: 30-Aug-1995

Time: 15:53: 1

***** M D A R E P O R T *****

peak spectrum #	library energy keV	spectrum energy keV	energy diff. keV	full photopeak activity pCi/g	detection limit pCi/g
BE-7 1	19	477.59	449.68	27.91	0.000E+00
					1.178E+00
					1.178E+00
NA-22 1	33	1274.54	1376.98	-102.44	0.000E+00
					3.351E-02
					3.351E-02
K-40 1	35	1460.75	1460.34	.41	2.303E+01
					2.677E-01
					2.677E-01
CO-60 1	32	1173.23	1120.01	53.22	0.000E+00
2	33	1332.51	1376.98	-44.47	0.000E+00
					3.411E-02
					2.814E-02
					2.814E-02
SB-125 19		427.95	449.68	-21.73	0.000E+00
22		600.77	609.17	-8.40	0.000E+00
					3.923E-01
					3.766E-01
					3.766E-01
CS-134 1	22	604.66	609.17	-4.51	0.000E+00
2	26	795.76	794.77	.99	0.000E+00
					7.128E-02
					4.192E-02
					4.192E-02
CS-136 1	27	818.50	806.36	12.14	0.000E+00
2	32	1048.07	1120.01	-71.94	0.000E+00
					2.337E-02
					3.673E-02
					2.337E-02
CS-137 1	23	661.64	661.45	.19	1.576E+02
					5.812E-02
					5.812E-02
BA-133 1	2	30.97	31.62	-.65	1.108E+00
2	17	355.86	351.82	4.04	0.000E+00
					3.056E-01
					1.413E-01
					1.413E-01

1	10	121.78	92.86	28.92	0.000E+00	1.859E-01
2	16	344.30	338.23	6.07	0.000E+00	3.200E-01
3	34	1408.08	1407.53	.55	1.501E-01	9.121E-02

						9.121E-02
EU-154						
1	10	123.07	92.86	30.21	0.000E+00	1.291E-01
2	33	1274.80	1376.98	-102.18	0.000E+00	9.434E-02

						9.434E-02
IR-192						
1	14	308.44	295.05	13.39	0.000E+00	2.482E-01
2	15	316.49	331.57	-15.08	0.000E+00	9.345E-02
3	19	468.06	449.68	18.38	0.000E+00	2.602E-01

						9.345E-02
Tl-208T						
1	14	277.36	295.05	-17.69	0.000E+00	1.139E+00
2	21	583.14	582.98	.16	3.653E-01	8.096E-02
3	28	860.47	860.54	-.07	5.183E-01	1.870E-01

						8.096E-02
Tl-210U						
1	26	795.00	794.77	.23	5.788E-02	2.325E-02

						2.325E-02
-210U						
	5	46.52	37.22	9.30	0.000E+00	2.727E+00

						2.727E+00
Pb-211A						
1	18	404.80	394.13	10.67	0.000E+00	3.401E+00
2	27	831.80	806.36	25.44	0.000E+00	8.919E-01

						8.919E-01
Pb-212T						
1	13	238.63	238.52	.11	1.514E+00	1.671E-01
2	14	300.09	295.05	5.04	0.000E+00	2.418E+00

						1.671E-01
Pb-214U						
1	14	295.92	295.05	.87	0.000E+00	4.251E-01
2	17	351.99	351.82	.17	9.602E-01	2.258E-01

						2.258E-01
Bi-211A						
1	17	351.10	351.82	-.72	0.000E+00	7.896E-01
2	18	404.80	394.13	10.67	0.000E+00	2.489E+00
3	27	831.80	806.36	25.44	0.000E+00	7.568E-01

						7.568E-01

Bi-212T

1	5	39.86	37.22	2.64	0.000E+00	1.233E+01
24		727.17	727.07	.10	6.967E-01	2.090E-01
38		1620.56	1619.96	.60	9.214E-01	7.156E-01

						2.090E-01

Bi-214U

1	22	609.30	609.17	.13	9.218E-01	1.393E-01
2	32	1120.28	1120.01	.27	8.982E-01	1.958E-01

						1.393E-01

Rn-219A

1	14	271.23	295.05	-23.82	0.000E+00	7.838E-01
2	18	401.78	394.13	7.65	0.000E+00	1.520E+00

						7.838E-01

Rn-220T

1	20	549.70	523.39	26.31	0.000E+00	7.559E+01

						7.559E+01

Ra-223A

1	10	122.40	92.86	29.54	0.000E+00	4.350E+00
2	11	144.30	184.82	-40.52	0.000E+00	1.717E+00
3	11	154.30	184.82	-30.52	0.000E+00	9.754E-01
4	14	269.60	295.05	-25.45	0.000E+00	5.497E-01

						5.497E-01

Ra-224T

1	13	241.00	238.52	2.48	0.000E+00	1.997E+00

						1.997E+00

Ra-226U

1	12	186.00	186.07	-.07	3.741E+00	2.045E+00

						2.045E+00

Ac-227A

1	11	160.40	184.82	-24.42	0.000E+00	3.000E+02

						3.000E+02

Ac-228T

1	19	463.00	449.68	13.32	0.000E+00	2.805E+00
2	29	911.07	910.93	.14	1.343E+00	7.961E-02

						7.961E-02

Th-227A

1	13	236.00	238.52	-2.52	0.000E+00	6.713E-01
2	13	256.25	238.52	17.73	0.000E+00	1.111E+00

						6.713E-01

Th-228T

1	10	131.62	92.86	38.76	0.000E+00	4.620E+01
2	13	215.94	238.52	-22.58	0.000E+00	2.752E+01

						2.752E+01
Th-230U						
1	6	67.73	63.42	4.31	0.000E+00	1.906E+01

						1.906E+01
Th-231A						
1	2	26.64	31.62	-4.98	0.000E+00	1.270E+00
2	6	58.57	63.42	-4.85	0.000E+00	1.444E+01
3	11	163.12	184.82	-21.70	0.000E+00	3.791E+01

						1.270E+00
Th-232						
1	6	59.00	63.42	-4.42	0.000E+00	4.192E+01

						4.192E+01
Th-234U						
1	6	63.29	63.42	-.13	1.711E+00	1.862E+00
2	10	112.81	92.86	19.95	0.000E+00	2.068E+01

						1.862E+00
Pa-231A						
1	14	283.67	295.05	-11.38	0.000E+00	4.531E+00
2	14	302.67	295.05	7.62	0.000E+00	3.419E+00

						3.419E+00
Pa-234mU						
1	31	1001.03	968.67	32.36	0.000E+00	3.705E+00

						3.705E+00
U-234U						
1	6	53.10	63.42	-10.32	0.000E+00	8.118E+01

						8.118E+01
U-235						
1	10	105.00	92.86	12.14	0.000E+00	5.230E+00
2	11	143.76	184.82	-41.06	0.000E+00	5.046E-01
3	11	163.35	184.82	-21.47	0.000E+00	1.194E+00
4	11	182.70	184.82	-2.12	0.000E+00	1.640E+01
5	12	185.72	186.07	-.35	2.270E-01	1.241E-01
6	12	194.94	186.07	8.87	0.000E+00	1.243E+01
7	12	202.12	186.07	16.05	0.000E+00	7.465E+00
8	12	205.31	186.07	19.24	0.000E+00	1.593E+00

						1.241E-01
Am-241						
1	2	26.36	31.62	-5.26	0.000E+00	9.645E+00
2	6	59.54	63.42	-3.88	0.000E+00	2.161E-01

						2.161E-01



