

A4CM-ZR-0011
Revision A.

**AREA IV RADIOLOGICAL
CHARACTERIZATION SURVEY**

FINAL REPORT

Volume II

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

August 15, 1996

TMA Laboratory Data Sheets

TMA/Norcal

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February 8, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91309-7922

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N4-12-026-6103

Dear Mr. Klein:

Enclosed is the final data report for radiochemistry analyses on the eleven soil samples collected November 17 through November 22, 1994 and received at TMA/Richmond December 9, 1994.

Since this is our first report for Rocketdyne, I would like to explain the report format and how it relates to the statement of work requirements.

Case Narrative

This section contains all appropriate comments and observations regarding the processing of the sample.

Summary Data Section

This section is the output of our DVD data package preparation software. This section begins with a report guide, *About the Summary Data Section*, that summarizes the subsections included. The software has been customized to reflect the Rocketdyne technical requirements, such as minimum yield, spike recovery, Required Detection Limits (RDL's), expected aliquots and counting times, etc. The basic premise is that all parameters not in compliance with the statement of work are underlined in the report. Underlined values should be individually noted and discussed in the case narrative.

The DVD contains many advanced data verification issues including the following:

- All results less than the required detection limit (RDL) are flagged with a U,

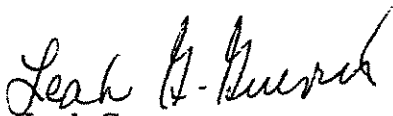
Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division

February 8, 1995
Page two

- All results greater than the measured MDA, but less than the RDL are flagged with a J,
- All Blank results greater than the RDL are underlined,
- All Blank results less than the RDL but greater than the MDA are underlined and flagged with a J.

Please review this report and we can discuss any changes that may be required.

Sincerely,


Leah Guerrero
Program Manager

LGG/ss

DOCUMENT INVENTORY FOR SAMPLE DELIVERY GROUP RF6103

SECTION 1	Case Narrative
SECTION 2	Summary Data Section
<u>X</u> APPENDIX 1	Chains-of-Custody Copies
<u>X</u> APPENDIX 2	Aliquot Information
<u>X</u> APPENDIX 3	Preparation Log For QC Samples
<u>X</u> APPENDIX 4	Continuing Calibration Data for LSC Counters
<u>X</u> APPENDIX 5	Copies of Raw Data Sheets

SECTION 1 Case Narrative

TMA/Richmond

Report N4-12-026-6103
Sample Delivery Group 6103

Rockwell International Corp.
Contract R44PJZ94034044

Case Narrative

February 8, 1995

1.0 GENERAL

TMA/Richmond Delivery Group 6103 is comprised of the eleven soil samples received December 9, 1994.

2.0 ANALYTICAL NOTES

The internal quality control consisted 5% each of laboratory control samples, blanks and replicates.

The QC samples were prepared by the Quality Control Department. Copies of the QC Notebook pages are included in the data package.

The blanks and laboratory control samples were created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consisted 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 was specified in the table but not added as KCl contains natural ⁴⁰K which raises the background considerably.

2.1 Tritium Analyses

No problems were encountered with the analyses.

2.2 Strontium-90 Analyses

Sample A4CM-94-0007 was reanalyzed due to a low yield.

2.3 Thorium 230/232 Analyses

Most of the samples were counted for less than the nominal 500 minutes, however all sample MDA's were less than the RDL. Sample A4CM-94-0001 was reanalyzed due to a poor yield. Positive thorium activity greater than the MDA but less than the RDL was detected in reagent blank 6103-013 (QC ID 22624). The activity may be due to cross contamination from samples with positive thorium activity.

TMA/Richmond

Report N4-12-026-6103
Sample Delivery Group 6103

Rockwell International Corp.
Contract R44PJZ94034044

Case Narrative

February 8, 1995

2.4 Uranium 233/234, 235, 238 Analyses

Positive uranium activity much larger than the MDA was detected in all samples, therefore, the high MDA's are not a concern. The samples were counted for less than the required 720 minutes.

2.5 Plutonium 239/240 Analyses

Samples A4CM-94-0001, 0003, 0004, and 0007 were reanalyzed due to low yields. Most of the samples were counted for less than the required 500 minutes however, all sample MDA's were less than or equal to the RDL

2.6 Gamma Spectroscopy Analyses

Due to a miscommunication between TMA/Richmond and Rocketdyne less than 850 g was received. After the samples were sieved the masses were reduced. As a result of the smaller aliquots for counting, the MDA's for samples A4CM-94-0001, 0006, 0008, 0010, and 0011 were greater than the RDL.

SECTION 2 Summary Data Section

T M A / R I C H M O N D
REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

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				
About this section	.	.	.	1
Sample Summaries	.	.	.	3
Prep Batch Summary	.	.	.	5
Work Summary	.	.	.	6
Reagent Blanks	.	.	.	10
Lab Control Samples	.	.	.	13
Duplicates	.	.	.	16
Data Sheets	.	.	.	18
Method Summaries	.	.	.	39
Report Guides	.	.	.	51
End of Section	.	.	.	65


pared by Leah G. Guerrero
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

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

WORK SUMMARY

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

REAGENT BLANKS

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

LAB CONTROL SAMPLES

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

DUPLICATES

REPORT GUIDES

Page 1

SUMMARY DATA SECTION

Page 1

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

MATRIX SPIKES

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

DATA SHEETS

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

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

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

REPORT GUIDES

Page 2

SUMMARY DATA SECTION

Page 2

10

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-94-0001	SSFA AREA 4	SOIL		N412026-01			11/17/94
A4CM-94-0002	SSFA AREA 4	SOIL		N412026-02			11/17/94
A4CM-94-0003	SSFA AREA 4	SOIL		N412026-03			11/18/94
A4CM-94-0004	SSFA AREA 4	SOIL		N412026-04			11/18/94
A4CM-94-0005	SSFA AREA 4	SOIL		N412026-05			11/18/94
A4CM-94-0006	SSFA AREA 4	SOIL		N412026-06			11/18/94
A4CM-94-0007	SSFA AREA 4	SOIL		N412026-07			11/21/94
A4CM-94-0008	SSFA AREA 4	SOIL		N412026-08			11/21/94
A4CM-94-0009	SSFA AREA 4	SOIL		N412026-09			11/21/94
A4CM-94-0010	SSFA AREA 4	SOIL		N412026-10			11/22/94
A4CM-94-0011	SSFA AREA 4	SOIL		N412026-11			11/22/94
Reagent Blank		SOIL		N412026-13			
Reagent Blank		SOIL		N412026-16			
Reagent Blank		SOIL		N412033-14			
Lab Control Sample		SOIL		N412026-12			
Lab Control Sample		SOIL		N412026-15			
Lab Control Sample		SOIL		N412033-13			
Duplicate (N412026-01)	SSFA AREA 4	SOIL		N412026-14			11/17/94

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

11

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	† MOIST	SAMPLE WT/VOL	BASIS WT/VOL	DAYS SINCE RECEIVED COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
6103		A4CM-94-0001	SOIL	10.5			12/09/94 22	N412026-01	6103-001
		A4CM-94-0002	SOIL	10.8			12/09/94 22	N412026-02	6103-002
		A4CM-94-0003	SOIL	7.0			12/09/94 21	N412026-03	6103-003
		A4CM-94-0004	SOIL	7.0			12/09/94 21	N412026-04	6103-004
		A4CM-94-0005	SOIL	9.3			12/09/94 21	N412026-05	6103-005
		A4CM-94-0006	SOIL	8.7			12/09/94 21	N412026-06	6103-006
		A4CM-94-0007	SOIL	7.0			12/09/94 18	N412026-07	6103-007
		A4CM-94-0008	SOIL	9.2			12/09/94 18	N412026-08	6103-008
		A4CM-94-0009	SOIL	10.2			12/09/94 18	N412026-09	6103-009
		A4CM-94-0010	SOIL	11.1			12/09/94 17	N412026-10	6103-010
		A4CM-94-0011	SOIL	10.6			12/09/94 17	N412026-11	6103-011
		Reagent Blank	SOIL					N412026-13	6103-013
		Reagent Blank	SOIL					N412026-16	6103-016
		Lab Control Sample	SOIL					N412026-12	6103-012
		Lab Control Sample	SOIL					N412026-15	6103-015
		Duplicate (N412026-01)	SOIL	10.5			12/09/94 22	N412026-14	6103-014
6104		Reagent Blank	SOIL					N412033-14	6104-014
		Lab Control Sample	SOIL					N412033-13	6104-013

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

12

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

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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	2781-016	5.0	7			1	1	1/0	
			2781-016B	5.0	4			1	1	0/1	
TH	SOIL	Thorium, Isotopic in Soil	2781-016	5.0	10			1	1	1/0	
			2781-016A	5.0	1			1	1	0/1	
U	SOIL	Uranium, Isotopic in Soil	2781-016	5.0	11			1	1	1/1	
Beta Counting											
SR	SOIL	Strontium, Total in Soil	2781-016	10.0	10			1	1	1/1	X
			2781-024	10.0	1			1	1		
Gamma Spectroscopy											
GAM	SOIL	Gamma Scan	2781-016	15.0	11			1	1	1/1	
Liquid Scintillation											
H	SOIL	Tritium-Soil	2781-016	10.0	11			1	1	1/1	

icates 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 5

13

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

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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-94-0001		N412026-01	6103-001	GAM		01/19/95		Gamma Scan			
SSFA AREA 4	SOIL	11/17/94	6103-001	H		01/05/95		Tritium-Soil			
		12/09/94	6103-001	PU	A1	01/19/95		Plutonium, Isotopic in Soil			
			6103-001	SR		01/13/95		Strontium, Total in Soil			
			6103-001	TH	A1	01/18/95		Thorium, Isotopic in Soil			
			6103-001	U		01/12/95		Uranium, Isotopic in Soil			
A4CM-94-0002		N412026-02	6103-002	GAM		01/19/95		Gamma Scan			
SSFA AREA 4	SOIL	11/17/94	6103-002	H		01/05/95		Tritium-Soil			
		12/09/94	6103-002	PU		01/10/95		Plutonium, Isotopic in Soil			
			6103-002	SR		01/13/95		Strontium, Total in Soil			
			6103-002	TH		01/12/95		Thorium, Isotopic in Soil			
			6103-002	U		01/12/95		Uranium, Isotopic in Soil			
A4CM-94-0003		N412026-03	6103-003	GAM		01/19/95		Gamma Scan			
SSFA AREA 4	SOIL	11/18/94	6103-003	H		01/05/95		Tritium-Soil			
		12/09/94	6103-003	PU	A1	01/19/95		Plutonium, Isotopic in Soil			
			6103-003	SR		01/13/95		Strontium, Total in Soil			
			6103-003	TH		01/12/95		Thorium, Isotopic in Soil			
			6103-003	U		01/12/95		Uranium, Isotopic in Soil			
A4CM-94-0004		N412026-04	6103-004	GAM		01/20/95		Gamma Scan			
SSFA AREA 4	SOIL	11/18/94	6103-004	H		01/05/95		Tritium-Soil			
		12/09/94	6103-004	PU	A1	01/19/95		Plutonium, Isotopic in Soil			
			6103-004	SR		01/13/95		Strontium, Total in Soil			
			6103-004	TH		01/12/95		Thorium, Isotopic in Soil			
			6103-004	U		01/12/95		Uranium, Isotopic in Soil			
A4CM-94-0005		N412026-05	6103-005	GAM		01/20/95		Gamma Scan			
SSFA AREA 4	SOIL	11/18/94	6103-005	H		01/05/95		Tritium-Soil			
		12/09/94	6103-005	PU		01/19/95		Plutonium, Isotopic in Soil			
			6103-005	SR		01/13/95		Strontium, Total in Soil			
			6103-005	TH		01/12/95		Thorium, Isotopic in Soil			
			6103-005	U		01/12/95		Uranium, Isotopic in Soil			

WORK SUMMARY

Page 1

SUMMARY DATA SECTION

Page 6

14

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

tact Leah G. Guerrero

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED	TEST	SUP-	ANALYZED	REVIEWED BY	METHOD						
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED BY	METHOD					
A4CM-94-0006		N412026-06	6103-006	GAM		01/20/95		Gamma Scan					
SSFA AREA 4	SOIL	11/18/94	6103-006	H		01/05/95		Tritium-Soil					
		12/09/94	6103-006	PU		01/13/95		Plutonium, Isotopic in Soil					
			6103-006	SR		01/13/95		Strontium, Total in Soil					
			6103-006	TH		01/12/95		Thorium, Isotopic in Soil					
			6103-006	U		01/12/95		Uranium, Isotopic in Soil					
A4CM-94-0007		N412026-07	6103-007	GAM		01/20/95		Gamma Scan					
SSFA AREA 4	SOIL	11/21/94	6103-007	H		01/05/95		Tritium-Soil					
		12/09/94	6103-007	PU	A1	01/19/95		Plutonium, Isotopic in Soil					
			6103-007	SR	A1	01/17/95		Strontium, Total in Soil					
			6103-007	TH		01/12/95		Thorium, Isotopic in Soil					
			6103-007	U		01/12/95		Uranium, Isotopic in Soil					
A4CM-94-0008		N412026-08	6103-008	GAM		01/20/95		Gamma Scan					
SSFA AREA 4	SOIL	11/21/94	6103-008	H		01/05/95		Tritium-Soil					
		12/09/94	6103-008	PU		01/13/95		Plutonium, Isotopic in Soil					
			6103-008	SR		01/13/95		Strontium, Total in Soil					
			6103-008	TH		01/13/95		Thorium, Isotopic in Soil					
			6103-008	U		01/12/95		Uranium, Isotopic in Soil					
A4CM-94-0009		N412026-09	6103-009	GAM		01/20/95		Gamma Scan					
SSFA AREA 4	SOIL	11/21/94	6103-009	H		01/05/95		Tritium-Soil					
		12/09/94	6103-009	PU		01/13/95		Plutonium, Isotopic in Soil					
			6103-009	SR		01/13/95		Strontium, Total in Soil					
			6103-009	TH		01/13/95		Thorium, Isotopic in Soil					
			6103-009	U		01/12/95		Uranium, Isotopic in Soil					
A4CM-94-0010		N412026-10	6103-010	GAM		01/20/95		Gamma Scan					
SSFA AREA 4	SOIL	11/22/94	6103-010	H		01/05/95		Tritium-Soil					
		12/09/94	6103-010	PU		01/13/95		Plutonium, Isotopic in Soil					
			6103-010	SR		01/13/95		Strontium, Total in Soil					
			6103-010	TH		01/13/95		Thorium, Isotopic in Soil					
			6103-010	U		01/12/95		Uranium, Isotopic in Soil					

WORK SUMMARY

Page 2

SUMMARY DATA SECTION

Page 7

15

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

WORK SUMMARY, cont.

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	
MCM-94-0011		N412026-11	6103-011	GAM		01/23/95		Gamma Scan	
SSFA AREA 4	SOIL	11/22/94	6103-011	H		01/05/95		Tritium-Soil	
		12/09/94	6103-011	PU		01/13/95		Plutonium, Isotopic in Soil	
			6103-011	SR		01/13/95		Strontium, Total in Soil	
			6103-011	TH		01/13/95		Thorium, Isotopic in Soil	
			6103-011	U		01/12/95		Uranium, Isotopic in Soil	
Reagent Blank	SOIL	N412026-13	6103-013	GAM		01/23/95		Gamma Scan	
			6103-013	H		01/05/95		Tritium-Soil	
			6103-013	PU		01/13/95		Plutonium, Isotopic in Soil	
			6103-013	SR		01/13/95		Strontium, Total in Soil	
			6103-013	TH		01/13/95		Thorium, Isotopic in Soil	
			6103-013	U		01/12/95		Uranium, Isotopic in Soil	
Reagent Blank	SOIL	N412026-16	6103-016	PU		01/19/95		Plutonium, Isotopic in Soil	
			6103-016	TH		01/19/95		Thorium, Isotopic in Soil	
Reagent Blank	SOIL	N412033-14	6104-014	SR		01/14/95		Strontium, Total in Soil	
Lab Control Sample	SOIL	N412026-12	6103-012	GAM		01/23/95		Gamma Scan	
			6103-012	H		01/05/95		Tritium-Soil	
			6103-012	PU		01/13/95		Plutonium, Isotopic in Soil	
			6103-012	SR		01/13/95		Strontium, Total in Soil	
			6103-012	TH		01/13/95		Thorium, Isotopic in Soil	
			6103-012	U		01/14/95		Uranium, Isotopic in Soil	
Lab Control Sample	SOIL	N412026-15	6103-015	PU		01/19/95		Plutonium, Isotopic in Soil	
			6103-015	TH		01/18/95		Thorium, Isotopic in Soil	
Lab Control Sample	SOIL	N412033-13	6104-013	SR		01/14/95		Strontium, Total in Soil	
uplicate (N412026-01)		N412026-14	6103-014	GAM		01/23/95		Gamma Scan	
SFA AREA 4	SOIL	11/17/94	6103-014	H		01/05/95		Tritium-Soil	
		12/09/94	6103-014	PU		01/13/95		Plutonium, Isotopic in Soil	
			6103-014	SR		01/13/95		Strontium, Total in Soil	
			6103-014	TH		01/13/95		Thorium, Isotopic in Soil	
			6103-014	U		01/14/95		Uranium, Isotopic in Soil	

WORK SUMMARY

Page 3

SUMMARY DATA SECTION

Page 8

16

Lab id TMAK

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-TMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

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		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			2	2	1		16
SR		Strontium, Total in Soil	HASL 300/SR-01,-02	11			2	2	1		16
TH		Thorium, Isotopic in Soil		11			2	2	1		16
U		Uranium, Isotopic in Soil	HASL 300/U-04	11			1	1	1		14
TOTALS				66			9	9	6		90

WORK SUMMARY

Page 4

SUMMARY DATA SECTION

Page 9

17

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CWSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-13

REAGENT BLANK

Reagent Blank

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-13

Client sample id Reagent Blank

Dept sample id 6103-013

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.093	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.001	0.053	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.058	0.039	0.05	0.1	J	TH
Thorium 232	7740-29-1	0.023	0.023	0.03	0.1	U	TH
Uranium 233/234	11-08-5	0.005	0.009	0.01	0.01	U	U
Uranium 235	14117-96-1	0.002	0.004	0.01	0.01	U	U
Uranium 238	7440-61-1	0	0.003	0.01	0.01	U	U
Plutonium 238	13981-16-3	0.001	0.002	0.008		U	PU
Plutonium 239/240	10-12-8	0.001	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Cesium 40		U		0.1		U	GAM
Chromium 51		U		0.04		U	GAM
Manganese 54		U		0.006		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		0.007		U	GAM
Cesium 134		U		0.008		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		0.007		U	GAM
Europium 155		U		0.02		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.03		U	GAM

REAGENT BLANKS

Page 1

SUMMARY DATA SECTION

Page 10

18

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-16

REAGENT BLANK

Reagent Blank

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-16

Client sample id Reagent Blank

Dept sample id 6103-016

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 230	14269-63-7	0.056	0.030	0.03	0.1	J	TH
Thorium 232	7740-29-1	-0.003	0.006	0.02	0.1	U	TH
Plutonium 238	13981-16-3	0.001	0.002	0.004		U	PU
Plutonium 239/240	10-12-8	0	0.001	0.004	0.01	U	PU

REAGENT BLANKS

Page 2

SUMMARY DATA SECTION

Page 11

19

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412033-14

REAGENT BLANK

Reagent Blank

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-14

Client sample id Reagent Blank

Dept sample id 6104-014

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		N.A.			0.5		H
Strontium 90	10098-97-2	0.024	0.049	0.05	0.5	U	SR
Thorium 230	14269-63-7	N.A.			0.1		TH
Thorium 232	7740-29-1	N.A.			0.1		TH
Uranium 233/234	11-08-5	N.A.			0.01		U
Uranium 235	14117-96-1	N.A.			0.01		U
Uranium 238	7440-61-1	N.A.			0.01		U
Plutonium 238	13981-16-3	N.A.					PU
Plutonium 239/240	10-12-8	N.A.			0.01		PU
GAMMA 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.			0.02		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

REAGENT BLANKS

Page 3

SUMMARY DATA SECTION

Page 12

20

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-12

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-12

Client sample id Lab Control Sample

Dept sample id 6103-012

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	4.5	0.22	0.1	0.5		H	4.65	0.19	97	83-117	
Strontium 90	9.7	0.46	0.2	0.5	X	SR	9.80	0.39	99	83-117	
Thorium 230	2.2	0.23	0.04	0.1	B	TH	2.05	0.082	107	80-120	
Thorium 232	0	0.016	0.03	0.1	U	TH	0	0			
Uranium 233/234	1.6	0.10	0.05	0.01		U	1.62	0.065	99	86-114	
Uranium 235	1.3	0.093	0.01	0.01		U	1.24	0.050	105	84-116	
Uranium 238	1.7	0.11	0.05	0.01		U	1.61	0.064	106	85-115	
Plutonium 238	-0.001	0.003	0.01		U	PU	0	0			
Plutonium 239/240	0.31	0.041	0.01	0.01		PU	0.300	0.012	103	77-123	
GAMMA SCAN ANALYTES											
Cesium 40	U		0.06		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		0.01		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.006		U	GAM					
Ruthenium 103	U		0.007		U	GAM					
Ruthenium 106	U		0.06		U	GAM					
Tin 113	U		0.009		U	GAM					
Cesium 134	U		0.006		U	GAM					
Cesium 137	0.38	0.017		0.02		GAM	0.384	0.015	99	76-124	
Cerium 144	U		0.03		U	GAM					
Europium 152	U		0.01		U	GAM					
Europium 154	U		0.008		U	GAM					
Europium 155	U		0.02		U	GAM					
Radium 226	U		0.01		U	GAM					
Thorium 232	U		0.03		U	GAM					

LAB CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 13

21

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-15

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-15

Client sample id Lab Control Sample

Dept sample id 6103-015

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
Thorium 230	2.2	0.18	0.02	0.1	B	TH	2.05	0.082	107	83-117	
Thorium 232	0.003	0.011	0.02	0.1	U	TH	0	0			
Plutonium 238	-0.002	0.007	0.02		U	PU	0	0			
Plutonium 239/240	0.33	0.041	0.009	0.01		PU	0.300	0.012	110	77-123	

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 14

22

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412033-13

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-13

Dept sample id 6104-013

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
Tritium	N.A.			0.5		H					
Strontium 90	10	0.31	0.1	0.5		SR	10.3	0.41	97	83-117	
Thorium 230	N.A.			0.1		TH					
Thorium 232	N.A.			0.1		TH					
Uranium 233/234	N.A.			0.01		U					
Uranium 235	N.A.			0.01		U					
Uranium 238	N.A.			0.01		U					
Plutonium 238	N.A.					PU					
Plutonium 239/240	N.A.			0.01		PU					
GAMMA SCAN ANALYTES											
Sodium 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.			0.02		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					

LAB CONTROL SAMPLES

Page 3

SUMMARY DATA SECTION

Page 15

23

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-14

A4CM-94-0001

DUPLICATE

SDG 6103

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N412026-14Lab sample id N412026-01Client sample id A4CM-94-0001Dept sample id 6103-014Dept sample id 6103-001Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/17/94% moisture 10.5% moisture 10.5

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	-0.035	0.079	0.1	0.5	U	H	-0.045	0.072	0.1	U	-		
Strontium 90	0.13	0.057	0.05	0.5	J	SR	0.044	0.10	0.1	U	99	200	
Thorium 230	0.86	0.13	0.05	0.1	B	TH	1.0	0.13	0.02	B	15	32	
Thorium 232	1.1	0.15	0.03	0.1		TH	1.2	0.13	0.02		9	29	
Uranium 233/234	0.76	0.060	0.01	0.01		U	0.67	0.072	0.02		13	22	
Uranium 235	0.054	0.015	0.007	0.01		U	0.054	0.019	0.01		0	68	
Uranium 238	0.66	0.055	0.01	0.01		U	0.72	0.073	0.01		9	23	
Plutonium 238	0.001	0.005	0.01		U	PU	0	0.009	0.02	U	-		
Plutonium 239/240	0.005	0.005	0.01	0.01	U	PU	0.002	0.004	0.008	U	-		
GAMMA SCAN ANALYTES													
Potassium 40	19	0.75				GAM	18	0.93			5	34	
Chromium 51	U		1		U	GAM	U		1	U	-		
Manganese 54	U		0.04		U	GAM	U		0.05	U	-		
Cobalt 58	U		0.06		U	GAM	U		0.08	U	-		
Iron 59	U		0.2		U	GAM	U		0.3	U	-		
Cobalt 60	U		0.04		U	GAM	U		0.05	U	-		
Zinc 65	U		0.1		U	GAM	U		0.1	U	-		
Niobium 94	U		0.03		U	GAM	U		0.04	U	-		
Ruthenium 103	U		0.09		U	GAM	U		0.1	U	-		
Ruthenium 106	U		0.3		U	GAM	U		0.4	U	-		
Tin 113	U		0.06		U	GAM	U		0.07	U	-		
Cesium 134	U		0.04		U	GAM	U		0.06	U	-		
Cesium 137	0.037	0.032		0.02		GAM	U		0.08	U	74	224	
Cerium 144	U		0.2		U	GAM	U		0.2	U	-		
Europium 152	U		0.07		U	GAM	U		0.08	U	-		
Europium 154	U		0.04		U	GAM	U		0.05	U	-		
Europium 155	U		0.1		U	GAM	U		0.1	U	-		
Radium 226	0.85	0.072				GAM	0.87	0.11			2	39	

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 16

24

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-14

A4CM-94-0001

DUPLICATE, cont.

SDG 6103

Contact Leah G. Guerrero

DUPLICATE

Lab sample id N412026-14Dept sample id 6103-014% moisture 10.5

ORIGINAL

Lab sample id N412026-01Dept sample id 6103-001Received 12/09/94% moisture 10.5Client RocketdyneContract R44PJZ94034044Client sample id A4CM-94-0001Location/Matrix SSFA AREA 4 SOILCollected 11/17/94

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
Thorium 232	1.3	0.18				GAM	1.2	0.23			8	48	

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 17

25

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-01

DATA SHEET

A4CM-94-0001

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-01

Client sample id A4CM-94-0001

Dept sample id 6103-001

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/17/94

% moisture 10.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.045	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.044	0.10	0.1	0.5	U	SR
Thorium 230	14269-63-7	1.0	0.13	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.2	0.13	0.02	0.1		TH
Uranium 233/234	11-08-5	0.67	0.072	0.02	0.01		U
Uranium 235	14117-96-1	0.054	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.72	0.073	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.009	0.02		U	PU
Plutonium 239/240	10-12-8	0.002	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.93				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.05		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.05		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.04		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.07		U	GAM
Cesium 134		U		0.06		U	GAM
Cesium 137		U		0.08	0.02	U	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		0.1		U	GAM
Radium 226		0.87	0.11				GAM

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 18

26

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-01

A4CM-94-0001

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-01Client sample id A4CM-94-0001Dept sample id 6103-001Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/17/94% moisture 10.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.23				GAM

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 19

27

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-02

A4CM-94-0002

DATA SHEET

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-02

Client sample id A4CM-94-0002

Dept sample id 6103-002

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/17/94

% moisture 10.8

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.012	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	0.22	0.096	0.09	0.5	J	SR
Thorium 230	14269-63-7	0.94	0.14	0.05	0.1	B	TH
Thorium 232	7740-29-1	1.3	0.17	0.03	0.1		TH
Uranium 233/234	11-08-5	0.73	0.074	0.02	0.01		U
Uranium 235	14117-96-1	0.052	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.76	0.076	0.01	0.01		U
Plutonium 238	13981-16-3	-0.006	0.006	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		19	1.1				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.076	0.057		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.89	0.12				GAM

DATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 20

28

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-02

A4CM-94-0002

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-02Client sample id A4CM-94-0002Dept sample id 6103-002Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/17/94% moisture 10.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.25				GAM

DATA SHEETS

Page 4

SUMMARY DATA SECTION

Page 21

29

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-03

DATA SHEET

A4CM-94-0003

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-03

Client sample id A4CM-94-0003

Dept sample id 6103-003

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/18/94

% 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		-0.083	0.067	0.1	0.5	U	H
Strontium 90	10098-97-2	0.12	0.17	0.2	0.5	U	SR
Thorium 230	14269-63-7	0.90	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	0.99	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.79	0.084	0.02	0.01		U
Uranium 235	14117-96-1	0.049	0.021	0.01	0.01		U
Uranium 238	7440-61-1	0.76	0.081	0.02	0.01		U
Plutonium 238	13981-16-3	0.001	0.009	0.02		U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.093	0.053		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.97	0.14				GAM

DATA SHEETS

Page 5

SUMMARY DATA SECTION

Page 22

30

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-03

A4CM-94-0003

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-03Client sample id A4CM-94-0003Dept sample id 6103-003Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/18/94% moisture 7.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.27				GAM

DATA SHEETS

Page 6

SUMMARY DATA SECTION

Page 23

31

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-04

A4CM-94-0004

DATA SHEET

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-04Client sample id A4CM-94-0004Dept sample id 6103-004Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/18/94% 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		-0.050	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.014	0.053	0.06	0.5	U	SR
Thorium 230	14269-63-7	1.0	0.16	0.06	0.1		TH
Thorium 232	7740-29-1	1.3	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.81	0.086	0.02	0.01		U
Uranium 235	14117-96-1	0.050	0.018	0.01	0.01		U
Uranium 238	7440-61-1	0.82	0.087	0.02	0.01		U
Plutonium 238	13981-16-3	0	0.004	0.01		U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		19	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.078	0.043		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.08		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.90	0.13				GAM

DATA SHEETS

Page 7

SUMMARY DATA SECTION

Page 24

32

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-04

A4CM-94-0004

DATA SHEET, cont

SDG <u>6103</u>	Client <u>Rocketdyne</u>
Contact <u>Leah G. Guerrero</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N412026-04</u>	Client sample id <u>A4CM-94-0004</u>
Dept sample id <u>6103-004</u>	Location/Matrix <u>SSFA AREA 4</u> <u>SOIL</u>
Received <u>12/09/94</u>	Collected <u>11/18/94</u>
% moisture <u>7.0</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.28				GAM

DATA SHEETS

Page 8

SUMMARY DATA SECTION

Page 25

33

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-05

A4CM-94-0005

DATA SHEET

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-05

Client sample id A4CM-94-0005

Dept sample id 6103-005

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/18/94

% 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		-0.083	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.053	0.058	0.06	0.5	U	SR
Thorium 230	14269-63-7	0.69	0.13	0.06	0.1		TH
Thorium 232	7740-29-1	1.0	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.68	0.071	0.02	0.01		U
Uranium 235	14117-96-1	0.033	0.016	0.01	0.01		U
Uranium 238	7440-61-1	0.74	0.076	0.01	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.007		U	PU
Plutonium 239/240	10-12-8	0.008	0.005	0.007	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	1.3				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.4		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.1		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		0.16	0.078		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.80	0.12				GAM

DATA SHEETS

Page 9

SUMMARY DATA SECTION

Page 26

34

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-05

A4CM-94-0005

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-05Client sample id A4CM-94-0005Dept sample id 6103-005Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/18/94% 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
Thorium 232		1.4	0.32				GAM

DATA SHEETS

Page 10

SUMMARY DATA SECTION

Page 27

35

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-06

DATA SHEET

A4CM-94-0006

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-06

Client sample id A4CM-94-0006

Dept sample id 6103-006

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/18/94

% moisture 8.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.064	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.012	0.059	0.07	0.5	U	SR
Thorium 230	14269-63-7	0.75	0.14	0.05	0.1	B	TH
Thorium 232	7740-29-1	0.89	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.66	0.073	0.02	0.01		U
Uranium 235	14117-96-1	0.034	0.017	0.01	0.01		U
Uranium 238	7440-61-1	0.74	0.078	0.02	0.01		U
Plutonium 238	13981-16-3	-0.001	0.003	0.01		U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.01	0.01	U	PU
TMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.82	0.11				GAM

DATA SHEETS

Page 11

SUMMARY DATA SECTION

Page 28

36

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-06

A4CM-94-0006

DATA SHEET, cont

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-06

Client sample id A4CM-94-0006

Dept sample id 6103-006

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/18/94

% moisture 8.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.1	0.27				GAM

DATA SHEETS

Page 12

SUMMARY DATA SECTION

Page 29

37

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-07

A4CM-94-0007

DATA SHEET

SDG 6103

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412026-07Client sample id A4CM-94-0007Dept sample id 6103-007Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/21/94% 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		-0.036	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	1.9	0.13	0.09	0.5		SR
Thorium 230	14269-63-7	0.82	0.14	0.04	0.1	B	TH
Thorium 232	7740-29-1	1.0	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.90	0.098	0.02	0.01		U
Uranium 235	14117-96-1	0.032	0.016	0.02	0.01		U
Uranium 238	7440-61-1	0.84	0.093	0.02	0.01		U
Plutonium 238	13981-16-3	0.002	0.009	0.02		U	PU
Plutonium 239/240	10-12-8	0.004	0.004	0.008	0.01	U	PU
TMA SCAN ANALYTES		U					
Potassium 40		20	0.65				GAM
Chromium 51		U		0.8		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.05		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		0.06		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		0.057	0.034		0.02		GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM
Radium 226		0.82	0.064				GAM
Thorium 232		1.3	0.16				GAM

DATA SHEETS

Page 13

SUMMARY DATA SECTION

Page 30

38

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-08

DATA SHEET

A4CM-94-0008

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-08

Client sample id A4CM-94-0008

Dept sample id 6103-008

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/21/94

% 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		-0.078	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	0.015	0.064	0.07	0.5	U	SR
Thorium 230	14269-63-7	0.82	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	1.2	0.16	0.04	0.1		TH
Uranium 233/234	11-08-5	0.74	0.074	0.02	0.01		U
Uranium 235	14117-96-1	0.048	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.78	0.077	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.005	0.01		U	PU
Plutonium 239/240	10-12-8	-0.002	0.005	0.01	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		20	1.3				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		U		0.07	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		1.0	0.15				GAM

DATA SHEETS

Page 14

SUMMARY DATA SECTION

Page 31

39

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-08

A4CM-94-0008

DATA SHEET, cont

SDG <u>6103</u>	Client <u>Rocketdyne</u>
Contact <u>Leah G. Guerrero</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N412026-08</u>	Client sample id <u>A4CM-94-0008</u>
Dept sample id <u>6103-008</u>	Location/Matrix <u>SSFA AREA 4</u> <u>SOIL</u>
Received <u>12/09/94</u>	Collected <u>11/21/94</u>
% moisture <u>9.2</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.6	0.30				GAM

DATA SHEETS

Page 15

SUMMARY DATA SECTION

Page 32

40

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-09

A4CM-94-0009

DATA SHEET

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-09
Dept sample id 6103-009
Received 12/09/94
% moisture 10.2Client sample id A4CM-94-0009
Location/Matrix SSFA AREA 4 SOIL
Collected 11/21/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.011	0.076	0.1	0.5	U	H
Strontium 90	10098-97-2	0.056	0.047	0.05	0.5	J	SR
Thorium 230	14269-63-7	0.81	0.15	0.06	0.1		TH
Thorium 232	7740-29-1	1.2	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.63	0.066	0.02	0.01		U
Uranium 235	14117-96-1	0.047	0.018	0.01	0.01		U
Uranium 238	7440-61-1	0.72	0.071	0.01	0.01		U
Plutonium 238	13981-16-3	0.003	0.005	0.01		U	PU
Plutonium 239/240	10-12-8	-0.001	0.003	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		0.063	0.060		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.08		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.82	0.12				GAM

DATA SHEETS

Page 16

SUMMARY DATA SECTION

Page 33

41

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
 Version 3.04
 Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-09

A4CM-94-0009

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-09Client sample id A4CM-94-0009Dept sample id 6103-009Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/21/94% 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
Thorium 232		1.1	0.28				GAM

DATA SHEETS

Page 17

SUMMARY DATA SECTION

Page 34

42

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-10

A4CM-94-0010

DATA SHEET

SDG 6103

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-10Client sample id A4CM-94-0010Dept sample id 6103-010Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/22/94% 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		-0.035	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	0.077	0.045	0.05	0.5	J	SR
Thorium 230	14269-63-7	0.72	0.14	0.04	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.66	0.068	0.01	0.01		U
Uranium 235	14117-96-1	0.035	0.015	0.01	0.01		U
Uranium 238	7440-61-1	0.69	0.071	0.01	0.01		U
Plutonium 238	13981-16-3	0.001	0.005	0.009		U	PU
Plutonium 239/240	10-12-8	0	0.002	0.009	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		16	1.1				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.69	0.11				GAM

DATA SHEETS

Page 18

SUMMARY DATA SECTION

Page 35

43

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-10

A4CM-94-0010

DATA SHEET, cont

SDG <u>6103</u>	Client <u>Rocketdyne</u>
Contact <u>Leah G. Guerrero</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N412026-10</u>	Client sample id <u>A4CM-94-0010</u>
Dept sample id <u>6103-010</u>	Location/Matrix <u>SSFA AREA 4</u> <u>SOIL</u>
Received <u>12/09/94</u>	Collected <u>11/22/94</u>
% moisture <u>11.1</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.26				GAM

DATA SHEETS

Page 19

SUMMARY DATA SECTION

Page 36

44

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-11

DATA SHEET

A4CM-94-0011

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-11

Client sample id A4CM-94-0011

Dept sample id 6103-011

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/22/94

% moisture 10.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.11	0.073	0.1	0.5	U	H
Strontium 90	10098-97-2	0.11	0.051	0.04	0.5	J	SR
Thorium 230	14269-63-7	0.95	0.15	0.05	0.1	B	TH
Thorium 232	7740-29-1	1.2	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.92	0.11	0.03	0.01		U
Uranium 235	14117-96-1	0.049	0.022	0.02	0.01		U
Uranium 238	7440-61-1	0.80	0.10	0.03	0.01		U
Plutonium 238	13981-16-3	0.003	0.005	0.01		U	PU
Plutonium 239/240	10-12-8	-0.001	0.005	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.09		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.85	0.13				GAM

DATA SHEETS

Page 20

SUMMARY DATA SECTION

Page 37

45

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-11

A4CM-94-0011

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-11Client sample id A4CM-94-0011Dept sample id 6103-011Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/22/94% moisture 10.6

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.28				GAM

DATA SHEETS

Page 21

SUMMARY DATA SECTION

Page 38

46

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test PU Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Plutonium 238	Plutonium 239/240
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Preparation batch 2781-016

A4CM-94-0002	N412026-02	6103-002	U	U
A4CM-94-0005	N412026-05	6103-005	U	0.008 J
A4CM-94-0006	N412026-06	6103-006	U	U
A4CM-94-0008	N412026-08	6103-008	U	U
A4CM-94-0009	N412026-09	6103-009	U	U
A4CM-94-0010	N412026-10	6103-010	U	U
A4CM-94-0011	N412026-11	6103-011	U	U
BLK (QC ID=22626)	N412026-13	6103-013	U	U
LCS (QC ID=22620)	N412026-12	6103-012	ok U	ok
Duplicate (N412026-01)	N412026-14	6103-014	- U	- U

Preparation batch 2781-016B

A4CM-94-0001	N412026-01	A1 6103-001	U	U
A4CM-94-0003	N412026-03	A1 6103-003	U	U
A4CM-94-0004	N412026-04	A1 6103-004	U	U
A4CM-94-0007	N412026-07	A1 6103-007	U	U
LC ID=22937)	N412026-16	6103-016	U	U
LCS (QC ID=22935)	N412026-15	6103-015	ok U	ok

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

Page 1

SUMMARY DATA SECTION

Page 39

47

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test PU Matrix SOIL

SDG 6103

Lab Leah G. Guerrero

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

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 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0002	N412026-02		0.004	3.00			63	1046				54	01/10/95	01/10	SS-028
A4CM-94-0005	N412026-05		0.007	3.00			41	963				62	01/10/95	01/19	SS-045
A4CM-94-0006	N412026-06		0.01	3.00			55	464				56	01/10/95	01/13	SS-055
A4CM-94-0008	N412026-08		0.01	3.00			70	464				53	01/10/95	01/13	SS-057
A4CM-94-0009	N412026-09		0.01	3.00			61	464				53	01/10/95	01/13	SS-060
A4CM-94-0010	N412026-10		0.009	3.00			63	464				52	01/10/95	01/13	SS-061
A4CM-94-0011	N412026-11		0.01	3.00			60	464				52	01/10/95	01/13	SS-062
BLK (QC ID=22626)	N412026-13		0.008	3.00			78	464					01/10/95	01/13	SS-065
LCS (QC ID=22620)	N412026-12		0.01	3.00			63	464					01/10/95	01/13	SS-063
Duplicate (N412026-01)	N412026-14		0.01	3.00			61	464				57	01/10/95	01/13	SS-066
Preparation batch 2781-016B 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01	A1	0.008	3.00			71	507				63	01/19/95	01/19	SS-027
A4CM-94-0003	N412026-03	A1	0.008	3.00			70	507				62	01/19/95	01/19	SS-028
A4CM-94-0004	N412026-04	A1	0.008	3.00			40	963				62	01/19/95	01/19	SS-043
A4CM-94-0007	N412026-07	A1	0.008	3.04			65	507				59	01/19/95	01/19	SS-030
B ID=22937)	N412026-16		0.004	3.00			73	963					01/19/95	01/19	SS-044
LCS (QC ID=22935)	N412026-15		0.009	3.00			63	487					01/19/95	01/19	SS-041
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 ± 0.004
FOR 16 SAMPLES	YIELD	62 ± 21

TMA/RICHMOND

REPORTING GROUP 6103

Test TH Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

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
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Preparation batch 2781-016

A4CM-94-0002	N412026-02	6103-002		0.94	1.3	
A4CM-94-0003	N412026-03	6103-003		0.90	0.99	
A4CM-94-0004	N412026-04	6103-004		1.0	1.3	
A4CM-94-0005	N412026-05	6103-005		0.69	1.0	
A4CM-94-0006	N412026-06	6103-006		0.75	0.89	
A4CM-94-0007	N412026-07	6103-007		0.82	1.0	
A4CM-94-0008	N412026-08	6103-008		0.82	1.2	
A4CM-94-0009	N412026-09	6103-009		0.81	1.2	
A4CM-94-0010	N412026-10	6103-010		0.72	1.1	
A4CM-94-0011	N412026-11	6103-011		0.95	1.2	
BLK (QC ID=22624)	N412026-13	6103-013		0.058 J	U	
LCS (QC ID=22618)	N412026-12	6103-012		ok	ok	U
Duplicate (N412026-01)	N412026-14	6103-014		ok	ok	

Preparation batch 2781-016A

A4CM-94-0001	N412026-01	A1 6103-001		1.0	1.2	
C ID=22938)	N412026-16	6103-016		0.056 J	U	
LCS (QC ID=22936)	N412026-15	6103-015		ok	ok	U

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

Page 3

SUMMARY DATA SECTION

Page 41

49

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test TH Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

THORIUM, 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 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0002	N412026-02		0.05	1.00			71	466				56	01/12/95	01/12	SS-002
A4CM-94-0003	N412026-03		0.06	1.00			71	466				55	01/12/95	01/12	SS-003
A4CM-94-0004	N412026-04		0.06	1.00			65	466				55	01/12/95	01/12	SS-004
A4CM-94-0005	N412026-05		0.06	1.00			64	466				55	01/12/95	01/12	SS-019
A4CM-94-0006	N412026-06		0.05	1.00			68	466				55	01/12/95	01/12	SS-020
A4CM-94-0007	N412026-07		0.04	1.00			74	466				52	01/12/95	01/12	SS-022
A4CM-94-0008	N412026-08		0.06	1.00			71	477				53	01/12/95	01/13	SS-019
A4CM-94-0009	N412026-09		0.06	1.00			56	477				53	01/12/95	01/13	SS-020
A4CM-94-0010	N412026-10		0.04	1.00			67	477				52	01/12/95	01/13	SS-022
A4CM-94-0011	N412026-11		0.05	1.00			59	528				52	01/12/95	01/13	SS-001
BLK (QC ID=22624)	N412026-13		0.05	1.00			77	528					01/12/95	01/13	SS-003
LCS (QC ID=22618)	N412026-12		0.04	1.00			69	528					01/12/95	01/13	SS-002
Duplicate (N412026-01)	N412026-14		0.05	1.00			68	528				57	01/12/95	01/13	SS-004
Preparation batch 2781-016A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01	A1	0.02	1.00			77	470				62	01/18/95	01/18	SS-040
LCS (QC ID=22938)	N412026-16		0.03	1.00			71	503					01/18/95	01/19	SS-032
LCS (QC ID=22936)	N412026-15		0.02	1.00			87	470					01/18/95	01/18	SS-041
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 0.05 ± 0.03
 FOR 16 SAMPLES YIELD 70 ± 15

METHOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 42

50

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test U Matrix SOIL
 SDG 6103
 Contact Leah G. Guerrero

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne
 Contract R44PJZ94034044

RESULTS

LAB		RAW	SUF-	1: Uranium	2: Uranium	3: Uranium	RESULT RATIOS (%)			
CLIENT SAMPLE ID	SAMPLE ID	TEST FIX	PLANCHET	233/234	235	238	1+3	2σ	2+3	2σ
Preparation batch 2781-016										
A4CM-94-0001	N412026-01		6103-001	0.67	0.054	0.72	93	14	8	3
A4CM-94-0002	N412026-02		6103-002	0.73	0.052	0.76	96	14	7	3
A4CM-94-0003	N412026-03		6103-003	0.79	0.049	0.76	104	16	6	3
A4CM-94-0004	N412026-04		6103-004	0.81	0.050	0.82	99	15	6	2
A4CM-94-0005	N412026-05		6103-005	0.68	0.033	0.74	92	13	4	2
A4CM-94-0006	N412026-06		6103-006	0.66	0.034	0.74	89	14	5	2
A4CM-94-0007	N412026-07		6103-007	0.90	0.032	0.84	107	17	4	2
A4CM-94-0008	N412026-08		6103-008	0.74	0.048	0.78	95	13	6	3
A4CM-94-0009	N412026-09		6103-009	0.63	0.047	0.72	88	13	7	3
A4CM-94-0010	N412026-10		6103-010	0.66	0.035	0.69	96	14	5	2
A4CM-94-0011	N412026-11		6103-011	0.92	0.049	0.80	115	20	6	3
BLK (QC ID=22625)	N412026-13		6103-013	U	U	U				
LCS (QC ID=22619)	N412026-12		6103-012	ok	ok	ok				
Duplicate (N412026-01)	N412026-14		6103-014	ok	ok	ok	115	13	8	2
Nominal values and limits from method			RDLs (pCi/g)	0.01	0.01	0.01	100		4	
							Averages	99	6	

TMA/RICHMOND

REPORTING GROUP 6103

Test U Matrix SOIL
 SDG 6103
 Analyst Leah G. Guerrero

METHOD SUMMARY

URANIUM, 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 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01		0.02	3.00			69		405			56	01/10/95	01/12	SS-031
A4CM-94-0002	N412026-02		0.02	3.00			69		405			56	01/10/95	01/12	SS-033
A4CM-94-0003	N412026-03		0.02	3.00			61		405			55	01/10/95	01/12	SS-034
A4CM-94-0004	N412026-04		0.02	3.00			61		405			55	01/10/95	01/12	SS-035
A4CM-94-0005	N412026-05		0.02	3.00			69		405			55	01/10/95	01/12	SS-036
A4CM-94-0006	N412026-06		0.02	3.00			68		405			55	01/10/95	01/12	SS-037
A4CM-94-0007	N412026-07		0.02	3.00			56		405			52	01/10/95	01/12	SS-038
A4CM-94-0008	N412026-08		0.02	3.00			70		406			52	01/10/95	01/12	SS-039
A4CM-94-0009	N412026-09		0.02	3.00			73		406			52	01/10/95	01/12	SS-040
A4CM-94-0010	N412026-10		0.01	3.00			72		406			51	01/10/95	01/12	SS-041
A4CM-94-0011	N412026-11		0.03	3.00			41		406			51	01/10/95	01/12	SS-042
BLK (QC ID=22625)	N412026-13		0.01	3.00			58		405				01/10/95	01/12	SS-032
LCS (QC ID=22619)	N412026-12		0.05	3.00			69		680				01/10/95	01/14	SS-037
Duplicate (N412026-01)	N412026-14		0.01	3.00			70		680			58	01/10/95	01/14	SS-041
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 0.02 ± 0.02
 FOR 14 SAMPLES YIELD 65 ± 17

METHOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 44

52

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.04
 Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test SR Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Strontium 90
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Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	0.22 J
A4CM-94-0003	N412026-03	6103-003	U
A4CM-94-0004	N412026-04	6103-004	U
A4CM-94-0005	N412026-05	6103-005	U
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	0.056 J
A4CM-94-0010	N412026-10	6103-010	0.077 J
A4CM-94-0011	N412026-11	6103-011	0.11 J
BLK (QC ID=22623)	N412026-13	6103-013	U
LCS (QC ID=22617)	N412026-12	6103-012	ok X
Duplicate (N412026-01)	N412026-14	6103-014	ok J

Preparation batch 2781-024

A4CM-94-0007	N412026-07	A1 6103-007	1.9
QC ID=22641)	N412033-14	6104-014	U
LCS (QC ID=22635)	N412033-13	6104-013	ok

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

Page 7

SUMMARY DATA SECTION

Page 45

53

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test SR Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

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 2781-016 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01		0.1	2.00			71	605				57	01/13/95	01/13	LBG-001
A4CM-94-0002	N412026-02		0.09	2.00			83	605				57	01/13/95	01/13	LBG-003
A4CM-94-0003	N412026-03		0.2	2.00			47	605				56	01/13/95	01/13	LBG-002
A4CM-94-0004	N412026-04		0.06	2.00			82	477				56	01/13/95	01/13	LBG-001
A4CM-94-0005	N412026-05		0.06	2.00			85	477				56	01/13/95	01/13	LBG-002
A4CM-94-0006	N412026-06		0.07	2.00			72	477				56	01/13/95	01/13	LBG-003
A4CM-94-0008	N412026-08		0.07	2.00			80	477				53	01/13/95	01/13	LBG-004
A4CM-94-0009	N412026-09		0.05	2.00			87	477				53	01/13/95	01/13	LBG-013
A4CM-94-0010	N412026-10		0.05	2.00			86	598				52	01/13/95	01/13	LBG-003
A4CM-94-0011	N412026-11		0.04	2.00			85	749				52	01/13/95	01/13	LBG-002
BLK (QC ID=22623)	N412026-13		0.05	2.00			64	749					01/13/95	01/13	LBG-003
LCS (QC ID=22617)	N412026-12		0.2	2.00			69	105					01/13/95	01/13	LBG-004
Duplicate (N412026-01)	N412026-14		0.05	2.00			80	749				57	01/13/95	01/13	LBG-004
Preparation batch 2781-024 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0007	N412026-07	Al	0.09	2.00			89	194				57	01/17/95	01/17	LBG-014
C ID=22641)	N412033-14		0.05	2.00			70	749					01/14/95	01/14	LBG-013
LCS (QC ID=22635)	N412033-13		0.1	2.00			72	170					01/14/95	01/14	LBG-013
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 ± 0.1
FOR 16 SAMPLES	YIELD	76 ± 22

TMA/RICHMOND

REPORTING GROUP 6103

Test GAM Matrix SOILSDG 6103Contact Leah G. Guerrero

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	0.076
A4CM-94-0003	N412026-03	6103-003	0.093
A4CM-94-0004	N412026-04	6103-004	0.078
A4CM-94-0005	N412026-05	6103-005	0.16
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0007	N412026-07	6103-007	0.057
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	0.063
A4CM-94-0010	N412026-10	6103-010	U
A4CM-94-0011	N412026-11	6103-011	U
BLK (QC ID=22622)	N412026-13	6103-013	U
LCS (QC ID=22616)	N412026-12	6103-012	ok
Duplicate (N412026-01)	N412026-14	6103-014	ok

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

Page 9

SUMMARY DATA SECTION

Page 47

55

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test GAM Matrix SOILSDG 6103Contact Leah G. Guerrero

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
CLIENT SAMPLE ID	SAMPLE ID	TEST FIX	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 2781-016 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01		0.08	132					1014			63	01/19/95	01/19	JR,03,00
A4CM-94-0002	N412026-02			128					905			63	01/19/95	01/19	JR,02,00
A4CM-94-0003	N412026-03			137					812			62	01/19/95	01/19	JR,01,00
A4CM-94-0004	N412026-04			137					725			63	01/20/95	01/20	JR,02,00
A4CM-94-0005	N412026-05			126					725			63	01/20/95	01/20	JR,01,00
A4CM-94-0006	N412026-06		0.06	125					725			63	01/20/95	01/20	JR,03,00
A4CM-94-0007	N412026-07			137					1048			60	01/20/95	01/20	JR,04,00
A4CM-94-0008	N412026-08		0.07	131					736			60	01/20/95	01/20	JR,01,00
A4CM-94-0009	N412026-09			126					736			60	01/20/95	01/20	JR,02,00
A4CM-94-0010	N412026-10		0.06	135					736			59	01/20/95	01/20	JR,03,00
A4CM-94-0011	N412026-11		0.06	148					724			62	01/23/95	01/23	JR,01,00
BLK (QC ID=22622)	N412026-13		0.006	750					724				01/23/95	01/23	JR,03,00
LCS (QC ID=22616)	N412026-12			750					724				01/23/95	01/23	JR,02,00
Duplicate (N412026-01)	N412026-14			137					724			67	01/23/95	01/23	JR,04,00
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 0.06 ± 0.05
FOR 6 SAMPLES YIELD ±

MOD SUMMARIES

Page 10

SUMMARY DATA SECTION

Page 48

56

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	U
A4CM-94-0003	N412026-03	6103-003	U
A4CM-94-0004	N412026-04	6103-004	U
A4CM-94-0005	N412026-05	6103-005	U
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0007	N412026-07	6103-007	U
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	U
A4CM-94-0010	N412026-10	6103-010	U
A4CM-94-0011	N412026-11	6103-011	U
BLK (QC ID=22627)	N412026-13	6103-013	U
LCS (QC ID=22621)	N412026-12	6103-012	ok
Duplicate (N412026-01)	N412026-14	6103-014	- U

Net values and limits from method	EDLs (pCi/g)	0.5
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METHOD SUMMARIES

Page 11

SUMMARY DATA SECTION

Page 49

57

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

Test H Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

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 2781-016 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 016																
A4CM-94-0001	N412026-01			0.1	21.3					50			49	12/20/94	01/05	LSC-005
A4CM-94-0002	N412026-02			0.1	21.5					50			49	12/20/94	01/05	LSC-005
A4CM-94-0003	N412026-03			0.1	21.0					50			48	12/20/94	01/05	LSC-005
A4CM-94-0004	N412026-04			0.1	20.6					50			48	12/20/94	01/05	LSC-005
A4CM-94-0005	N412026-05			0.1	20.8					50			48	12/20/94	01/05	LSC-005
A4CM-94-0006	N412026-06			0.1	21.0					50			48	12/20/94	01/05	LSC-005
A4CM-94-0007	N412026-07			0.1	20.2					50			45	12/20/94	01/05	LSC-005
A4CM-94-0008	N412026-08			0.1	20.7					50			45	12/20/94	01/05	LSC-005
A4CM-94-0009	N412026-09			0.1	21.0					50			45	12/20/94	01/05	LSC-005
A4CM-94-0010	N412026-10			0.1	20.8					50			44	12/20/94	01/05	LSC-005
A4CM-94-0011	N412026-11			0.1	20.2					50			44	12/20/94	01/05	LSC-005
BLK (QC ID=22627)	N412026-13			0.1	20.0					50				12/20/94	01/05	LSC-005
LCS (QC ID=22621)	N412026-12			0.1	20.0			0		50				12/20/94	01/05	LSC-005
Duplicate (N412026-01)	N412026-14			0.1	20.5					50			49	12/20/94	01/05	LSC-005
Nominal values and limits from method				0.5	20.0					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	0.1	±	0
FOR 14 SAMPLES	YIELD	0	±	

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

REPORT GUIDE

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- * LAB SAMPLE ID is the lab's primary identification for a sample.
 - * DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.
 - * CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
 - * QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.
- QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.
- * All Lab Control Samples, Reagent Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Reagent Blank, Replicate, Matrix Spike and Method Summary Reports detail these relationships.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

REPORT GUIDE

Client RocketdyneContract R44PJZ94034044

PREPARATION BATCH SUMMARY

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

The following notes apply to this report:

- The preparation batches are shown in the same order as the Method Summary Reports are printed.
- * Only analyses of planchets relevant to the SDG are included.
- * Each preparation batch should have at least one Reagent Blank and LCS in it to validate client sample results.
- * The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified.
Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

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

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- * TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- * SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- * The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- * PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- * For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Reagent Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- * The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

REPORT GUIDES

Page 3

SUMMARY DATA SECTION

Page 53

61

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND
REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

DATA SHEET

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

The following notes apply to this report:

- * TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
- * The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.
- ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
- * A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
- * When reporting a Reagent Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Reagent Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

DATA SHEET

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
- B A Reagent Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When reagent blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Reagent Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
- H Similar to 'L' except the recovery was high.
- P The RESULT is 'preliminary'.
- X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
- 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.
- Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- * An MDA is underlined if it is bigger than its RDL.
- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

DATA SHEET

may not be a good estimate of the 'real' minimum detectable activity.

- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- * When reporting a Reagent Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

REPORT GUIDE

Client RocketdyneContract R44PJZ94034044

LAB CONTROL SAMPLE

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

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- * An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

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

- * REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- * The first, computed limits for the recovery reflect:
 1. The error of RESULT, including that introduced by rounding the result prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
 2. The error of ADDED.
 3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- * The second limits are protocol defined upper and lower QC limits for the recovery.
- * The recovery is underlined if it is outside either of these ranges.

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

DUPLICATE

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

The following notes apply to this report:

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

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

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

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

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

- * The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

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

This value reported for this limit is at most 999.

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

1. A fixed percentage specified in the protocol.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND
REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne
Contract R44PJZ94034044

DUPLICATE

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

- * The RPD is underlined if it is greater than either limit.
- * If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- * The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

MATRIX SPIKE

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

The following notes apply to this report:

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

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

- * An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

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

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

- * The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

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

2. The error of ADDED.

3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

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

REPORT GUIDES

Page 10

SUMMARY DATA SECTION

Page 60

68

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND
REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne
Contract R44PJZ94034044

MATRIX SPIKE

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

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- * Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

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

- * The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

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

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

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

- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data' means no amount ADDED was specified. 'LOW' and 'HIGH'

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

- * Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.
 - * If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.
- MDAs are underlined if greater than the printed RDL.
- * Aliquots are underlined if less than the nominal value specified for the method.
 - * Preparation factors are underlined if greater than the nominal value specified for the method.
 - * Dilution factors are underlined if greater than the nominal value specified for the method.
 - * Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
 - * Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
 - * Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.
 - * Count times are underlined if less than the nominal value

REPORT GUIDES

Page 13

SUMMARY DATA SECTION

Page 63

71

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

specified for the method.

- * Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- * Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- * Days Held are underlined if greater than the holding time specified in the protocol.
- * Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

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

Ratios are not computed for Lab Control Sample, Reagent Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included.

SPORT GUIDES

Page 14

SUMMARY DATA SECTION

Page 64

72

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

GUIDE, cont.

Client RocketdyneContract R44PJZ94034044

METHOD SUMMARY

No sums are computed for Lab Control, Reagent Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

REPORT GUIDES

Page 15

SUMMARY DATA SECTION

Page 65

73

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95



TMA/Norcal

2030 Wright Avenue

P. O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax No. (510) 235-0438

Batch 941B

February 8, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91309-7922

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N4-12-026-6103

Dear Mr. Klein:

Enclosed is the final data report for radiochemistry analyses on the eleven soil samples collected November 17 through November 22, 1994 and received at TMA/Richmond December 9, 1994.

Since this is our first report for Rocketdyne, I would like to explain the report format and how it relates to the statement of work requirements.

Case Narrative

This section contains all appropriate comments and observations regarding the processing of the sample.

Summary Data Section

This section is the output of our DVD data package preparation software. This section begins with a report guide, *About the Summary Data Section*, that summarizes the subsections included. The software has been customized to reflect the Rocketdyne technical requirements, such as minimum yield, spike recovery, Required Detection Limits (RDL's), expected aliquots and counting times, etc. The basic premise is that all parameters not in compliance with the statement of work are underlined in the report. Underlined values should be individually noted and discussed in the case narrative.

The DVD contains many advanced data verification issues including the following:

- All results less than the ^{Minimum Detectable Activity (MDA)} ~~required detection limit (RDL)~~ are flagged with a U, _{FOR}

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division

February 8, 1995
Page two

- All results greater than the measured MDA, but less than the RDL are flagged with a J,
- All Blank results greater than the RDL are underlined,
- All Blank results less than the RDL but greater than the MDA are underlined and flagged with a J.

Please review this report and we can discuss any changes that may be required.

Sincerely,


Leah Guerrero
Program Manager

LGG/ss

TMA
Thermo Analytical Inc.

TMA/Norcal

2030 Wright Avenue

P. O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax No. (510) 235-0438

February 8, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91309-7922

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N4-12-026-6104

Dear Mr. Klein:

Enclosed is the final data report for radiochemistry analyses on the twelve samples collected November 22 through November 30, 1994 and received at TMA/Richmond December 9, 1994. All parameters not in compliance with the Statement of Work are underlined in the report and discussed the case narrative.

Please call if you have any questions regarding this data.

Sincerely,


Leah Guerrero
Program Manager

LGG/ss

Enclosure: Data Package

DOCUMENT INVENTORY FOR SAMPLE DELIVERY GROUP RF6103

SECTION 1	Case Narrative
SECTION 2	Summary Data Section
<u>X</u> APPENDIX 1	Chains-of-Custody Copies
<u>X</u> APPENDIX 2	Aliquot Information
<u>X</u> APPENDIX 3	Preparation Log For QC Samples
<u>X</u> APPENDIX 4	Continuing Calibration Data for LSC Counters
<u>X</u> APPENDIX 5	Copies of Raw Data Sheets

SECTION 1 Case Narrative

TMA/Richmond

Report N4-12-033-6104
Sample Delivery Group 6104

Rockwell International Corp.
Contract R44PJZ94034044

Case Narrative

February 8, 1995

1.0 GENERAL

TMA/Richmond Delivery Group 6104 is comprised of the ten soil samples and group 6104A is comprised of the two liquid samples received with the soil samples on December 9, 1994.

2.0 ANALYTICAL NOTES

The internal quality control consisted 5% each of laboratory control samples, blanks and replicates.

The QC samples were prepared by the Quality Control Department. Copies of the QC Notebook pages are included in the data package.

The blanks and laboratory control samples were created using the 1989 ASTM formula for moderately hard water, listed in Table 8010: *Recommended Composition for Reconstituted Fresh Water*. This consisted 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 was specified in the table but not added as KCl contains natural ⁴⁰K which raises the background considerably.

2.1 Tritium Analyses

Sample 6104-15, the duplicate of sample A4CM-94-0015 was reanalyzed because the sample was inadvertently spiked for efficiency determination prior to the sample count.

2.2 Strontium-90 Analyses

Sample 6104-13 (laboratory control sample) was counted for less than the nominal 200 minutes, however, the MDA was less than the RDL despite the short count time.

2.3 Thorium 230/232 Analyses

Samples A4CM-94-0022, 6104-13 (laboratory control sample) and 6104-14 (reagent blank) were counted for less than the required 500 minutes, however the MDA's were less than the RDL despite the short count times.

TMA/Richmond

Report N4-12-033-6104

Sample Delivery Group 6104

Rockwell International Corp.

Contract R44PJZ94034044

Case Narrative

February 8, 1995

2.0 ANALYTICAL NOTES (cont'd)**2.4 Uranium 233/234, 235, 238 Analyses**

Most of the samples were counted for less than the required 720 minutes. Sample A4CM-94-0018 had a yield of 29%, slightly less than the required 30%. Positive uranium activities greater than the MDA's were detected in most client samples, therefore the high MDA's are not a concern.

2.5 Plutonium 239/240 Analyses

Sample A4CM-94-0019 and its duplicate (6104-15) were reanalyzed due to poor yields. The LCS for the reanalysis (6104-15, QC ID 22935) was counted for less than the required 500 minutes, however the MDA was less than the RDL. The MDA's for laboratory control sample 6104-13 (QC ID 22638) and reagent blank (6104-14, QC ID 22644) were greater than the RDL. The elevated MDA for the LCS is not a problem since the activity of the LCS is so much greater than the MDA. The reagent blank MDA is high due to a slightly elevated counter background.

2.6 Gamma Spectroscopy Analyses(SOIL)

Due to a miscommunication between TMA/Richmond and Rocketdyne less than 850 g was received. After the samples were sieved the masses were greatly reduced and the MDA's exceeded the RDL for most of the samples.

2.7 Gamma Spectroscopy Analyses (WATER)

The MDA for the reagent blank (6104-17) processed with the sample was greater than the RDL due to an elevated background at the cesium-137 energy (661.6 KeV).

SECTION 2 Summary Data Section

T M A / R I C H M O N D
REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

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				
About this section	.	.	.	1
Sample Summaries	.	.	.	3
Prep Batch Summary	.	.	.	5
Work Summary	.	.	.	6
Reagent Blanks	.	.	.	10
Lab Control Samples	.	.	.	13
Duplicates	.	.	.	16
Data Sheets	.	.	.	18
Method Summaries	.	.	.	38
Report Guides	.	.	.	50
End of Section	.	.	.	64

Leah G. Guerrero
pared by
Leah G. Guerrero
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

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

WORK SUMMARY

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

REAGENT BLANKS

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

LAB CONTROL SAMPLES

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

DUPLICATES

REPORT GUIDES

Page 1

SUMMARY DATA SECTION

Page 1

8

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne
Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

MATRIX SPIKES

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

DATA SHEETS

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

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

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

REPORT GUIDES

Page 2

SUMMARY DATA SECTION

Page 2

9

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

tact Leah G. Guerrero

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-94-0013	SSFL AREA 4	SOIL		N412033-03			11/22/94
A4CM-94-0014	SSFL AREA 4	SOIL		N412033-04			11/23/94
A4CM-94-0015	SSFL AREA 4	SOIL		N412033-05			11/23/94
A4CM-94-0016	SSFL AREA 4	SOIL		N412033-06			11/23/94
A4CM-94-0017	SSFL AREA 4	SOIL		N412033-07			11/28/94
A4CM-94-0018	SSFL AREA 4	SOIL		N412033-08			11/28/94
A4CM-94-0019	SSFL AREA 4	SOIL		N412033-09			11/29/94
A4CM-94-0020	SSFL AREA 4	SOIL		N412033-10			11/29/94
A4CM-94-0021	SSFL AREA 4	SOIL		N412033-11			11/30/94
A4CM-94-0022	SSFL AREA 4	SOIL		N412033-12			11/30/94
Reagent Blank		SOIL		N412026-16			
Reagent Blank		SOIL		N412033-14			
Reagent Blank		SOIL		N412033-19			
Lab Control Sample		SOIL		N412026-15			
Lab Control Sample		SOIL		N412033-13			
Lab Control Sample		SOIL		N412033-18			
Duplicate (N412033-05)	SSFL AREA 4	SOIL		N412033-15			11/23/94

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

10

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY		MATRIX	†	SAMPLE		BASIS	DAYS SINCE		LAB	DEPARTMENT
		CLIENT SAMPLE ID			MOIST	WT/VOL		RECEIVED	COLL		
6103		Reagent Blank	SOIL							N412026-16	6103-016
		Lab Control Sample	SOIL							N412026-15	6103-015
6104		A4CM-94-0013	SOIL					12/09/94	17	N412033-03	6104-003
		A4CM-94-0014	SOIL					12/09/94	16	N412033-04	6104-004
		A4CM-94-0015	SOIL					12/09/94	16	N412033-05	6104-005
		A4CM-94-0016	SOIL					12/09/94	16	N412033-06	6104-006
		A4CM-94-0017	SOIL					12/09/94	11	N412033-07	6104-007
		A4CM-94-0018	SOIL					12/09/94	11	N412033-08	6104-008
		A4CM-94-0019	SOIL					12/09/94	10	N412033-09	6104-009
		A4CM-94-0020	SOIL					12/09/94	10	N412033-10	6104-010
		A4CM-94-0021	SOIL					12/09/94	9	N412033-11	6104-011
		A4CM-94-0022	SOIL					12/09/94	9	N412033-12	6104-012
		Reagent Blank	SOIL							N412033-14	6104-014
		Reagent Blank	SOIL							N412033-19	6104-019
		Lab Control Sample	SOIL							N412033-13	6104-013
		Lab Control Sample	SOIL							N412033-18	6104-018
		Duplicate (N412033-05)	SOIL					12/09/94	16	N412033-15	6104-015

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

11

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

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	SOIL	Plutonium, Isotopic in Soil	2781-016B	5.0	1			1	1	1/0		
			2781-024	5.0	9			1	1	0/1		
TH	SOIL	Thorium, Isotopic in Soil	2781-024	5.0	10			1	1	1/1		
U	SOIL	Uranium, Isotopic in Soil	2781-024	5.0	10			1	1	1/1		
Beta Counting												
SR	SOIL	Strontium, Total in Soil	2781-024	10.0	10			1	1	1/1		
Gamma Spectroscopy												
GAM	SOIL	Gamma Scan	2781-024	15.0	10			1	1	1/1		
Liquid Scintillation												
H	SOIL	Tritium-Soil	2781-024	10.0	10			1	1	0/1		
			2781-024B	10.0			1	1	1/0			

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.

k 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 5

12

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

WORK SUMMARY

CLIENT SAMPLE ID		LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED	TEST	SUF-	ANALYZED	REVIEWED	BY	METHOD			
CUSTODY	SAS no	RECEIVED	PLANCHET	FIX							
A4CM-94-0013		N412033-03	6104-003	GAM	01/23/95			Gamma Scan			
SSFL AREA 4	SOIL	11/22/94	6104-003	H	12/22/94			Tritium-Soil			
		12/09/94	6104-003	PU	01/16/95			Plutonium, Isotopic in Soil			
			6104-003	SR	01/14/95			Strontium, Total in Soil			
			6104-003	TH	01/13/95			Thorium, Isotopic in Soil			
			6104-003	U	01/15/95			Uranium, Isotopic in Soil			
A4CM-94-0014		N412033-04	6104-004	GAM	01/23/95			Gamma Scan			
SSFL AREA 4	SOIL	11/23/94	6104-004	H	12/22/94			Tritium-Soil			
		12/09/94	6104-004	PU	01/14/95			Plutonium, Isotopic in Soil			
			6104-004	SR	01/14/95			Strontium, Total in Soil			
			6104-004	TH	01/13/95			Thorium, Isotopic in Soil			
			6104-004	U	01/15/95			Uranium, Isotopic in Soil			
A4CM-94-0015		N412033-05	6104-005	GAM	01/23/95			Gamma Scan			
SSFL AREA 4	SOIL	11/23/94	6104-005	H	12/22/94			Tritium-Soil			
		12/09/94	6104-005	PU	01/14/95			Plutonium, Isotopic in Soil			
			6104-005	SR	01/14/95			Strontium, Total in Soil			
			6104-005	TH	01/14/95			Thorium, Isotopic in Soil			
			6104-005	U	01/15/95			Uranium, Isotopic in Soil			
A4CM-94-0016		N412033-06	6104-006	GAM	01/23/95			Gamma Scan			
SSFL AREA 4	SOIL	11/23/94	6104-006	H	12/22/94			Tritium-Soil			
		12/09/94	6104-006	PU	01/14/95			Plutonium, Isotopic in Soil			
			6104-006	SR	01/14/95			Strontium, Total in Soil			
			6104-006	TH	01/14/95			Thorium, Isotopic in Soil			
			6104-006	U	01/15/95			Uranium, Isotopic in Soil			
A4CM-94-0017		N412033-07	6104-007	GAM	01/24/95			Gamma Scan			
SSFL AREA 4	SOIL	11/28/94	6104-007	H	12/22/94			Tritium-Soil			
		12/09/94	6104-007	PU	01/14/95			Plutonium, Isotopic in Soil			
			6104-007	SR	01/14/95			Strontium, Total in Soil			
			6104-007	TH	01/14/95			Thorium, Isotopic in Soil			
			6104-007	U	01/15/95			Uranium, Isotopic in Soil			

WORK SUMMARY

Page 1

SUMMARY DATA SECTION

Page 6

13

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 1.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

tact Leah G. Guerrero

WORK SUMMARY, cont.

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-94-0018		N412033-08	6104-008	GAM		01/24/95			Gamma Scan
SSFL AREA 4	SOIL	11/28/94	6104-008	H		12/22/94			Tritium-Soil
		12/09/94	6104-008	PU		01/14/95			Plutonium, Isotopic in Soil
			6104-008	SR		01/14/95			Strontium, Total in Soil
			6104-008	TH		01/14/95			Thorium, Isotopic in Soil
			6104-008	U		01/15/95			Uranium, Isotopic in Soil
A4CM-94-0019		N412033-09	6104-009	GAM		01/24/95			Gamma Scan
SSFL AREA 4	SOIL	11/29/94	6104-009	H		12/22/94			Tritium-Soil
		12/09/94	6104-009	PU	A1	01/19/95			Plutonium, Isotopic in Soil
			6104-009	SR		01/14/95			Strontium, Total in Soil
			6104-009	TH		01/14/95			Thorium, Isotopic in Soil
			6104-009	U		01/15/95			Uranium, Isotopic in Soil
A4CM-94-0020		N412033-10	6104-010	GAM		01/24/95			Gamma Scan
SSFL AREA 4	SOIL	11/29/94	6104-010	H		12/22/94			Tritium-Soil
		12/09/94	6104-010	PU		01/14/95			Plutonium, Isotopic in Soil
			6104-010	SR		01/14/95			Strontium, Total in Soil
			6104-010	TH		01/14/95			Thorium, Isotopic in Soil
			6104-010	U		01/15/95			Uranium, Isotopic in Soil
A4CM-94-0021		N412033-11	6104-011	GAM		01/24/95			Gamma Scan
SSFL AREA 4	SOIL	11/30/94	6104-011	H		12/22/94			Tritium-Soil
		12/09/94	6104-011	PU		01/14/95			Plutonium, Isotopic in Soil
			6104-011	SR		01/14/95			Strontium, Total in Soil
			6104-011	TH		01/14/95			Thorium, Isotopic in Soil
			6104-011	U		01/15/95			Uranium, Isotopic in Soil
A4CM-94-0022		N412033-12	6104-012	GAM		01/24/95			Gamma Scan
SSFL AREA 4	SOIL	11/30/94	6104-012	H		12/22/94			Tritium-Soil
		12/09/94	6104-012	PU		01/16/95			Plutonium, Isotopic in Soil
			6104-012	SR		01/14/95			Strontium, Total in Soil
			6104-012	TH		01/16/95			Thorium, Isotopic in Soil
			6104-012	U		01/15/95			Uranium, Isotopic in Soil
Reagent Blank		N412026-16	6103-016	PU		01/19/95			Plutonium, Isotopic in Soil
	SOIL								

WORK SUMMARY

Page 2

SUMMARY DATA SECTION

Page 7

14

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

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
Reagent Blank		N412033-14	6104-014	GAM		01/24/95			Gamma Scan
	SOIL		6104-014	H		12/22/94			Tritium-Soil
			6104-014	PU		01/17/95			Plutonium, Isotopic in Soil
			6104-014	SR		01/14/95			Strontium, Total in Soil
			6104-014	TH		01/16/95			Thorium, Isotopic in Soil
			6104-014	U		01/15/95			Uranium, Isotopic in Soil
Reagent Blank		N412033-19	6104-019	H		01/10/95			Tritium-Soil
	SOIL								
Lab Control Sample		N412026-15	6103-015	PU		01/19/95			Plutonium, Isotopic in Soil
	SOIL								
Lab Control Sample		N412033-13	6104-013	GAM		01/24/95			Gamma Scan
	SOIL		6104-013	H		12/22/94			Tritium-Soil
			6104-013	PU		01/17/95			Plutonium, Isotopic in Soil
			6104-013	SR		01/14/95			Strontium, Total in Soil
			6104-013	TH		01/16/95			Thorium, Isotopic in Soil
			6104-013	U		01/14/95			Uranium, Isotopic in Soil
Lab Control Sample		N412033-18	6104-018	H		01/10/95			Tritium-Soil
	SOIL								
Duplicate (N412033-05)		N412033-15	6104-015	GAM		01/25/95			Gamma Scan
SSFL AREA 4	SOIL	11/23/94	6104-015	H	A1	01/10/95			Tritium-Soil
		12/09/94	6104-015	PU	A1	01/19/95			Plutonium, Isotopic in Soil
			6104-015	SR		01/14/95			Strontium, Total in Soil
			6104-015	TH		01/18/95			Thorium, Isotopic in Soil
			6104-015	U		01/15/95			Uranium, Isotopic in Soil

WORK SUMMARY

Page 3

SUMMARY DATA SECTION

Page 8

15

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

tact Leah G. Guerrero

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 Scan		10			1	1	1		13
H		Tritium-Soil	EPA 906.0; ASTM 2476-81	10			2	2	1		15
PU		Plutonium, Isotopic in Soil	HASL 300/PU-02	10			2	2	1		15
SR		Strontium, Total in Soil	HASL 300/SR-01,-02	10			1	1	1		13
TH		Thorium, Isotopic in Soil		10			1	1	1		13
U		Uranium, Isotopic in Soil	HASL 300/U-04	10			1	1	1		13
TOTALS				60			8	8	6		82

WORK SUMMARY

Page 4

SUMMARY DATA SECTION

Page 9

16

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form RVD-CWS

Version 2.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412026-16

REAGENT BLANK

Reagent Blank

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-16

Client sample id Reagent Blank

Dept sample id 6103-016

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 230	14269-63-7	N.A.			0.1		TH
Thorium 232	7740-29-1	N.A.			0.1		TH
Plutonium 238	13981-16-3	0.001	0.002	0.004		U	PU
Plutonium 239/240	10-12-8	0	0.001	0.004	0.01	U	PU

REAGENT BLANKS

Page 1

SUMMARY DATA SECTION

Page 10

17

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-14

REAGENT BLANK

Reagent Blank

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-14

Client sample id Reagent Blank

Dept sample id 6104-014

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.016	0.082	0.1	0.5	U	H
Strontium 90	10098-97-2	0.024	0.049	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.005	0.020	0.04	0.1	U	TH
Thorium 232	7740-29-1	0.020	0.020	0.04	0.1	U	TH
Uranium 233/234	11-08-5	0.002	0.007	0.01	0.01	U	U
Uranium 235	14117-96-1	0	0.006	0.01	0.01	U	U
Uranium 238	7440-61-1	-0.002	0.002	0.009	0.01	U	U
Plutonium 238	13981-16-3	0	0.008	0.02		U	PU
Plutonium 239/240	10-12-8	0.001	0.008	0.02	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		U		0.07		U	GAM
Chromium 51		U		0.02		U	GAM
Manganese 54		U		0.004		U	GAM
Cobalt 58		U		0.003		U	GAM
Iron 59		U		0.007		U	GAM
Cobalt 60		U		0.004		U	GAM
Zinc 65		U		0.008		U	GAM
Niobium 94		U		0.004		U	GAM
Ruthenium 103		U		0.003		U	GAM
Ruthenium 106		U		0.03		U	GAM
Tin 113		U		0.004		U	GAM
Cesium 134		U		0.004		U	GAM
Cesium 137		U		0.004	0.02	U	GAM
Cerium 144		U		0.01		U	GAM
Europium 152		U		0.007		U	GAM
Europium 154		U		0.005		U	GAM
Europium 155		U		0.008		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.02		U	GAM

REAGENT BLANKS

Page 2

SUMMARY DATA SECTION

Page 11

18

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVP-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-19

REAGENT BLANK

Reagent Blank

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-19

Client sample id Reagent Blank

Dept sample id 6104-019

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.048	0.079	0.1	0.5	U	H

REAGENT BLANKS

Page 3

SUMMARY DATA SECTION

Page 12

19

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412026-15

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-15

Client sample id Lab Control Sample

Dept sample id 6103-015

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
Thorium 230	N.A.			0.1		TH					
Thorium 232	N.A.			0.1		TH					
Plutonium 238	-0.002	0.007	0.02		U	PU	0	0			
Plutonium 239/240	0.33	0.041	0.009	0.01		PU	0.300	0.012	110	77-123	

LAB CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 13

20

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-13

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6104

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-13

Client sample id Lab Control Sample

Dept sample id 6104-013

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	4.86	0.21	0.1	0.5		H	4.86	0.19	95	83-117	
Strontium 90	10	0.31	0.1	0.5		SR	10.3	0.41	97	83-117	
Thorium 230	2.7	0.27	0.05	0.1		TH	2.56	0.10	106	81-119	
Thorium 232	-0.004	0.008	0.03	0.1	U	TH	0	0			
Uranium 233/234	1.7	0.12	0.05	0.01		U	1.68	0.067	101	85-115	
Uranium 235	1.3	0.10	0.01	0.01		U	1.29	0.052	101	84-116	
Uranium 238	1.7	0.12	0.05	0.01		U	1.68	0.067	101	85-115	
Plutonium 238	0.012	0.024	0.04		U	PU	0	0			
Plutonium 239/240	0.33	0.069	0.04	0.01		PU	0.330	0.013	100	67-133	
GAMMA SCAN ANALYTES											
Cesium 40	U		0.09		U	GAM					
Chromium 51	U		0.04		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		0.006		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.005		U	GAM					
Ruthenium 103	U		0.006		U	GAM					
Ruthenium 106	U		0.06		U	GAM					
Tin 113	U		0.008		U	GAM					
Cesium 134	U		0.006		U	GAM					
Cesium 137	0.35	0.014		0.02		GAM	0.376	0.015	93	77-123	
Cerium 144	U		0.03		U	GAM					
Europium 152	U		0.01		U	GAM					
Europium 154	U		0.008		U	GAM					
Europium 155	U		0.02		U	GAM					
Radium 226	U		0.01		U	GAM					
Thorium 232	U		0.02		U	GAM					

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 14

21

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-18

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJ294034044Lab sample id N412033-18Client sample id Lab Control SampleDept sample id 6104-018Material/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
Tritium	5.6	0.24	0.1	0.5		H	5.05	0.20	111	81-119	

LAB CONTROL SAMPLES

Page 3

SUMMARY DATA SECTION

Page 15

22

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-15

A4CM-94-0015

DUPLICATE

SDG 6104

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N412033-15

Lab sample id N412033-05

Client sample id A4CM-94-0015

Dept sample id 6104-015

Dept sample id 6104-005

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/23/94

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	-0.049	0.13	0.2	0.5	U	H	0.012	0.072	0.1	U	-	
Strontium 90	0.10	0.069	0.06	0.5	J	SR	0.14	0.083	0.1	J	33	137
Thorium 230	0.80	0.15	0.04	0.1		TH	0.90	0.13	0.04		12	37
Thorium 232	1.0	0.16	0.04	0.1		TH	1.2	0.16	0.03		18	34
Uranium 233/234	0.74	0.064	0.01	0.01		U	0.74	0.065	0.02		0	21
Uranium 235	0.032	0.014	0.009	0.01		U	0.034	0.014	0.01		6	91
Uranium 238	0.80	0.067	0.01	0.01		U	0.76	0.066	0.01		5	21
Plutonium 238	-0.001	0.001	0.005		U	PU	0.001	0.011	0.02	U	-	
Plutonium 239/240	0	0.001	0.005	0.01	U	PU	0.012	0.008	0.01		200	203
SCA SCAN ANALYTES	U						U					
Potassium 40	15	0.95				GAM	15	0.96			0	35
Chromium 51	U		1		U	GAM	U		1	U	-	
Manganese 54	U		0.05		U	GAM	U		0.05	U	-	
Cobalt 58	U		0.08		U	GAM	U		0.07	U	-	
Iron 59	U		0.2		U	GAM	U		0.2	U	-	
Cobalt 60	U		0.05		U	GAM	U		0.05	U	-	
Zinc 65	U		0.1		U	GAM	U		0.1	U	-	
Niobium 94	U		0.04		U	GAM	U		0.04	U	-	
Ruthenium 103	U		0.1		U	GAM	U		0.1	U	-	
Ruthenium 106	U		0.5		U	GAM	U		0.4	U	-	
Tin 113	U		0.07		U	GAM	U		0.07	U	-	
Cesium 134	U		0.06		U	GAM	U		0.06	U	-	
Cesium 137	U		0.05	0.02	U	GAM	U		0.05	U	-	
Cerium 144	U		0.3		U	GAM	U		0.2	U	-	
Europium 152	U		0.08		U	GAM	U		0.08	U	-	
Europium 154	U		0.06		U	GAM	U		0.06	U	-	
Europium 155	U		0.1		U	GAM	U		0.1	U	-	
Radium 226	0.67	0.094				GAM	0.75	0.087			11	42

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 16

23

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DUP

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-15

A4CM-94-0015

DUPLICATE, cont.

SDG 6104

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N412033-15Lab sample id N412033-05Client sample id A4CM-94-0015Dept sample id 6104-015Dept sample id 6104-005Location/Matrix SSFL AREA 4SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

ANALYTE	DUPLICATE pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ORIGINAL pCi/g	2 σ ERR (COUNT)	MDA pCi/g	QUALI- FIERS	RPD %	3 σ TOT	PROT LIMIT
Thorium 232	1.2	0.22				GAM	1.4	0.23			15	49	

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 17

24

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6104

N412033-03

A4CM-94-0013

DATA SHEET

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-03

Client sample id A4CM-94-0013

Dept sample id 6104-003

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/22/94

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.021	0.069	0.1	0.5	U	H
Strontium 90	10098-97-2	0.19	0.077	0.1	0.5	J	SR
Thorium 230	14269-63-7	0.89	0.15	0.05	0.1		TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.90	0.077	0.02	0.01		U
Uranium 235	14117-96-1	0.027	0.013	0.01	0.01		U
Uranium 238	7440-61-1	0.94	0.080	0.01	0.01		U
Plutonium 238	13981-16-3	0.005	0.009	0.02		U	PU
Plutonium 239/240	10-12-8	-0.001	0.002	0.009	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.1				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.05		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.05		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.07		U	GAM
Cesium 134		U		0.06		U	GAM
Cesium 137		U		0.05	0.02	U	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
Radium 226		0.57	0.097				GAM

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 18

25

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-03

A4CM-94-0013

DATA SHEET, cont

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-03

Client sample id A4CM-94-0013

Dept sample id 6104-003

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/22/94

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	0.28				GAM

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 19

26

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-04

DATA SHEET

A4CM-94-0014

SDG 6104

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-04Client sample id A4CM-94-0014Dept sample id 6104-004Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.007	0.073	0.1	0.5	U	H
Strontium 90	10098-97-2	0.13	0.058	0.08	0.5	J	SR
Thorium 230	14269-63-7	0.82	0.14	0.04	0.1		TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.76	0.065	0.01	0.01		U
Uranium 235	14117-96-1	0.036	0.014	0.009	0.01		U
Uranium 238	7440-61-1	0.79	0.067	0.01	0.01		U
Plutonium 238	13981-16-3	-0.008	0.011	0.03		U	PU
Plutonium 239/240	10-12-8	-0.001	0.006	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	1.0				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.05	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.67	0.10				GAM

DATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 20

27

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-04

A4CM-94-0014

DATA SHEET, cont

SDG 6104Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-04Client sample id A4CM-94-0014Dept sample id 6104-004Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.24				GAM

ATA SHEETS

Page 4

SUMMARY DATA SECTION

Page 21

28

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-05

A4CM-94-0015

DATA SHEET

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-05Client sample id A4CM-94-0015Dept sample id 6104-005Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.012	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.14	0.083	0.1	0.5	J	SR
Thorium 230	14269-63-7	0.90	0.13	0.04	0.1		TH
Thorium 232	7740-29-1	1.2	0.16	0.03	0.1		TH
Uranium 233/234	11-08-5	0.74	0.065	0.02	0.01		U
Uranium 235	14117-96-1	0.034	0.014	0.01	0.01		U
Uranium 238	7440-61-1	0.76	0.066	0.01	0.01		U
Plutonium 238	13981-16-3	0.001	0.011	0.02		U	PU
Plutonium 239/240	10-12-8	0.012	0.008	0.01	0.01		PU
TMA SCAN ANALYTES		U					
Potassium 40		15	0.96				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.05		U	GAM
Cobalt 58		U		0.07		U	GAM
Iron 59		U		0.2		U	GAM
Cobalt 60		U		0.05		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.04		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.07		U	GAM
Cesium 134		U		0.06		U	GAM
Cesium 137		U		0.05	0.02	U	GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.08		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.75	0.087				GAM

DATA SHEETS

Page 5

SUMMARY DATA SECTION

Page 22

29

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-05

A4CM-94-0015

DATA SHEET, cont

SDG 6104Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-05Client sample id A4CM-94-0015Dept sample id 6104-005Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.23				GAM

DATA SHEETS

Page 6

SUMMARY DATA SECTION

Page 23

30

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6104

N412033-06

A4CM-94-0016

DATA SHEET

SDG 6104

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-06

Client sample id A4CM-94-0016

Dept sample id 6104-006

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/23/94

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.11	0.079	0.1	0.5	J	H
Strontium 90	10098-97-2	0.13	0.090	0.1	0.5	J	SR
Thorium 230	14269-63-7	0.96	0.18	0.06	0.1		TH
Thorium 232	7740-29-1	1.3	0.21	0.06	0.1		TH
Uranium 233/234	11-08-5	0.74	0.064	0.02	0.01		U
Uranium 235	14117-96-1	0.044	0.014	0.009	0.01		U
Uranium 238	7440-61-1	0.79	0.066	0.01	0.01		U
Plutonium 238	13981-16-3	-0.003	0.011	0.02		U	PU
Plutonium 239/240	10-12-8	-0.001	0.005	0.01	0.01	U	PU
MA SCAN ANALYTES		U					
Potassium 40		16	0.63				GAM
Chromium 51		U		0.9		U	GAM
Manganese 54		U		0.04		U	GAM
Cobalt 58		U		0.05		U	GAM
Iron 59		U		0.2		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		0.07		U	GAM
Ruthenium 106		U		0.3		U	GAM
Tin 113		U		0.05		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		U		0.06	0.02	U	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
Radium 226		0.79	0.065				GAM

ATA SHEETS

Page 7

SUMMARY DATA SECTION

Page 24

31

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-06

A4CM-94-0016

DATA SHEET, cont

SDG 6104Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-06Client sample id A4CM-94-0016Dept sample id 6104-006Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/23/94

Chain of custody id _____

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

DATA SHEETS

Page 8

SUMMARY DATA SECTION

Page 25

32

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6104

N412033-07

A4CM-94-0017

DATA SHEET

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-07

Client sample id A4CM-94-0017

Dept sample id 6104-007

Location/Matrix SSFL AREA 4

SOIL

Received 12/09/94

Collected 11/28/94

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.017	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	0.020	0.059	0.09	0.5	U	SR
Thorium 230	14269-63-7	0.80	0.12	0.05	0.1		TH
Thorium 232	7740-29-1	0.89	0.12	0.03	0.1		TH
Uranium 233/234	11-08-5	0.86	0.075	0.02	0.01		U
Uranium 235	14117-96-1	0.052	0.018	0.01	0.01		U
Uranium 238	7440-61-1	0.85	0.074	0.02	0.01		U
Plutonium 238	13981-16-3	-0.009	0.010	0.02		U	PU
Plutonium 239/240	10-12-8	0.004	0.008	0.01	0.01	U	PU
TMA SCAN ANALYTES		U					
Potassium 40		17	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.2		U	GAM
Europium 152		U		0.09		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.77	0.13				GAM

DATA SHEETS

Page 9

SUMMARY DATA SECTION

Page 26

33

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-07

A4CM-94-0017

DATA SHEET, cont

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJ294034044Lab sample id N412033-07Client sample id A4CM-94-0017Dept sample id 6104-007Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/28/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.3	0.22				GAM

DATA SHEETS

Page 10

SUMMARY DATA SECTION

Page 27

34

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-08

DATA SHEET

A4CM-94-0018

SDG 6104

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-08Client sample id A4CM-94-0018Dept sample id 6104-008Location/Matrix SSFL AREA 4SOILReceived 12/09/94Collected 11/28/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.036	0.073	0.1	0.5	U	H
Strontium 90	10098-97-2	0.091	0.067	0.09	0.5	J	SR
Thorium 230	14269-63-7	1.0	0.13	0.05	0.1		TH
Thorium 232	7740-29-1	1.4	0.16	0.03	0.1		TH
Uranium 233/234	11-08-5	0.86	0.12	0.04	0.01		U
Uranium 235	14117-96-1	0.044	0.025	0.03	0.01		U
Uranium 238	7440-61-1	0.86	0.11	0.02	0.01		U
Plutonium 238	13981-16-3	0	0.010	0.02		U	PU
Plutonium 239/240	10-12-8	0.002	0.005	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	1.1				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.05	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.83	0.12				GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

DATA SHEETS

Page 11

SUMMARY DATA SECTION

Page 28

TMA / RICHMOND

REPORTING GROUP 6104

N412033-08

A4CM-94-0018

DATA SHEET, cont

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-08Client sample id A4CM-94-0018Dept sample id 6104-008Location/Matrix SSFL AREA 4SOILReceived 12/09/94Collected 11/28/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.3	0.25				GAM

DATA SHEETS

Page 12

SUMMARY DATA SECTION

Page 29

36

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-09

A4CM-94-0019

DATA SHEET

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-09

Client sample id A4CM-94-0019

Dept sample id 6104-009

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/29/94

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.059	0.076	0.1	0.5	U	H
Strontium 90	10098-97-2	0.046	0.047	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.77	0.11	0.05	0.1		TH
Thorium 232	7740-29-1	1.1	0.14	0.03	0.1		TH
Uranium 233/234	11-08-5	0.74	0.069	0.02	0.01		U
Uranium 235	14117-96-1	0.051	0.016	0.01	0.01		U
Uranium 238	7440-61-1	0.79	0.072	0.01	0.01		U
Plutonium 238	13981-16-3	-0.001	0.002	0.006		U	PU
Plutonium 239/240	10-12-8	0	0.001	0.004	0.01	U	PU
LMA SCAN ANALYTES							
Potassium 40		15	0.96				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.2		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.05	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.09		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.71	0.11				GAM

DATA SHEETS

Page 13

SUMMARY DATA SECTION

Page 30

37

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-09

A4CM-94-0019

DATA SHEET, cont

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-09Client sample id A4CM-94-0019Dept sample id 6104-009Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/29/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.0	0.22				GAM

DATA SHEETS

Page 14

SUMMARY DATA SECTION

Page 31

38

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA / RICHMOND

REPORTING GROUP 6104

N412033-10

DATA SHEET

A4CM-94-0020

SDG 6104

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-10Client sample id A4CM-94-0020Dept sample id 6104-010Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/29/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.032	0.076	0.1	0.5	U	H
Strontium 90	10098-97-2	0.020	0.067	0.09	0.5	U	SR
Thorium 230	14269-63-7	0.98	0.13	0.04	0.1		TH
Thorium 232	7740-29-1	1.2	0.14	0.03	0.1		TH
Uranium 233/234	11-08-5	0.73	0.051	0.01	0.01		U
Uranium 235	14117-96-1	0.038	0.010	0.006	0.01		U
Uranium 238	7440-61-1	0.75	0.052	0.009	0.01		U
Plutonium 238	13981-16-3	0.003	0.010	0.02		U	PU
Plutonium 239/240	10-12-8	0	0.002	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.68				GAM
Chromium 51		U		0.8		U	GAM
Manganese 54		U		0.04		U	GAM
Cobalt 58		U		0.05		U	GAM
Iron 59		U		0.2		U	GAM
Cobalt 60		U		0.04		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.03		U	GAM
Ruthenium 103		U		0.07		U	GAM
Ruthenium 106		U		0.3		U	GAM
Tin 113		U		0.05		U	GAM
Cesium 134		U		0.04		U	GAM
Cesium 137		U		0.03	0.02	U	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		0.09		U	GAM
Radium 226		0.74	0.075				GAM

DATA SHEETS

Page 15

SUMMARY DATA SECTION

Page 32

39

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-10

A4CM-94-0020

DATA SHEET, cont

SDG 6104
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412033-10
Dept sample id 6104-010
Received 12/09/94Client sample id A4CM-94-0020
Location/Matrix SSFL AREA 4 SOIL
Collected 11/29/94
Chain of custody id _____

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

DATA SHEETS

Page 16

SUMMARY DATA SECTION

Page 33

40

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-11

DATA SHEET

A4CM-94-0021

SDG 6104
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412033-11
Dept sample id 6104-011
Received 12/09/94Client sample id A4CM-94-0021
Location/Matrix SSFL AREA 4 SOIL
Collected 11/30/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.004	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	0.030	0.055	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.96	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	0.75	0.054	0.01	0.01		U
Uranium 235	14117-96-1	0.036	0.011	0.006	0.01		U
Uranium 238	7440-61-1	0.81	0.057	0.009	0.01		U
Plutonium 238	13981-16-3	0.001	0.009	0.02		U	PU
Plutonium 239/240	10-12-8	0.008	0.007	0.009	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.09		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.79	0.12				GAM

DATA SHEETS

Page 17

SUMMARY DATA SECTION

Page 34

41

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-11

A4CM-94-0021

DATA SHEET, cont

SDG 6104Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-11Client sample id A4CM-94-0021Dept sample id 6104-011Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/30/94

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	0.29				GAM

DATA SHEETS

Page 18

SUMMARY DATA SECTION

Page 35

42

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-12

A4CM-94-0022

DATA SHEET

SDG 6104

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-12

Client sample id A4CM-94-0022

Dept sample id 6104-012

Location/Matrix SSFL AREA 4 SOIL

Received 12/09/94

Collected 11/30/94

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.057	0.073	0.1	0.5	U	H
Strontium 90	10098-97-2	0.022	0.054	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.78	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.72	0.058	0.02	0.01		U
Uranium 235	14117-96-1	0.052	0.016	0.009	0.01		U
Uranium 238	7440-61-1	0.79	0.061	0.01	0.01		U
Plutonium 238	13981-16-3	0.004	0.010	0.02		U	PU
Plutonium 239/240	10-12-8	0.001	0.005	0.01	0.01	U	PU
TMA SCAN ANALYTES		U					
Potassium 40		16	0.98				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.07		U	GAM
Iron 59		U		0.2		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.07		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.05	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.74	0.12				GAM

DATA SHEETS

Page 19

SUMMARY DATA SECTION

Page 36

43

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

N412033-12

A4CM-94-0022

DATA SHEET, cont

SDG 6104Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-12Client sample id A4CM-94-0022Dept sample id 6104-012Location/Matrix SSFL AREA 4 SOILReceived 12/09/94Collected 11/30/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.3	0.27				GAM

DATA SHEETS

Page 20

SUMMARY DATA SECTION

Page 37

44

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test PU Matrix SOILSDG 6104tact Leah G. Guerrero

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 2781-016B

A4CM-94-0019	N412033-09	A1	6104-009	U	U
BLK (QC ID=22937)	N412026-16		6103-016	U	U
LCS (QC ID=22935)	N412026-15		6103-015	ok U	ok
Duplicate (N412033-05)	N412033-15	A1	6104-015	- U	ok U

Preparation batch 2781-024

A4CM-94-0013	N412033-03		6104-003	U	U
A4CM-94-0014	N412033-04		6104-004	U	U
A4CM-94-0015	N412033-05		6104-005	U	0.012
A4CM-94-0016	N412033-06		6104-006	U	U
A4CM-94-0017	N412033-07		6104-007	U	U
A4CM-94-0018	N412033-08		6104-008	U	U
A4CM-94-0020	N412033-10		6104-010	U	U
A4CM-94-0021	N412033-11		6104-011	U	U
A4CM-94-0022	N412033-12		6104-012	U	U
BLK (QC ID=22644)	N412033-14		6104-014	U	U
I C ID=22638)	N412033-13		6104-013	ok U	ok

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

Page 1

SUMMARY DATA SECTION

Page 38

45

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test PU Matrix SOIL

SDG 6104

Contact Leah G. Guerrero

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

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 2781-0168 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0019	N412033-09	A1	0.004	3.00			67	963				51	01/19/95	01/19	SS-046
BLK (QC ID=22937)	N412026-16		0.004	3.00			73	963					01/19/95	01/19	SS-044
LCS (QC ID=22935)	N412026-15		0.009	3.00			63	487					01/19/95	01/19	SS-041
Duplicate (N412033-05)	N412033-15	A1	0.005	3.00			75	732				57	01/19/95	01/19	SS-053
Preparation batch 2781-024 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0013	N412033-03		0.009	3.00			60	518				55	01/10/95	01/16	SS-032
A4CM-94-0014	N412033-04		0.01	3.00			51	510				52	01/10/95	01/14	SS-029
A4CM-94-0015	N412033-05		0.01	3.00			54	510				52	01/10/95	01/14	SS-030
A4CM-94-0016	N412033-06		0.01	3.00			53	510				52	01/10/95	01/14	SS-035
A4CM-94-0017	N412033-07		0.01	3.00			55	510				47	01/10/95	01/14	SS-036
A4CM-94-0018	N412033-08		0.01	3.00			61	510				47	01/10/95	01/14	SS-038
A4CM-94-0020	N412033-10		0.01	3.00			57	510				46	01/10/95	01/14	SS-040
A4CM-94-0021	N412033-11		0.009	3.00			64	510				45	01/10/95	01/14	SS-041
A4CM-94-0022	N412033-12		0.01	3.00			53	518				47	01/10/95	01/16	SS-034
BLK (QC ID=22644)	N412033-14		0.02	3.00			67	561					01/10/95	01/17	SS-020
I C ID=22638)	N412033-13		0.04	3.00			32	561					01/10/95	01/17	SS-019
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	±	0.02
FOR 15 SAMPLES	YIELD	59	±	21

METHOD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 39

46

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test TH Matrix SOILSDG 6104tact Leah G. Guerrero

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Thorium 228	Thorium 230	Thorium 232
Preparation batch 2781-024						
A4CM-94-0013	N412033-03	6104-003		0.89	1.1	
A4CM-94-0014	N412033-04	6104-004		0.82	1.1	
A4CM-94-0015	N412033-05	6104-005		0.90	1.2	
A4CM-94-0016	N412033-06	6104-006		0.96	1.3	
A4CM-94-0017	N412033-07	6104-007		0.80	0.89	
A4CM-94-0018	N412033-08	6104-008		1.0	1.4	
A4CM-94-0019	N412033-09	6104-009		0.77	1.1	
A4CM-94-0020	N412033-10	6104-010		0.98	1.2	
A4CM-94-0021	N412033-11	6104-011		0.96	1.3	
A4CM-94-0022	N412033-12	6104-012		0.78	1.1	
BLK (QC ID=22642)	N412033-14	6104-014		U	U	
LCS (QC ID=22636)	N412033-13	6104-013		ok	ok	U
Duplicate (N412033-05)	N412033-15	6104-015		ok	ok	
Nominal values and limits from method				RDLs (pCi/g)	0.1	0.1

MOD SUMMARIES

Page 3

SUMMARY DATA SECTION

Page 40

47

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test TH Matrix SOIL

SDG 6104

tact Leah G. Guerrero

METHOD SUMMARY

THORIUM, 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 2781-024 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0013	N412033-03		0.05	1.00			57	528				52	01/12/95	01/13	SS-020
A4CM-94-0014	N412033-04		0.04	1.00			64	528				51	01/12/95	01/13	SS-022
A4CM-94-0015	N412033-05		0.04	1.00			58	680				52	01/12/95	01/14	SS-001
A4CM-94-0016	N412033-06		0.06	1.00			31	680				52	01/12/95	01/14	SS-002
A4CM-94-0017	N412033-07		0.05	1.00			66	680				47	01/12/95	01/14	SS-003
A4CM-94-0018	N412033-08		0.05	1.00			68	680				47	01/12/95	01/14	SS-004
A4CM-94-0019	N412033-09		0.05	1.00			69	680				46	01/12/95	01/14	SS-019
A4CM-94-0020	N412033-10		0.04	1.00			64	680				46	01/12/95	01/14	SS-020
A4CM-94-0021	N412033-11		0.04	1.00			63	680				45	01/12/95	01/14	SS-022
A4CM-94-0022	N412033-12		0.06	1.00			66	461				47	01/12/95	01/16	SS-019
BLK (QC ID=22642)	N412033-14		0.04	1.00			74	461					01/12/95	01/16	SS-022
LCS (QC ID=22636)	N412033-13		0.05	1.00			80	461					01/12/95	01/16	SS-020
Duplicate (N412033-05)	N412033-15		0.04	1.00			35	527				56	01/12/95	01/18	SS-032
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 0.05 ± 0.02
 FOR 13 SAMPLES YIELD 61 ± 28

MOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 41

48

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.04
 Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test U Matrix SOIL

SDG 6104

Contact Leah G. Guerrero

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

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 2781-024									
A4CM-94-0013	N412033-03	6104-003	0.90	0.027	0.94	96	12	3	1
A4CM-94-0014	N412033-04	6104-004	0.76	0.036	0.79	96	12	5	2
A4CM-94-0015	N412033-05	6104-005	0.74	0.034	0.76	97	12	4	2
A4CM-94-0016	N412033-06	6104-006	0.74	0.044	0.79	94	11	6	2
A4CM-94-0017	N412033-07	6104-007	0.86	0.052	0.85	101	12	6	2
A4CM-94-0018	N412033-08	6104-008	0.86	0.044	0.86	100	19	5	3
A4CM-94-0019	N412033-09	6104-009	0.74	0.051	0.79	94	12	6	2
A4CM-94-0020	N412033-10	6104-010	0.73	0.038	0.75	97	10	5	1
A4CM-94-0021	N412033-11	6104-011	0.75	0.036	0.81	93	9	4	1
A4CM-94-0022	N412033-12	6104-012	0.72	0.052	0.79	91	10	7	2
BLK (QC ID=22643)	N412033-14	6104-014	U	U	U				
LCS (QC ID=22637)	N412033-13	6104-013	ok	ok	ok				
Duplicate (N412033-05)	N412033-15	6104-015	ok	ok	ok	92	11	4	2
Nominal values and limits from method									
		RDLs (pCi/g)	0.01	0.01	0.01	100		4	
						Averages 96		5	

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 42

49

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test U Matrix SOIL

SDG 6104

Contact Leah G. Guerrero

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- 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 2781-024 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0013	N412033-03	0.02	3.00				69	704				54	01/11/95	01/15	SS-001
A4CM-94-0014	N412033-04	0.01	3.00				71	704				53	01/11/95	01/15	SS-002
A4CM-94-0015	N412033-05	0.02	3.00				76	704				53	01/11/95	01/15	SS-003
A4CM-94-0016	N412033-06	0.02	3.00				80	704				53	01/11/95	01/15	SS-004
A4CM-94-0017	N412033-07	0.02	3.00				76	703				48	01/11/95	01/15	SS-019
A4CM-94-0018	N412033-08	0.04	3.00				29	703				48	01/11/95	01/15	SS-020
A4CM-94-0019	N412033-09	0.02	3.00				74	703				47	01/11/95	01/15	SS-022
A4CM-94-0020	N412033-10	0.01	3.00				84	726				47	01/11/95	01/15	SS-031
A4CM-94-0021	N412033-11	0.01	3.00				75	726				46	01/11/95	01/15	SS-033
A4CM-94-0022	N412033-12	0.02	3.00				66	726				46	01/11/95	01/15	SS-037
BLK (QC ID=22643)	N412033-14	0.01	3.00				62	704					01/11/95	01/15	SS-001
LCS (QC ID=22637)	N412033-13	0.05	3.00				80	492					01/11/95	01/14	SS-037
Duplicate (N412033-05)	N412033-15	0.01	3.00				72	704				53	01/11/95	01/15	SS-002
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 0.02 ± 0.02
FOR 13 SAMPLES	YIELD 70 ± 28

METHOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 43

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.04
 Report date 02/07/95

50

TMA/RICHMOND

REPORTING GROUP 6104

Test SR Matrix SOILSDG 6104Contact Leah G. Guerrero

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 2781-024

A4CM-94-0013	N412033-03	6104-003	0.19 J
A4CM-94-0014	N412033-04	6104-004	0.13 J
A4CM-94-0015	N412033-05	6104-005	0.14 J
A4CM-94-0016	N412033-06	6104-006	0.13 J
A4CM-94-0017	N412033-07	6104-007	U
A4CM-94-0018	N412033-08	6104-008	0.091 J
A4CM-94-0019	N412033-09	6104-009	U
A4CM-94-0020	N412033-10	6104-010	U
A4CM-94-0021	N412033-11	6104-011	U
A4CM-94-0022	N412033-12	6104-012	U
BLK (QC ID=22641)	N412033-14	6104-014	U
LCS (QC ID=22635)	N412033-13	6104-013	ok
Duplicate (N412033-05)	N412033-15	6104-015	ok J

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

Page 7

SUMMARY DATA SECTION

Page 44

51

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test SR Matrix SOIL

SDG 6104

Contact Leah G. Guerrero

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-024 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024																
A4CM-94-0013	N412033-03		0.1	2.00				80		208			53	01/14/95	01/14	LBG-004
A4CM-94-0014	N412033-04		0.08	2.00				86		208			52	01/14/95	01/14	LBG-013
A4CM-94-0015	N412033-05		0.1	2.00				77		208			52	01/14/95	01/14	LBG-015
A4CM-94-0016	N412033-06		0.1	2.00				78		528			52	01/14/95	01/14	LBG-013
A4CM-94-0017	N412033-07		0.09	2.00				79		208			47	01/14/95	01/14	LBG-001
A4CM-94-0018	N412033-08		0.09	2.00				83		208			47	01/14/95	01/14	LBG-002
A4CM-94-0019	N412033-09		0.05	2.00				86		598			46	01/14/95	01/14	LBG-001
A4CM-94-0020	N412033-10		0.09	2.00				86		208			46	01/14/95	01/14	LBG-014
A4CM-94-0021	N412033-11		0.05	2.00				83		598			45	01/14/95	01/14	LBG-002
A4CM-94-0022	N412033-12		0.05	2.00				89		598			45	01/14/95	01/14	LBG-004
BLK (QC ID=22641)	N412033-14		0.05	2.00				70		749				01/14/95	01/14	LBG-013
LCS (QC ID=22635)	N412033-13		0.1	2.00				72		170				01/14/95	01/14	LBG-013
Duplicate (N412033-05) (QC ID=22641)	N412033-15		0.06	2.00				69		749			52	01/14/95	01/14	LBG-014

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 13 SAMPLES YIELD 80 ± 13

TMA/RICHMOND

REPORTING GROUP 6104

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOIL
SDG 6104
tact Leah G. Guerrero

Client Rocketdyne
Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-024

A4CM-94-0013	N412033-03	6104-003	U
A4CM-94-0014	N412033-04	6104-004	U
A4CM-94-0015	N412033-05	6104-005	U
A4CM-94-0016	N412033-06	6104-006	U
A4CM-94-0017	N412033-07	6104-007	U
A4CM-94-0018	N412033-08	6104-008	U
A4CM-94-0019	N412033-09	6104-009	U
A4CM-94-0020	N412033-10	6104-010	U
A4CM-94-0021	N412033-11	6104-011	U
A4CM-94-0022	N412033-12	6104-012	U
BLK (QC ID=22640)	N412033-14	6104-014	U
LCS (QC ID=22634)	N412033-13	6104-013	ok
Duplicate (N412033-05)	N412033-15	6104-015	- U

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

Page 9

SUMMARY DATA SECTION

Page 46

53

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOILSDG 6104Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-024 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0013	N412033-03		0.05	150						894		62	01/23/95	01/23	JR,01,00
A4CM-94-0014	N412033-04		0.05	136						894		61	01/23/95	01/23	JR,02,00
A4CM-94-0015	N412033-05		0.05	137						894		61	01/23/95	01/23	JR,03,00
A4CM-94-0016	N412033-06		0.06	141						894		61	01/23/95	01/23	JR,04,00
A4CM-94-0017	N412033-07		0.06	147						722		57	01/24/95	01/24	JR,01,00
A4CM-94-0018	N412033-08		0.05	153						722		57	01/24/95	01/24	JR,02,00
A4CM-94-0019	N412033-09		0.05	140						722		56	01/24/95	01/24	JR,03,00
A4CM-94-0020	N412033-10		0.03	144						721		56	01/24/95	01/24	JR,04,00
A4CM-94-0021	N412033-11		0.06	145						726		55	01/24/95	01/24	JR,01,00
A4CM-94-0022	N412033-12		0.05	161						726		55	01/24/95	01/24	JR,02,00
BLK (QC ID=22640)	N412033-14		0.004	850						726			01/24/95	01/24	JR,04,00
LCS (QC ID=22634)	N412033-13			850						726			01/14/95	01/24	JR,03,00
Duplicate (N412033-05)	N412033-15		0.05	142						842		63	01/25/95	01/25	JR,03,00
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 0.05 ± 0.03
FOR 12 SAMPLES YIELD _____ ± _____

TMA/RICHMOND

REPORTING GROUP 6104

Test H Matrix SOIL

SDG 6104

tact Leah G. Guerrero

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-024

A4CM-94-0013	N412033-03	6104-003	U
A4CM-94-0014	N412033-04	6104-004	U
A4CM-94-0015	N412033-05	6104-005	U
A4CM-94-0016	N412033-06	6104-006	0.11 J
A4CM-94-0017	N412033-07	6104-007	U
A4CM-94-0018	N412033-08	6104-008	U
A4CM-94-0019	N412033-09	6104-009	U
A4CM-94-0020	N412033-10	6104-010	U
A4CM-94-0021	N412033-11	6104-011	U
A4CM-94-0022	N412033-12	6104-012	U
BLK (QC ID=22645)	N412033-14	6104-014	U
LCS (QC ID=22639)	N412033-13	6104-013	ok

Preparation batch 2781-024B

BLK (QC ID=22903)	N412033-19	6104-019	U
LCC (QC ID=22902)	N412033-18	6104-018	ok
date (N412033-05)	N412033-15	A1 6104-015	- U

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

Page 11

SUMMARY DATA SECTION

Page 48

55

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

Test H Matrix SOIL

SDG 6104

tact Leah G. Guerrero

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

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 2781-024 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0013	N412033-03		0.1	23.9					50			30	12/22/94	12/22	LSC-004
A4CM-94-0014	N412033-04		0.1	23.1					50			29	12/22/94	12/22	LSC-004
A4CM-94-0015	N412033-05		0.1	23.8					50			29	12/22/94	12/22	LSC-004
A4CM-94-0016	N412033-06		0.1	22.8					50			29	12/22/94	12/22	LSC-004
A4CM-94-0017	N412033-07		0.1	22.5					50			24	12/22/94	12/22	LSC-004
A4CM-94-0018	N412033-08		0.1	23.6					50			24	12/22/94	12/22	LSC-004
A4CM-94-0019	N412033-09		0.1	23.0					50			23	12/22/94	12/22	LSC-004
A4CM-94-0020	N412033-10		0.1	23.1					50			23	12/22/94	12/22	LSC-004
A4CM-94-0021	N412033-11		0.1	23.0					50			22	12/22/94	12/22	LSC-004
A4CM-94-0022	N412033-12		0.1	23.3					50			22	12/22/94	12/22	LSC-004
BLK (QC ID=22645)	N412033-14		0.1	20.0					50				12/22/94	12/22	LSC-004
LCS (QC ID=22639)	N412033-13		0.1	20.0					50				12/22/94	12/22	LSC-004
Preparation batch 2781-024B 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024															
BLK (QC ID=22903)	N412033-19		0.1	20.0					50				01/10/95	01/10	LSC-005
LCS (QC ID=22902)	N412033-18		0.1	20.0					50				01/10/95	01/10	LSC-005
Dilute (N412033-05)	N412033-15	A1	0.2	20.3					50			48	01/10/95	01/10	LSC-005
Nominal values and limits from method			0.5	20.0					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 0.1 ± 0.05
 FOR 15 SAMPLES YIELD _____ ± _____

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- * LAB SAMPLE ID is the lab's primary identification for a sample.
- * DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.
- * CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
- * QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

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

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

PREPARATION BATCH SUMMARY

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

The following notes apply to this report:

- The preparation batches are shown in the same order as the Method Summary Reports are printed.
- * Only analyses of planchets relevant to the SDG are included.
- * Each preparation batch should have at least one Reagent Blank and LCS in it to validate client sample results.
- * The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified. Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- * TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- * SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- * The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- * PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- * For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Reagent Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- * The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104Contact Leah G. Guerrero**REPORT GUIDE**Client RocketdyneContract R44PJZ94034044**DATA SHEET**

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

The following notes apply to this report:

- * TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
- * The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.
- * ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
- * A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
- * When reporting a Reagent Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Reagent Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

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

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne
Contract R44PJZ94034044

DATA SHEET

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
- B A Reagent Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When reagent blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Reagent Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
- H Similar to 'L' except the recovery was high.
- P The RESULT is 'preliminary'.
- X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
- 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.
- Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- * An MDA is underlined if it is bigger than its RDL.
- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

GUIDE, cont.

DATA SHEET

may not be a good estimate of the 'real' minimum detectable activity.

- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- * When reporting a Reagent Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

LAB CONTROL SAMPLE

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

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- * An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

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

- * REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- * The first, computed limits for the recovery reflect:
 1. The error of RESULT, including that introduced by rounding the result prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
 2. The error of ADDED.
 3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- * The second limits are protocol defined upper and lower QC limits for the recovery.
- * The recovery is underlined if it is outside either of these ranges.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

DUPLICATE

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

The following notes apply to this report:

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

If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.
- * The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTS divided by their average expressed as a percent.

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

For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.
- * The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

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

This value reported for this limit is at most 999.
- * The second limit for the RPD is the larger of:
 1. A fixed percentage specified in the protocol.

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

DUPLICATE

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

- * The RPD is underlined if it is greater than either limit.
- * If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- * The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

MATRIX SPIKE

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

The following notes apply to this report:

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

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

- * An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

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

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

- * The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

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

2. The error of ADDED.

3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

GUIDE, cont.

Client RocketdyneContract R44PJZ94034044

MATRIX SPIKE

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

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

REPORT GUIDES

Page 11

SUMMARY DATA SECTION

Page 60

67

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- * Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

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

- * The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

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

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

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

- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data' means no amount ADDED was specified. 'LOW' and 'HIGH'

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

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

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

MDAs are underlined if greater than the printed RDL.

- * Aliquots are underlined if less than the nominal value specified for the method.
- * Preparation factors are underlined if greater than the nominal value specified for the method.
- * Dilution factors are underlined if greater than the nominal value specified for the method.
- * Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
- * Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
- * Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.
- * Count times are underlined if less than the nominal value

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

GUIDE, cont.

Client RocketdyneContract R44PJ294034044

METHOD SUMMARY

specified for the method.

- * Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- * Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- * Days Held are underlined if greater than the holding time specified in the protocol.
- * Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

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

Ratios are not computed for Lab Control Sample, Reagent Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included.

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/07/95

TMA/RICHMOND

REPORTING GROUP 6104

SDG 6104

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

No sums are computed for Lab Control, Reagent Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

REPORT GUIDES

Page 15

SUMMARY DATA SECTION

Page 64

71

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/07/95

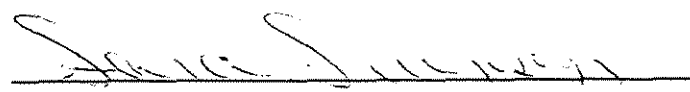
T M A / R I C H M O N D
REPORTING GROUP 6104A

SDG 6104A
Contact Leah G. Guerrero

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					
About this section	.	.	.	.	1
Sample Summaries	.	.	.	.	3
Prep Batch Summary	.	.	.	.	5
Work Summary	.	.	.	.	6
Reagent Blanks	.	.	.	.	7
Lab Control Samples	.	.	.	.	9
Data Sheets	.	.	.	.	11
Method Summaries	.	.	.	.	13
Report Guides	.	.	.	.	19
End of Section	.	.	.	.	33


Prepared by
Leah G. Guerrero
Reviewed by 72

Lab id	<u>TMAN</u>
Protocol	<u>ROCKETDYNE</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-TOC</u>
Version	<u>3.04</u>
Report date	<u>02/08/95</u>

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

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

WORK SUMMARY

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

REAGENT BLANKS

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

LAB CONTROL SAMPLES

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

DUPLICATES

REPORT GUIDES

Page 1

SUMMARY DATA SECTION

Page 1

73

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

MATRIX SPIKES

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

DATA SHEETS

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

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

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

REPORT GUIDES

Page 2

SUMMARY DATA SECTION

Page 2

74

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

SAMPLE SUMMARY

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-94-0012A	SSFL AREA 4	WATER		N412033-01			11/22/94
A4CM-94-0012B	SSFL AREA 4	WATER		N412033-02			11/22/94
Reagent Blank		WATER		N412033-17			
Lab Control Sample		WATER		N412033-16			

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

75

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

tact Leah G. Guerrero

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	MOIST	SAMPLE WT/VOL	BASIS WT/VOL	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
0104		A4CM-94-0012A	WATER				12/09/95 382	N412033-01	0104-001
		A4CM-94-0012B	WATER				12/09/95 382	N412033-02	0104-002
		Reagent Blank	WATER					N412033-17	0104-017
		Lab Control Sample	WATER					N412033-16	0104-016

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

76

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

tact Leah G. Guerrero

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	2781-024A	5.0	1				1	1		
TH	WATER	Thorium, Isotopic in Water	2781-024A	5.0	1				1	1		
U	WATER	Uranium, Isotopic in Water	2781-024A	5.0	1				1	1		
Beta Counting												
SR	WATER	Strontium, Total in Water	2781-024A	10.0	1				1	1		
Gamma Scan												
GAM	WATER	Gamma Emitters	2781-024A	15.0	1				1	1		
Liquid Scintillation												
H	WATER	Tritium in Water	2781-024A	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 5

77

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-FBS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

act Leah G. Guerrero

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	MATRIX	LAB SAMPLE ID	COLLECTED	SUF-	FIX	ANALYZED	REVIEWED BY	METHOD
LOCATION		RECEIVED	PLANCHET	TEST				
CUSTODY	SAS no							
A4CM-94-0012A		N412033-01	0104-001	H		12/22/94		Tritium in Water
SSFL AREA 4	WATER	11/22/94						
		12/09/95						
A4CM-94-0012B		N412033-02	0104-002	GAM		01/14/95		Gamma Emitters
SSFL AREA 4	WATER	11/22/94	0104-002	PU		01/14/95		Plutonium, Isotopic in Water
		12/09/95	0104-002	SR		01/13/95		Strontium, Total in Water
			0104-002	TH		01/13/95		Thorium, Isotopic in Water
			0104-002	U		01/14/95		Uranium, Isotopic in Water
Reagent Blank		N412033-17	0104-017	GAM		01/05/95		Gamma Emitters
	WATER		0104-017	H		12/29/94		Tritium in Water
			0104-017	PU		01/18/95		Plutonium, Isotopic in Water
			0104-017	SR		01/14/95		Strontium, Total in Water
			0104-017	TH		01/19/95		Thorium, Isotopic in Water
			0104-017	U		01/15/95		Uranium, Isotopic in Water
Lab Control Sample		N412033-16	0104-016	GAM		01/05/95		Gamma Emitters
	WATER		0104-016	H		12/29/94		Tritium in Water
			0104-016	PU		01/18/95		Plutonium, Isotopic in Water
			0104-016	SR		01/13/95		Strontium, Total in Water
			0104-016	TH		01/18/95		Thorium, Isotopic in Water
			0104-016	U		01/13/95		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 6

78

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-17

REAGENT BLANK

Reagent Blank

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-17

Client sample id Reagent Blank

Dept sample id 0104-017

Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-76	160	300	500	U	H
Strontium 90	10098-97-2	0.026	0.10	0.09	0.5	U	SR
Thorium 230	14269-63-7	0	0.036	0.06	0.5	U	TH
Thorium 232	7740-29-1	0.018	0.036	0.05	0.5	U	TH
Uranium 233/234	11-08-5	-0.051	0.17	0.3	0.5	U	U
Uranium 235	14117-96-1	0	0.082	0.2	0.5	U	U
Uranium 238	7440-61-1	-0.051	0.068	0.2	0.5	U	U
Plutonium 238	13981-16-3	0.059	0.049	0.08		U	PU
Plutonium 239/240	10-12-8	0.010	0.020	0.05	0.1	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		U		100		U	GAM
Barium 137		U		50		U	GAM
Manganese 54		U		6		U	GAM
Cobalt 58		U		6		U	GAM
Iron 59		U		10		U	GAM
Cobalt 60		U		7		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		7		U	GAM
Ruthenium 103		U		6		U	GAM
Ruthenium 106		U		50		U	GAM
Tin 113		U		7		U	GAM
Cesium 134		U		8		U	GAM
Cesium 137		U		7	5	U	GAM
Cerium 144		U		30		U	GAM
Europium 152		U		20		U	GAM
Europium 154		U		9		U	GAM
Europium 155		U		20		U	GAM
Radium 226		U		10		U	GAM
Thorium 232		U		30		U	GAM

REAGENT BLANKS

Page 1

SUMMARY DATA SECTION

Page 7

79

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-17

BLANK, cont.

Reagent Blank

SDG 6104A

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-17

Client sample id Reagent Blank

Dept sample id 0104-017

Material/Matrix WATER

QC BLANK 22666-22671

REAGENT BLANKS

Page 2

SUMMARY DATA SECTION

Page 8

80

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-16

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-16

Dept sample id 0104-016

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	9000	420	300	500		H	9320	370	97	83-117	
Strontium 90	16	0.52	0.2	0.5		SR					
Thorium 230	4.5	0.37	0.05	0.5		TH	4.10	0.16	110	83-117	
Thorium 232	0	0.022	0.04	0.5	U	TH					
Uranium 233/234	23	1.6	0.8	0.5		U	24.3	0.97	95	86-114	
Uranium 235	18	1.4	0.1	0.5		U	18.6	0.74	97	85-115	
Uranium 238	24	1.7	0.7	0.5		U	24.2	0.97	99	86-114	
Plutonium 238	-0.009	0.086	0.2		U	PU	0	0			
Plutonium 239/240	1.8	0.25	0.08	0.1		PU	1.80	0.072	100	77-123	
GAMMA SCAN ANALYTES											
Cesium 40	U		80		U	GAM					
Barium 137	U		50		U	GAM					
Manganese 54	U		5		U	GAM					
Cobalt 58	U		6		U	GAM					
Iron 59	U		10		U	GAM					
Cobalt 60	U		9		U	GAM					
Zinc 65	U		10		U	GAM					
Niobium 94	U		6		U	GAM					
Ruthenium 103	U		6		U	GAM					
Ruthenium 106	U		60		U	GAM					
Tin 113	U		10		U	GAM					
Cesium 134	U		5		U	GAM					
Cesium 137	270	16		5		GAM	288	12	94	76-124	
Cerium 144	U		30		U	GAM					
Europium 152	U		10		U	GAM					
Europium 154	U		9		U	GAM					
Europium 155	U		20		U	GAM					
Radium 226	U		10		U	GAM					
Thorium 232	U		30		U	GAM					

CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 9

81

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-16

Lab Control Sample

LAB CONTROL SAMPLE, cont.

SDG 6104AClient RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412033-16Client sample id Lab Control SampleDept sample id 0104-016Material/Matrix WATER

QC LCS 22660-22665

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 10

82

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-LCSVersion 3.04Report date 02/08/95

TMA / RICHMOND

REPORTING GROUP 6104A

N412033-01

A4CM-94-0012A

DATA SHEET

SDG 6104A
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412033-01
Dept sample id 0104-001
Received 12/09/95Client sample id A4CM-94-0012A
Location/Matrix SSFL AREA 4 WATER
Collected 11/22/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-21	160	300	500	U	H

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 11

83

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.04
Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-02

A4CM-94-0012B

DATA SHEET

SDG 6104A

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-02

Client sample id A4CM-94-0012B

Dept sample id 0104-002

Location/Matrix SSFL AREA 4 WATER

Received 12/09/95

Collected 11/22/94

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	-0.028	0.10	0.2	0.5	U	SR
Thorium 230	14269-63-7	0.025	0.065	0.1	0.5	U	TH
Thorium 232	7740-29-1	0.008	0.033	0.06	0.5	U	TH
Uranium 233/234	11-08-5	-0.012	0.073	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.059	0.1	0.5	U	U
Uranium 238	7440-61-1	0.037	0.049	0.09	0.5	U	U
Plutonium 238	13981-16-3	-0.014	0.041	0.1		U	PU
Plutonium 239/240	10-12-8	0	0.014	0.05	0.1	U	PU
MA SCAN ANALYTES		U					
Potassium 40		U		60		U	GAM
Chromium 51		U		100		U	GAM
Manganese 54		U		5		U	GAM
Cobalt 58		U		8		U	GAM
Iron 59		U		20		U	GAM
Cobalt 60		U		7		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		5		U	GAM
Ruthenium 103		U		10		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		7		U	GAM
Cesium 134		U		5		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		30		U	GAM
Europium 152		U		10		U	GAM
Europium 154		U		7		U	GAM
Europium 155		U		10		U	GAM
Radium 226		U		10		U	GAM
Thorium 232		U		20		U	GAM

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 12

84

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test PU Matrix WATER

SDG 6104A

Contact Leah G. Guerrero

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 2781-024A

A4CM-94-0012B	N412033-02	0104-002	U	U
BLK (QC ID=22670)	N412033-17	0104-017	U	U
LCS (QC ID=22664)	N412033-16	0104-016	ok U	ok

Nominal values and limits from method	RDLs (pCi/L)	0.1
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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	PREPARED YZED	ANAL- DETECTOR
------------------	------------------	-----------------	---------------	-----	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	------------------	-------------------

Preparation batch 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	0.05	0.500	66	510	53	01/10/95	01/14	SS-027
BLK (QC ID=22670)	N412033-17	0.05	0.500	87	529	01/10/95	01/18	SS-038	
LCS (QC ID=22664)	N412033-16	0.08	0.500	48	529	01/10/95	01/18	SS-036	

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	0.06 ± 0.03
FOR 3 SAMPLES	YIELD	67 ± 39

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

Page 13

85

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.04
Report date	02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test TH Matrix WATER
SDG 6104A
Contact Leah G. Guerrero

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 2781-024A

A4CM-94-0012B	N412033-02	0104-002		U	U	
BLK (QC ID=22668)	N412033-17	0104-017		U	U	
LCS (QC ID=22662)	N412033-16	0104-016		ok	No data U	

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

METHOD PERFORMANCE

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

Preparation batch 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	0.1	0.500				78	528				52	01/12/95	01/13	SS-019
BLK (QC ID=22668)	N412033-17	0.06	0.500				71	503					01/12/95	01/19	SS-034
LCS (QC ID=22662)	N412033-16	0.05	0.500				76	527					01/12/95	01/18	SS-034

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 0.07 ± 0.05
FOR 3 SAMPLES YIELD 75 ± 7

MOD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 14

86

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.04
Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test U Matrix WATER

SDG 6104A

Lab Leah G. Guerrero

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

ALPHA SPECTROSCOPY

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

LAB	RAW	SUF-	1: Uranium	2: Uranium	3: Uranium	RESULT RATIOS (%)				
CLIENT SAMPLE ID	SAMPLE ID	TEST FIX	PLANCHET	233/234	235	238	1+3	2σ	2+3	2σ
Preparation batch 2781-024A										
A4CM-94-0012B	N412033-02		0104-002	U	U	U				
BLK (QC ID=22669)	N412033-17		0104-017	U	U	U				
LCS (QC ID=22663)	N412033-16		0104-016	ok	ok	ok				
Nominal values and limits from method			RDLs (pCi/L)	0.5	0.5	0.5	100		4	
Averages										

METHOD PERFORMANCE

LAB	RAW	SUF-	MAX MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
CLIENT SAMPLE ID	SAMPLE ID	TEST FIX	pCi/L	L	FAC	TION	%	%	min	keV	keV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024															
A4CM-94-0012B	N412033-02		0.1	0.200			69	680				53	01/11/95	01/14	SS-042
BLK (QC ID=22669)	N412033-17		0.3	0.200			66	704					01/11/95	01/15	SS-003
LCS (QC ID=22663)	N412033-16		0.8	0.200			75	543					01/11/95	01/13	SS-042
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 ± 0.7

FOR 3 SAMPLES YIELD 70 ± 9

MOD SUMMARIES

Page 3

SUMMARY DATA SECTION

Page 15

87

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test SR Matrix WATERSDG 6104AContact Leah G. Guerrero

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 2781-024A

A4CM-94-0012B	N412033-02	0104-002	U
BLK (QC ID=22667)	N412033-17	0104-017	U
Lab Control Sample	N412033-16	0104-016	No data

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 2781-024A 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	0.2	1.00	85	208	52	01/13/95	01/13	LBG-003
BLK (QC ID=22667)	N412033-17	0.09	1.00	74	749	01/14/95	01/14	LBG-001	
Lab Control Sample	N412033-16	0.2	1.00	85	170	01/14/95	01/13	LBG-014	

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	0.2	±	0.1
FOR 3 SAMPLES	YIELD	81	±	13

OD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 16

88

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.04
Report date	02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test GAM Matrix WATERSDG 6104Atact Leah G. Guerrero

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 2781-024A

A4CM-94-0012B	N412033-02	0104-002	U	U
BLK (QC ID=22666)	N412033-17	0104-017	U	U
LCS (QC ID=22660)	N412033-16	0104-016	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 %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	----------	-------------	--------------	------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-024A 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	5	0.460							2504			53	01/14/95	01/14	MB,02,00
BLK (QC ID=22666)	N412033-17	7	1.00							412				01/05/95	01/05	MB,03,00
LCS (QC ID=22660)	N412033-16		1.00							412				01/05/95	01/05	MB,02,00

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	6	±	3
FOR 2 SAMPLES	YIELD		±	

TMA/RICHMOND

REPORTING GROUP 6104A

Test H Matrix WATERSDG 6104AContact Leah G. Guerrero

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION

Client RocketdyneContract R44PJZ94034044

RESULTS

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

Preparation batch 2781-024A

A4CM-94-0012A	N412033-01	0104-001	U
BLK (QC ID=22671)	N412033-17	0104-017	U
LCS (QC ID=22665)	N412033-16	0104-016	ok

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

Preparation batch 2781-024A 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012A	N412033-01	300	0.0100	50	30	12/22/94	12/22	LSC-004
BLK (QC ID=22671)	N412033-17	300	0.0100	50	12/29/94	12/29	LSC-004	
LCS (QC ID=22665)	N412033-16	300	0.0100	50	12/29/94	12/29	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 ±

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REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- * LAB SAMPLE ID is the lab's primary identification for a sample.
 - * DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.
 - CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
 - * QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.
- QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.
- * All Lab Control Samples, Reagent Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Reagent Blank, Replicate, Matrix Spike and Method Summary Reports detail these relationships.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

REPORT GUIDE

SDG 6104AContact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

PREPARATION BATCH SUMMARY

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

The following notes apply to this report:

- * The preparation batches are shown in the same order as the Method Summary Reports are printed.
- * Only analyses of planchets relevant to the SDG are included.
- * Each preparation batch should have at least one Reagent Blank and LCS in it to validate client sample results.
- * The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified. Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- * TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- * SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- * The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- * PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- * For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Reagent Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- * The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA / RICHMOND

REPORTING GROUP 6104A

SDG 6104A
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

DATA SHEET

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

The following notes apply to this report:

- * TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
- * The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.
- * ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
- A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
- * When reporting a Reagent Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Reagent Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

DATA SHEET

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
- B A Reagent Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When reagent blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Reagent Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
- H Similar to 'L' except the recovery was high.
- P The RESULT is 'preliminary'.
- X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
- 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.
- Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- * An MDA is underlined if it is bigger than its RDL.
- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

GUIDE, cont.

DATA SHEET

may not be a good estimate of the 'real' minimum detectable activity.

- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- When reporting a Reagent Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

REPORT GUIDES

Page 6

SUMMARY DATA SECTION

Page 24

96

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

REPORT GUIDE

LAB CONTROL SAMPLE

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

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- * An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.
- * REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- * The first, computed limits for the recovery reflect:
 1. The error of RESULT, including that introduced by rounding the result prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
 2. The error of ADDED.
 3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- * The second limits are protocol defined upper and lower QC limits for the recovery.
- * The recovery is underlined if it is outside either of these ranges.

REPORT GUIDES

Page 7

SUMMARY DATA SECTION

Page 25

37

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

DUPLICATE

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

The following notes apply to this report:

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

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

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

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

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

- * The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

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

This value reported for this limit is at most 999.

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

1. A fixed percentage specified in the protocol.

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

DUPLICATE

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

- * The RPD is underlined if it is greater than either limit.
- If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- * The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

REPORT GUIDES

Page 9

SUMMARY DATA SECTION

Page 27

99

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND
REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne

Contract R44PJZ94034044

MATRIX SPIKE

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

The following notes apply to this report:

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

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

- * An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

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

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

- * The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

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

2. The error of ADDED.

3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

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

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND
REPORTING GROUP 6104A

SDG 6104A
Contact Leah G. Guerrero

Client Rocketdyne
Contract R44PJZ94034044

GUIDE, cont.

MATRIX SPIKE

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

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

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/08/95

TMA/RICHMOND
REPORTING GROUP 6104A

SDG 6104A
Contact Leah G. Guerrero

REPORT GUIDE

Client Rocketdyne
Contract R44PJZ94034044

METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- * Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

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

- * The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

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

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

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

- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data' means no amount ADDED was specified. 'LOW' and 'HIGH'

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-RG
Version 3.04
Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

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

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

MDAs are underlined if greater than the printed RDL.

- * Aliquots are underlined if less than the nominal value specified for the method.
- * Preparation factors are underlined if greater than the nominal value specified for the method.
- * Dilution factors are underlined if greater than the nominal value specified for the method.
- * Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
- * Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
- * Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.
- * Count times are underlined if less than the nominal value

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client RocketdyneContract R44PJZ94034044

METHOD SUMMARY

specified for the method.

- * Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- * Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- * Days Held are underlined if greater than the holding time specified in the protocol.
- * Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

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

Ratios are not computed for Lab Control Sample, Reagent Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included.

PORT GUIDES

Page 14

SUMMARY DATA SECTION

Page 32

104

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-RGVersion 3.04Report date 02/08/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

METHOD SUMMARY

No sums are computed for Lab Control, Reagent Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

REPORT GUIDES

Page 15

SUMMARY DATA SECTION

Page 33

105

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.04

Report date 02/08/95



TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

1st half

Batch # 2A

April 13, 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 N5-02-079-6105

Dear Mr. Klein:

The enclosed data report is for the radiochemistry analyses of the eleven soil samples collected February 15, 16 and 22, 1995. These samples were received at TMA/Richmond on February 28, 1995. The case narrative discusses all parameters that are underlined in the data report that are not in compliance with the Statement of Work.

If you have any questions regarding this data, please call.

Sincerely,



Italy E. Pittman
Program Manager

Enclosure: Data Report N5-02-079-6105
Electronic Deliverable

DOCUMENT INVENTORY FOR SAMPLE DELIVERY GROUP 6105

SECTION 1 Case Narrative

SECTION 2 Summary Data Section

X APPENDIX 1 Chains-of-Custody Copies

X APPENDIX 2 Aliquot Information

X APPENDIX 3 Preparation Log For QC Samples

X APPENDIX 4 Continuing Calibration Data for LSC Counters

X APPENDIX 5 Copies of Raw Data Sheets

SECTION 1 Case Narrative

April 13, 1995

1.0 GENERAL

TMA/Richmond Delivery Group 6105 consist of the eleven soil samples received on February 28, 1995.

2.0 ANALYTICAL NOTES

The internal quality control consist of 5% each of laboratory control samples, blanks and replicates. The QC samples are prepared by the Quality Control Department, and copies of the QC Notebook pages are included with the data package.

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 background considerably.

2.1 Tritium Analyses

No problems were associated with the analyses.

2.2 Strontium-90 Analyses

The Laboratory Control Sample was counted for less than the nominal count time required; however, the MDA was less than the RDL despite the shorter count time. The average yield for 14 samples was 88% ± 5%.

2.3 Thorium 228, 230, 232 Analyses

Samples A4CM-95-0003A, A4CM-95-0006A, and A4CM-95-0013 were re-analyzed due to lower than nominal chemical yields from the initial sample analysis. These samples were processed with another LCS and reagent blank reflected in preparation batch 2781-038A. Samples A4CM-95-0004A and A4CM-95-0013 have MDA's slightly greater than the RDL due to relatively low chemical yields. The LCS and the reagent blank have count times less than the 500 nominal required; however, the MDA's were less than the RDL despite the shorter count times. The average yield for 16 samples was 44% ± 38%.

April 13, 1995

2.4 Uranium 233/234, 235, 238 Analyses

Sample A4CM-95-0013 and the reagent blank have MDA slightly greater than the RDL. The MDA for the Laboratory Control Sample (LCS) was greater than the RDL; however, this is not a problem since the activity of the LCS is far greater than the MDA. The average yield for 14 samples was $52\% \pm 16\%$.

2.5 Plutonium 239/240 Analyses

Samples A4CM-95-0001A, A4CM-95-0003A, A4CM-95-0007A, and A4CM-95-0009 have MDA's slightly greater than the RDL due to relatively high counter backgrounds. The average yield for 14 samples was $48\% \pm 9\%$.

2.6 Gamma Spectroscopy Analyses

All of the samples have aliquot less than the 850g nominal required; however, despite the smaller aliquot, all of the MDA's were less than or equal to the RDL. Because of the small sample aliquot available, the Cs-137 result in the duplicate analyses has a MDA greater than the RDL.

SECTION 2 Summary Data Section

T M A / R I C H M O N D
REPORTING GROUP 6105

SDG 6105
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				
About this section	.	.	.	1
Sample Summaries	.	.	.	3
Prep Batch Summary	.	.	.	5
Work Summary	.	.	.	6
Method Blanks	.	.	.	10
Lab Control Samples	.	.	.	13
Duplicates	.	.	.	16
Data Sheets	.	.	.	18
Method Summaries	.	.	.	40
Report Guides	.	.	.	52
End of Section	.	.	.	66

Italy E. Pittman 4/13/95
Prepared by

NGV 4/13/95
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

REPORT GUIDE

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

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

WORK SUMMARY

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

METHOD BLANKS

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

LAB CONTROL SAMPLES

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

DUPLICATES

REPORT GUIDES

Page 1

SUMMARY DATA SECTION

Page 1

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

Contact Italy E. Pittman

GUIDE, cont.

Client Rocketdyne

Contract R44PJZ94034044

ABOUT THE DATA SUMMARY SECTION

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

MATRIX SPIKES

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

DATA SHEETS

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

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

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

REPORT GUIDES

Page 2

SUMMARY DATA SECTION

Page 2

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-RG

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

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-95-0001A	SSFL AREA 4	SOIL		N502079-01			02/15/95 08:25
A4CM-95-0002A	SSFL AREA 4	SOIL		N502079-02			02/15/95 09:35
A4CM-95-0003A	SSFL AREA 4	SOIL		N502079-03			02/15/95 10:00
A4CM-95-0004A	SSFL AREA 4	SOIL		N502079-04			02/16/95 09:05
A4CM-95-0005A	SSFL AREA 4	SOIL		N502079-05			02/16/95 10:00
A4CM-95-0006A	SSFL AREA 4	SOIL		N502079-06			02/16/95 10:20
A4CM-95-0007A	SSFL AREA 4	SOIL		N502079-07			02/16/95 13:15
A4CM-95-0008A	SSFL AREA 4	SOIL		N502079-08			02/16/95 13:55
A4CM-95-0009	SSFL AREA 4	SOIL		N502079-09			02/22/95 09:08
A4CM-95-0010	SSFL AREA 4	SOIL		N502079-10			02/22/95 10:02
A4CM-95-0013	SSFL AREA 4	SOIL		N502079-11			02/22/95 10:35
Method Blank		SOIL		N502079-13			
Method Blank		SOIL		N502079-17			
Lab Control Sample		SOIL		N502079-12			
Lab Control Sample		SOIL		N502079-16			
Duplicate (N502079-01)	SSFL AREA 4	SOIL		N502079-14			02/15/95 08:25
Duplicate (N502079-10)	SSFL AREA 4	SOIL		N502079-15			02/22/95 10:02

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 3

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

tact Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CHAIN OF		CLIENT SAMPLE ID	MATRIX	%	SAMPLE MOIST	BASIS AMOUNT	DAYS SINCE		LAB SAMPLE ID	DEPARTMENT SAMPLE ID
QC BATCH	CUSTODY						RECEIVED	COLL		
6105		A4CM-95-0001A	SOIL	20.8			02/28/95	13	N502079-01	6105-001
		A4CM-95-0002A	SOIL	17.7			02/28/95	13	N502079-02	6105-002
		A4CM-95-0003A	SOIL	23.0			02/28/95	13	N502079-03	6105-003
		A4CM-95-0004A	SOIL	17.4			02/28/95	12	N502079-04	6105-004
		A4CM-95-0005A	SOIL	16.5			02/28/95	12	N502079-05	6105-005
		A4CM-95-0006A	SOIL	15.2			02/28/95	12	N502079-06	6105-006
		A4CM-95-0007A	SOIL	18.5			02/28/95	12	N502079-07	6105-007
		A4CM-95-0008A	SOIL	12.5			02/28/95	12	N502079-08	6105-008
		A4CM-95-0009	SOIL	14.5			02/28/95	6	N502079-09	6105-009
		A4CM-95-0010	SOIL	15.7			02/28/95	6	N502079-10	6105-010
		A4CM-95-0013	SOIL	13.2			02/28/95	6	N502079-11	6105-011
		Method Blank	SOIL						N502079-13	6105-013
		Method Blank	SOIL						N502079-17	6105-017
		Lab Control Sample	SOIL						N502079-12	6105-012
		Lab Control Sample	SOIL						N502079-16	6105-016
		Duplicate (N502079-01)	SOIL				02/28/95	13	N502079-14	6105-014
		Duplicate (N502079-10)	SOIL				02/28/95	6	N502079-15	6105-015

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

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	FIERS
Alpha Spectroscopy												
PU	SOIL	Plutonium, Isotopic in Soil	2781-038	5.0	11			1	1	1/1		
TH	SOIL	Thorium, Isotopic in Soil	2781-038	5.0	8			1	1	1/1		
			2781-038A	5.0	3			1	1			
U	SOIL	Uranium, Isotopic in Soil	2781-038	5.0	11			1	1	1/1		
Beta Counting												
SR	SOIL	Strontium, Total in Soil	2781-038	10.0	11			1	1	1/1		
Gamma Spectroscopy												
GAM	SOIL	Gamma Scan	2781-038	15.0	11			1	1	1/1		
Liquid Scintillation												
H	SOIL	Tritium-Soil	2781-038	10.0	11			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

Page 1

SUMMARY DATA SECTION

Page 5

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PES

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

WORK SUMMARY

CLIENT SAMPLE ID		LAB SAMPLE ID																	
LOCATION	MATRIX	COLLECTED	PLANCHET	TEST	SUF-	FIX	ANALYZED	REVIEWED	BY	METHOD									
CUSTODY	SAS no	RECEIVED																	
A4CM-95-0001A		N502079-01	6105-001	GAM			03/22/95	04/10/95	IEP	Gamma Scan									
SSFL AREA 4	SOIL	02/15/95	6105-001	H			03/21/95	04/05/95	IEP	Tritium-Soil									
		02/28/95	6105-001	PU			03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil									
			6105-001	SR			03/29/95	04/10/95	IEP	Strontium, Total in Soil									
			6105-001	TH			03/30/95	04/10/95	IEP	Thorium, Isotopic in Soil									
			6105-001	U			04/03/95	04/05/95	IEP	Uranium, Isotopic in Soil									
A4CM-95-0002A		N502079-02	6105-002	GAM			03/22/95	04/10/95	IEP	Gamma Scan									
SSFL AREA 4	SOIL	02/15/95	6105-002	H			03/21/95	04/05/95	IEP	Tritium-Soil									
		02/28/95	6105-002	PU			03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil									
			6105-002	SR			03/29/95	04/10/95	IEP	Strontium, Total in Soil									
			6105-002	TH			03/30/95	04/10/95	IEP	Thorium, Isotopic in Soil									
			6105-002	U			04/03/95	04/05/95	IEP	Uranium, Isotopic in Soil									
A4CM-95-0003A		N502079-03	6105-003	GAM			03/22/95	04/10/95	IEP	Gamma Scan									
SSFL AREA 4	SOIL	02/15/95	6105-003	H			03/21/95	04/05/95	IEP	Tritium-Soil									
		02/28/95	6105-003	PU			03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil									
			6105-003	SR			03/29/95	04/10/95	IEP	Strontium, Total in Soil									
			6105-003	TH	A1		04/07/95	04/10/95	IEP	Thorium, Isotopic in Soil									
			6105-003	U			04/03/95	04/05/95	IEP	Uranium, Isotopic in Soil									
A4CM-95-0004A		N502079-04	6105-004	GAM			03/22/95	04/10/95	IEP	Gamma Scan									
SSFL AREA 4	SOIL	02/16/95	6105-004	H			03/21/95	04/05/95	IEP	Tritium-Soil									
		02/28/95	6105-004	PU			03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil									
			6105-004	SR			03/29/95	04/10/95	IEP	Strontium, Total in Soil									
			6105-004	TH			03/30/95	04/10/95	IEP	Thorium, Isotopic in Soil									
			6105-004	U			04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil									
A4CM-95-0005A		N502079-05	6105-005	GAM			03/23/95	04/10/95	IEP	Gamma Scan									
SSFL AREA 4	SOIL	02/16/95	6105-005	H			03/21/95	04/05/95	IEP	Tritium-Soil									
		02/28/95	6105-005	PU			03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil									
			6105-005	SR			03/29/95	04/10/95	IEP	Strontium, Total in Soil									
			6105-005	TH			03/30/95	04/10/95	IEP	Thorium, Isotopic in Soil									
			6105-005	U			04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil									

WORK SUMMARY

Page 1

SUMMARY DATA SECTION

Page 6

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CWSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

Contact Italy E. Pittman

WORK SUMMARY, cont.

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-95-0006A		N502079-06	6105-006	GAM		03/23/95	04/10/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	02/16/95	6105-006	H		03/21/95	04/05/95	IEP	Tritium-Soil						
		02/28/95	6105-006	PU		04/01/95	04/05/95	IEP	Plutonium, Isotopic in Soil						
			6105-006	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil						
			6105-006	TH	A1	04/07/95	04/10/95	IEP	Thorium, Isotopic in Soil						
			6105-006	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0007A		N502079-07	6105-007	GAM		03/23/95	04/10/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	02/16/95	6105-007	H		03/21/95	04/05/95	IEP	Tritium-Soil						
		02/28/95	6105-007	PU		03/30/95	04/05/95	IEP	Plutonium, Isotopic in Soil						
			6105-007	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil						
			6105-007	TH		03/30/95	04/10/95	IEP	Thorium, Isotopic in Soil						
			6105-007	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0008A		N502079-08	6105-008	GAM		03/24/95	04/10/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	02/16/95	6105-008	H		03/21/95	04/05/95	IEP	Tritium-Soil						
		02/28/95	6105-008	PU		04/01/95	04/08/95	IEP	Plutonium, Isotopic in Soil						
			6105-008	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil						
			6105-008	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil						
			6105-008	U		04/03/95	04/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0009		N502079-09	6105-009	GAM		03/24/95	04/10/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	02/22/95	6105-009	H		03/21/95	04/05/95	IEP	Tritium-Soil						
		02/28/95	6105-009	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil						
			6105-009	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil						
			6105-009	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil						
			6105-009	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil						
A4CM-95-0010		N502079-10	6105-010	GAM		03/24/95	04/10/95	IEP	Gamma Scan						
SSFL AREA 4	SOIL	02/22/95	6105-010	H		03/21/95	04/05/95	IEP	Tritium-Soil						
		02/28/95	6105-010	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil						
			6105-010	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil						
			6105-010	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil						
			6105-010	U		04/03/95	04/05/95	IEP	Uranium, Isotopic in Soil						

WORK SUMMARY

Page 2

SUMMARY DATA SECTION

Page 7

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

Contact 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-95-0013		N502079-11	6105-011	GAM		03/27/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/22/95	6105-011	H		03/22/95	04/05/95	IEP	Tritium-Soil		
		02/28/95	6105-011	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil		
			6105-011	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil		
			6105-011	TH	A1	04/07/95	04/11/95	IEP	Thorium, Isotopic in Soil		
			6105-011	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil		
Method Blank		N502079-13	6105-013	GAM		03/27/95	04/10/95	IEP	Gamma Scan		
	SOIL		6105-013	H		03/21/95	04/05/95	IEP	Tritium-Soil		
			6105-013	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil		
			6105-013	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil		
			6105-013	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil		
			6105-013	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil		
Method Blank		N502079-17	6105-017	TH		04/07/95	04/11/95	IEP	Thorium, Isotopic in Soil		
	SOIL										
Lab Control Sample		N502079-12	6105-012	GAM		03/27/95	04/10/95	IEP	Gamma Scan		
	SOIL		6105-012	H		03/21/95	04/05/95	IEP	Tritium-Soil		
			6105-012	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil		
			6105-012	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil		
			6105-012	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil		
			6105-012	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil		
Lab Control Sample		N502079-16	6105-016	TH		04/07/95	04/11/95	IEP	Thorium, Isotopic in Soil		
	SOIL										
Duplicate (N502079-01)		N502079-14	6105-014	H		03/22/95	04/05/95	IEP	Tritium-Soil		
SSFL AREA 4	SOIL	02/15/95	6105-014	PU		03/30/95	04/08/95	IEP	Plutonium, Isotopic in Soil		
		02/28/95	6105-014	SR		03/29/95	04/10/95	IEP	Strontium, Total in Soil		
			6105-014	TH		03/31/95	04/10/95	IEP	Thorium, Isotopic in Soil		
			6105-014	U		04/01/95	04/05/95	IEP	Uranium, Isotopic in Soil		
Duplicate (N502079-10)		N502079-15	6105-015	GAM		03/24/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/22/95									
		02/28/95									

WORK SUMMARY

Page 3

SUMMARY DATA SECTION

Page 8

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

SDG 6105

Contact Italy E. Pittman

WORK SUMMARY, cont.

Client Rocketdyne

Contract R44PJ294034044

COUNTS OF TESTS BY SAMPLE TYPE

TEST	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		11			2	2	1	16
U		Uranium, Isotopic in Soil	HASL 300/U-04	11			1	1	1	14
TOTALS				66			7	7	6	86

RK SUMMARY

Page 4

SUMMARY DATA SECTION

Page 9

16

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/12/95

TMA / RICHMOND

REPORTING GROUP 6105

N502079-13

METHOD BLANK

Method Blank

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-13

Client sample id Method Blank

Dept sample id 6105-013

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.063	0.084	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.022	0.070	0.07	0.5	U	SR
Thorium 228		0.035	0.040	0.07	0.1	U	TH
Thorium 230	14269-63-7	0.025	0.030	0.04	0.1	U	TH
Thorium 232	7740-29-1	0	0.010	0.04	0.1	U	TH
Uranium 233/234	11-08-5	0.006	0.009	0.02	0.01	U	U
Uranium 235	14117-96-1	-0.003	0.003	0.01	0.01	U	U
Uranium 238	7440-61-1	0.007	0.007	0.009	0.01	U	U
Plutonium 238	13981-16-3	0.002	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	-0.001	0.003	0.008	0.01	U	PU
TMA SCAN ANALYTES							
Potassium 40		U		0.04		U	GAM
Chromium 51		U		0.02		U	GAM
Manganese 54		U		0.003		U	GAM
Cobalt 58		U		0.003		U	GAM
Iron 59		U		0.006		U	GAM
Cobalt 60		U		0.003		U	GAM
Zinc 65		U		0.006		U	GAM
Niobium 94		U		0.003		U	GAM
Ruthenium 103		U		0.003		U	GAM
Ruthenium 106		U		0.03		U	GAM
Tin 113		U		0.004		U	GAM
Cesium 134		U		0.003		U	GAM
Cesium 137		U		0.003	0.02	U	GAM
Cerium 144		U		0.02		U	GAM
Europium 152		U		0.007		U	GAM
Europium 154		U		0.005		U	GAM
Europium 155		U		0.01		U	GAM
Radium 226		U		0.007		U	GAM
Thorium 232		U		0.01		U	GAM

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 10

17

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-13

BLANK, cont.

Method Blank

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-13

Client sample id Method Blank

Dept sample id 6105-013

Material/Matrix SOIL

QC-BLANK #23482

METHOD BLANKS

Page 2

SUMMARY DATA SECTION

Page 11

18

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-17

METHOD BLANK

Method Blank

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-17

Client sample id Method Blank

Dept sample id 6105-017

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 228		0.018	0.018	0.03	0.1	U	TH
Thorium 230	14269-63-7	0.009	0.018	0.03	0.1	U	TH
Thorium 232	7740-29-1	0	0.006	0.02	0.1	U	TH

QC-BLANK #23631

TMA/RICHMOND

REPORTING GROUP 6105

N502079-12

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-12

Client sample id Lab Control Sample

Dept sample id 6105-012

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	5.0	0.23	0.1	0.5	X	H	4.80	0.19	104	82-118	
Strontium 90	9.6	0.38	0.2	0.5		SR	9.80	0.39	98	83-117	
Thorium 228	0.027	0.041	0.08	0.1	U	TH					
Thorium 230	2.1	0.29	0.05	0.1		TH	1.79	0.072	117	73-127	
Thorium 232	-0.007	0.014	0.05	0.1	U	TH					
Uranium 233/234	1.3	0.083	0.04	0.01		U	1.30	0.052	100	86-114	
Uranium 235	1.0	0.071	0.006	0.01		U	0.990	0.040	101	84-116	
Uranium 238	1.2	0.080	0.04	0.01		U	1.29	0.052	93	86-114	
Plutonium 238	0.37	0.040	0.008	0.01		PU	0.347	0.014	107	80-120	
Plutonium 239/240	0.31	0.036	0.008	0.01		PU	0.309	0.012	100	80-120	
1 SCAN ANALYTES	U										
Cesium 40	U		0.1		U	GAM					
Chromium 51	U		0.06		U	GAM					
Manganese 54	U		0.007		U	GAM					
Cobalt 58	U		0.007		U	GAM					
Iron 59	U		0.01		U	GAM					
Cobalt 60	U		0.008		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.007		U	GAM					
Ruthenium 103	U		0.009		U	GAM					
Ruthenium 106	U		0.07		U	GAM					
Tin 113	U		0.01		U	GAM					
Cesium 134	U		0.008		U	GAM					
Cesium 137	0.37	0.016		0.02		GAM	0.374	0.015	99	76-124	
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		0.03		U	GAM					

TMA/RICHMOND

REPORTING GROUP 6105

N502079-12

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-12

Dept sample id 6105-012

Client sample id Lab Control Sample

Material/Matrix SOIL

QC-LCS #23481

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 14

21

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-16

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-16

Dept sample id 6105-016

Client sample id Lab Control Sample

Material/Matrix SOIL

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- PIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Thorium 228	-0.003	0.012	0.03	0.1	U	TH					
Thorium 230	1.7	0.16	0.03	0.1		TH	1.79	0.072	95	83-117	
Thorium 232	-0.003	0.006	0.02	0.1	U	TH					

QC-LCS #23630

LAB CONTROL SAMPLES

Page 3

SUMMARY DATA SECTION

Page 15

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-14

A4CM-95-0001A

DUPLICATE

SDG 6105

Contact Italy E. Pittman

DUPLICATE

Lab sample id N502079-14Dept sample id 6105-014Client RocketdyneContract R44PJZ94034044

ORIGINAL

Lab sample id N502079-01Dept sample id 6105-001Received 02/28/95* moisture 20.8Client sample id A4CM-95-0001ALocation/Matrix SSFL AREA 4 SOILCollected 02/15/95 08:25

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	0.041	0.056	0.09	0.5	U	H	0.073	0.059	0.1	U	-		
Strontium 90	0.060	0.077	0.07	0.5	U	SR	0.028	0.055	0.05	U	-		
Thorium 228	1.4	0.24	0.1	0.1		TH	1.3	0.17	0.06		7	35	
Thorium 230	0.96	0.19	0.09	0.1		TH	1.1	0.16	0.05		14	38	
Thorium 232	1.1	0.19	0.05	0.1		TH	1.4	0.18	0.03		24	34	
Uranium 233/234	0.69	0.049	0.01	0.01		U	0.59	0.042	0.008		16	19	
Uranium 235	0.037	0.011	0.006	0.01		U	0.019	0.008	0.005		64	74	
Uranium 238	0.74	0.051	0.008	0.01		U	0.65	0.044	0.007		13	18	
Uranium 238	0	0.002	0.006	0.01	U	PU	0.003	0.009	0.02	U	-		
Neptunium 239/240	0.008	0.005	0.006	0.01	J	PU	0.005	0.005	0.008	U	46	164	

QC-DUP#1 23483

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 16

23

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-15

A4CM-95-0010

DUPLICATE

SDG 6105

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N502079-15Lab sample id N502079-10Client sample id A4CM-95-0010Dept sample id 6105-015Dept sample id 6105-010Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 10:02% moisture 15.7

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
GAMMA SCAN ANALYTES	U						U						
Potassium 40	17	0.82				GAM	22	0.31			26	33	
Chromium 51	U		0.5		U	GAM	U		0.2	U	-		
Manganese 54	U		0.04		U	GAM	U		0.01	U	-		
Cobalt 58	U		0.05		U	GAM	U		0.02	U	-		
Iron 59	U		0.1		U	GAM	U		0.04	U	-		
Cobalt 60	U		0.04		U	GAM	U		0.01	U	-		
Zinc 65	U		0.1		U	GAM	U		0.04	U	-		
Yttrium 94	U		0.04		U	GAM	U		0.01	U	-		
Rhenium 103	U		0.05		U	GAM	U		0.02	U	-		
Ruthenium 106	U		0.3		U	GAM	U		0.1	U	-		
Tin 113	U		0.05		U	GAM	U		0.02	U	-		
Cesium 134	U		0.05		U	GAM	U		0.02	U	-		
Cesium 137	U		0.04	0.02	U	GAM	U		0.01	U	-		
Cerium 144	U		0.2		U	GAM	U		0.09	U	-		
Europium 152	U		0.07		U	GAM	U		0.04	U	-		
Europium 154	U		0.05		U	GAM	U		0.02	U	-		
Europium 155	U		0.08		U	GAM	U		0.07	U	-		
Radium 226	0.79	0.11				GAM	0.87	0.032			10	38	
Thorium 232	1.3	0.24				GAM	1.4	0.076			7	43	

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 17

24

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-01

A4CM-95-0001A

DATA SHEET

SDG 6105

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-01Client sample id A4CM-95-0001ADept sample id 6105-001Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/15/95 08:25% moisture 20.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.073	0.059	0.1	0.5	U	H
Strontium 90	10098-97-2	0.028	0.055	0.05	0.5	U	SR
Thorium 228		1.3	0.17	0.06	0.1		TH
Thorium 230	14269-63-7	1.1	0.16	0.05	0.1		TH
Thorium 232	7740-29-1	1.4	0.18	0.03	0.1		TH
Uranium 233/234	11-08-5	0.59	0.042	0.008	0.01		U
Uranium 235	14117-96-1	0.019	0.008	0.005	0.01		U
Uranium 238	7440-61-1	0.65	0.044	0.007	0.01		U
Antonium 238	13981-16-3	-0.003	0.009	0.02	0.01	U	PU
Antonium 239/240	10-12-8	0.005	0.005	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	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		0.09		U	GAM
Cobalt 60		U		0.03		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		0.12	0.028		0.02		GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.05		U	GAM
Europium 154		U		0.04		U	GAM
Radium 226		0.71	0.060				GAM

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 18

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-01

A4CM-95-0001A

DATA SHEET, cont

SDG 6105Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-01Client sample id A4CM-95-0001ADept sample id 6105-001Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/15/95 08:25% moisture 20.8

Chain of custody id _____

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

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 19

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-02

A4CM-95-0002A

DATA SHEET

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-02Client sample id A4CM-95-0002ADept sample id 6105-002Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/15/95 09:35% moisture 17.7

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.055	0.061	0.1	0.5	U	H
Strontium 90	10098-97-2	0.021	0.046	0.05	0.5	U	SR
Thorium 228		1.3	0.18	0.06	0.1		TH
Thorium 230	14269-63-7	1.0	0.16	0.04	0.1		TH
Thorium 232	7740-29-1	1.2	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.56	0.043	0.009	0.01		U
Uranium 235	14117-96-1	0.034	0.010	0.006	0.01		U
Uranium 238	7440-61-1	0.58	0.044	0.008	0.01		U
Plutonium 238	13981-16-3	0.006	0.009	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	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		0.07		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		0.060	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
Radium 226		0.77	0.052				GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

ATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 20

TMA/RICHMOND

REPORTING GROUP 6105

N502079-02

A4CM-95-0002A

DATA SHEET, cont

SDG 6105Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-02Client sample id A4CM-95-0002ADept sample id 6105-002Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/15/95 09:35% moisture 17.7

Chain of custody id _____

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

DATA SHEETS

Page 4

SUMMARY DATA SECTION

Page 21

28

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-03

A4CM-95-0003A

DATA SHEET

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-03

Client sample id A4CM-95-0003A

Dept sample id 6105-003

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/15/95 10:00

% moisture 23.0

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.065	0.063	0.1	0.5	U	H
Strontium 90	10098-97-2	0.046	0.051	0.05	0.5	U	SR
Thorium 228		0.89	0.18	0.1	0.1		TH
Thorium 230	14269-63-7	0.82	0.17	0.07	0.1		TH
Thorium 232	7740-29-1	0.87	0.17	0.05	0.1		TH
Uranium 233/234	11-08-5	0.58	0.045	0.01	0.01		U
Uranium 235	14117-96-1	0.035	0.011	0.006	0.01		U
Uranium 238	7440-61-1	0.59	0.046	0.009	0.01		U
Plutonium 238	13981-16-3	0.009	0.009	0.02	0.01	U	PU
Plutonium 239/240	10-12-8	0.006	0.006	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	0.48				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		0.24	0.029		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

DATA SHEETS

Page 5

SUMMARY DATA SECTION

Page 22

29

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-03

A4CM-95-0003A

DATA SHEET, cont

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-03
Dept sample id 6105-003
Received 02/28/95
% moisture 23.0Client sample id A4CM-95-0003A
Location/Matrix SSFL AREA 4 SOIL
Collected 02/15/95 10:00
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		0.70	0.056				GAM
Thorium 232		1.3	0.13				GAM

DATA SHEETS

Page 6

SUMMARY DATA SECTION

Page 23

30

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-04

DATA SHEET

A4CM-95-0004A

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-04

Client sample id A4CM-95-0004A

Dept sample id 6105-004

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/16/95 09:05

% moisture 17.4

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.037	0.064	0.1	0.5	U	H
Strontium 90	10098-97-2	0.092	0.062	0.08	0.5	J	SR
Thorium 228		1.2	0.28	0.2	0.1		TH
Thorium 230	14269-63-7	1.1	0.25	0.1	0.1		TH
Thorium 232	7740-29-1	1.3	0.26	0.08	0.1		TH
Uranium 233/234	11-08-5	0.64	0.046	0.009	0.01		U
Uranium 235	14117-96-1	0.032	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.71	0.049	0.008	0.01		U
Plutonium 238	13981-16-3	0.004	0.007	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.001	0.005	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		19	0.51				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		0.03		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		0.038	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

Page 7

SUMMARY DATA SECTION

Page 24

31

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-04

A4CM-95-0004A

DATA SHEET, cont

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-04Client sample id A4CM-95-0004ADept sample id 6105-004Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/16/95 09:05% moisture 17.4

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		0.72	0.057				GAM
Thorium 232		1.3	0.14				GAM

DATA SHEETS

Page 8

SUMMARY DATA SECTION

Page 25

32

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-05

A4CM-95-0005A

DATA SHEET

SDG 6105

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N502079-05

Client sample id A4CM-95-0005A

Dept sample id 6105-005

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/16/95 10:00

% moisture 16.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.031	0.062	0.1	0.5	U	H
Strontium 90	10098-97-2	0.061	0.055	0.08	0.5	U	SR
Thorium 228		1.5	0.26	0.1	0.1		TH
Thorium 230	14269-63-7	1.2	0.22	0.06	0.1		TH
Thorium 232	7740-29-1	1.3	0.22	0.06	0.1		TH
Uranium 233/234	11-08-5	0.64	0.048	0.01	0.01		U
Uranium 235	14117-96-1	0.031	0.010	0.006	0.01		U
Uranium 238	7440-61-1	0.68	0.050	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.007	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	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		0.04		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		0.039	0.015		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		0.05		U	GAM

DATA SHEETS

Page 9

SUMMARY DATA SECTION

Page 26

33

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA / RICHMOND

REPORTING GROUP 6105

N502079-05

A4CM-95-0005A

DATA SHEET, cont

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-05Client sample id A4CM-95-0005ADept sample id 6105-005Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/16/95 10:00% moisture 16.5

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		0.71	0.028				GAM
Thorium 232		1.5	0.070				GAM

DATA SHEETS

Page 10

SUMMARY DATA SECTION

Page 27

34

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-06

DATA SHEET

A4CM-95-0006A

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-06

Client sample id A4CM-95-0006A

Dept sample id 6105-006

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/16/95 10:20

% moisture 15.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.059	0.062	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.012	0.051	0.08	0.5	U	SR
Thorium 228		1.2	0.19	0.06	0.1		TH
Thorium 230	14269-63-7	1.2	0.18	0.04	0.1		TH
Thorium 232	7740-29-1	1.0	0.18	0.06	0.1		TH
Uranium 233/234	11-08-5	0.80	0.056	0.01	0.01		U
Uranium 235	14117-96-1	0.069	0.016	0.006	0.01		U
Uranium 238	7440-61-1	0.83	0.057	0.01	0.01		U
Plutonium 238	13981-16-3	0.002	0.002	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.004	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.47				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		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
Radium 226		0.89	0.051				GAM

DATA SHEETS

Page 11

SUMMARY DATA SECTION

Page 28

35

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-06

A4CM-95-0006A

DATA SHEET, cont

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-06

Client sample id A4CM-95-0006A

Dept sample id 6105-006

Location/Matrix SSFL AREA 4

SOIL

Received 02/28/95

Collected 02/16/95 10:20

% moisture 15.2

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	0.12				GAM

DATA SHEETS

Page 12

SUMMARY DATA SECTION

Page 29

36

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-07

DATA SHEET

A4CM-95-0007A

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-07

Client sample id A4CM-95-0007A

Dept sample id 6105-007

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/16/95 13:15

% moisture 18.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.026	0.063	0.1	0.5	U	H
Strontium 90	10098-97-2	0.058	0.060	0.08	0.5	U	SR
Thorium 228		1.1	0.16	0.09	0.1		TH
Thorium 230	14269-63-7	0.97	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	1.1	0.14	0.03	0.1		TH
Uranium 233/234	11-08-5	0.61	0.050	0.01	0.01		U
Uranium 235	14117-96-1	0.037	0.012	0.007	0.01		U
Uranium 238	7440-61-1	0.61	0.049	0.01	0.01		U
Protactinium 238	13981-16-3	0.008	0.008	0.02	0.01	U	PU
Protactinium 239/240	10-12-8	0.003	0.004	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.47				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		0.07		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		0.03		U	GAM
Cesium 134		U		0.03		U	GAM
Cesium 137		0.12	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		0.08		U	GAM

DATA SHEETS

Page 13

SUMMARY DATA SECTION

Page 30

37

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-07

A4CM-95-0007A

DATA SHEET, cont

SDG 6105Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-07Client sample id A4CM-95-0007ADept sample id 6105-007Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/16/95 13:15% moisture 18.5

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		0.74	0.049				GAM
Thorium 232		1.3	0.13				GAM

DATA SHEETS

Page 14

SUMMARY DATA SECTION

Page 31

38

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-08

A4CM-95-0008A

DATA SHEET

SDG 6105

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N502079-08Client sample id A4CM-95-0008ADept sample id 6105-008Location/Matrix SSFL AREA 4SOILReceived 02/28/95Collected 02/16/95 13:55% moisture 12.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.067	0.060	0.1	0.5	U	H
Strontium 90	10098-97-2	0.001	0.056	0.07	0.5	U	SR
Thorium 228		1.2	0.21	0.07	0.1		TH
Thorium 230	14269-63-7	0.98	0.18	0.05	0.1		TH
Thorium 232	7740-29-1	1.3	0.21	0.05	0.1		TH
Uranium 233/234	11-08-5	0.61	0.052	0.01	0.01		U
Uranium 235	14117-96-1	0.031	0.011	0.007	0.01		U
Uranium 238	7440-61-1	0.63	0.052	0.008	0.01		U
Antonium 238	13981-16-3	-0.001	0.003	0.006	0.01	U	PU
Antonium 239/240	10-12-8	0.001	0.001	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	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		0.07		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		0.082	0.027		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		0.06		U	GAM

DATA SHEETS

Page 15

SUMMARY DATA SECTION

Page 32

39

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-08

A4CM-95-0008A

DATA SHEET, cont

SDG 6105Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-08Client sample id A4CM-95-0008ADept sample id 6105-008Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/16/95 13:55% moisture 12.5

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		0.79	0.053				GAM
Thorium 232		1.4	0.13				GAM

DATA SHEETS

Page 16

SUMMARY DATA SECTION

Page 33

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-09

A4CM-95-0009

DATA SHEET

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-09
Dept sample id 6105-009
Received 02/28/95
% moisture 14.5Client sample id A4CM-95-0009
Location/Matrix SSFL AREA 4 SOIL
Collected 02/22/95 09:08
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0	0.057	0.1	0.5	U	H
Strontium 90	10098-97-2	0.008	0.048	0.06	0.5	U	SR
Thorium 228		1.5	0.30	0.1	0.1		TH
Thorium 230	14269-63-7	1.8	0.33	0.08	0.1		TH
Thorium 232	7740-29-1	1.6	0.30	0.08	0.1		TH
Uranium 233/234	11-08-5	1.4	0.084	0.01	0.01		U
Uranium 235	14117-96-1	0.056	0.015	0.006	0.01		U
Uranium 238	7440-61-1	1.4	0.083	0.01	0.01		U
Plutonium 238	13981-16-3	0.003	0.009	0.02	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.005	0.009	0.01	U	PU
GAMMA SCAN ANALYTES							
Potassium 40		18	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		0.03		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		U		0.02	0.02	U	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

DATA SHEETS

Page 17

SUMMARY DATA SECTION

Page 34

41

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA / RICHMOND

REPORTING GROUP 6105

N502079-09

A4CM-95-0009

DATA SHEET, cont

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-09Client sample id A4CM-95-0009Dept sample id 6105-009Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 09:08% 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		1.1	0.052				GAM
Thorium 232		1.4	0.15				GAM

DATA SHEETS

Page 18

SUMMARY DATA SECTION

Page 35

42

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA / RICHMOND

REPORTING GROUP 6105

N502079-10

DATA SHEET

A4CM-95-0010

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-10

Client sample id A4CM-95-0010

Dept sample id 6105-010

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/22/95 10:02

% moisture 15.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.067	0.055	0.09	0.5	U	H
Strontium 90	10098-97-2	0.025	0.053	0.08	0.5	U	SR
Thorium 228		1.1	0.25	0.1	0.1		TH
Thorium 230	14269-63-7	1.2	0.25	0.09	0.1		TH
Thorium 232	7740-29-1	1.4	0.29	0.09	0.1		TH
Uranium 233/234	11-08-5	0.96	0.066	0.01	0.01		U
Uranium 235	14117-96-1	0.057	0.014	0.006	0.01		U
Uranium 238	7440-61-1	1.0	0.068	0.01	0.01		U
Plutonium 238	13981-16-3	0.004	0.004	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.003	0.007	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		22	0.31				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		0.04		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		U		0.01	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		0.07		U	GAM

DATA SHEETS

Page 19

SUMMARY DATA SECTION

Page 36

43

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-10

A4CM-95-0010

DATA SHEET, cont

SDG 6105
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N502079-10Client sample id A4CM-95-0010Dept sample id 6105-010Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 10:02% moisture 15.7

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		0.87	0.032				GAM
Thorium 232		1.4	0.076				GAM

DATA SHEETS

Page 20

SUMMARY DATA SECTION

Page 37

44

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-11

DATA SHEET

A4CM-95-0013

SDG 6105

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N502079-11

Client sample id A4CM-95-0013

Dept sample id 6105-011

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/22/95 10:35

% moisture 13.2

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.042	0.055	0.09	0.5	U	H
Strontium 90	10098-97-2	0.013	0.058	0.08	0.5	U	SR
Thorium 228		1.1	0.28	0.2	0.1		TH
Thorium 230	14269-63-7	0.95	0.24	0.1	0.1		TH
Thorium 232	7740-29-1	0.75	0.21	0.1	0.1		TH
Uranium 233/234	11-08-5	0.86	0.066	0.02	0.01		U
Uranium 235	14117-96-1	0.050	0.014	0.008	0.01		U
Uranium 238	7440-61-1	0.89	0.067	0.01	0.01		U
Plutonium 238	13981-16-3	0.001	0.003	0.008	0.01	U	PU
Plutonium 239/240	10-12-8	0.005	0.003	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.51				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		0.07		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		U		0.02	0.02	U	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		0.09		U	GAM

DATA SHEETS

Page 21

SUMMARY DATA SECTION

Page 38

45

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

N502079-11

A4CM-95-0013

DATA SHEET, cont

SDG 6105Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N502079-11Client sample id A4CM-95-0013Dept sample id 6105-011Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 10:35% 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		0.89	0.047				GAM
Thorium 232		1.3	0.12				GAM

DATA SHEETS

Page 22

SUMMARY DATA SECTION

Page 39

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test PU Matrix SOIL
SDG 6105
tact Italy E. Pittman

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

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 2781-038

A4CM-95-0001A	N502079-01	6105-001	U	U
A4CM-95-0002A	N502079-02	6105-002	U	U
A4CM-95-0003A	N502079-03	6105-003	U	U
A4CM-95-0004A	N502079-04	6105-004	U	U
A4CM-95-0005A	N502079-05	6105-005	U	U
A4CM-95-0006A	N502079-06	6105-006	U	U
A4CM-95-0007A	N502079-07	6105-007	U	U
A4CM-95-0008A	N502079-08	6105-008	U	U
A4CM-95-0009	N502079-09	6105-009	U	U
A4CM-95-0010	N502079-10	6105-010	U	U
A4CM-95-0013	N502079-11	6105-011	U	U
BLK (QC ID=23482)	N502079-13	6105-013	U	U
LCS (QC ID=23481)	N502079-12	6105-012	ok	ok
Duplicate (N502079-01)	N502079-14	6105-014	- U	ok J

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

Page 1

SUMMARY DATA SECTION

Page 40

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test PU Matrix SOIL

SDG 6105

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 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 2781-038 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 038																
A4CM-95-0001A	N502079-01		0.02	3.00				45	1003				43	03/30/95	03/30	SS-027
A4CM-95-0002A	N502079-02		0.01	3.00				49	1003				43	03/30/95	03/30	SS-028
A4CM-95-0003A	N502079-03		0.02	3.00				50	1003				43	03/30/95	03/30	SS-029
A4CM-95-0004A	N502079-04		0.01	3.00				52	1003				42	03/30/95	03/30	SS-030
A4CM-95-0005A	N502079-05		0.01	3.00				49	1003				42	03/30/95	03/30	SS-032
A4CM-95-0006A	N502079-06		0.007	3.00				43	1045				44	03/30/95	04/01	SS-053
A4CM-95-0007A	N502079-07		0.02	3.00				55	1003				42	03/30/95	03/30	SS-035
A4CM-95-0008A	N502079-08		0.006	3.00				54	1045				44	03/30/95	04/01	SS-052
A4CM-95-0009	N502079-09		0.02	3.00				47	1003				36	03/30/95	03/30	SS-038
A4CM-95-0010	N502079-10		0.007	3.00				52	1002				36	03/30/95	03/30	SS-051
A4CM-95-0013	N502079-11		0.008	3.00				46	1002				36	03/30/95	03/30	SS-052
BLK (QC ID=23482)	N502079-13		0.008	3.00				42	1002					03/30/95	03/30	SS-054
LCS (QC ID=23481)	N502079-12		0.008	3.00				39	1002					03/30/95	03/30	SS-053
Duplicate (N502079-01)	N502079-14		0.006	3.00				50	1002				43	03/30/95	03/30	SS-055
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 14 SAMPLES	YIELD	48	±	9

METHOD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 41

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test TH Matrix SOILSDG 6105Cact Italy E. Pittman

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Client RocketdyneContract 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 2781-038

A4CM-95-0001A	N502079-01	6105-001	1.3	1.1	1.4
A4CM-95-0002A	N502079-02	6105-002	1.3	1.0	1.2
A4CM-95-0004A	N502079-04	6105-004	1.2	1.1	1.3
A4CM-95-0005A	N502079-05	6105-005	1.5	1.2	1.3
A4CM-95-0007A	N502079-07	6105-007	1.1	0.97	1.1
A4CM-95-0008A	N502079-08	6105-008	1.2	0.98	1.3
A4CM-95-0009	N502079-09	6105-009	1.5	1.8	1.6
A4CM-95-0010	N502079-10	6105-010	1.1	1.2	1.4
BLK (QC ID=23482)	N502079-13	6105-013	U	U	U
LCS (QC ID=23481)	N502079-12	6105-012	No data U	ok	No data U
Duplicate (N502079-01)	N502079-14	6105-014	ok	ok	ok

Preparation batch 2781-038A

A4CM-95-0003A	N502079-03	A1 6105-003	0.89	0.82	0.87
A4CM-95-0006A	N502079-06	A1 6105-006	1.2	1.2	1.0
A4CM-95-0013	N502079-11	A1 6105-011	1.1	0.95	0.75
B (QC ID=23631)	N502079-17	6105-017	U	U	U
LCS (QC ID=23630)	N502079-16	6105-016	No data U	ok	No data U

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

Page 3

SUMMARY DATA SECTION

Page 42

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test TH Matrix SOIL

SDG 6105

Contact Italy E. Pittman

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 2781-038 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 038																
A4CM-95-0001A	N502079-01		0.06	1.00				50		690			43	03/30/95	03/30	SS-017
A4CM-95-0002A	N502079-02		0.06	1.00				42		690			43	03/30/95	03/30	SS-018
A4CM-95-0004A	N502079-04		0.2	1.00				23		690			42	03/30/95	03/30	SS-020
A4CM-95-0005A	N502079-05		0.1	1.00				27		690			42	03/30/95	03/30	SS-021
A4CM-95-0007A	N502079-07		0.09	1.00				56		690			42	03/30/95	03/30	SS-023
A4CM-95-0008A	N502079-08		0.07	1.00				46		506			43	03/30/95	03/31	SS-017
A4CM-95-0009	N502079-09		0.1	1.00				26		506			37	03/30/95	03/31	SS-018
A4CM-95-0010	N502079-10		0.1	1.00				29		506			37	03/30/95	03/31	SS-019
BLK (QC ID=23482)	N502079-13		0.07	1.00				62		506				03/30/95	03/31	SS-022
LCS (QC ID=23481)	N502079-12		0.08	1.00				46		506				03/30/95	03/31	SS-021
Duplicate (N502079-01)	N502079-14		0.1	1.00				44		506			44	03/30/95	03/31	SS-023
Preparation batch 2781-038A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 038																
A4CM-95-0003A	N502079-03	A1	0.1	1.00				36		630			51	04/06/95	04/07	SS-020
A4CM-95-0006A	N502079-06	A1	0.06	1.00				43		630			50	04/06/95	04/07	SS-021
A4CM-95-0013	N502079-11	A1	0.2	1.00				19		630			44	04/06/95	04/07	SS-019
BLK (QC ID=23631)	N502079-17		0.03	1.00				79		474				04/06/95	04/07	SS-044
LCS (QC ID=23630)	N502079-16		0.03	1.00				84		474				04/06/95	04/07	SS-043
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 0.09 ± 0.1
 FOR 16 SAMPLES YIELD 44 ± 38

MOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 43

50

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test U Matrix SOILSDG 6105Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUF- TEST FIX PLANCHET	1: Uranium 233/234	2: Uranium 235	3: Uranium 238	RESULT RATIOS (%)			
						1+3	2σ	2+3	2σ
Preparation batch 2781-038									
A4CM-95-0001A	N502079-01	6105-001	0.59	0.019	0.65	91	9	3	1
A4CM-95-0002A	N502079-02	6105-002	0.56	0.034	0.58	97	10	6	2
A4CM-95-0003A	N502079-03	6105-003	0.58	0.035	0.59	98	11	6	2
A4CM-95-0004A	N502079-04	6105-004	0.64	0.032	0.71	90	9	5	1
A4CM-95-0005A	N502079-05	6105-005	0.64	0.031	0.68	94	10	5	2
A4CM-95-0006A	N502079-06	6105-006	0.80	0.069	0.83	96	9	8	2
A4CM-95-0007A	N502079-07	6105-007	0.61	0.037	0.61	100	11	6	2
A4CM-95-0008A	N502079-08	6105-008	0.61	0.031	0.63	97	11	5	2
A4CM-95-0009	N502079-09	6105-009	1.4	0.056	1.4	100	8	4	1
A4CM-95-0010	N502079-10	6105-010	0.96	0.057	1.0	96	9	6	1
A4CM-95-0013	N502079-11	6105-011	0.86	0.050	0.89	97	10	6	2
BLK (QC ID=23482)	N502079-13	6105-013	U	U	U				
LCS (QC ID=23481)	N502079-12	6105-012	ok	ok	ok				
Duplicate (N502079-01)	N502079-14	6105-014	ok	ok	ok	93	9	5	2
Nominal values and limits from method									
		RDLs (pCi/g)	0.01	0.01	0.01	100		4	
						Averages 96		5	

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 44

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test U Matrix SOIL

SDG 6105

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 FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM KeV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-038 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 038															
A4CM-95-0001A	N502079-01	0.008	3.00				66	1042				47	03/31/95	04/03	SS-030
A4CM-95-0002A	N502079-02	0.009	3.00				58	1042				47	03/31/95	04/03	SS-032
A4CM-95-0003A	N502079-03	0.01	3.00				54	1042				47	03/31/95	04/03	SS-027
A4CM-95-0004A	N502079-04	0.009	3.00				59	1041				44	03/31/95	04/01	SS-028
A4CM-95-0005A	N502079-05	0.01	3.00				53	1041				44	03/31/95	04/01	SS-029
A4CM-95-0006A	N502079-06	0.01	3.00				55	1041				44	03/31/95	04/01	SS-030
A4CM-95-0007A	N502079-07	0.01	3.00				49	1041				44	03/31/95	04/01	SS-032
A4CM-95-0008A	N502079-08	0.01	3.00				45	1042				46	03/31/95	04/03	SS-028
A4CM-95-0009	N502079-09	0.01	3.00				53	1041				38	03/31/95	04/01	SS-035
A4CM-95-0010	N502079-10	0.01	3.00				50	1042				40	03/31/95	04/03	SS-029
A4CM-95-0013	N502079-11	0.02	3.00				44	1041				38	03/31/95	04/01	SS-038
BLK (QC ID=23482)	N502079-13	0.02	3.00				31	1041					03/31/95	04/01	SS-040
LCS (QC ID=23481)	N502079-12	0.04	3.00				51	1041					03/31/95	04/01	SS-039
Duplicate (N502079-01)	N502079-14	0.01	3.00				56	1041				45	03/31/95	04/01	SS-041
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 14 SAMPLES	YIELD	52	±	16

MOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 45

52

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Test SR Matrix SOIL

SDG 6105

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 2781-038

A4CM-95-0001A	N502079-01	6105-001	U
A4CM-95-0002A	N502079-02	6105-002	U
A4CM-95-0003A	N502079-03	6105-003	U
A4CM-95-0004A	N502079-04	6105-004	0.092 J
A4CM-95-0005A	N502079-05	6105-005	U
A4CM-95-0006A	N502079-06	6105-006	U
A4CM-95-0007A	N502079-07	6105-007	U
A4CM-95-0008A	N502079-08	6105-008	U
A4CM-95-0009	N502079-09	6105-009	U
A4CM-95-0010	N502079-10	6105-010	U
A4CM-95-0013	N502079-11	6105-011	U
BLK (QC ID=23482)	N502079-13	6105-013	U
LCS (QC ID=23481)	N502079-12	6105-012	ok
Duplicate (N502079-01)	N502079-14	6105-014	U

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

Page 7

SUMMARY DATA SECTION

Page 46

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test SR Matrix SOIL

SDG 6105

Contact Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUF- 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 2781-038 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 038															
A4CM-95-0001A	N502079-01		0.05	2.00			90		616			42	03/29/95	03/29	LBG-015
A4CM-95-0002A	N502079-02		0.05	2.00			91		616			42	03/29/95	03/29	LBG-016
A4CM-95-0003A	N502079-03		0.05	2.00			83		604			42	03/29/95	03/29	LBG-001
A4CM-95-0004A	N502079-04		0.08	2.00			93		200			41	03/29/95	03/29	LBG-015
A4CM-95-0005A	N502079-05		0.08	2.00			89		200			41	03/29/95	03/29	LBG-016
A4CM-95-0006A	N502079-06		0.08	2.00			87		214			41	03/29/95	03/29	LBG-001
A4CM-95-0007A	N502079-07		0.08	2.00			89		214			41	03/29/95	03/29	LBG-002
A4CM-95-0008A	N502079-08		0.07	2.00			89		335			41	03/29/95	03/29	LBG-015
A4CM-95-0009	N502079-09		0.06	2.00			89		335			35	03/29/95	03/29	LBG-016
A4CM-95-0010	N502079-10		0.08	2.00			87		213			35	03/29/95	03/29	LBG-001
A4CM-95-0013	N502079-11		0.08	2.00			88		213			35	03/29/95	03/29	LBG-002
BLK (QC ID=23482)	N502079-13		0.07	2.00			84		576				03/29/95	03/29	LBG-001
LCS (QC ID=23481)	N502079-12		0.2	2.00			85		141				03/29/95	03/29	LBG-016
Duplicate (N502079-01)	N502079-14		0.07	2.00			89		576			42	03/29/95	03/29	LBG-002

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 ± 0.07

FOR 14 SAMPLES YIELD 88 ± 5

METHOD SUMMARIES

Page 8

SUMMARY DATA SECTION

Page 47

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test GAM Matrix SOILSDG 6105Sact Italy E. Pittman

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-038

A4CM-95-0001A	N502079-01	6105-001	0.12
A4CM-95-0002A	N502079-02	6105-002	0.060
A4CM-95-0003A	N502079-03	6105-003	0.24
A4CM-95-0004A	N502079-04	6105-004	0.038
A4CM-95-0005A	N502079-05	6105-005	0.039
A4CM-95-0006A	N502079-06	6105-006	U
A4CM-95-0007A	N502079-07	6105-007	0.12
A4CM-95-0008A	N502079-08	6105-008	0.082
A4CM-95-0009	N502079-09	6105-009	U
A4CM-95-0010	N502079-10	6105-010	U
A4CM-95-0013	N502079-11	6105-011	U
BLK (QC ID=23482)	N502079-13	6105-013	U
LCS (QC ID=23481)	N502079-12	6105-012	ok
Duplicate (N502079-10)	N502079-15	6105-015	- U

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

Page 9

SUMMARY DATA SECTION

Page 48

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test GAM Matrix SOILSDG 6105Cact Italy E. Pittman

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	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 2781-038 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 038

A4CM-95-0001A	N502079-01			652						754		35	03/22/95	MB,02,00
A4CM-95-0002A	N502079-02			750						729		35	03/22/95	01,01,00
A4CM-95-0003A	N502079-03			746						729		35	03/22/95	MB,02,00
A4CM-95-0004A	N502079-04			751						729		34	03/22/95	MB,03,00
A4CM-95-0005A	N502079-05			750						878		35	03/23/95	01,04,00
A4CM-95-0006A	N502079-06	0.02		751						896		35	03/23/95	01,01,00
A4CM-95-0007A	N502079-07			751						896		35	03/23/95	MB,03,00
A4CM-95-0008A	N502079-08			751						739		36	03/24/95	01,01,00
A4CM-95-0009	N502079-09	0.02		750						739		30	03/24/95	MB,03,00
A4CM-95-0010	N502079-10	0.01		756						750		30	03/24/95	01,04,00
A4CM-95-0013	N502079-11	0.02		750						765		33	03/27/95	MB,02,00
BLK (QC ID=23482)	N502079-13	0.003	850							767			03/27/95	01,04,00
LCS (QC ID=23481)	N502079-12		850							767			03/27/95	MB,03,00
Duplicate (N502079-10)	N502079-15	0.04	187							1019		30	03/24/95	JR,01,00

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 6 SAMPLES

YIELD _____ ± _____

MOD SUMMARIES

Page 10

SUMMARY DATA SECTION

Page 49

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test H Matrix SOILSDG 6105tact Italy E. Pittman

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Client RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-038

A4CM-95-0001A	N502079-01	6105-001	U
A4CM-95-0002A	N502079-02	6105-002	U
A4CM-95-0003A	N502079-03	6105-003	U
A4CM-95-0004A	N502079-04	6105-004	U
A4CM-95-0005A	N502079-05	6105-005	U
A4CM-95-0006A	N502079-06	6105-006	U
A4CM-95-0007A	N502079-07	6105-007	U
A4CM-95-0008A	N502079-08	6105-008	U
A4CM-95-0009	N502079-09	6105-009	U
A4CM-95-0010	N502079-10	6105-010	U
A4CM-95-0013	N502079-11	6105-011	U
BLK (QC ID=23482)	N502079-13	6105-013	U
LCS (QC ID=23481)	N502079-12	6105-012	ok X
Duplicate (N502079-01)	N502079-14	6105-014	- U

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

Page 11

SUMMARY DATA SECTION

Page 50

57

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/12/95

TMA/RICHMOND

REPORTING GROUP 6105

Test H Matrix SOIL

SDG 6105

Contact Italy E. Pittman

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

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 2781-038 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 038															
A4CM-95-0001A	N502079-01		0.1	29.2					50			34	03/20/95	03/21	LSC-005
A4CM-95-0002A	N502079-02		0.1	27.9					50			34	03/20/95	03/21	LSC-005
A4CM-95-0003A	N502079-03		0.1	27.1					50			34	03/20/95	03/21	LSC-005
A4CM-95-0004A	N502079-04		0.1	26.2					50			33	03/20/95	03/21	LSC-005
A4CM-95-0005A	N502079-05		0.1	26.8					50			33	03/20/95	03/21	LSC-005
A4CM-95-0006A	N502079-06		0.1	27.2					50			33	03/20/95	03/21	LSC-005
A4CM-95-0007A	N502079-07		0.1	25.8					50			33	03/20/95	03/21	LSC-005
A4CM-95-0008A	N502079-08		0.1	28.3					50			33	03/20/95	03/21	LSC-005
A4CM-95-0009	N502079-09		0.1	28.5					50			27	03/20/95	03/21	LSC-005
A4CM-95-0010	N502079-10		0.09	30.2					50			27	03/20/95	03/21	LSC-005
A4CM-95-0013	N502079-11		0.09	30.4					50			28	03/20/95	03/22	LSC-005
BLK (QC ID=23482)	N502079-13		0.1	20.0					50				03/20/95	03/21	LSC-005
LCS (QC ID=23481)	N502079-12		0.1	20.0					50				03/20/95	03/21	LSC-005
Duplicate (N502079-01)	N502079-14		0.09	30.3					50			35	03/20/95	03/22	LSC-005
Nominal values and limits from method			0.5	20.0					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	0.1	±	0.009
FOR 14 SAMPLES	YIELD		±	

MOD SUMMARIES

Page 12

SUMMARY DATA SECTION

Page 51

58

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/12/95



TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

2nd copy - P.O. Box 4040 = B

April 19, 1995

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

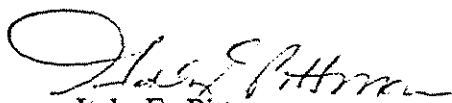
Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N5-03-001-6106
Report N5-03-002-6107

Dear Mr. Klein:

The enclosed data report is for the radiochemistry analyses of the ten soil and two water samples collected February 21 through 23, 1995. The samples were received at TMA/Richmond on February 28, 1995. The case narrative discusses all parameters which are underlined in the data report that are not in compliance with the Statement of Work.

If you have any questions regarding this data, please call.

Sincerely,


Italy E. Pittman
Program Manager

Enclosure: Data Report N5-03-001-6106 (soil)
Data Report N5-03-002-6107 (rinsate)

DOCUMENT INVENTORY FOR SAMPLE DELIVERY GROUP 6106 and 6107

SECTION 1 Case Narrative

SECTION 2 Summary Data Section

X APPENDIX 1 Chains-of-Custody Copies

X APPENDIX 2 Aliquot Information

X APPENDIX 3 Preparation Log For QC Samples

X APPENDIX 4 Continuing Calibration Data for LSC Counters

X APPENDIX 5 Copies of Raw Data Sheets

SECTION 1 Case Narrative

TMA/Richmond

Report N5-03-001-6106

Report N5-03-002-6107

Sample Delivery Group 6106/6107

Case Narrative

Rockwell International Corp.

Contract R44PJZ94034044

April 19, 1995

1.0 GENERAL

TMA/Richmond Sample Delivery Group 6106 consists of ten soil samples, and SDG 6107 consists of two liquid samples. Both sets were received on February 28, 1995.

2.0 ANALYTICAL NOTES

The internal quality control consists of 5% each of laboratory control samples, blanks and duplicates. The QC samples are prepared by the Quality Control Department, and copies of the QC Notebook pages are included with the data package.

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 gamma background spectra considerably.

2.1 Tritium Analyses

No problems were associated with the analyses.

2.2 Strontium-90 Analyses

6106 (Soil)

The Laboratory Control Sample and sample A4CM-95-0015 were counted for less than the nominal 200 minutes count time required; however, the MDA's for both samples were less than the RDL despite the shorter count time. The average yield for 13 samples was 80% ± 15%.

6107 (Rinsate)

The count time for the LCS was less than the nominal 200 minutes count time required. The MDA for the LCS was greater the RDL; however, this is not a problem since the activity of the LCS is far greater than the MDA. The average yield for three samples was 81% ± 10%.

TMA/Richmond

Report N5-03-001-6106

Report N5-03-002-6107

Sample Delivery Group 6106/6107

Case Narrative

Rockwell International Corp.

Contract R44PJZ94034044

April 19, 1995

2.0 ANALYTICAL NOTES (cont'd)**2.3 Thorium 228, 230, 232 Analyses**6106 (Soil)

Sample A4CM-95-0014 has an MDA slightly greater than the RDL. Several samples have count times less than the nominal 500 minutes required; however, all of the sample MDA's, except for the aforementioned sample, were less than the RDL despite the shorter count times. The average yield for 13 samples was $59\% \pm 35\%$.

6107 (Rinsate)

The reagent blank has a result slightly greater than the sample MDA, but less than the RDL. The LCS has a Percent Recovery slightly greater than the upper limit allowed. The average yield for three samples was $73\% \pm 20\%$.

2.4 Uranium 233/234, 235, 238 Analyses6106 (Soil)

The duplicate analyses did not meet the RPD required. The MDA for the Laboratory Control Sample was greater than the RDL; however, this is not a problem since the activity of the LCS is far greater than the MDA. The average yield for 13 samples was $79\% \pm 9\%$.

6107 (Rinsate)

The MDA for the LCS was greater than the RDL; however, this is not a problem since the activity of the LCS is far greater than the MDA. The average yield for three samples was $53\% \pm 21\%$.

2.5 Plutonium 239/240 Analyses6106 (Soil)

No problems were associated with the analyses. The average yield for 13 samples was $63\% \pm 22\%$.

6107 (Rinsate)

No problems were associated with the analyses. The average yield for 3 samples was $61\% \pm 37\%$.

TMA/Richmond

Report N5-03-001-6106

Report N5-03-002-6107

Sample Delivery Group 6106/6107

Case Narrative

Rockwell International Corp.

Contract R44PJZ94034044

April 19, 1995

2.0 ANALYTICAL NOTES (cont'd)

2.6 Gamma Spectroscopy Analyses

6106 (Soil)

All samples have aliquots less than the 850 g nominal required; however, despite the smaller aliquots, all of the MDA's were below the RDL.

6107 (Rinsate)

No problems were associated with the analysis.

SECTION 2 Summary Data Section

T M A / R I C H M O N D
REPORTING GROUP 6106

SDG 6106
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
Prep Batch Summary	.	.	.	3
Work Summary	.	.	.	4
Method Blanks	.	.	.	7
Lab Control Samples	.	.	.	9
Duplicates	.	.	.	11
Data Sheets	.	.	.	13
Method Summaries	.	.	.	33
End of Section	.	.	.	44

Italy E. Pittman 4/19/95
pared by

297/4/9
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

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-95-0011	SSFL AREA 4	SOIL		N503001-03			02/21/95 08:47
A4CM-95-0012	SSFL AREA 4	SOIL		N503001-04			02/21/95 09:35
A4CM-95-0014	SSFL AREA 4	SOIL		N503001-01			02/22/95 14:17
A4CM-95-0015	SSFL AREA 4	SOIL		N503001-02			02/22/95 14:21
A4CM-95-0016A	SSFL AREA 4	SOIL		N503001-05			02/23/95 09:02
A4CM-95-0017A	SSFL AREA 4	SOIL		N503001-06			02/23/95 09:45
A4CM-95-0018	SSFL AREA 4	SOIL		N503001-09			02/20/95 12:45
A4CM-95-0019	SSFL AREA 4	SOIL		N503001-10			02/20/95 13:20
A4CM-95-0020A	SSFL AREA 4	SOIL		N503001-07			02/23/95 10:40
A4CM-95-0023A	SSFL AREA 4	SOIL		N503001-08			02/23/95 13:40
Method Blank		SOIL		N503001-12			
Lab Control Sample		SOIL		N503001-11			
Duplicate (N503001-01)	SSFL AREA 4	SOIL		N503001-13			02/22/95 14:17
Duplicate (N503001-10)	SSFL AREA 4	SOIL		N503001-14			02/20/95 13:20

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 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

Contact Italy E. Pittman

QC SUMMARY

Client Rocketdyne

Contract R44PJZ54334044

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% MOIST	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
6106		A4CM-95-0011	SOIL	16.3			02/28/95	7	6106-003
		A4CM-95-0012	SOIL	17.8			02/28/95	7	6106-004
		A4CM-95-0014	SOIL	24.5			02/28/95	6	6106-001
		A4CM-95-0015	SOIL	15.3			02/28/95	6	6106-002
		A4CM-95-0016A	SOIL	8.4			02/28/95	5	6106-005
		A4CM-95-0017A	SOIL	12.3			02/28/95	5	6106-006
		A4CM-95-0018	SOIL	8.9			02/28/95	8	6106-009
		A4CM-95-0019	SOIL	12.3			02/28/95	8	6106-010
		A4CM-95-0020A	SOIL	15.8			02/28/95	5	6106-007
		A4CM-95-0023A	SOIL	17.3			02/28/95	5	6106-008
		Method Blank	SOIL						6106-012
		Lab Control Sample	SOIL						6106-011
		Duplicate (N503001-01)	SOIL				02/28/95	6	6106-013
		Duplicate (N503001-10)	SOIL				02/28/95	8	6106-014

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

10

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-QS

Version 1.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

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	SOIL	Plutonium, Isotopic in Soil	2781-046	5.0	10			1	1	1/1		
TH	SOIL	Thorium, Isotopic in Soil	2781-046	5.0	10			1	1	1/1		
U	SOIL	Uranium, Isotopic in Soil	2781-046	5.0	10			1	1	1/1		
Beta Counting												
SR	SOIL	Strontium, Total in Soil	2781-046	10.0	10			1	1	1/1		
Gamma Spectroscopy												
GAM	SOIL	Gamma Scan	2781-046	15.0	10			1	1	1/1		
Liquid Scintillation												
H	SOIL	Tritium-Soil	2781-046	10.0	10			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

Page 1

SUMMARY DATA SECTION

Page 3

11

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-PBS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

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-95-0011		N503001-03	6106-003	GAM		03/28/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/21/95	6106-003	H		03/21/95	04/06/95	IEP	Tritium-Soil		
		02/28/95	6106-003	PU		04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil		
			6106-003	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil		
			6106-003	TH		03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil		
			6106-003	U		04/01/95	04/07/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0012		N503001-04	6106-004	GAM		03/28/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/21/95	6106-004	H		03/21/95	04/06/95	IEP	Tritium-Soil		
		02/28/95	6106-004	PU		04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil		
			6106-004	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil		
			6106-004	TH		03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil		
			6106-004	U		04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0014		N503001-01	6106-001	GAM		03/30/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/22/95	6106-001	H		03/21/95	04/06/95	IEP	Tritium-Soil		
		02/28/95	6106-001	PU		04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil		
			6106-001	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil		
			6106-001	TH		03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil		
			6106-001	U		04/01/95	04/07/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0015		N503001-02	6106-002	GAM		03/27/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/22/95	6106-002	H		03/21/95	04/06/95	IEP	Tritium-Soil		
		02/28/95	6106-002	PU		04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil		
			6106-002	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil		
			6106-002	TH		03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil		
			6106-002	U		04/01/95	04/07/95	IEP	Uranium, Isotopic in Soil		
A4CM-95-0016A		N503001-05	6106-005	GAM		03/28/95	04/10/95	IEP	Gamma Scan		
SSFL AREA 4	SOIL	02/23/95	6106-005	H		03/21/95	04/06/95	IEP	Tritium-Soil		
		02/28/95	6106-005	PU		04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil		
			6106-005	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil		
			6106-005	TH		03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil		
			6106-005	U		04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil		

WORK SUMMARY

Page 1

SUMMARY DATA SECTION

Page 4

12

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

Fact 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-95-0017A		N503001-06	6106-006	GAM	03/30/95	04/10/95	IEP	Gamma Scan					
SSFL AREA 4	SOIL	02/23/95	6106-006	H	03/21/95	04/07/95	IEP	Tritium-Soil					
		02/28/95	6106-006	PU	04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil					
			6106-006	SR	03/30/95	04/10/95	IEP	Strontium, Total in Soil					
			6106-006	TH	03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil					
			6106-006	U	04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil					
A4CM-95-0018		N503001-09	6106-009	GAM	03/30/95	04/10/95	IEP	Gamma Scan					
SSFL AREA 4	SOIL	02/20/95	6106-009	H	03/22/95	04/07/95	IEP	Tritium-Soil					
		02/28/95	6106-009	PU	04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil					
			6106-009	SR	03/30/95	04/10/95	IEP	Strontium, Total in Soil					
			6106-009	TH	04/01/95	04/13/95	IEP	Thorium, Isotopic in Soil					
			6106-009	U	04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil					
A4CM-95-0019		N503001-10	6106-010	GAM	03/31/95	04/10/95	IEP	Gamma Scan					
SSFL AREA 4	SOIL	02/20/95	6106-010	H	03/22/95	04/07/95	IEP	Tritium-Soil					
		02/28/95	6106-010	PU	04/03/95	04/07/95	IEP	Plutonium, Isotopic in Soil					
			6106-010	SR	03/30/95	04/10/95	IEP	Strontium, Total in Soil					
			6106-010	TH	04/01/95	04/13/95	IEP	Thorium, Isotopic in Soil					
			6106-010	U	04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil					
A4CM-95-0020A		N503001-07	6106-007	GAM	04/01/95	04/10/95	IEP	Gamma Scan					
SSFL AREA 4	SOIL	02/23/95	6106-007	H	03/21/95	04/07/95	IEP	Tritium-Soil					
		02/28/95	6106-007	PU	04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil					
			6106-007	SR	03/30/95	04/10/95	IEP	Strontium, Total in Soil					
			6106-007	TH	03/31/95	04/13/95	IEP	Thorium, Isotopic in Soil					
			6106-007	U	04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil					
A4CM-95-0023A		N503001-08	6106-008	GAM	04/01/95	04/10/95	IEP	Gamma Scan					
SSFL AREA 4	SOIL	02/23/95	6106-008	H	03/22/95	04/07/95	IEP	Tritium-Soil					
		02/28/95	6106-008	PU	04/01/95	04/07/95	IEP	Plutonium, Isotopic in Soil					
			6106-008	SR	03/30/95	04/10/95	IEP	Strontium, Total in Soil					
			6106-008	TH	04/03/95	04/13/95	IEP	Thorium, Isotopic in Soil					
			6106-008	U	04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil					

WORK SUMMARY

Page 2

SUMMARY DATA SECTION

Page 5

13

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

SDG 6106

Contact Italy E. Pittman

WORK SUMMARY, cont.

Client RocketdyneContract R44PZ9403+044

CLIENT SAMPLE ID		LAB SAMPLE ID								
LOCATION	MATRIX	COLLECTED		SUF-						
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
Method Blank		N503001-12	6106-012	GAM		03/31/95	04/10/95	IEP	Gamma Scan	
	SOIL		6106-012	H		03/21/95	04/07/95	IEP	Tritium-Soil	
			6106-012	PU		04/03/95	04/07/95	IEP	Plutonium, Isotopic in Soil	
			6106-012	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil	
			6106-012	TH		04/01/95	04/13/95	IEP	Thorium, Isotopic in Soil	
			6106-012	U		04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil	
Lab Control Sample		N503001-11	6106-011	GAM		03/31/95	04/10/95	IEP	Gamma Scan	
	SOIL		6106-011	H		03/21/95	04/07/95	IEP	Tritium-Soil	
			6106-011	PU		04/03/95	04/07/95	IEP	Plutonium, Isotopic in Soil	
			6106-011	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil	
			6106-011	TH		04/01/95	04/13/95	IEP	Thorium, Isotopic in Soil	
			6106-011	U		04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil	
Duplicate (N503001-01)		N503001-13	6106-013	H		03/22/95	04/07/95	IEP	Tritium-Soil	
SSFL AREA 4	SOIL	02/22/95	6106-013	PU		04/03/95	04/07/95	IEP	Plutonium, Isotopic in Soil	
		02/28/95	6106-013	SR		03/30/95	04/10/95	IEP	Strontium, Total in Soil	
			6106-013	TH		04/01/95	04/13/95	IEP	Thorium, Isotopic in Soil	
			6106-013	U		04/03/95	04/07/95	IEP	Uranium, Isotopic in Soil	
Duplicate (N503001-10)		N503001-14	6106-014	GAM		03/28/95	04/10/95	IEP	Gamma Scan	
SSFL AREA 4	SOIL	02/20/95								
		02/28/95								

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAS no	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
GAM		Gamma Scan		10			1	1	1	13
H		Tritium-Soil	EPA 906.0; ASTM 2476-81	10			1	1	1	13
PU		Plutonium, Isotopic in Soil	HASL 300/PU-02	10			1	1	1	13
SR		Strontium, Total in Soil	HASL 300/SR-01,-02	10			1	1	1	13
TH		Thorium, Isotopic in Soil		10			1	1	1	13
U		Uranium, Isotopic in Soil	HASL 300/U-04	10			1	1	1	13
TOTALS				60			6	6	6	78

RK SUMMARY

Page 3

SUMMARY DATA SECTION

Page 6

14

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DND-CWSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-12

METHOD BLANK

Method Blank

SDG 6106

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N503001-12

Client sample id Method Blank

Dept sample id 6106-012

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.042	0.083	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.013	0.054	0.08	0.5	U	SR
Thorium 228		0.009	0.018	0.04	0.1	U	TH
Thorium 230	14269-63-7	-0.003	0.012	0.03	0.1	U	TH
Thorium 232	7740-29-1	0.003	0.012	0.02	0.1	U	TH
Uranium 233/234	11-08-5	0	0.004	0.006	0.01	U	U
Uranium 235	14117-96-1	-0.001	0.001	0.005	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	0.003	0.006	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.003	0.006	0.01	U	PU
MA SCAN ANALYTES		U					
Potassium 40		U		0.1		U	GAM
Chromium 51		U		0.05		U	GAM
Manganese 54		U		0.007		U	GAM
Cobalt 58		U		0.007		U	GAM
Iron 59		U		0.01		U	GAM
Cobalt 60		U		0.008		U	GAM
Zinc 65		U		0.02		U	GAM
Niobium 94		U		0.007		U	GAM
Ruthenium 103		U		0.007		U	GAM
Ruthenium 106		U		0.06		U	GAM
Tin 113		U		0.008		U	GAM
Cesium 134		U		0.008		U	GAM
Cesium 137		U		0.008	0.02	U	GAM
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		0.01		U	GAM
Thorium 232		U		0.03		U	GAM

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 7

15

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-12

BLANK, cont.

Method Blank

SDG 6106

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503001-12

Client sample id Method Blank

Dept sample id 6106-012

Material/Matrix SOIL

QC-BLANK #23485

METHOD BLANKS

Page 2

SUMMARY DATA SECTION

Page 8

16

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-11

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6106

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N503001-11

Client sample id Lab Control Sample

Dept sample id 6106-011

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	5.1	0.23	0.1	0.5	X	H	5.00	0.20	102	82-118	
Strontium 90	11	0.82	0.3	0.5		SR	10.8	0.43	102	79-121	
Thorium 228	0.003	0.027	0.06	0.1	U	TH					
Thorium 230	2.2	0.20	0.04	0.1		TH	2.05	0.082	107	82-118	
Thorium 232	0.003	0.013	0.03	0.1	U	TH					
Uranium 233/234	1.3	0.067	0.03	0.01		U	1.43	0.057	91	88-112	
Uranium 235	1.1	0.059	0.005	0.01		U	1.09	0.044	101	86-114	
Uranium 238	1.4	0.069	0.03	0.01		U	1.42	0.057	99	87-113	
Plutonium 238	0.39	0.032	0.007	0.01		PU	0.380	0.015	103	84-116	
Plutonium 239/240	0.35	0.030	0.007	0.01		PU	0.340	0.014	103	83-117	
SCAN ANALYTES	U										
Potassium 40	U		0.07		U	GAM					
Chromium 51	U		0.06		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		0.008		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.006		U	GAM					
Ruthenium 103	U		0.008		U	GAM					
Ruthenium 106	U		0.07		U	GAM					
Tin 113	U		0.01		U	GAM					
Cesium 134	U		0.007		U	GAM					
Cesium 137	0.45	0.019		0.02		GAM	0.449	0.018	100	76-124	
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		0.01		U	GAM					
Thorium 232	U		0.03		U	GAM					

LAB CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 9

17

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-11

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6106Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N503001-11Dept sample id 6106-011Client sample id Lab Control SampleMaterial/Matrix SOIL

QC-LCS #23484

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 10

18

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-LCSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-13

A4CM-95-0014

DUPLICATE

SDG 6106

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N503001-13Lab sample id N503001-01Client sample id A4CM-95-0014Dept sample id 6106-013Dept sample id 6106-001Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 14:17% moisture 24.5

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	0	0.061	0.1	0.5	U	H	0.008	0.063	0.1	U	-		
Strontium 90	0.026	0.055	0.07	0.5	U	SR	0.026	0.099	0.1	U	-		
Thorium 228	1.2	0.15	0.06	0.1		TH	1.3	0.26	0.2		8	38	
Thorium 230	1.0	0.14	0.04	0.1		TH	1.3	0.24	0.08		26	38	
Thorium 232	1.3	0.16	0.03	0.1		TH	1.5	0.27	0.08		14	36	
Uranium 233/234	1.1	0.058	0.009	0.01		U	0.84	0.051	0.008		27	17	
Uranium 235	0.056	0.011	0.004	0.01		U	0.034	0.010	0.005		49	51	
Uranium 238	1.1	0.057	0.008	0.01		U	0.87	0.051	0.007		23	17	
Uranium 238	0.002	0.005	0.009	0.01	U	PU	-0.001	0.001	0.004	U	-		
Uranium 239/240	0.001	0.004	0.007	0.01	U	PU	0	0.002	0.006	U	-		

QC-DUP#1 23486

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 11

19

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-14

A4CM-95-0019

DUPLICATE

SDG 6106

Contact Italy E. Pittman

DUPLICATE

Lab sample id N503001-14Dept sample id 6106-014Client RocketdyneContract R44PJZ94034044

ORIGINAL

Lab sample id N503001-10Dept sample id 6106-010Received 02/28/95% moisture 12.3Client sample id A4CM-95-0019Location/Matrix SSPL AREA 4 SOILCollected 02/20/95 13:20

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
GAMMA SCAN ANALYTES	U						U					
Potassium 40	18	0.87				GAM	22	0.32			20	33
Chromium 51	U		0.7		U	GAM	U		0.2	U	-	
Manganese 54	U		0.05		U	GAM	U		0.01	U	-	
Cobalt 58	U		0.06		U	GAM	U		0.02	U	-	
Iron 59	U		0.2		U	GAM	U		0.05	U	-	
Cobalt 60	U		0.05		U	GAM	U		0.01	U	-	
Zinc 65	U		0.1		U	GAM	U		0.05	U	-	
Strontium 90	U		0.04		U	GAM	U		0.01	U	-	
Technetium 99m 103	U		0.06		U	GAM	U		0.02	U	-	
Ruthenium 106	U		0.4		U	GAM	U		0.1	U	-	
Tin 113	U		0.06		U	GAM	U		0.02	U	-	
Cesium 134	U		0.06		U	GAM	U		0.02	U	-	
Cesium 137	0.082	0.049		0.02		GAM	0.091	0.015			10	94
Cerium 144	U		0.2		U	GAM	U		0.1	U	-	
Europium 152	U		0.1		U	GAM	U		0.04	U	-	
Europium 154	U		0.06		U	GAM	U		0.03	U	-	
Europium 155	U		0.1		U	GAM	U		0.1	U	-	
Radium 226	0.69	0.10				GAM	0.89	0.032			25	38
Thorium 232	1.4	0.24				GAM	1.6	0.083			13	41

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 12

20

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-03

A4CM-95-0011

DATA SHEET

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-03Client sample id A4CM-95-0011Dept sample id 6106-003Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/21/95 08:47% moisture 16.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.035	0.063	0.1	0.5	U	H
Strontium 90	10098-97-2	0.19	0.064	0.06	0.5	J	SR
Thorium 228		1.3	0.19	0.09	0.1		TH
Thorium 230	14269-63-7	0.99	0.16	0.04	0.1		TH
Thorium 232	7740-29-1	1.3	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.84	0.048	0.01	0.01		U
Uranium 235	14117-96-1	0.046	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.93	0.051	0.008	0.01		U
Protactinium 238	13981-16-3	0	0.001	0.005	0.01	U	PU
Protactinium 239/240	10-12-8	0	0.001	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.41				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		0.07		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		0.03		U	GAM
Cesium 134		U		0.02		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		0.06		U	GAM

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 13

21

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-03

A4CM-95-0011

DATA SHEET, cont

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-03Client sample id A4CM-95-0011Dept sample id 6106-003Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/21/95 08:47% moisture 16.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.91	0.050				GAM
Thorium 232		1.4	0.12				GAM

ATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 14

22

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-04

A4CM-95-0012

DATA SHEET

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-04
Dept sample id 6106-004
Received 02/28/95
% moisture 17.8Client sample id A4CM-95-0012
Location/Matrix SSFL AREA 4 SOIL
Collected 02/21/95 09:35
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.055	0.067	0.1	0.5	U	H
Strontium 90	10098-97-2	0.035	0.054	0.05	0.5	U	SR
Thorium 228		1.3	0.21	0.1	0.1		TH
Thorium 230	14269-63-7	1.2	0.19	0.05	0.1		TH
Thorium 232	7740-29-1	1.3	0.21	0.05	0.1		TH
Uranium 233/234	11-08-5	0.74	0.045	0.008	0.01		U
Uranium 235	14117-96-1	0.037	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.81	0.048	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		18	0.26				GAM
Chromium 51		U		0.2		U	GAM
Manganese 54		U		0.01		U	GAM
Cobalt 58		U		0.01		U	GAM
Iron 59		U		0.04		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		0.01		U	GAM
Cesium 137		U		0.01	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		0.04		U	GAM

DATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 15

23

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-04

A4CM-95-0012

DATA SHEET, cont

SDG <u>6106</u>	Client <u>Rocketdyne</u>
Contact <u>Italy E. Pittman</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N503001-04</u>	Client sample id <u>A4CM-95-0012</u>
Dept sample id <u>6106-004</u>	Location/Matrix <u>SSFL AREA 4</u> <u>SOIL</u>
Received <u>02/28/95</u>	Collected <u>02/21/95 09:35</u>
% moisture <u>17.8</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		0.85	0.030				GAM
Thorium 232		1.6	0.072				GAM

DATA SHEETS

Page 4

SUMMARY DATA SECTION

Page 16

24

Lab id	<u>TMAN</u>
Protocol	<u>ROCKETDYNE</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-DS</u>
Version	<u>3.06</u>
Report date	<u>04/19/95</u>

TMA/RICHMOND

REPORTING GROUP 6106

N503001-01

A4CM-95-0014

DATA SHEET

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-01
Dept sample id 6106-001
Received 02/28/95
% moisture 24.5Client sample id A4CM-95-0014
Location/Matrix SSFL AREA 4 SOIL
Collected 02/22/95 14:17
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.008	0.063	0.1	0.5	U	H
Strontium 90	10098-97-2	0.026	0.099	0.1	0.5	U	SR
Thorium 228		1.3	0.26	0.2	0.1		TH
Thorium 230	14269-63-7	1.3	0.24	0.08	0.1		TH
Thorium 232	7740-29-1	1.5	0.27	0.08	0.1		TH
Uranium 233/234	11-08-5	0.84	0.051	0.008	0.01		U
Uranium 235	14117-96-1	0.034	0.010	0.005	0.01		U
Uranium 238	7440-61-1	0.87	0.051	0.007	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	0.002	0.006	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.32				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		U		0.01	0.02	U	GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.08		U	GAM

DATA SHEETS

Page 5

SUMMARY DATA SECTION

Page 17

25

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-01

DATA SHEET, cont

A4CM-95-0014

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-01
Dept sample id 6106-001
Received 02/28/95
% moisture 24.5Client sample id A4CM-95-0014
Location/Matrix SSFL AREA 4 SOIL
Collected 02/22/95 14:17
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		0.61	0.033				GAM
Thorium 232		1.4	0.085				GAM

DATA SHEETS

Page 6

SUMMARY DATA SECTION

Page 18

26

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-02

DATA SHEET

A4CM-95-0015

SDG 6106

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503001-02

Client sample id A4CM-95-0015

Dept sample id 6106-002

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/22/95 14:21

% moisture 15.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.013	0.065	0.1	0.5	U	H
Strontium 90	10098-97-2	0.097	0.080	0.1	0.5	U	SR
Thorium 228		1.4	0.21	0.08	0.1		TH
Thorium 230	14269-63-7	1.0	0.16	0.04	0.1		TH
Thorium 232	7740-29-1	1.2	0.19	0.04	0.1		TH
Uranium 233/234	11-08-5	0.95	0.054	0.009	0.01		U
Uranium 235	14117-96-1	0.049	0.011	0.004	0.01		U
Uranium 238	7440-61-1	1.0	0.056	0.008	0.01		U
Plutonium 238	13981-16-3	0.001	0.002	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.001	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	0.48				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		U		0.02	0.02	U	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

DATA SHEETS

Page 7

SUMMARY DATA SECTION

Page 19

27

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-02

DATA SHEET, cont

A4CM-95-0015

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-02Client sample id A4CM-95-0015Dept sample id 6106-002Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/22/95 14:21% moisture 15.3

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		0.89	0.053				GAM
Thorium 232		1.7	0.16				GAM

DATA SHEETS

Page 8

SUMMARY DATA SECTION

Page 20

28

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-PSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-05

DATA SHEET

A4CM-95-0016A

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-05Client sample id A4CM-95-0016ADept sample id 6106-005Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/23/95 09:02% moisture 8.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.029	0.061	0.1	0.5	U	H
Strontium 90	10098-97-2	0.050	0.062	0.06	0.5	U	SR
Thorium 228		1.4	0.16	0.07	0.1		TH
Thorium 230	14269-63-7	0.95	0.13	0.03	0.1		TH
Thorium 232	7740-29-1	1.3	0.16	0.03	0.1		TH
Uranium 233/234	11-08-5	0.75	0.045	0.01	0.01		U
Uranium 235	14117-96-1	0.051	0.011	0.004	0.01		U
Uranium 238	7440-61-1	0.79	0.046	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.001	0.005	0.01	U	PU
Plutonium 239/240	10-12-8	0.006	0.004	0.005	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		24	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		0.07		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		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

DATA SHEETS

Page 9

SUMMARY DATA SECTION

Page 21

29

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-05

A4CM-95-0016A

DATA SHEET, cont

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-05Client sample id A4CM-95-0016ADept sample id 6106-005Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/23/95 09:02% moisture 8.4

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.81	0.056				GAM
Thorium 232		1.4	0.14				GAM

DATA SHEETS

Page 10

SUMMARY DATA SECTION

Page 22

30

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-06

A4CM-95-0017A

DATA SHEET

SDG 6106

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-06Client sample id A4CM-95-0017ADept sample id 6106-006Location/Matrix SSFL AREA 4SOILReceived 02/28/95Collected 02/23/95 09:45% moisture 12.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.003	0.062	0.1	0.5	U	H
Strontium 90	10098-97-2	0.11	0.048	0.05	0.5	J	SR
Thorium 228		1.2	0.15	0.07	0.1		TH
Thorium 230	14269-63-7	1.2	0.15	0.04	0.1		TH
Thorium 232	7740-29-1	1.1	0.14	0.03	0.1		TH
Uranium 233/234	11-08-5	0.92	0.051	0.01	0.01		U
Uranium 235	14117-96-1	0.046	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.88	0.049	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	0.001	0.003	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.32				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		0.04		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		U		0.01	0.02	U	GAM
Cerium 144		U		0.1		U	GAM
Europium 152		U		0.04		U	GAM
Europium 154		U		0.02		U	GAM
Europium 155		U		0.06		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

DATA SHEETS

Page 11

SUMMARY DATA SECTION

Page 23

TMA/RICHMOND

REPORTING GROUP 6106

N503001-06

A4CM-95-0017A

DATA SHEET, cont

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-06Client sample id A4CM-95-0017ADept sample id 6106-006Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/23/95 09:45% moisture 12.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		0.89	0.033				GAM
Thorium 232		1.4	0.084				GAM

DATA SHEETS

Page 12

SUMMARY DATA SECTION

Page 24

32

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-09

DATA SHEET

A4CM-95-0018

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-09
Dept sample id 6106-009
Received 02/28/95
% moisture 8.9Client sample id A4CM-95-0018
Location/Matrix SSFL AREA 4 SOIL
Collected 02/20/95 12:45
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.009	0.059	0.1	0.5	U	H
Strontium 90	10098-97-2	0.045	0.057	0.08	0.5	U	SR
Thorium 228		0.93	0.12	0.04	0.1		TH
Thorium 230	14269-63-7	0.74	0.10	0.03	0.1		TH
Thorium 232	7740-29-1	1.0	0.13	0.02	0.1		TH
Uranium 233/234	11-08-5	0.58	0.037	0.008	0.01		U
Uranium 235	14117-96-1	0.039	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.63	0.039	0.007	0.01		U
Protactinium 238	13981-16-3	0.002	0.002	0.004	0.01	U	PU
Protactinium 239/240	10-12-8	0	0.001	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		21	0.52				GAM
Chromium 51		U		0.4		U	GAM
Manganese 54		U		0.03		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		0.11	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		0.07		U	GAM

DATA SHEETS

Page 13

SUMMARY DATA SECTION

Page 25

33

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

N503001-09

A4CM-95-0018

DATA SHEET, cont

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-09Client sample id A4CM-95-0018Dept sample id 6106-009Location/Matrix SSFL AREA 4SOILReceived 02/28/95Collected 02/20/95 12:45% moisture 8.9

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		0.75	0.053				GAM
Thorium 232		1.7	0.14				GAM

DATA SHEETS

Page 14

SUMMARY DATA SECTION

Page 26

34

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-10

A4CM-95-0019

DATA SHEET

SDG 6106

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503001-10

Client sample id A4CM-95-0019

Dept sample id 6106-010

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/20/95 13:20

% moisture 12.3

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.008	0.062	0.1	0.5	U	H
Strontium 90	10098-97-2	0.073	0.064	0.09	0.5	U	SR
Thorium 228		1.3	0.17	0.05	0.1		TH
Thorium 230	14269-63-7	1.2	0.16	0.04	0.1		TH
Thorium 232	7740-29-1	1.4	0.17	0.03	0.1		TH
Uranium 233/234	11-08-5	0.85	0.047	0.008	0.01		U
Uranium 235	14117-96-1	0.042	0.009	0.004	0.01		U
Uranium 238	7440-61-1	0.85	0.047	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	0.001	0.004	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		22	0.32				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		0.05		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		0.091	0.015		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

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

DATA SHEETS

Page 15

SUMMARY DATA SECTION

Page 27

TMA/RICHMOND

REPORTING GROUP 6106

N503001-10

A4CM-95-0019

DATA SHEET, cont

SDG 6106Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503001-10Client sample id A4CM-95-0019Dept sample id 6106-010Location/Matrix SSFL AREA 4SOILReceived 02/28/95Collected 02/20/95 13:20% moisture 12.3

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		0.89	0.032				GAM
Thorium 232		1.6	0.083				GAM

DATA SHEETS

Page 16

SUMMARY DATA SECTION

Page 28

36

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-07

DATA SHEET

A4CM-95-0020A

SDG 6106

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503001-07

Client sample id A4CM-95-0020A

Dept sample id 6106-007

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/23/95 10:40

% moisture 15.8

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.004	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	0.12	0.070	0.09	0.5	J	SR
Thorium 228		1.2	0.19	0.09	0.1		TH
Thorium 230	14269-63-7	0.92	0.15	0.04	0.1		TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.79	0.044	0.01	0.01		U
Uranium 235	14117-96-1	0.051	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.77	0.044	0.008	0.01		U
Plutonium 238	13981-16-3	0	0.003	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.001	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		17	0.50				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		U		0.02	0.02	U	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

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

ATA SHEETS

Page 17

SUMMARY DATA SECTION

Page 29

37

TMA/RICHMOND

REPORTING GROUP 6106

N503001-07

A4CM-95-0020A

DATA SHEET, cont

SDG 6106
Contact Italy E. PittmanClient Rocketdyne
Contract R44PJZ94034044Lab sample id N503001-07Client sample id A4CM-95-0020ADept sample id 6106-007Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/23/95 10:40% moisture 15.8

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Radium 226		1.0	0.052				GAM
Thorium 232		1.6	0.15				GAM

ATA SHEETS

Page 18

SUMMARY DATA SECTION

Page 30

38

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6106

N503001-08

DATA SHEET

A4CM-95-0023A

SDG 6106

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N503001-08Client sample id A4CM-95-0023ADept sample id 6106-008Location/Matrix SSFL AREA 4 SOILReceived 02/28/95Collected 02/23/95 13:40% moisture 17.3

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		0.030	0.066	0.1	0.5	U	H
Strontium 90	10098-97-2	0.068	0.073	0.1	0.5	U	SR
Thorium 228		1.1	0.11	0.04	0.1		TH
Thorium 230	14269-63-7	1.0	0.11	0.02	0.1		TH
Thorium 232	7740-29-1	1.2	0.11	0.02	0.1		TH
Uranium 233/234	11-08-5	0.96	0.053	0.01	0.01		U
Uranium 235	14117-96-1	0.047	0.010	0.004	0.01		U
Uranium 238	7440-61-1	0.96	0.053	0.008	0.01		U
Plutonium 238	13981-16-3	-0.001	0.002	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	0.006	0.004	0.005	0.01	J	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.32				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		0.02		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		0.17	0.018		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		0.05		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

ATA SHEETS

Page 19

SUMMARY DATA SECTION

Page 31

TMA / RICHMOND

REPORTING GROUP 6106

N503001-08

A4CM-95-0023A

DATA SHEET, cont

SDG 6106

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503001-08

Client sample id A4CM-95-0023A

Dept sample id 6106-008

Location/Matrix SSFL AREA 4 SOIL

Received 02/28/95

Collected 02/23/95 13:40

% moisture 17.3

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		0.93	0.036				GAM
Thorium 232		1.4	0.079				GAM

ATA SHEETS

Page 20

SUMMARY DATA SECTION

Page 32

40

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test PU Matrix SOILSDG 6106Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX PLANCHET	Plutonium 238	Plutonium 239/240
Preparation batch 2781-046				
A4CM-95-0011	N503001-03	6106-003	U	U
A4CM-95-0012	N503001-04	6106-004	U	0.004 J
A4CM-95-0014	N503001-01	6106-001	U	U
A4CM-95-0015	N503001-02	6106-002	U	U
A4CM-95-0016A	N503001-05	6106-005	U	0.006 J
A4CM-95-0017A	N503001-06	6106-006	U	U
A4CM-95-0018	N503001-09	6106-009	U	U
A4CM-95-0019	N503001-10	6106-010	U	U
A4CM-95-0020A	N503001-07	6106-007	U	U
A4CM-95-0023A	N503001-08	6106-008	U	0.006 J
BLK (QC ID=23485)	N503001-12	6106-012	U	U
LCS (QC ID=23484)	N503001-11	6106-011	ok	ok
Duplicate (N503001-01)	N503001-13	6106-013	- U	- U
Nominal values and limits from method				
		RDLs (pCi/g)	0.01	0.01

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

Page 33

41

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.05Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test PU Matrix SOIL

SDG 6106

ntact 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 2781-046 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 046															
A4CM-95-0011	N503001-03		0.005	3.00			52	1045				39	03/31/95	04/01	SS-056
A4CM-95-0012	N503001-04		0.004	3.00			79	1045				39	03/31/95	04/01	SS-057
A4CM-95-0014	N503001-01		0.006	3.00			60	1045				38	03/31/95	04/01	SS-054
A4CM-95-0015	N503001-02		0.005	3.00			63	1045				38	03/31/95	04/01	SS-055
A4CM-95-0016A	N503001-05		0.005	3.00			50	1045				37	03/31/95	04/01	SS-058
A4CM-95-0017A	N503001-06		0.003	3.00			80	1045				37	03/31/95	04/01	SS-059
A4CM-95-0018	N503001-09		0.004	3.00			76	1045				40	03/31/95	04/01	SS-062
A4CM-95-0019	N503001-10		0.005	3.00			76	1037				42	03/31/95	04/03	SS-046
A4CM-95-0020A	N503001-07		0.007	3.00			53	1045				37	03/31/95	04/01	SS-060
A4CM-95-0023A	N503001-08		0.007	3.00			59	1045				37	03/31/95	04/01	SS-061
BLK (QC ID=23485)	N503001-12		0.006	3.00			51	1037					03/31/95	04/03	SS-048
LCS (QC ID=23484)	N503001-11		0.007	3.00			63	1037					03/31/95	04/03	SS-047
Duplicate (N503001-01)	N503001-13		0.009	3.00			59	1037				40	03/31/95	04/03	SS-049
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	0.006 ± 0.003
FOR 13 SAMPLES	YIELD	63 ± 22

MOD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 34

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

METHOD SUMMARY

THORIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

Test TH Matrix SOIL

SDG 6106

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

	LAB	RAW	SUF-			
CLIENT SAMPLE ID	SAMPLE ID	TEST FIX	PLANCHET	Thorium 228	Thorium 230	Thorium 232
Preparation batch 2781-046						
A4CM-95-0011	N503001-03		6106-003	1.3	0.99	1.3
A4CM-95-0012	N503001-04		6106-004	1.3	1.2	1.3
A4CM-95-0014	N503001-01		6106-001	1.3	1.3	1.5
A4CM-95-0015	N503001-02		6106-002	1.4	1.0	1.2
A4CM-95-0016A	N503001-05		6106-005	1.4	0.95	1.3
A4CM-95-0017A	N503001-06		6106-006	1.2	1.2	1.1
A4CM-95-0018	N503001-09		6106-009	0.93	0.74	1.0
A4CM-95-0019	N503001-10		6106-010	1.3	1.2	1.4
A4CM-95-0020A	N503001-07		6106-007	1.2	0.92	1.1
A4CM-95-0023A	N503001-08		6106-008	1.1	1.0	1.2
BLK (QC ID=23485)	N503001-12		6106-012	U	U	U
LCS (QC ID=23484)	N503001-11		6106-011	No data U	ok	No data U
Duplicate (N503001-01)	N503001-13		6106-013	ok	ok	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

Page 35

43

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test TH Matrix SOIL

SDG 6106

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 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 2781-046 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 046															
A4CM-95-0011	N503001-03		0.09	1.00			49	434				38	03/31/95	03/31	SS-029
A4CM-95-0012	N503001-04		0.1	1.00			38	434				38	03/31/95	03/31	SS-030
A4CM-95-0014	N503001-01		0.2	1.00			25	434				37	03/31/95	03/31	SS-027
A4CM-95-0015	N503001-02		0.08	1.00			43	434				37	03/31/95	03/31	SS-028
A4CM-95-0016A	N503001-05		0.07	1.00			69	434				36	03/31/95	03/31	SS-035
A4CM-95-0017A	N503001-06		0.07	1.00			68	434				36	03/31/95	03/31	SS-036
A4CM-95-0018	N503001-09		0.04	1.00			71	645				40	03/31/95	04/01	SS-018
A4CM-95-0019	N503001-10		0.05	1.00			62	645				40	03/31/95	04/01	SS-019
A4CM-95-0020A	N503001-07		0.09	1.00			49	434				36	03/31/95	03/31	SS-038
A4CM-95-0023A	N503001-08		0.04	1.00			78	923				39	03/31/95	04/03	SS-019
BLK (QC ID=23485)	N503001-12		0.04	1.00			83	645					03/31/95	04/01	SS-021
LCS (QC ID=23484)	N503001-11		0.06	1.00			76	645					03/31/95	04/01	SS-020
Duplicate (N503001-01)	N503001-13		0.06	1.00			61	645				38	03/31/95	04/01	SS-022
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 0.08 ± 0.08
 FOR 13 SAMPLES YIELD 59 ± 35

METHOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 36

44

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test U Matrix SOILSDG 6106Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

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 2781-046										
A4CM-95-0011	N503001-03		6106-003	0.84	0.046	0.93	90	7	5	1
A4CM-95-0012	N503001-04		6106-004	0.74	0.037	0.81	91	8	5	1
A4CM-95-0014	N503001-01		6106-001	0.84	0.034	0.87	97	8	4	1
A4CM-95-0015	N503001-02		6106-002	0.95	0.049	1.0	95	8	5	1
A4CM-95-0016A	N503001-05		6106-005	0.75	0.051	0.79	95	8	6	1
A4CM-95-0017A	N503001-06		6106-006	0.92	0.046	0.88	105	8	5	1
A4CM-95-0018	N503001-09		6106-009	0.58	0.039	0.63	92	8	6	1
A4CM-95-0019	N503001-10		6106-010	0.85	0.042	0.85	100	8	5	1
A4CM-95-0020A	N503001-07		6106-007	0.79	0.051	0.77	103	8	7	1
A4CM-95-0023A	N503001-08		6106-008	0.96	0.047	0.96	100	8	5	1
BLK (QC ID=23485)	N503001-12		6106-012	U	U	U				
LCS (QC ID=23484)	N503001-11		6106-011	ok	ok	ok				
Duplicate (N503001-01)	N503001-13		6106-013	OUT	ok	OUT	100	7	5	1
Nominal values and limits from method										
			RDLs (pCi/g)	0.01	0.01	0.01	100		4	
							Averages	97		5

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 37

45

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test U Matrix SOIL

SDG 6106

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 g	MDA FAC	ALIQ TION	PREP %	DILU- %	YIELD min	EFF keV	COUNT KeV	FWM HELD	DRIFT PREPARED	DAYS YZED	ANAL- DETECTOR
Preparation batch 2781-046 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 046															
A4CM-95-0011	N503001-03	0.01	3.00					79	1040				39	03/31/95	04/01 SS-046
A4CM-95-0012	N503001-04	0.008	3.00					74	1042				41	03/31/95	04/03 SS-035
A4CM-95-0014	N503001-01	0.008	3.00					72	1040				38	03/31/95	04/01 SS-044
A4CM-95-0015	N503001-02	0.009	3.00					74	1040				38	03/31/95	04/01 SS-045
A4CM-95-0016A	N503001-05	0.01	3.00					78	1042				39	03/31/95	04/03 SS-036
A4CM-95-0017A	N503001-06	0.01	3.00					84	1042				39	03/31/95	04/03 SS-037
A4CM-95-0018	N503001-09	0.008	3.00					82	1038				42	03/31/95	04/03 SS-040
A4CM-95-0019	N503001-10	0.008	3.00					83	1038				42	03/31/95	04/03 SS-041
A4CM-95-0020A	N503001-07	0.01	3.00					86	1042				39	03/31/95	04/03 SS-038
A4CM-95-0023A	N503001-08	0.01	3.00					77	1038				39	03/31/95	04/03 SS-039
BLK (QC ID=23485)	N503001-12	0.006	3.00					72	1037					03/31/95	04/03 SS-044
LCS (QC ID=23484)	N503001-11	0.03	3.00					82	1038					03/31/95	04/03 SS-042
Duplicate (N503001-01)	N503001-13	0.009	3.00					78	1037				40	03/31/95	04/03 SS-045
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 ± 0.01

FOR 13 SAMPLES YIELD 79 ± 9

MOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 38

46

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Test SR Matrix SOIL

SDG 6106

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

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

Preparation batch 2781-046

A4CM-95-0011	N503001-03	6106-003	0.19 J
A4CM-95-0012	N503001-04	6106-004	U
A4CM-95-0014	N503001-01	6106-001	U
A4CM-95-0015	N503001-02	6106-002	U
A4CM-95-0016A	N503001-05	6106-005	U
A4CM-95-0017A	N503001-06	6106-006	0.11 J
A4CM-95-0018	N503001-09	6106-009	U
A4CM-95-0019	N503001-10	6106-010	U
A4CM-95-0020A	N503001-07	6106-007	0.12 J
A4CM-95-0023A	N503001-08	6106-008	U
BLK (QC ID=23485)	N503001-12	6106-012	U
LCS (QC ID=23484)	N503001-11	6106-011	ok
Duplicate (N503001-01)	N503001-13	6106-013	- U

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

Page 7

SUMMARY DATA SECTION

Page 39

47

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test SR Matrix SOILSDG 6106Contact Italy E. Pittman

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-046 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 046															
A4CM-95-0011	N503001-03		0.06	2.00				67		625		37	03/30/95	03/30	LBG-001
A4CM-95-0012	N503001-04		0.05	2.00				86		625		37	03/30/95	03/30	LBG-002
A4CM-95-0014	N503001-01		0.1	2.00				79		207		36	03/30/95	03/30	LBG-001
A4CM-95-0015	N503001-02		0.1	2.00				78		101		36	03/30/95	03/30	LBG-016
A4CM-95-0016A	N503001-05		0.06	2.00				79		625		35	03/30/95	03/30	LBG-015
A4CM-95-0017A	N503001-06		0.05	2.00				90		625		35	03/30/95	03/30	LBG-016
A4CM-95-0018	N503001-09		0.08	2.00				81		202		38	03/30/95	03/30	LBG-001
A4CM-95-0019	N503001-10		0.09	2.00				85		202		38	03/30/95	03/30	LBG-015
A4CM-95-0020A	N503001-07		0.09	2.00				84		206		35	03/30/95	03/30	LBG-015
A4CM-95-0023A	N503001-08		0.1	2.00				64		202		35	03/30/95	03/30	LBG-001
BLK (QC ID=23485)	N503001-12		0.08	2.00				82		202			03/30/95	03/30	LBG-016
LCS (QC ID=23484)	N503001-11		0.3	2.00				80		22			03/30/95	03/30	LBG-016
Duplicate (N503001-01)	N503001-13		0.07	2.00				88		334		36	03/30/95	03/30	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 0.09 ± 0.1

FOR 13 SAMPLES YIELD 80 ± 15

METHOD SUMMARIES

Page 8

SUMMARY DATA SECTION

Page 40

48

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOILSDG 6106Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-046

A4CM-95-0011	N503001-03	6106-003	U
A4CM-95-0012	N503001-04	6106-004	U
A4CM-95-0014	N503001-01	6106-001	U
A4CM-95-0015	N503001-02	6106-002	U
A4CM-95-0016A	N503001-05	6106-005	U
A4CM-95-0017A	N503001-06	6106-006	U
A4CM-95-0018	N503001-09	6106-009	0.11
A4CM-95-0019	N503001-10	6106-010	0.091
A4CM-95-0020A	N503001-07	6106-007	U
A4CM-95-0023A	N503001-08	6106-008	0.17
BLK (QC ID=23485)	N503001-12	6106-012	U
LCS (QC ID=23484)	N503001-11	6106-011	ok
Duplicate (N503001-10)	N503001-14	6106-014	ok

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

Page 9

SUMMARY DATA SECTION

Page 41

49

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test GAM Matrix SOILSDG 6106Contact Italy E. Pittman

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJZ94034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM KeV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-046 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 046															
A4CM-95-0011	N503001-03	0.02	750							1023		35	03/28/95	MB,03,00	
A4CM-95-0012	N503001-04	0.01	758							1014		35	03/28/95	01,04,00	
A4CM-95-0014	N503001-01	0.01	622							782		36	03/30/95	01,04,00	
A4CM-95-0015	N503001-02	0.02	750							701		33	03/27/95	01,01,00	
A4CM-95-0016A	N503001-05	0.02	750							833		33	03/28/95	01,01,00	
A4CM-95-0017A	N503001-06	0.01	750							749		35	03/30/95	01,04,00	
A4CM-95-0018	N503001-09		750							723		38	03/30/95	01,01,00	
A4CM-95-0019	N503001-10		750							748		39	03/31/95	01,04,00	
A4CM-95-0020A	N503001-07	0.02	757							736		37	04/01/95	MB,03,00	
A4CM-95-0023A	N503001-08		750							735		37	04/01/95	01,04,00	
BLK (QC ID=23485)	N503001-12	0.008	850							705			03/31/95	MB,03,00	
LCS (QC ID=23484)	N503001-11		850							705			03/31/95	MB,02,00	
Duplicate (N503001-10)	N503001-14		188							1015		36	03/28/95	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 0.01 ± 0.01
 FOR 8 SAMPLES YIELD _____ ± _____

TMA/RICHMOND

REPORTING GROUP 6106

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6106

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 2781-046

A4CM-95-0011	NS03001-03	6106-003	U
A4CM-95-0012	NS03001-04	6106-004	U
A4CM-95-0014	NS03001-01	6106-001	U
A4CM-95-0015	NS03001-02	6106-002	U
A4CM-95-0016A	NS03001-05	6106-005	U
A4CM-95-0017A	NS03001-06	6106-006	U
A4CM-95-0018	NS03001-09	6106-009	U
A4CM-95-0019	NS03001-10	6106-010	U
A4CM-95-0020A	NS03001-07	6106-007	U
A4CM-95-0023A	NS03001-08	6106-008	U
BLK (QC ID=23485)	NS03001-12	6106-012	U
LCS (QC ID=23484)	NS03001-11	6106-011	ok X
Duplicate (NS03001-01)	NS03001-13	6106-013	- U

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

Page 11

SUMMARY DATA SECTION

Page 43

51

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6106

Test H Matrix SOIL

SDG 6106

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 g	ALIQ g	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWRM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2781-046 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 046																
A4CM-95-0011	N503001-03		0.1	27.2						50			28	03/21/95	03/21	LSC-004
A4CM-95-0012	N503001-04		0.1	26.2						50			28	03/21/95	03/21	LSC-004
A4CM-95-0014	N503001-01		0.1	26.7						50			27	03/21/95	03/21	LSC-004
A4CM-95-0015	N503001-02		0.1	25.7						50			27	03/21/95	03/21	LSC-004
A4CM-95-0016A	N503001-05		0.1	28.0						50			26	03/21/95	03/21	LSC-004
A4CM-95-0017A	N503001-06		0.1	27.0						50			26	03/21/95	03/21	LSC-004
A4CM-95-0018	N503001-09		0.1	28.8						50			30	03/21/95	03/22	LSC-004
A4CM-95-0019	N503001-10		0.1	26.7						50			30	03/21/95	03/22	LSC-004
A4CM-95-0020A	N503001-07		0.1	23.6						50			26	03/21/95	03/21	LSC-004
A4CM-95-0023A	N503001-08		0.1	26.3						50			27	03/21/95	03/22	LSC-004
BLK (QC ID=23485)	N503001-12		0.1	20.0						50				03/21/95	03/21	LSC-004
LCS (QC ID=23484)	N503001-11		0.1	20.0						50				03/21/95	03/21	LSC-004
Duplicate (N503001-01)	N503001-13		0.1	27.4						50			28	03/21/95	03/22	LSC-004
Nominal values and limits from method			0.5	20.0						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 0.1 ± 0
 FOR 13 SAMPLES YIELD ±

METHOD SUMMARIES

Page 12

SUMMARY DATA SECTION

Page 44

52

Lab id TMAN
 Protocol ROCKETDYNE
 Version Ver 1.0
 Form DVD-CMS
 Version 3.06
 Report date 04/19/95

T M A / R I C H M O N D
REPORTING GROUP 6107

SDG 6107
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
Prep Batch Summary	.	.	.	3
Work Summary	.	.	.	4
Method Blanks	.	.	.	5
Lab Control Samples	.	.	.	7
Data Sheets	.	.	.	9
Method Summaries	.	.	.	12
End of Section	.	.	.	17

Italy E. Pittman 4/19/95
Prepared by

NGV 4/19
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

SDG 6107

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-95-0021	(rinsate) SSFL AREA 4	WATER		N503002-01			02/23/95 12:45
A4CM-95-0022	(rinsate) SSFL AREA 4	WATER		N503002-02			02/23/95 12:45
Method Blank		WATER		N503002-04			
Lab Control Sample		WATER		N503002-03			

SAMPLE SUMMARY

Page 1

SUMMARY DATA SECTION

Page 1

54

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

SDG 6107

tact 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
6107		A4CM-95-0021 (rinsate)	WATER				02/28/95 5	N503002-01	6107-001
		A4CM-95-0022 (rinsate)	WATER				02/28/95 5	N503002-02	6107-002
		Method Blank	WATER					N503002-04	6107-004
		Lab Control Sample	WATER					N503002-03	6107-003

QC SUMMARY

Page 1

SUMMARY DATA SECTION

Page 2

55

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-OS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

SDG 6107
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	2781-054	5.0	1			1	1		
TH	WATER	Thorium, Isotopic in Water	2781-054	5.0	1			1	1		
U	WATER	Uranium, Isotopic in Water	2781-054	5.0	1			1	1		
Beta Counting											
SR	WATER	Strontium, Total in Water	2781-054	10.0	1			1	1		
Gamma Scan											
GAM	WATER	Gamma Emitters	2781-054	15.0	1			1	1		
Liquid Scintillation											
H	WATER	Tritium in Water	2781-054	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

56

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-PBS
Version 3.06
Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

SDG 6107

Contact Italy E. Pittman

WORK SUMMARY

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-95-0021	(rinsate)	N503002-01	6107-001	H		03/22/95	04/10/95	IEP	Tritium in Water
SSFL AREA 4	WATER	02/23/95							
		02/28/95							
A4CM-95-0022	(rinsate)	N503002-02	6107-002	GAM		04/12/95	04/17/95	IEP	Gamma Emitters
SSFL AREA 4	WATER	02/23/95	6107-002	PU		03/29/95	04/10/95	IEP	Plutonium, Isotopic in Water
		02/28/95	6107-002	SR		03/29/95	04/10/95	IEP	Strontium, Total in Water
			6107-002	TH		03/30/95	04/10/95	IEP	Thorium, Isotopic in Water
			6107-002	U		03/29/95	03/30/95	LGG	Uranium, Isotopic in Water
Method Blank		N503002-04	6107-004	GAM		04/17/95	04/19/95	IEP	Gamma Emitters
	WATER		6107-004	H		03/22/95	04/10/95	IEP	Tritium in Water
			6107-004	PU		03/29/95	04/10/95	IEP	Plutonium, Isotopic in Water
			6107-004	SR		03/29/95	04/10/95	IEP	Strontium, Total in Water
			6107-004	TH		03/30/95	04/10/95	IEP	Thorium, Isotopic in Water
			6107-004	U		03/29/95	03/30/95	LGG	Uranium, Isotopic in Water
Lab Control Sample		N503002-03	6107-003	GAM		03/24/95	04/11/95	IEP	Gamma Emitters
	WATER		6107-003	H		03/22/95	04/10/95	IEP	Tritium in Water
			6107-003	PU		04/01/95	04/10/95	IEP	Plutonium, Isotopic in Water
			6107-003	SR		03/29/95	04/10/95	IEP	Strontium, Total in Water
			6107-003	TH		03/30/95	04/10/95	IEP	Thorium, Isotopic in Water
			6107-003	U		03/29/95	03/30/95	LGG	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

57

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

N503002-04

METHOD BLANK

Method Blank

SDG 6107

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N503002-04

Client sample id Method Blank

Dept sample id 6107-004

Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		98	170	300	500	U	H
Strontium 90	10098-97-2	-0.007	0.15	0.2	0.5	U	SR
Thorium 228		0.007	0.045	0.08	0.5	U	TH
Thorium 230	14269-63-7	0.089	0.045	0.03	0.5	J	TH
Thorium 232	7740-29-1	0.004	0.015	0.03	0.5	U	TH
Uranium 233/234	11-08-5	-0.012	0.075	0.1	0.5	U	U
Uranium 235	14117-96-1	0.045	0.061	0.1	0.5	U	U
Uranium 238	7440-61-1	0.050	0.050	0.1	0.5	U	U
Plutonium 238	13981-16-3	0.071	0.076	0.1	0.1	U	PU
Plutonium 239/240	10-12-8	0.027	0.033	0.06	0.1	U	PU
MA SCAN ANALYTES		U					
Barium 40		U		20		U	GAM
Chromium 51		U		10		U	GAM
Manganese 54		U		2		U	GAM
Cobalt 58		U		2		U	GAM
Iron 59		U		3		U	GAM
Cobalt 60		U		2		U	GAM
Zinc 65		U		3		U	GAM
Niobium 94		U		2		U	GAM
Ruthenium 103		U		2		U	GAM
Ruthenium 106		U		10		U	GAM
Tin 113		U		2		U	GAM
Cesium 134		U		2		U	GAM
Cesium 137		U		2	5	U	GAM
Cerium 144		U		9		U	GAM
Europium 152		U		4		U	GAM
Europium 154		U		2		U	GAM
Europium 155		U		5		U	GAM
Radium 226		U		3		U	GAM
Thorium 232		U		7		U	GAM

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 5

58

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

N503002-04

BLANK, cont.

Method Blank

SDG 6107

Client Rocketdyne

Contact Italy E. Pittman

Contract R44PJZ94034044

Lab sample id N503002-04

Client sample id Method Blank

Dept sample id 6107-004

Material/Matrix WATER

QC-BLANK #23488

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/19/95

METHOD BLANKS

Page 2

SUMMARY DATA SECTION

Page 6

TMA/RICHMOND

REPORTING GROUP 6107

N503002-03

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6107

Contact Italy E. Pittman

Client Rocketdyne

Contract R44PJ294034044

Lab sample id N503002-03

Client sample id Lab Control Sample

Dept sample id 6107-003

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	10000	440	300	500	X	H	10400	420	96	82-118	
Strontium 90	25	1.7	0.6	0.5		SR	24.4	0.98	102	80-120	
Thorium 228	0.013	0.044	0.08	0.5	U	TH					
Thorium 230	5.7	0.39	0.05	0.5	B	TH	4.62	0.18	123	83-117	
Thorium 232	0.009	0.018	0.03	0.5	U	TH					
Uranium 233/234	22	1.6	0.8	0.5		U	24.3	0.97	91	86-114	
Uranium 235	19	1.4	0.1	0.5		U	18.6	0.74	102	85-115	
Uranium 238	23	1.6	0.7	0.5		U	24.2	0.97	95	86-114	
Plutonium 238	2.6	0.19	0.03	0.1		PU	2.60	0.10	100	85-115	
Plutonium 239/240	2.3	0.18	0.03	0.1		PU	2.32	0.093	99	85-115	
MA SCAN ANALYTES	U										
Cesium 40	U		40		U	GAM					
Chromium 51	U		40		U	GAM					
Manganese 54	U		3		U	GAM					
Cobalt 58	U		3		U	GAM					
Iron 59	U		6		U	GAM					
Cobalt 60	U		3		U	GAM					
Zinc 65	U		6		U	GAM					
Niobium 94	U		3		U	GAM					
Ruthenium 103	U		5		U	GAM					
Ruthenium 106	U		40		U	GAM					
Tin 113	U		7		U	GAM					
Cesium 134	U		4		U	GAM					
Cesium 137	450	13		5		GAM	446	18	101	76-124	
Cerium 144	U		20		U	GAM					
Europium 152	U		10		U	GAM					
Europium 154	U		6		U	GAM					
Europium 156	U		10		U	GAM					
Radium 226	U		8		U	GAM					
Thorium 232	U		10		U	GAM					

CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 7

60

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

N503002-03

LAB CONTROL SAMPLE, cont.

Lab Control Sample

SDG 6107Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N503002-03Dept sample id 6107-003Client sample id Lab Control SampleMaterial/Matrix WATER

QC-LCS #23487

TMA/RICHMOND

REPORTING GROUP 6107

N503002-01

DATA SHEET

A4CM-95-0021 (rinsate)

SDG 6107

Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503002-01Client sample id A4CM-95-0021 (rinsate)Dept sample id 6107-001Location/Matrix SSFL AREA 4 WATERReceived 02/28/95Collected 02/23/95 12:45

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	160	300	500	U	H

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 9

62

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

N503002-02

DATA SHEET

A4CM-95-0022 (rinsate)

SDG 6107

Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044Lab sample id N503002-02Client sample id A4CM-95-0022 (rinsate)Dept sample id 6107-002Location/Matrix SSFL AREA 4 WATERReceived 02/28/95Collected 02/23/95 12:45

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	0.10	0.16	0.2	0.5	U	SR
Thorium 228		0.020	0.059	0.1	0.5	U	TH
Thorium 230	14269-63-7	0.049	0.039	0.05	0.5	U	TH
Thorium 232	7740-29-1	0.015	0.020	0.04	0.5	U	TH
Uranium 233/234	11-08-5	-0.019	0.057	0.1	0.5	U	U
Uranium 235	14117-96-1	0.023	0.046	0.09	0.5	U	U
Uranium 238	7440-61-1	-0.009	0.019	0.07	0.5	U	U
Plutonium 238	13981-16-3	-0.003	0.039	0.07	0.1	U	PU
Plutonium 239/240	10-12-8	0.017	0.017	0.03	0.1	U	PU
EMMA SCAN ANALYTES		U					
Potassium 40		U		20		U	GAM
Chromium 51		U		40		U	GAM
Manganese 54		U		2		U	GAM
Cobalt 58		U		3		U	GAM
Iron 59		U		7		U	GAM
Cobalt 60		U		2		U	GAM
Zinc 65		U		4		U	GAM
Niobium 94		U		2		U	GAM
Ruthenium 103		U		4		U	GAM
Ruthenium 106		U		20		U	GAM
Tin 113		U		3		U	GAM
Cesium 134		U		2		U	GAM
Cesium 137		U		2	5	U	GAM
Cerium 144		U		10		U	GAM
Europium 152		U		4		U	GAM
Europium 154		U		3		U	GAM
Europium 155		U		5		U	GAM
Radium 226		U		4		U	GAM

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 10

63

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA / RICHMOND

REPORTING GROUP 6107

N503002-02

A4CM-95-0022 (rinsate)

DATA SHEET, cont

SDG 6107Client RocketdyneContact Italy E. PittmanContract R44PJZ94034044Lab sample id N503002-02Client sample id A4CM-95-0022 (rinsate)Dept sample id 6107-002Location/Matrix SSFL AREA 4 WATERReceived 02/28/95Collected 02/23/95 12:45

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		8		U	GAM

DATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 11

64

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

Test PU Matrix WATER

SDG 6107

tact 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 2781-054

A4CM-95-0022 (rinsate)	N503002-02	6107-002	U	U
BLK (QC ID=23488)	N503002-04	6107-004	U	U
LCS (QC ID=23487)	N503002-03	6107-003	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 2781-054 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 054

A4CM-95-0022 (rinsate)	N503002-02	0.07	0.500	76	1037	34	03/29/95	03/29	SS-035
BLK (QC ID=23488)	N503002-04	0.1	0.500	40	1037	03/29/95	03/29	SS-038	
LCS (QC ID=23487)	N503002-03	0.03	0.500	67	1045	03/29/95	04/01	SS-051	

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 0.07 ± 0.07
FOR 3 SAMPLES	YIELD 61 ± 37

MOD SUMMARIES

Page 1

SUMMARY DATA SECTION

Page 12

65

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

Test TH Matrix WATER

SDG 6107

Lab 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 2781-054

A4CM-95-0022 (rinsate) N503002-02

6107-002

U

U

U

BLK (QC ID=23488)

N503002-04

6107-004

U

0.089 J

U

LCS (QC ID=23487)

N503002-03

6107-003

No data U

HIGH

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 2781-054 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 054

A4CM-95-0022 (rinsate) N503002-02

0.1

0.500

64

691

35

03/30/95

03/30

SS-039

BLK (QC ID=23488)

N503002-04

0.08

0.500

84

691

03/30/95

03/30

SS-041

LCS (QC ID=23487)

N503002-03

0.08

0.500

72

691

03/30/95

03/30

SS-040

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 73 ± 20

SD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 13

66

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

Test U Matrix WATERSDG 6107tact Italy E. Pittman

METHOD SUMMARY

URANIUM, ISOTOPIC IN WATER

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 2781-054										
A4CM-95-0022 (rinsate)	N503002-02		6107-002	U	U	U				
BLK (QC ID=23488)	N503002-04		6107-004	U	U	U				
LCS (QC ID=23487)	N503002-03		6107-003	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 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 2781-054 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 054																
A4CM-95-0022 (rinsate)	N503002-02		0.1	0.200				65	1266				34	03/29/95	03/29	SS-017
BLK (QC ID=23488)	N503002-04		0.1	0.200				51	1266					03/29/95	03/29	SS-019
I C ID=23487)	N503002-03		0.8	0.200				44	1266					03/29/95	03/29	SS-018
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 0.3 ± 0.8
 FOR 3 SAMPLES YIELD 53 ± 21

OD SUMMARIES

Page 3

SUMMARY DATA SECTION

Page 14

67

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

METHOD SUMMARY

STRONTIUM, TOTAL IN WATER

BETA COUNTING

Test SR Matrix WATERSDG 6107Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

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

Preparation batch 2781-054

A4CM-95-0022 (rinsate) N503002-02

6107-002

U

BLK (QC ID=23488) N503002-04

6107-004

U

LCS (QC ID=23487) N503002-03

6107-003

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 L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
------------------	------------------	-----------------	---------------	----------	-----------	-------------	---------------	------------	----------	--------------	-------------	--------------	--------------	-------------------	------	----------

Preparation batch 2781-054 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 054

A4CM-95-0022 (rinsate) N503002-02

0.2

1.00

87

576

34

03/29/95

03/29

LBG-015

BLK (QC ID=23488) N503002-04

0.2

1.00

78

576

03/29/95

03/29

LBG-016

LCS (QC ID=23487) N503002-03

0.6

1.00

78

20

03/29/95

03/29

LBG-001

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	0.3	±	0.5
FOR 3 SAMPLES	YIELD	81	±	10

METHOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 15

68

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

METHOD SUMMARY

GAMMA EMITTERS

GAMMA SCAN

Test GAM Matrix WATERSDG 6107Contact Italy E. PittmanClient RocketdyneContract R44PJZ94034044

RESULTS

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

Preparation batch 2781-054

A4CM-95-0022 (rinsate)	N503002-02	6107-002	U	U
BLK (QC ID=23488)	N503002-04	6107-004	U	U
LCS (QC ID=23487)	N503002-03	6107-003	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
------------------	------------------	-----------------	---------------	----------	-------------	--------------	------------	------------	------------	--------------	-------------	---------------	------------------	---------------	----------

Preparation batch 2781-054 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 054

A4CM-95-0022 (rinsate)	N503002-02	2	1.00							1507		48	04/12/95	02,04,00
BLK (QC ID=23488)	N503002-04	2	1.00							2007			04/17/95	02,04,00
LCS (QC ID=23487)	N503002-03		1.00							426			03/24/95	02,04,00

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	2	±	0
FOR 2 SAMPLES	YIELD		±	

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 16

69

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/19/95

TMA/RICHMOND

REPORTING GROUP 6107

Test H Matrix WATERSDG 6107Contact Italy E. Pittman

METHOD SUMMARY

TRITIUM IN WATER

LIQUID SCINTILLATION

Client RocketdyneContract R44PJZ94034044

RESULTS

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

Preparation batch 2781-054

A4CM-95-0021 (rinsate) N503002-01 6107-001

U

BLK (QC ID=23488) N503002-04 6107-004

U

LCS (QC ID=23487) N503002-03 6107-003

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

Preparation batch 2781-054 2 σ prep error 10.0 % Reference Lab Notebook 2781 pg. 054

A4CM-95-0021 (rinsate) N503002-01 300 0.0100 50 27 03/21/95 03/22 LSC-004

BLK (QC ID=23488) N503002-04 300 0.0100 50 03/22/95 03/22 LSC-004

LCS (QC ID=23487) N503002-03 300 0.0100 50 03/22/95 03/22 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 $\pm$ 2 SD	MDA <u>300</u> $\pm$ <u>0</u>
FOR 3 SAMPLES	YIELD <u> </u> $\pm$ <u> </u>

METHOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 17

70

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>04/19/95</u>



TMA
Thermo Analytical

Revised
Batch # 1A

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

April 21, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91309-7922

Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N4-12-033-6103

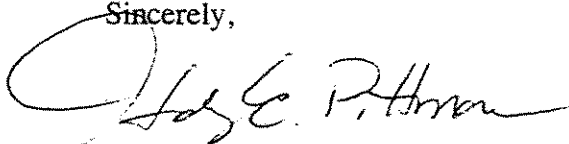
Dear Mr. Klein:

Enclosed is a revised final data report for radiochemical analyses on the eleven soil samples collected November 17 through November 22, 1994. These samples were received at TMA/Richmond on December 9, 1994.

Sample A4CM-94-0007 was requested for strontium-90 re-analysis because the original data did not reflect the normal level of activity for the sample. The sample was re-analyzed with a new LCS and reagent blank for Strontium-90 Analyses. Sample A4CM-94-0005 was used to re-analyze a new LCS and blank for isotopic plutonium. Also, a new LCS and reagent blank were analyzed for isotopic thorium. The re-analyzed data has been reviewed and compared to the original data. The conclusions are presented in the case narrative; the re-analyzed data sheets are being submitted along with the revised report.

If you have any questions regarding this data, please call me at (510) 235-2633.

Sincerely,



Italy E. Pittman
Program Manager

Enclosure: Data Package 6103 (rev)
Copies of Data Sheets

TMA/Richmond

Report N4-12-026-6103

Sample Delivery Group 6103(rev)

Rockwell International Corp.

Contract R44PJZ94034044

Case Narrative

April 21, 1995

1.0 GENERAL

TMA/Richmond Delivery Group 6103 consists of eleven soil samples received on December 9, 1994.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, blanks and replicates. The QC samples are prepared by the Quality Control Department, and copies of the QC Notebook pages are included in the data package.

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- but is not added since KCl contains natural ⁴⁰K which raises the gamma background spectra considerably.

2.1 Strontium-90 Re-Analyses

Sample A4CM-94-0007 was re-analyzed along with a new laboratory control sample and reagent blank in sample prep batch 2781-060. No problems were associated with this analyses. After comparing the original to the re-analyzed data, the following difference between the two data sets was found. The original value for A4CM-94-0007 was 1.9 pCi/g $\pm$ 0.13 2 σ error. The re-analyzed results yielded a result of 0.016 pCi/g $\pm$ 0.072 (2sigma) error. The new LCS was counted for less than the nominal 200 minute count time; however, the RDL was achieved despite the shorter count times.

2.2 Thorium 228/230/232 Analyses

The new LCS and reagent blank are shown in the Method Summary with sample prep group 2781-016A, because no sample were associated with these QC samples, the DVD report would not have reported values. The original report had a result for the reagent blank that was underline. The value reported was underlined because the result was greater than the Blank's MDA; however, the RDL was achieved. The MDA for the new LCS and blank are both below the RDL.

TMA/Richmond

Report N4-12-026-6103

Sample Delivery Group 6103(rev)

Rockwell International Corp.

Contract R44PJZ94034044

Case Narrative

April 21, 1995

2.3 Plutonium 238, 239/240 Analyses

Sample A4CM-94-0005 was used for the re-analysis of a new LCS and reagent blank in sample prep group 2781-060. No problems are associated with this group. The differences noticed between the original and the reanalyzed data are as follows: the LCS was underlined because the MDA was greater than the RDL. This is not normally a problem because the activity of the LCS is significantly greater than the MDA. No other differences could be found.

T M A / R I C H M O N D
REPORTING GROUP 6103

SDG 6103
Contact Leah G. Guerrero

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
Prep Batch Summary	.	.	.	3
Work Summary	.	.	.	4
Method Blanks	.	.	.	8
Lab Control Samples	.	.	.	11
Duplicates	.	.	.	14
Data Sheets	.	.	.	16
Method Summaries	.	.	.	37
End of Section	.	.	.	48

Jeff Pittman 4/21/95
Prepared by David R. [Signature]
Reviewed by _____

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-94-0001	SSFA AREA 4	SOIL		N412026-01			11/17/94
A4CM-94-0002	SSFA AREA 4	SOIL		N412026-02			11/17/94
A4CM-94-0003	SSFA AREA 4	SOIL		N412026-03			11/18/94
A4CM-94-0004	SSFA AREA 4	SOIL		N412026-04			11/18/94
A4CM-94-0005	SSFA AREA 4	SOIL		N412026-05			11/18/94
A4CM-94-0006	SSFA AREA 4	SOIL		N412026-06			11/18/94
A4CM-94-0007	SSFA AREA 4	SOIL		N412026-07			11/21/94
A4CM-94-0008	SSFA AREA 4	SOIL		N412026-08			11/21/94
A4CM-94-0009	SSFA AREA 4	SOIL		N412026-09			11/21/94
A4CM-94-0010	SSFA AREA 4	SOIL		N412026-10			11/22/94
A4CM-94-0011	SSFA AREA 4	SOIL		N412026-11			11/22/94
Method Blank		SOIL		N412026-13			
Method Blank		SOIL		N412026-16			
Method Blank		SOIL		N412026-17			
Lab Control Sample		SOIL		N412026-12			
Lab Control Sample		SOIL		N412026-15			
Lab Control Sample		SOIL		N412026-18			
Duplicate (N412026-01)	SSFA AREA 4	SOIL		N412026-14			11/17/94

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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

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
6103		Method Blank	SOIL					N412026-13	6103-013
		Method Blank	SOIL					N412026-16	6103-016
		Method Blank	SOIL					N412026-17	6103-017
		Lab Control Sample	SOIL					N412026-12	6103-012
		Lab Control Sample	SOIL					N412026-15	6103-015
		Lab Control Sample	SOIL					N412026-18	6103-018
		A4CM-94-0003	SOIL	7.0			12/09/94 21	N412026-03	6103-003
		A4CM-94-0004	SOIL	7.0			12/09/94 21	N412026-04	6103-004
		A4CM-94-0007	SOIL	7.0			12/09/94 18	N412026-07	6103-007
		A4CM-94-0006	SOIL	8.7			12/09/94 21	N412026-06	6103-006
		A4CM-94-0008	SOIL	9.2			12/09/94 18	N412026-08	6103-008
		A4CM-94-0005	SOIL	9.3			12/09/94 21	N412026-05	6103-005
		A4CM-94-0009	SOIL	10.2			12/09/94 18	N412026-09	6103-009
		A4CM-94-0001	SOIL	10.5			12/09/94 22	N412026-01	6103-001
		Duplicate (N412026-01)	SOIL	10.5			12/09/94 22	N412026-14	6103-014
		A4CM-94-0011	SOIL	10.6			12/09/94 17	N412026-11	6103-011
		A4CM-94-0002	SOIL	10.8			12/09/94 22	N412026-02	6103-002
		A4CM-94-0010	SOIL	11.1			12/09/94 17	N412026-10	6103-010

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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

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	SOIL	Plutonium, Isotopic in Soil	2781-016	5.0	6			1	1	1/0		
			2781-016B	5.0	4			1	1	0/1		
			2781-060	5.0	1			1	1			
TH	SOIL	Thorium, Isotopic in Soil	2781-016	5.0	10			1	1	1/0		
			2781-016A	5.0	1			2	2	0/1		
U	SOIL	Uranium, Isotopic in Soil	2781-016	5.0	11			1	1	1/1		
Beta Counting												
SR	SOIL	Strontium, Total in Soil	2781-016	10.0	10			1	1	1/1		X
			2781-060	10.0	1			1	1			
Gamma Spectroscopy												
GAM	SOIL	Gamma Scan	2781-016	15.0	11			1	1	1/1		
Liquid Scintillation												
H	SOIL	Tritium-Soil	2781-016	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.

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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

WORK SUMMARY

CLIENT SAMPLE ID		LAB SAMPLE ID											
LOCATION	MATRIX	COLLECTED			SUF-								
CUSTODY	SAS no	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD				
A4CM-94-0001		N412026-01	6103-001	GAM		01/19/95	01/27/95	LGG	Gamma Scan				
SSFA AREA 4	SOIL	11/17/94	6103-001	H		01/05/95	01/15/95	LGG	Tritium-Soil				
		12/09/94	6103-001	PU	A1	01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil				
			6103-001	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil				
			6103-001	TH	A1	01/18/95	01/23/95	LGG	Thorium, Isotopic in Soil				
			6103-001	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil				
A4CM-94-0002		N412026-02	6103-002	GAM		01/19/95	01/27/95	LGG	Gamma Scan				
SSFA AREA 4	SOIL	11/17/94	6103-002	H		01/05/95	01/15/95	LGG	Tritium-Soil				
		12/09/94	6103-002	PU		01/10/95	01/13/95	LGG	Plutonium, Isotopic in Soil				
			6103-002	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil				
			6103-002	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil				
			6103-002	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil				
A4CM-94-0003		N412026-03	6103-003	GAM		01/19/95	01/27/95	LGG	Gamma Scan				
SSFA AREA 4	SOIL	11/18/94	6103-003	H		01/05/95	01/15/95	LGG	Tritium-Soil				
		12/09/94	6103-003	PU	A1	01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil				
			6103-003	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil				
			6103-003	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil				
			6103-003	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil				
A4CM-94-0004		N412026-04	6103-004	GAM		01/20/95	01/27/95	LGG	Gamma Scan				
SSFA AREA 4	SOIL	11/18/94	6103-004	H		01/05/95	01/15/95	LGG	Tritium-Soil				
		12/09/94	6103-004	PU	A1	01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil				
			6103-004	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil				
			6103-004	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil				
			6103-004	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil				
A4CM-94-0005		N412026-05	6103-005	GAM		01/20/95	01/27/95	LGG	Gamma Scan				
SSFA AREA 4	SOIL	11/18/94	6103-005	H		01/05/95	01/15/95	LGG	Tritium-Soil				
		12/09/94	6103-005	PU	A1	03/23/95	04/21/95	IEP	Plutonium, Isotopic in Soil				
			6103-005	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil				
			6103-005	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil				
			6103-005	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil				

RK 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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

WORK SUMMARY, cont.

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-94-0006		N412026-06	6103-006	GAM		01/20/95	01/27/95	LGG	Gamma Scan						
SSFA AREA 4	SOIL	11/18/94	6103-006	H		01/05/95	01/15/95	LGG	Tritium-Soil						
		12/09/94	6103-006	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil						
			6103-006	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil						
			6103-006	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil						
			6103-006	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil						
A4CM-94-0007		N412026-07	6103-007	GAM		01/20/95	01/27/95	LGG	Gamma Scan						
SSFA AREA 4	SOIL	11/21/94	6103-007	H		01/05/95	01/15/95	LGG	Tritium-Soil						
		12/09/94	6103-007	PU	A1	01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil						
			6103-007	SR	A2	03/22/95	04/21/95	IEP	Strontium, Total in Soil						
			6103-007	TH		01/12/95	01/17/95	LGG	Thorium, Isotopic in Soil						
			6103-007	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil						
A4CM-94-0008		N412026-08	6103-008	GAM		01/20/95	01/27/95	LGG	Gamma Scan						
SSFA AREA 4	SOIL	11/21/94	6103-008	H		01/05/95	01/15/95	LGG	Tritium-Soil						
		12/09/94	6103-008	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil						
			6103-008	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil						
			6103-008	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil						
			6103-008	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil						
A4CM-94-0009		N412026-09	6103-009	GAM		01/20/95	01/27/95	LGG	Gamma Scan						
SSFA AREA 4	SOIL	11/21/94	6103-009	H		01/05/95	01/15/95	LGG	Tritium-Soil						
		12/09/94	6103-009	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil						
			6103-009	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil						
			6103-009	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil						
			6103-009	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil						
A4CM-94-0010		N412026-10	6103-010	GAM		01/20/95	01/27/95	LGG	Gamma Scan						
SSFA AREA 4	SOIL	11/22/94	6103-010	H		01/05/95	01/15/95	LGG	Tritium-Soil						
		12/09/94	6103-010	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil						
			6103-010	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil						
			6103-010	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil						
			6103-010	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil						

WORK SUMMARY

Page 2

SUMMARY DATA SECTION

Page 5

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

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-94-0011		N412026-11	6103-011	GAM		01/23/95	01/27/95	LGG	Gamma Scan		
SSFA AREA 4	SOIL	11/22/94	6103-011	H		01/05/95	01/15/95	LGG	Tritium-Soil		
		12/09/94	6103-011	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil		
			6103-011	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil		
			6103-011	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil		
			6103-011	U		01/12/95	01/15/95	LGG	Uranium, Isotopic in Soil		
Method Blank		N412026-13	6103-013	GAM		01/23/95	01/27/95	LGG	Gamma Scan		
	SOIL		6103-013	H		01/05/95	01/15/95	LGG	Tritium-Soil		
			6103-013	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil		
			6103-013	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil		
			6103-013	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil		
			6103-013	U		01/12/95	01/23/95	LGG	Uranium, Isotopic in Soil		
Method Blank		N412026-16	6103-016	PU		01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil		
	SOIL		6103-016	TH		01/19/95	01/23/95	LGG	Thorium, Isotopic in Soil		
Method Blank		N412026-17	6103-017	PU		03/23/95	04/21/95	IEP	Plutonium, Isotopic in Soil		
	SOIL		6103-017	SR		03/22/95	04/21/95	IEP	Strontium, Total in Soil		
			6103-017	TH		03/24/95			Thorium, Isotopic in Soil		
Lab Control Sample		N412026-12	6103-012	GAM		01/23/95	01/27/95	LGG	Gamma Scan		
	SOIL		6103-012	H		01/05/95	01/15/95	LGG	Tritium-Soil		
			6103-012	PU		01/13/95	01/17/95	LGG	Plutonium, Isotopic in Soil		
			6103-012	SR		01/13/95	01/23/95	LGG	Strontium, Total in Soil		
			6103-012	TH		01/13/95	01/17/95	LGG	Thorium, Isotopic in Soil		
			6103-012	U		01/14/95	01/17/95	LGG	Uranium, Isotopic in Soil		
Lab Control Sample		N412026-15	6103-015	PU		01/19/95	01/23/95	LGG	Plutonium, Isotopic in Soil		
	SOIL		6103-015	TH		01/18/95	01/23/95	LGG	Thorium, Isotopic in Soil		
Lab Control Sample		N412026-18	6103-018	PU		03/23/95	04/21/95	IEP	Plutonium, Isotopic in Soil		
	SOIL		6103-018	SR		03/22/95	04/21/95	IEP	Strontium, Total in Soil		
			6103-018	TH		03/23/95			Thorium, Isotopic in Soil		

RK SUMMARY

Page 3

SUMMARY DATA SECTION

Page 6

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

SDG 6103

Contact Leah G. Guerrero

WORK SUMMARY, cont.

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	
Duplicate (N412026-01)		N412026-14	6103-014	GAM	01/23/95	01/27/95	LGG		Gamma Scan	
SSPA AREA 4	SOIL	11/17/94	6103-014	H	01/05/95	01/15/95	LGG		Tritium-Soil	
		12/09/94	6103-014	PU	01/13/95	01/17/95	LGG		Plutonium, Isotopic in Soil	
			6103-014	SR	01/13/95	01/23/95	LGG		Strontium, Total in Soil	
			6103-014	TH	01/13/95	01/20/95	LGG		Thorium, Isotopic in Soil	
			6103-014	U	01/14/95	01/17/95	LGG		Uranium, Isotopic in Soil	

COUNTS OF TESTS BY SAMPLE TYPE

TEST	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			3	3	1		18
SR		Strontium, Total in Soil	HASL 300/SR-01,-02	11			2	2	1		16
TH		Thorium, Isotopic in Soil		11			3	3	1		18
		Uranium, Isotopic in Soil	HASL 300/U-04	11			1	1	1		14
TOTALS				66			11	11	6		94

ORK SUMMARY

Page 4

SUMMARY DATA SECTION

Page 7

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CWS

Version 3.06

Report date 04/21/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-13

METHOD BLANK

Method Blank

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-13Client sample id Method BlankDept sample id 6103-013Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.093	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.001	0.053	0.05	0.5	U	SR
Thorium 230	14269-63-7	0.058	0.039	0.05	0.1	J	TH
Thorium 232	7740-29-1	0.023	0.023	0.03	0.1	U	TH
Uranium 233/234	11-08-5	0.005	0.009	0.01	0.01	U	U
Uranium 235	14117-96-1	0.002	0.004	0.01	0.01	U	U
Uranium 238	7440-61-1	0	0.003	0.01	0.01	U	U
Plutonium 238	13981-16-3	0.001	0.002	0.008	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		U		0.1		U	GAM
Promium 51		U		0.04		U	GAM
Manganese 54		U		0.006		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		0.007		U	GAM
Cesium 134		U		0.008		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		0.007		U	GAM
Europium 155		U		0.02		U	GAM
Radium 226		U		0.01		U	GAM
Thorium 232		U		0.03		U	GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

METHOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 8

TMA / RICHMOND

REPORTING GROUP 6103

N412026-16

METHOD BLANK

Method Blank

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-16

Client sample id Method Blank

Dept sample id 6103-016

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 230	14269-63-7	0.056	0.030	0.03	0.1	J	TH
Thorium 232	7740-29-1	-0.003	0.006	0.02	0.1	U	TH
Plutonium 238	13981-16-3	0.001	0.002	0.004	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.001	0.004	0.01	U	PU

METHOD BLANKS

Page 2

SUMMARY DATA SECTION

Page 9

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-17

METHOD BLANK

Method Blank

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-17

Client sample id Method Blank

Dept sample id 6103-017

Material/Matrix SOIL

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Strontium 90	10098-97-2	0	0.053	0.07	0.5	U	SR
Thorium 228		0.005	0.028	0.05	0.1	U	TH
Thorium 230	14269-63-7	0.091	0.046	0.05	0.1	J	TH
Thorium 232	7740-29-1	-0.005	0.009	0.03	0.1	U	TH
Plutonium 238	13981-16-3	0.001	0.004	0.007	0.01	U	PU
Plutonium 239/240	10-12-8	-0.001	0.001	0.006	0.01	U	PU

BLANK #23526

METHOD BLANKS

Page 3

SUMMARY DATA SECTION

Page 10

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-12

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-12

Client sample id Lab Control Sample

Dept sample id 6103-012

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	4.5	0.22	0.1	0.5		H	4.65	0.19	97	83-117	
Strontium 90	9.7	0.46	0.2	0.5	X	SR	9.80	0.39	99	83-117	
Thorium 230	2.2	0.23	0.04	0.1	B	TH	2.05	0.082	107	80-120	
Thorium 232	0	0.016	0.03	0.1	U	TH	0	0			
Uranium 233/234	1.6	0.10	0.05	0.01		U	1.62	0.065	99	86-114	
Uranium 235	1.3	0.093	0.01	0.01		U	1.24	0.050	105	84-116	
Uranium 238	1.7	0.11	0.05	0.01		U	1.61	0.064	106	85-115	
Plutonium 238	-0.001	0.003	0.01	0.01	U	PU	0	0			
Plutonium 239/240	0.31	0.041	0.01	0.01		PU	0.300	0.012	103	77-123	
GAMMA SCAN ANALYTES											
Cesium 40	U		0.06		U	GAM					
Promium 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		0.01		U	GAM					
Zinc 65	U		0.01		U	GAM					
Niobium 94	U		0.006		U	GAM					
Ruthenium 103	U		0.007		U	GAM					
Ruthenium 106	U		0.06		U	GAM					
Tin 113	U		0.009		U	GAM					
Cesium 134	U		0.006		U	GAM					
Cesium 137	0.38	0.017		0.02		GAM	0.384	0.015	99	76-124	
Cerium 144	U		0.03		U	GAM					
Europium 152	U		0.01		U	GAM					
Europium 154	U		0.008		U	GAM					
Europium 155	U		0.02		U	GAM					
Radium 226	U		0.01		U	GAM					
Thorium 232	U		0.03		U	GAM					

CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 11

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-15

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-15

Dept sample id 6103-015

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
Thorium 230	2.2	0.18	0.02	0.1	B	TH	2.05	0.082	107	83-117	
Thorium 232	0.003	0.011	0.02	0.1	U	TH	0	0			
Plutonium 238	-0.002	0.007	0.02	0.01	U	PU	0	0			
Plutonium 239/240	0.33	0.041	0.009	0.01		PU	0.300	0.012	110	77-123	

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 12

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-18

LAB CONTROL SAMPLE

Lab Control Sample

SDG 6103

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412026-18

Dept sample id 6103-018

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
Strontium 90	9.7	0.46	0.2	0.5		SR	9.80	0.39	99	83-117	
Thorium 228	-0.010	0.039	0.09	0.1	U	TH					
Thorium 230	2.0	0.23	0.05	0.1	B	TH	1.79	0.072	112	78-122	
Thorium 232	-0.005	0.010	0.04	0.1	U	TH					
Plutonium 238	0.32	0.027	0.006	0.01		PU	0.347	0.014	92	85-115	
Plutonium 239/240	0.32	0.027	0.005	0.01		PU	0.309	0.012	104	84-116	

CS #23527

LAB CONTROL SAMPLES

Page 3

SUMMARY DATA SECTION

Page 13

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-14

A4CM-94-0001

DUPLICATE

SDG 6103

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

DUPLICATE

ORIGINAL

Lab sample id N412026-14Lab sample id N412026-01Client sample id A4CM-94-0001Dept sample id 6103-014Dept sample id 6103-001Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/17/94% moisture 10.5% moisture 10.5

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	-0.035	0.079	0.1	0.5	U	H	-0.045	0.072	0.1	U	-		
Strontium 90	0.13	0.057	0.05	0.5	J	SR	0.044	0.10	0.1	U	99	200	
Thorium 230	0.86	0.13	0.05	0.1	B	TH	1.0	0.13	0.02	B	15	32	
Thorium 232	1.1	0.15	0.03	0.1		TH	1.2	0.13	0.02		9	29	
Uranium 233/234	0.76	0.060	0.01	0.01		U	0.67	0.072	0.02		13	22	
Uranium 235	0.054	0.015	0.007	0.01		U	0.054	0.019	0.01		0	68	
Uranium 238	0.66	0.055	0.01	0.01		U	0.72	0.073	0.01		9	23	
Plutonium 238	0.001	0.005	0.01	0.01	U	PU	0	0.009	0.02	U	-		
Plutonium 239/240	0.005	0.005	0.01	0.01	U	PU	0.002	0.004	0.008	U	-		
MA SCAN ANALYTES	U						U						
Potassium 40	19	0.75				GAM	18	0.93			5	34	
Chromium 51	U		1		U	GAM	U		1	U	-		
Manganese 54	U		0.04		U	GAM	U		0.05	U	-		
Cobalt 58	U		0.06		U	GAM	U		0.08	U	-		
Iron 59	U		0.2		U	GAM	U		0.3	U	-		
Cobalt 60	U		0.04		U	GAM	U		0.05	U	-		
Zinc 65	U		0.1		U	GAM	U		0.1	U	-		
Niobium 94	U		0.03		U	GAM	U		0.04	U	-		
Ruthenium 103	U		0.09		U	GAM	U		0.1	U	-		
Ruthenium 106	U		0.3		U	GAM	U		0.4	U	-		
Tin 113	U		0.06		U	GAM	U		0.07	U	-		
Cesium 134	U		0.04		U	GAM	U		0.06	U	-		
Cesium 137	0.037	0.032		0.02		GAM	U		0.08	U	74	224	
Cerium 144	U		0.2		U	GAM	U		0.2	U	-		
Europium 152	U		0.07		U	GAM	U		0.08	U	-		
Europium 154	U		0.04		U	GAM	U		0.05	U	-		
Europium 155	U		0.1		U	GAM	U		0.1	U	-		
Radium 226	0.85	0.072				GAM	0.87	0.11			2	39	

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 14

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-14

A4CM-94-0001

DUPLICATE, cont.

SDG 6103

Contact Leah G. Guerrero

DUPLICATE

Lab sample id N412026-14Dept sample id 6103-014% moisture 10.5

ORIGINAL

Lab sample id N412026-01Dept sample id 6103-001Received 12/09/94% moisture 10.5Client RocketdyneContract R44PJZ94034044Client sample id A4CM-94-0001Location/Matrix SSFA AREA 4 SOILCollected 11/17/94

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 232	1.3	0.18				GAM	1.2	0.23			8	48

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 15

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DUPVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-01

DATA SHEET

A4CM-94-0001

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-01

Client sample id A4CM-94-0001

Dept sample id 6103-001

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/17/94

% moisture 10.5

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.045	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.044	0.10	0.1	0.5	U	SR
Thorium 230	14269-63-7	1.0	0.13	0.02	0.1	B	TH
Thorium 232	7740-29-1	1.2	0.13	0.02	0.1		TH
Uranium 233/234	11-08-5	0.67	0.072	0.02	0.01		U
Uranium 235	14117-96-1	0.054	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.72	0.073	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.009	0.02	0.01	U	PU
Plutonium 239/240	10-12-8	0.002	0.004	0.008	0.01	U	PU
ALPHA SCAN ANALYTES		U					
Potassium 40		18	0.93				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.05		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.05		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.04		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.07		U	GAM
Cesium 134		U		0.06		U	GAM
Cesium 137		U		0.08	0.02	U	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		0.1		U	GAM
Radium 226		0.87	0.11				GAM

DATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 16

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-01

A4CM-94-0001

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-01Client sample id A4CM-94-0001Dept sample id 6103-001Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/17/94% moisture 10.5

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.23				GAM

ATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 17

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-02

A4CM-94-0002

DATA SHEET

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-02

Client sample id A4CM-94-0002

Dept sample id 6103-002

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/17/94

% moisture 10.8

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.012	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	0.22	0.096	0.09	0.5	J	SR
Thorium 230	14269-63-7	0.94	0.14	0.05	0.1	B	TH
Thorium 232	7740-29-1	1.3	0.17	0.03	0.1		TH
Uranium 233/234	11-08-5	0.73	0.074	0.02	0.01		U
Uranium 235	14117-96-1	0.052	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.76	0.076	0.01	0.01		U
Plutonium 238	13981-16-3	-0.006	0.006	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.001	0.002	0.004	0.01	U	PU
MA SCAN ANALYTES		U					
Potassium 40		19	1.1				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.076	0.057		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.89	0.12				GAM

ATA SHEETS

Page 3

SUMMARY DATA SECTION

Page 18

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-02

A4CM-94-0002

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-02
Dept sample id 6103-002
Received 12/09/94
% moisture 10.8Client sample id A4CM-94-0002
Location/Matrix SSFA AREA 4 SOIL
Collected 11/17/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.25				GAM

DATA SHEETS

Page 4

SUMMARY DATA SECTION

Page 19

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-03

DATA SHEET

A4CM-94-0003

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-03

Client sample id A4CM-94-0003

Dept sample id 6103-003

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/18/94

% 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		-0.083	0.067	0.1	0.5	U	H
Strontium 90	10098-97-2	0.12	0.17	0.2	0.5	U	SR
Thorium 230	14269-63-7	0.90	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	0.99	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.79	0.084	0.02	0.01		U
Uranium 235	14117-96-1	0.049	0.021	0.01	0.01		U
Uranium 238	7440-61-1	0.76	0.081	0.02	0.01		U
Plutonium 238	13981-16-3	0.001	0.009	0.02	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.008	0.01	U	PU
MA SCAN ANALYTES		U					
Potassium 40		21	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.093	0.053		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.97	0.14				GAM

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

ATA SHEETS

Page 5

SUMMARY DATA SECTION

Page 20

TMA/RICHMOND

REPORTING GROUP 6103

N412026-03

A4CM-94-0003

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-03Client sample id A4CM-94-0003Dept sample id 6103-003Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/18/94% moisture 7.0

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.27				GAM

DATA SHEETS

Page 6

SUMMARY DATA SECTION

Page 21

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA / RICHMOND

REPORTING GROUP 6103

N412026-04

A4CM-94-0004

DATA SHEET

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-04
Dept sample id 6103-004
Received 12/09/94
% moisture 7.0Client sample id A4CM-94-0004
Location/Matrix SSFA AREA 4 SOIL
Collected 11/18/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.050	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.014	0.053	0.06	0.5	U	SR
Thorium 230	14269-63-7	1.0	0.16	0.06	0.1		TH
Thorium 232	7740-29-1	1.3	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.81	0.086	0.02	0.01		U
Uranium 235	14117-96-1	0.050	0.018	0.01	0.01		U
Uranium 238	7440-61-1	0.82	0.087	0.02	0.01		U
Plutonium 238	13981-16-3	0	0.004	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		19	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		0.078	0.043		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.08		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.90	0.13				GAM

DATA SHEETS

Page 7

SUMMARY DATA SECTION

Page 22

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-04

A4CM-94-0004

DATA SHEET, cont

SDG <u>6103</u>	Client <u>Rocketdyne</u>
Contact <u>Leah G. Guerrero</u>	Contract <u>R44PJZ94034044</u>
Lab sample id <u>N412026-04</u>	Client sample id <u>A4CM-94-0004</u>
Dept sample id <u>6103-004</u>	Location/Matrix <u>SSFA AREA 4</u> <u>SOIL</u>
Received <u>12/09/94</u>	Collected <u>11/18/94</u>
% moisture <u>7.0</u>	Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.28				GAM

DATA SHEETS

Page 8

SUMMARY DATA SECTION

Page 23

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-05

A4CM-94-0005

DATA SHEET

SDG 6103

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-05Client sample id A4CM-94-0005Dept sample id 6103-005Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/18/94% 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		-0.083	0.072	0.1	0.5	U	H
Strontium 90	10098-97-2	0.053	0.058	0.06	0.5	U	SR
Thorium 230	14269-63-7	0.69	0.13	0.06	0.1		TH
Thorium 232	7740-29-1	1.0	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.68	0.071	0.02	0.01		U
Uranium 235	14117-96-1	0.033	0.016	0.01	0.01		U
Uranium 238	7440-61-1	0.74	0.076	0.01	0.01		U
Plutonium 238	13981-16-3	0.002	0.007	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.005	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	1.3				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.4		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.1		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		0.16	0.078		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.80	0.12				GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

DATA SHEETS

Page 9

SUMMARY DATA SECTION

Page 24

TMA/RICHMOND

REPORTING GROUP 6103

N412026-05

A4CM-94-0005

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-05
Dept sample id 6103-005
Received 12/09/94
% moisture 9.3Client sample id A4CM-94-0005
Location/Matrix SSFA AREA 4 SOIL
Collected 11/18/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.4	0.32				GAM

DATA SHEETS

Page 10

SUMMARY DATA SECTION

Page 25

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-06

DATA SHEET

A4CM-94-0006

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-06

Client sample id A4CM-94-0006

Dept sample id 6103-006

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/18/94

% moisture 8.7

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.064	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	-0.012	0.059	0.07	0.5	U	SR
Thorium 230	14269-63-7	0.75	0.14	0.05	0.1	B	TH
Thorium 232	7740-29-1	0.89	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.66	0.073	0.02	0.01		U
Uranium 235	14117-96-1	0.034	0.017	0.01	0.01		U
Uranium 238	7440-61-1	0.74	0.078	0.02	0.01		U
Plutonium 238	13981-16-3	-0.001	0.003	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	0.003	0.003	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.08		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.82	0.11				GAM

DATA SHEETS

Page 11

SUMMARY DATA SECTION

Page 26

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-06

A4CM-94-0006

DATA SHEET, cont

SDG 6103
Contact Leah G. GuerreroClient Rocketdyne
Contract R44PJZ94034044Lab sample id N412026-06
Dept sample id 6103-006
Received 12/09/94
% moisture 8.7Client sample id A4CM-94-0006
Location/Matrix SSFA AREA 4 SOIL
Collected 11/18/94
Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.1	0.27				GAM

ATA SHEETS

Page 12

SUMMARY DATA SECTION

Page 27

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-07

A4CM-94-0007

DATA SHEET

SDG 6103

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-07Client sample id A4CM-94-0007Dept sample id 6103-007Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/21/94% 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		-0.036	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	0.016	0.052	0.07	0.5	U	SR
Thorium 230	14269-63-7	0.82	0.14	0.04	0.1	B	TH
Thorium 232	7740-29-1	1.0	0.15	0.04	0.1		TH
Uranium 233/234	11-08-5	0.90	0.098	0.02	0.01		U
Uranium 235	14117-96-1	0.032	0.016	0.02	0.01		U
Uranium 238	7440-61-1	0.84	0.093	0.02	0.01		U
Plutonium 238	13981-16-3	0.002	0.009	0.02	0.01	U	PU
Plutonium 239/240	10-12-8	0.004	0.004	0.008	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	0.65				GAM
Chromium 51		U		0.8		U	GAM
Manganese 54		U		0.03		U	GAM
Cobalt 58		U		0.05		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		0.06		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		0.057	0.034		0.02		GAM
Europium 152		U		0.06		U	GAM
Europium 154		U		0.04		U	GAM
Europium 155		U		0.08		U	GAM
Radium 226		0.82	0.064				GAM
Thorium 232		1.3	0.16				GAM

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

DATA SHEETS

Page 13

SUMMARY DATA SECTION

Page 28

TMA / RICHMOND

REPORTING GROUP 6103

N412026-08

A4CM-94-0008

DATA SHEET

SDG 6103

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-08Client sample id A4CM-94-0008Dept sample id 6103-008Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/21/94% 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		-0.078	0.071	0.1	0.5	U	H
Strontium 90	10098-97-2	0.015	0.064	0.07	0.5	U	SR
Thorium 230	14269-63-7	0.82	0.14	0.06	0.1		TH
Thorium 232	7740-29-1	1.2	0.16	0.04	0.1		TH
Uranium 233/234	11-08-5	0.74	0.074	0.02	0.01		U
Uranium 235	14117-96-1	0.048	0.019	0.01	0.01		U
Uranium 238	7440-61-1	0.78	0.077	0.01	0.01		U
Plutonium 238	13981-16-3	0	0.005	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	-0.002	0.005	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		20	1.3				GAM
Chromium 51		U		2		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		U		0.07	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		1.0	0.15				GAM

DATA SHEETS

Page 14

SUMMARY DATA SECTION

Page 29

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-08

A4CM-94-0008

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-08Client sample id A4CM-94-0008Dept sample id 6103-008Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/21/94% 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
Thorium 232		1.6	0.30				GAM

DATA SHEETS

Page 15

SUMMARY DATA SECTION

Page 30

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-09

DATA SHEET

A4CM-94-0009

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-09

Client sample id A4CM-94-0009

Dept sample id 6103-009

Location/Matrix SSFA AREA 4 SOIL

Received 12/09/94

Collected 11/21/94

% 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		-0.011	0.076	0.1	0.5	U	H
Strontium 90	10098-97-2	0.056	0.047	0.05	0.5	J	SR
Thorium 230	14269-63-7	0.81	0.15	0.06	0.1		TH
Thorium 232	7740-29-1	1.2	0.18	0.04	0.1		TH
Uranium 233/234	11-08-5	0.63	0.066	0.02	0.01		U
Uranium 235	14117-96-1	0.047	0.018	0.01	0.01		U
Uranium 238	7440-61-1	0.72	0.071	0.01	0.01		U
Plutonium 238	13981-16-3	0.003	0.005	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	-0.001	0.003	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.1		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.07		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.06		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.6		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		0.063	0.060		0.02		GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.08		U	GAM
Europium 155		U		0.2		U	GAM
Radium 226		0.82	0.12				GAM

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

ATA SHEETS

Page 16

SUMMARY DATA SECTION

Page 31

TMA/RICHMOND

REPORTING GROUP 6103

N412026-09

A4CM-94-0009

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-09Client sample id A4CM-94-0009Dept sample id 6103-009Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/21/94% 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
Thorium 232		1.1	0.28				GAM

DATA SHEETS

Page 17

SUMMARY DATA SECTION

Page 32

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-10

A4CM-94-0010

DATA SHEET

SDG 6103

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412026-10Client sample id A4CM-94-0010Dept sample id 6103-010Location/Matrix SSFA AREA 4SOILReceived 12/09/94Collected 11/22/94% 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		-0.035	0.075	0.1	0.5	U	H
Strontium 90	10098-97-2	0.077	0.045	0.05	0.5	J	SR
Thorium 230	14269-63-7	0.72	0.14	0.04	0.1	B	TH
Thorium 232	7740-29-1	1.1	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.66	0.068	0.01	0.01		U
Uranium 235	14117-96-1	0.035	0.015	0.01	0.01		U
Uranium 238	7440-61-1	0.69	0.071	0.01	0.01		U
Plutonium 238	13981-16-3	0.001	0.005	0.009	0.01	U	PU
Plutonium 239/240	10-12-8	0	0.002	0.009	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		16	1.1				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.06		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.1		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.4		U	GAM
Tin 113		U		0.08		U	GAM
Cesium 134		U		0.08		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.1		U	GAM
Europium 154		U		0.06		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.69	0.11				GAM

DATA SHEETS

Page 18

SUMMARY DATA SECTION

Page 33

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-10

A4CM-94-0010

DATA SHEET, cont

SDG 6103Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-10Client sample id A4CM-94-0010Dept sample id 6103-010Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/22/94% moisture 11.1

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/g	2 σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Thorium 232		1.2	0.26				GAM

DATA SHEETS

Page 19

SUMMARY DATA SECTION

Page 34

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-11

A4CM-94-0011

DATA SHEET

SDG 6103

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412026-11

Client sample id A4CM-94-0011

Dept sample id 6103-011

Location/Matrix SSFA AREA 4

SOIL

Received 12/09/94

Collected 11/22/94

% moisture 10.6

Chain of custody id

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium		-0.11	0.073	0.1	0.5	U	H
Strontium 90	10098-97-2	0.11	0.051	0.04	0.5	J	SR
Thorium 230	14269-63-7	0.95	0.15	0.05	0.1	B	TH
Thorium 232	7740-29-1	1.2	0.17	0.04	0.1		TH
Uranium 233/234	11-08-5	0.92	0.11	0.03	0.01		U
Uranium 235	14117-96-1	0.049	0.022	0.02	0.01		U
Uranium 238	7440-61-1	0.80	0.10	0.03	0.01		U
Plutonium 238	13981-16-3	0.003	0.005	0.01	0.01	U	PU
Plutonium 239/240	10-12-8	-0.001	0.005	0.01	0.01	U	PU
GAMMA SCAN ANALYTES		U					
Potassium 40		18	1.2				GAM
Chromium 51		U		1		U	GAM
Manganese 54		U		0.07		U	GAM
Cobalt 58		U		0.09		U	GAM
Iron 59		U		0.3		U	GAM
Cobalt 60		U		0.06		U	GAM
Zinc 65		U		0.2		U	GAM
Niobium 94		U		0.05		U	GAM
Ruthenium 103		U		0.1		U	GAM
Ruthenium 106		U		0.5		U	GAM
Tin 113		U		0.09		U	GAM
Cesium 134		U		0.07		U	GAM
Cesium 137		U		0.06	0.02	U	GAM
Cerium 144		U		0.3		U	GAM
Europium 152		U		0.09		U	GAM
Europium 154		U		0.07		U	GAM
Europium 155		U		0.1		U	GAM
Radium 226		0.85	0.13				GAM

DATA SHEETS

Page 20

SUMMARY DATA SECTION

Page 35

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

N412026-11

A4CM-94-0011

DATA SHEET, cont

SDG 6103

Client RocketdyneContact Leah G. GuerreroContract R44PJZ94034044Lab sample id N412026-11Client sample id A4CM-94-0011Dept sample id 6103-011Location/Matrix SSFA AREA 4 SOILReceived 12/09/94Collected 11/22/94% moisture 10.6

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	0.28				GAM

DATA SHEETS

Page 21

SUMMARY DATA SECTION

Page 36

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test PU Matrix SOILSDG 6103Contact Leah G. Guerrero

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
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Preparation batch 2781-016

A4CM-94-0002	N412026-02		6103-002	U	U
A4CM-94-0006	N412026-06		6103-006	U	U
A4CM-94-0008	N412026-08		6103-008	U	U
A4CM-94-0009	N412026-09		6103-009	U	U
A4CM-94-0010	N412026-10		6103-010	U	U
A4CM-94-0011	N412026-11		6103-011	U	U
BLK (QC ID=22626)	N412026-13		6103-013	U	U
LCS (QC ID=22620)	N412026-12		6103-012	ok U	ok
Duplicate (N412026-01)	N412026-14		6103-014	- U	- U

Preparation batch 2781-016B

A4CM-94-0001	N412026-01	A1	6103-001	U	U
A4CM-94-0003	N412026-03	A1	6103-003	U	U
A4CM-94-0004	N412026-04	A1	6103-004	U	U
A4CM-94-0007	N412026-07	A1	6103-007	U	U
BLK (QC ID=22937)	N412026-16		6103-016	U	U
LCS (QC ID=22935)	N412026-15		6103-015	ok U	ok

Preparation batch 2781-060

A4CM-94-0005	N412026-05	A1	6103-005	U	U
BLK (QC ID=23526)	N412026-17		6103-017	U	U
LCS (QC ID=23527)	N412026-18		6103-018	ok	ok

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

Page 1

SUMMARY DATA SECTION

Page 37

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test PU Matrix SOILSDG 6103cact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL

ALPHA SPECTROSCOPY

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- pCi/g	MAX MDA g	ALIQ FAC	PREP TION	DILU- %	YIELD %	EFF min	COUNT keV	FWHM keV	DRIFT HELD	DAYS PREPARED	ANAL- YZED	DETECTOR
Preparation batch 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0002	N412026-02		0.01	3.00			63	1046				54	01/10/95	01/10	SS-028
A4CM-94-0006	N412026-06		0.01	3.00			55	464				56	01/10/95	01/13	SS-055
A4CM-94-0008	N412026-08		0.01	3.00			70	464				53	01/10/95	01/13	SS-057
A4CM-94-0009	N412026-09		0.01	3.00			61	464				53	01/10/95	01/13	SS-060
A4CM-94-0010	N412026-10		0.009	3.00			63	464				52	01/10/95	01/13	SS-061
A4CM-94-0011	N412026-11		0.01	3.00			60	464				52	01/10/95	01/13	SS-062
BLK (QC ID=22626)	N412026-13		0.008	3.00			78	464					01/10/95	01/13	SS-065
LCS (QC ID=22620)	N412026-12		0.01	3.00			63	464					01/10/95	01/13	SS-063
Duplicate (N412026-01)	N412026-14		0.01	3.00			61	464				57	01/10/95	01/13	SS-066
Preparation batch 2781-016B 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01	A1	0.02	3.00			71	507				63	01/19/95	01/19	SS-027
A4CM-94-0003	N412026-03	A1	0.02	3.00			70	507				62	01/19/95	01/19	SS-028
A4CM-94-0004	N412026-04	A1	0.01	3.00			40	963				62	01/19/95	01/19	SS-043
A4CM-94-0007	N412026-07	A1	0.02	3.04			65	507				59	01/19/95	01/19	SS-030
BLK (QC ID=22937)	N412026-16		0.004	3.00			73	963					01/19/95	01/19	SS-044
LCS (QC ID=22935)	N412026-15		0.02	3.00			63	487					01/19/95	01/19	SS-041
Preparation batch 2781-060 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 060															
A4CM-94-0005	N412026-05	A1	0.01	3.00			63	1014				126	03/24/95	03/23	SS-040
BLK (QC ID=23526)	N412026-17		0.007	3.00			60	1013					03/23/95	03/23	SS-044
LCS (QC ID=23527)	N412026-18		0.006	3.00			68	1013					03/22/95	03/23	SS-045
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 18 SAMPLES	YIELD	64	±	16

D SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 38

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test TH Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

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 2781-016						
A4CM-94-0002	N412026-02	6103-002		0.94	1.3	
A4CM-94-0003	N412026-03	6103-003		0.90	0.99	
A4CM-94-0004	N412026-04	6103-004		1.0	1.3	
A4CM-94-0005	N412026-05	6103-005		0.69	1.0	
A4CM-94-0006	N412026-06	6103-006		0.75	0.89	
A4CM-94-0007	N412026-07	6103-007		0.82	1.0	
A4CM-94-0008	N412026-08	6103-008		0.82	1.2	
A4CM-94-0009	N412026-09	6103-009		0.81	1.2	
A4CM-94-0010	N412026-10	6103-010		0.72	1.1	
A4CM-94-0011	N412026-11	6103-011		0.95	1.2	
BLK (QC ID=22624)	N412026-13	6103-013		0.058 J	U	
LCS (QC ID=22618)	N412026-12	6103-012		ok	ok	U
Duplicate (N412026-01)	N412026-14	6103-014		ok	ok	

Preparation batch 2781-016A

A4CM-94-0001	N412026-01	A1 6103-001		1.0	1.2	
C ID=22938)	N412026-16	6103-016		0.056 J	U	
Method Blank	N412026-17	6103-017	U	0.091 J	U	
LCS (QC ID=22936)	N412026-15	6103-015		ok	ok	U
Lab Control Sample	N412026-18	6103-018	No data U	ok	No data U	

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

Page 3

SUMMARY DATA SECTION

Page 39

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/22/95

TMA/RICHMOND

REPORTING GROUP 6103

Test TH Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

THORIUM, 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 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0002	N412026-02		0.05	1.00			71	466				56	01/12/95	01/12	SS-002
A4CM-94-0003	N412026-03		0.06	1.00			71	466				55	01/12/95	01/12	SS-003
A4CM-94-0004	N412026-04		0.06	1.00			65	466				55	01/12/95	01/12	SS-004
A4CM-94-0005	N412026-05		0.06	1.00			64	466				55	01/12/95	01/12	SS-019
A4CM-94-0006	N412026-06		0.05	1.00			68	466				55	01/12/95	01/12	SS-020
A4CM-94-0007	N412026-07		0.04	1.00			74	466				52	01/12/95	01/12	SS-022
A4CM-94-0008	N412026-08		0.06	1.00			71	477				53	01/12/95	01/13	SS-019
A4CM-94-0009	N412026-09		0.06	1.00			56	477				53	01/12/95	01/13	SS-020
A4CM-94-0010	N412026-10		0.04	1.00			67	477				52	01/12/95	01/13	SS-022
A4CM-94-0011	N412026-11		0.05	1.00			59	528				52	01/12/95	01/13	SS-001
BLK (QC ID=22624)	N412026-13		0.05	1.00			77	528					01/12/95	01/13	SS-003
LCS (QC ID=22618)	N412026-12		0.04	1.00			69	528					01/12/95	01/13	SS-002
Duplicate (N412026-01)	N412026-14		0.05	1.00			68	528				57	01/12/95	01/13	SS-004

Preparation batch 2781-016A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01	A1	0.02	1.00			77	470				62	01/18/95	01/18	SS-040
QC ID=22938)	N412026-16		0.03	1.00			71	503					01/18/95	01/19	SS-032
Method Blank	N412026-17		0.05	1.00			60	541					03/23/95	03/24	SS-018
LCS (QC ID=22936)	N412026-15		0.02	1.00			87	470					01/18/95	01/18	SS-041
Lab Control Sample	N412026-18		0.09	1.00			54	612					03/23/95	03/23	SS-020

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	0.05	±	0.03
FOR 18 SAMPLES	YIELD	68	±	16

METHOD SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 40

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test U Matrix SOILSDG 6103Contact Leah G. Guerrero

METHOD SUMMARY

URANIUM, ISOTOPIC IN SOIL

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 2781-016										
A4CM-94-0001	N412026-01		6103-001	0.67	0.054	0.72	93	14	8	3
A4CM-94-0002	N412026-02		6103-002	0.73	0.052	0.76	96	14	7	3
A4CM-94-0003	N412026-03		6103-003	0.79	0.049	0.76	104	16	6	3
A4CM-94-0004	N412026-04		6103-004	0.81	0.050	0.82	99	15	6	2
A4CM-94-0005	N412026-05		6103-005	0.68	0.033	0.74	92	13	4	2
A4CM-94-0006	N412026-06		6103-006	0.66	0.034	0.74	89	14	5	2
A4CM-94-0007	N412026-07		6103-007	0.90	0.032	0.84	107	17	4	2
A4CM-94-0008	N412026-08		6103-008	0.74	0.048	0.78	95	13	6	3
A4CM-94-0009	N412026-09		6103-009	0.63	0.047	0.72	88	13	7	3
A4CM-94-0010	N412026-10		6103-010	0.66	0.035	0.69	96	14	5	2
A4CM-94-0011	N412026-11		6103-011	0.92	0.049	0.80	115	20	6	3
BLK (QC ID=22625)	N412026-13		6103-013	U	U	U				
LCS (QC ID=22619)	N412026-12		6103-012	ok	ok	ok				
Duplicate (N412026-01)	N412026-14		6103-014	ok	ok	ok	115	13	8	2
Nominal values and limits from method				RDLs (pCi/g)	0.01	0.01	0.01	100	4	
							Averages	99	6	

OD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 41

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test U Matrix SOIL

SDG 6103

tact Leah G. Guerrero

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 2781-016 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 016																
A4CM-94-0001	N412026-01	0.02		3.00				69		405			56	01/10/95	01/12	SS-031
A4CM-94-0002	N412026-02	0.02		3.00				69		405			56	01/10/95	01/12	SS-033
A4CM-94-0003	N412026-03	0.02		3.00				61		405			55	01/10/95	01/12	SS-034
A4CM-94-0004	N412026-04	0.02		3.00				61		405			55	01/10/95	01/12	SS-035
A4CM-94-0005	N412026-05	0.02		3.00				69		405			55	01/10/95	01/12	SS-036
A4CM-94-0006	N412026-06	0.02		3.00				68		405			55	01/10/95	01/12	SS-037
A4CM-94-0007	N412026-07	0.02		3.00				56		405			52	01/10/95	01/12	SS-038
A4CM-94-0008	N412026-08	0.02		3.00				70		406			52	01/10/95	01/12	SS-039
A4CM-94-0009	N412026-09	0.02		3.00				73		406			52	01/10/95	01/12	SS-040
A4CM-94-0010	N412026-10	0.01		3.00				72		406			51	01/10/95	01/12	SS-041
A4CM-94-0011	N412026-11	0.03		3.00				41		406			51	01/10/95	01/12	SS-042
BLK (QC ID=22625)	N412026-13	0.01		3.00				58		405				01/10/95	01/12	SS-032
LCS (QC ID=22619)	N412026-12	0.05		3.00				69		680				01/10/95	01/14	SS-037
Duplicate (N412026-01)	N412026-14	0.01		3.00				70		680			58	01/10/95	01/14	SS-041
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

FOR 14 SAMPLES

MDA 0.02 ± 0.02

YIELD 65 ± 17

DD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 42

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test SR Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

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

Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	0.22 J
A4CM-94-0003	N412026-03	6103-003	U
A4CM-94-0004	N412026-04	6103-004	U
A4CM-94-0005	N412026-05	6103-005	U
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	0.056 J
A4CM-94-0010	N412026-10	6103-010	0.077 J
A4CM-94-0011	N412026-11	6103-011	0.11 J
BLK (QC ID=22623)	N412026-13	6103-013	U
LCS (QC ID=22617)	N412026-12	6103-012	ok X
Duplicate (N412026-01)	N412026-14	6103-014	ok J

Preparation batch 2781-060

A4CM-94-0007	N412026-07	A2 6103-007	U
BLK (QC ID=23526)	N412026-17	6103-017	U
LCS (QC ID=23527)	N412026-18	6103-018	ok

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

Page 7

SUMMARY DATA SECTION

Page 43

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test SR Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

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 2781-016 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 016																
A4CM-94-0001	N412026-01			0.1	2.00			71	605				57	01/13/95	01/13	LBG-001
A4CM-94-0002	N412026-02			0.09	2.00			83	605				57	01/13/95	01/13	LBG-003
A4CM-94-0003	N412026-03			0.2	2.00			47	605				56	01/13/95	01/13	LBG-002
A4CM-94-0004	N412026-04			0.06	2.00			82	477				56	01/13/95	01/13	LBG-001
A4CM-94-0005	N412026-05			0.06	2.00			85	477				56	01/13/95	01/13	LBG-002
A4CM-94-0006	N412026-06			0.07	2.00			72	477				56	01/13/95	01/13	LBG-003
A4CM-94-0008	N412026-08			0.07	2.00			80	477				53	01/13/95	01/13	LBG-004
A4CM-94-0009	N412026-09			0.05	2.00			87	477				53	01/13/95	01/13	LBG-013
A4CM-94-0010	N412026-10			0.05	2.00			86	598				52	01/13/95	01/13	LBG-003
A4CM-94-0011	N412026-11			0.04	2.00			85	749				52	01/13/95	01/13	LBG-002
BLK (QC ID=22623)	N412026-13			0.05	2.00			64	749					01/13/95	01/13	LBG-003
LCS (QC ID=22617)	N412026-12			0.2	2.00			69	105					01/13/95	01/13	LBG-004
Duplicate (N412026-01)	N412026-14			0.05	2.00			80	749				57	01/13/95	01/13	LBG-004
Preparation batch 2781-060 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 060																
A4CM-94-0007	N412026-07	A2		0.07	2.03			96	206				122	03/23/95	03/22	LBG-002
QC ID=23526)	N412026-17			0.07	2.00			91	270					03/22/95	03/22	LBG-016
QC ID=23527)	N412026-18			0.2	2.00			66	74					03/22/95	03/22	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	0.09 ± 0.1
FOR 16 SAMPLES	YIELD	78 ± 25

MOD SUMMARIES

Page 8

SUMMARY DATA SECTION

Page 44

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOILSDG 6103Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Cesium 137
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Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	0.076
A4CM-94-0003	N412026-03	6103-003	0.093
A4CM-94-0004	N412026-04	6103-004	0.078
A4CM-94-0005	N412026-05	6103-005	0.16
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0007	N412026-07	6103-007	0.057
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	0.063
A4CM-94-0010	N412026-10	6103-010	U
A4CM-94-0011	N412026-11	6103-011	U
BLK (QC ID=22622)	N412026-13	6103-013	U
LCS (QC ID=22616)	N412026-12	6103-012	ok
Duplicate (N412026-01)	N412026-14	6103-014	ok

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

Page 9

SUMMARY DATA SECTION

Page 45

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

Test GAM Matrix SOILSDG 6103tact Leah G. Guerrero

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Client RocketdyneContract R44PJ294034044

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	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 2781-016 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 016															
A4CM-94-0001	N412026-01		0.08	132						1014		63	01/19/95	01/19	JR,03,00
A4CM-94-0002	N412026-02			128						905		63	01/19/95	01/19	JR,02,00
A4CM-94-0003	N412026-03			137						812		62	01/19/95	01/19	JR,01,00
A4CM-94-0004	N412026-04			137						725		63	01/20/95	01/20	JR,02,00
A4CM-94-0005	N412026-05			126						725		63	01/20/95	01/20	JR,01,00
A4CM-94-0006	N412026-06		0.06	125						725		63	01/20/95	01/20	JR,03,00
A4CM-94-0007	N412026-07			137						1048		60	01/20/95	01/20	JR,04,00
A4CM-94-0008	N412026-08		0.07	131						736		60	01/20/95	01/20	JR,01,00
A4CM-94-0009	N412026-09			126						736		60	01/20/95	01/20	JR,02,00
A4CM-94-0010	N412026-10		0.06	135						736		59	01/20/95	01/20	JR,03,00
A4CM-94-0011	N412026-11		0.06	148						724		62	01/23/95	01/23	JR,01,00
BLK (QC ID=22622)	N412026-13		0.006	750						724			01/23/95	01/23	JR,03,00
LCS (QC ID=22616)	N412026-12			750						724			01/23/95	01/23	JR,02,00
Duplicate (N412026-01)	N412026-14			137						724		67	01/23/95	01/23	JR,04,00
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 0.06 ± 0.05
 FOR 6 SAMPLES YIELD _____ ± _____

OD SUMMARIES

Page 10

SUMMARY DATA SECTION

Page 46

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 1.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6103

tact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-016

A4CM-94-0001	N412026-01	6103-001	U
A4CM-94-0002	N412026-02	6103-002	U
A4CM-94-0003	N412026-03	6103-003	U
A4CM-94-0004	N412026-04	6103-004	U
A4CM-94-0005	N412026-05	6103-005	U
A4CM-94-0006	N412026-06	6103-006	U
A4CM-94-0007	N412026-07	6103-007	U
A4CM-94-0008	N412026-08	6103-008	U
A4CM-94-0009	N412026-09	6103-009	U
A4CM-94-0010	N412026-10	6103-010	U
A4CM-94-0011	N412026-11	6103-011	U
BLK (QC ID=22627)	N412026-13	6103-013	U
LCS (QC ID=22621)	N412026-12	6103-012	ok
Duplicate (N412026-01)	N412026-14	6103-014	- U

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

Page 11

SUMMARY DATA SECTION

Page 47

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6103

METHOD SUMMARY

TRITIUM-SOIL

LIQUID SCINTILLATION

Test H Matrix SOIL

SDG 6103

Contact Leah G. Guerrero

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 2781-016 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 016																
A4CM-94-0001	N412026-01	0.1		21.3						50			49	12/20/94	01/05	LSC-005
A4CM-94-0002	N412026-02	0.1		21.5						50			49	12/20/94	01/05	LSC-005
A4CM-94-0003	N412026-03	0.1		21.0						50			48	12/20/94	01/05	LSC-005
A4CM-94-0004	N412026-04	0.1		20.6						50			48	12/20/94	01/05	LSC-005
A4CM-94-0005	N412026-05	0.1		20.8						50			48	12/20/94	01/05	LSC-005
A4CM-94-0006	N412026-06	0.1		21.0						50			48	12/20/94	01/05	LSC-005
A4CM-94-0007	N412026-07	0.1		20.2						50			45	12/20/94	01/05	LSC-005
A4CM-94-0008	N412026-08	0.1		20.7						50			45	12/20/94	01/05	LSC-005
A4CM-94-0009	N412026-09	0.1		21.0						50			45	12/20/94	01/05	LSC-005
A4CM-94-0010	N412026-10	0.1		20.8						50			44	12/20/94	01/05	LSC-005
A4CM-94-0011	N412026-11	0.1		20.2						50			44	12/20/94	01/05	LSC-005
BLK (QC ID=22627)	N412026-13	0.1		20.0						50				12/20/94	01/05	LSC-005
LCS (QC ID=22621)	N412026-12	0.1		20.0				0		50				12/20/94	01/05	LSC-005
Duplicate (N412026-01)	N412026-14	0.1		20.5						50			49	12/20/94	01/05	LSC-005
Nominal values and limits from method				0.5	20.0					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	0.1	±	0
FOR 14 SAMPLES	YIELD	0	±	

OD SUMMARIES

Page 12

SUMMARY DATA SECTION

Page 48

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

31-MAR-95
16:21:45
N412026
LGG

TMA Corporation
Beta Counting Data
AUTOB V 2.06

6103- 7A2 Sr
A4CM-94-0007

Reviewed OK Date 4/14

Sr 90

Counter LBG 2
Length of count 206.9 Min.
Gross counts = 152.

OK
4/21/98

Zero time 325.334 94
Separation time 81.877 95
0.059 CPM ON DAY 89.843 95

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)

WHERE A = $\text{EXP}(-\text{SR} \times \text{T}) - \text{EXP}(-\text{Y} \times \text{T})$

B = SR EFF/Y EFF

C = $\text{EXP}(\text{SR} \times \text{T})$

FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 81.877 95 = 0.027 (Y/Sr eff ratio = 1.418)

Elapsed time (days) = 121.543
Lambda = 6.863E-05 Reciprocal days
 $\text{exp}(-\text{lambda} \times \text{t})$ (1) = 9.917E-01
Chemical yield (2) = 0.9597
PPT. correction (3) = 1.0085 (recovery = 17.62 mgs)
liquot (4) = 2.030 gram

Product (1X2X3X4) = 1.948506E+00

C-zero	P-factor	dpm/gram	dpm error	1 sigma	percent sigma
1.3629E-02	2.5560	3.4835E-02	5.7730E-02		165.72 %

pCi /gram	1 sigma	2 sigma
1.5692E-02	2.6005E-02	5.0969E-02

LTV 5.8599E-02

MDA 7.2427E-02

DPM OF ALIQUOT 7.072E-02

Saved answer = 7.072E-02 165.72% (DPM of aliquot) (10757)

31-MAR-95 16:21:54

Counting Data Summary
6103- 7A2 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	82.890	LBO	16	129.83	76	0.06	153.2%	0.5250	1.0340 0
2.	87.808	LBO	16	199.75	128	0.11	71.1%	0.5330	1.0350 0
3.	89.843	LBO	2	206.91	152	0.06	136.1%	0.6740	0.9800 0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
LBO	16 EF SF	78.754	41493	17.3	1.029	1.005 - 1.050	1.034	-0.6
LBO	16 EF SF	87.782	26129	10.9	1.030	1.006 - 1.050	1.035	-0.6
LBO	2 EF SF	89.756	49972	16.8	0.950	0.950 - 1.049	0.980	-3.0
LBO	16 BK BK	78.038	1320	2468.8	0.535	0.300 - 0.800	0.525	0.2
LBO	16 BK BK	85.053	1304	2297.6	0.568	0.300 - 0.800	0.533	0.5
LBO	2 BK BK	88.813	291	406.1	0.717	0.300 - 0.800	0.674	1.2

Counting Log(s)

Previous	3 counts	Time	Detector	ID	Length	Cpm
82.623	23-MAR-95	6:57	LBO	16 Sr 2237 15	\ 133.6 min	-0.08
82.717	23-MAR-95	9:12	LBO	16 Sr 2237 21	\ 102.4 min	-0.14
82.793	23-MAR-95	11:01	LBO	16 (50)9115 1	\ 130.6 min	3.73
87.096	27-MAR-95	18:18	LBO	16 (50)9116 6	\ 53.9 min	4.15
87.136	27-MAR-95	19:15	LBO	16 (50)9116 4	\ 717.7 min	4.32
87.782	28-MAR-95	10:46	LBO	16 SF	\ 10.9 min	0.00
89.718	30-MAR-95	9:13	LBO	2 SF	\ 10.9 min	0.00
89.756	30-MAR-95	10:08	LBO	2 SF	\ 16.8 min	0.00
89.790	30-MAR-95	10:57	LBO	2 (50)9116 2	\ 73.1 min	3.09

27-MAR-95
15:27:14
N412026
GG

TMA Corporation
Beta Counting Data
AUTOB V 2.06

6103- 17 Sr
QC-BLANK #23526

Sr 90

Reviewed 19 Date 3-27
3/30
JCP
4/21/95

Counter LBG 16
Length of count 270.2 Min.
Gross counts = 144.

Zero time 81.877 95
Separation time 81.877 95
0.000 CPM ON DAY 85.777 95

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = $\text{EXP}(-\text{SR} \times \text{T}) - \text{EXP}(-\text{Y} \times \text{T})$
B = SR EFF/Y EFF
C = $\text{EXP}(\text{SR} \times \text{T})$

FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 81.877 95 = 0.000 (Y/Sr eff ratio = 1.413)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
 $\text{exp}(-\text{lambda} \times \text{t})$ (1) = 1.000E+00
Chemical yield (2) = 0.9096
PT. correction (3) = 1.0122 (recovery = 16.70 mgs)
Aliquot (4) = 1.000 smpl

Product (1X2X3X4) = 9.207168E-01

C-zero	P-factor	dpm/smpl	dpm error	percent sigma
-1.2998E-05	2.5560	-3.3223E-05	-1.1794E-01	355006.19 %

pCi /smpl	1 sigma	2 sigma
-1.4965E-05	5.3127E-02	1.0413E-01

LTV 8.7660E-02 (P)

MDA 1.4851E-01 (F)

DPM OF ALIQUOT -3.322E-05

Saved answer = -3.322E-05 -355006.19% (DPM of aliquot) (9081)

QC-23526

Added = 0

Ky 3/27/95

27-MAR-95 15:27:24

Counting Data Summary
6103- 17 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF	
1.	83.096	LBG	15	174.21	107	-0.01	957.8%	0.6230	1.0330	0
2.	84.714	LBG	16	105.20	66	0.11	99.2%	0.5220	1.0360	0
3.	85.777	LBG	16	270.18	144	0.00*****%	0.5330	1.0360	0	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
LBG	15 EF SF	78.754	40751	17.3	1.034	1.002 - 1.050	1.033	0.4
LBG	16 EF SF	84.699	36944	15.5	1.035	1.004 - 1.050	1.036	0.1
LBG	16 EF SF	84.699	36944	15.5	1.035	1.004 - 1.050	1.036	0.1
LBG	15 BK BK	78.038	1660	2468.8	0.672	0.300 - 0.800	0.623	1.3
LBG	16 BK BK	84.310	289	560.3	0.516	0.300 - 0.800	0.522	-0.1
LBG	16 BK BK	85.053	1304	2297.6	0.568	0.300 - 0.800	0.533	0.5

Counting Log(s)

Previous 3 counts	Time	Detector	ID	Length	Cpm
82.717	23-MAR-95 9:12	LBG	15 Sr 2237 20 \	102.4 min	0.03
82.793	23-MAR-95 11:01	LBG	15 Sr 3953 1A1 \	130.6 min	5.70
82.890	23-MAR-95 13:21	LBG	15 Sr 6104 2A1 \	129.8 min	-0.05
84.101	24-MAR-95 18:25	LBG	16 (50)9115 13 \	298.8 min	0.12
84.310	24-MAR-95 23:26	LBG	16 BK \	560.3 min	0.00
84.699	25-MAR-95 8:46	LBG	16 SF \	15.5 min	0.00
84.890	25-MAR-95 13:21	LBG	16 (50)9116 6 \	102.5 min	3.54
84.962	25-MAR-95 15:05	LBG	16 (50)9116 10 \	106.6 min	4.55
85.054	25-MAR-95 17:17	LBG	16 BK \	2297.6 min	0.00

04-APR-95
08:49:36
N412026
90

TMA Corporation
Beta Counting Data
AUTOB V 2.06

6103- 18 Sr
QC-LCS #23527

Reviewed acc Date 4/4

Sr 90

Counter LBG 16
Length of count 75.0 Min.
Gross counts = 1858.

Jeff
4/21/95

Zero time 81.877 95
Separation time 81.877 95
25.108 CPM ON DAY 89.899 95

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = EXP(-SR*T) - EXP(-Y*T)
B = SR EFF/Y EFF
C = EXP(SR*T)

FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 81.877 95 = 11.297 (Y/Sr eff ratio = 1.398)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
exp(-lambda X t) (1) = 1.000E+00
Chemical yield (2) = 0.6569
PT. correction (3) = 1.0220 (recovery = 12.06 mgs)
Aliquot (4) = 1.000 smpl

Product (1X2X3X4) = 6.712818E-01

C-zero	P-factor	dpm/smpl	dpm error	percent sigma
1.6829E+01	2.5560	4.3014E+01	1.0267E+00	2.39 %

pCi /smpl	1 sigma	2 sigma
1.9376E+01	4.6246E-01	9.0642E-01

LTV 2.0139E+01

MDA 3.4803E-01

DPM OF ALIQUOT 4.301E+01

Saved answer = 4.301E+01 2.39% (DPM of aliquot) (10933)

QC-23527

Added = 19.56 pCi ($\pm 4\%$)

F/A = 0.991 ($\pm 6.1\%$) Ky 4/4/95

04-APR-95 08:49:43

Counting Data Summary
6103- 18 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF	
1.	83.096	LBG	16	174.23	2872	16.50	-2.0%	0.5250	1.0340	0
2.	88.082	LBG	2	44.25	1187	25.85	3.0%	0.6630	0.9880	0
3.	89.899	LBG	16	74.99	1858	25.11	2.4%	0.5410	1.0360	0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
LBG	16 EF SF	78.754	41493	17.3	1.029	1.005 - 1.050	1.034	-0.6
LBG	2 EF SF	87.947	51157	17.3	0.952	0.950 - 1.050	0.988	-2.9
LBG	16 EF SF	89.718	25755	10.9	1.041	1.005 - 1.050	1.036	1.2
LBG	16 BK BK	78.038	1320	2468.8	0.535	0.300 - 0.800	0.525	0.2
LBG	2 BK BK	85.053	1683	2297.6	0.732	0.300 - 0.800	0.663	1.7
LBG	16 BK BK	88.813	233	406.1	0.574	0.300 - 0.800	0.541	0.5

Counting Log(s)

Previous	3 counts	Time	Detector	ID	Length	Cpm
82.717	23-MAR-95	9:12	LBG	16 Sr 2237 21	\ 102.4 min	-0.14
82.793	23-MAR-95	11:01	LBG	16 (50)9115 1	\ 130.6 min	3.73
82.890	23-MAR-95	13:21	LBG	16 Sr 6103 7A2	\ 129.8 min	0.06
87.824	28-MAR-95	11:46	LBG	2 SF	\ 43.2 min	0.00
87.947	28-MAR-95	14:43	LBG	2 SF	\ 17.3 min	0.00
87.959	28-MAR-95	15:00	LBG	2 BK	\ 151.9 min	0.00
89.639	30-MAR-95	7:20	LBG	16 (50)9115 5	\ 105.6 min	3.12
89.718	30-MAR-95	9:13	LBG	16 SF	\ 10.9 min	0.00
89.756	30-MAR-95	10:08	LBG	16 Sr 5601 2A1	\ 203.3 min	1.43

24-MAR-95

16:26:21

N412026

LGG

TMA Corporation
Alpha Spectroscopy
ASPEC V 4.016103- 5A1 Pu
A4CM-94-0005Reviewed Y Date 3-27

Counted on SS 40 1014.00 minutes

GMT 83.303 95

Zero time 322.334 94

GMT of std 72.736 95

Sep. time 0.000 0

Chemical yield

0.6337

Tracer - Pu242 (H-B1-A-(5) 112.997-94)

39.60 Dpm X 1.0000 = 39.60 Corr. tracer DPM

Drift correction 1.9

(on 71.005 95 for 2374.52 Min.)

Channels 82-100

Bkg CPM 0.00084

Gross cnts 10406.

Background 1

Net counts 10405 1.0%

FWHM Of tracer = 72. KeV

Divisor 2.6275E+02 (net counts / corr. tracer DPM)

Det. Eff 0.4089

Yield 0.6337 (net counts) / (eff. x corr. tracer DPM X time)

Pu239Pu238Pu236

Channels 101-118

Bkg CPM 0.00211

128-144

0.01895

148-164

0.01306

Gross cnts 8 23 7

Background 2 19 13

Tracer cts 0 0 0

Net counts 6 3 4 6 4

Lambda (7.7775E-08)

(2.2005E-05)

(6.6560E-04)

Decay corr 1.0000

0.9972

0.9196

Brnch ratio 1.0000

1.0000

1.0000

DPM of aliq 2.2835E-02

1.5266E-02

-2.4832E-02

Aliquot 3.0000E+00

3.0000E+00

3.0000E+00

Dpm/gram 7.6118E-03

5.0886E-03

-8.2774E-03

pCi /gram 3.429E-03

2.292E-03

-3.729E-03

1 sigma Err 50.0%

150.0%

66.7%

pCi Err 1.715E-03

3.438E-03

2.486E-03

2 sigma Err 100.0%

300.0%

133.3%

pCi Err 3.429E-03

6.877E-03

4.972E-03

Limitng Vlu < 6.26E-03

< 7.97E-03

< 4.10E-03

MDA 5.47E-03

1.33E-02

1.23E-02

6103 5A1

Pu

83.303

1014.00 MIN

SS

40

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	642	1	-156	573	2	-104	504	0	52	435	0
0	0	0	207	641	0	-155	572	0	-103	503	0	51	434	0
0	0	0	206	639	1	-154	570	0	-102	502	0	50	433	3
0	0	0	205	638	1	-153	569	1	-101	500	0	49	431	0
256	705	0	204	637	0	-152	568	1	-100	499	1	48	430	1
255	704	0	203	635	1	-151	566	0	-99	498	3	47	429	0
254	703	0	202	634	3	-150	565	0	-98	496	52	46	427	1
253	702	0	201	633	3	-149	564	0	-97	495	235	45	426	2
252	700	0	200	631	1	-148	562	0	-96	494	600	44	425	0
251	699	0	199	630	0	147	561	1	-95	492	1094	43	423	1
250	698	0	198	629	0	146	560	0	-94	491	1610	42	422	0
249	696	0	197	627	0	145	558	0	-93	490	1702	41	421	0
248	695	0	196	626	0	-144	557	2	-92	488	1482	40	419	0
247	694	1	195	625	0	-143	556	1	-91	487	1148	39	418	0
246	692	0	194	623	0	-142	554	0	-90	486	841	38	417	0
245	691	0	193	622	0	-141	553	0	-89	484	555	37	415	1
244	690	0	192	621	0	-140	552	2	-88	483	355	36	414	0
243	688	1	191	619	0	-139	551	0	-87	482	242	35	413	1
242	687	1	190	618	0	-138	549	0	-86	480	183	34	411	1
241	686	1	189	617	0	-137	548	1	-85	479	126	33	410	0
240	684	0	188	615	1	-136	547	3	-84	478	80	32	409	1
239	683	1	187	614	1	-135	545	2	-83	476	57	31	407	1
238	682	0	186	613	0	-134	544	5	-82	475	40	30	406	1
237	680	0	185	611	1	-133	543	0	81	474	37	29	405	0
236	679	0	184	610	1	-132	541	3	80	472	15	28	403	0
235	678	1	183	609	1	-131	540	1	79	471	18	27	402	0
234	676	0	182	607	0	-130	539	0	78	470	20	26	401	1
233	675	0	181	606	0	-129	537	1	77	468	11	25	400	0
232	674	0	180	605	0	-128	536	2	76	467	18	24	398	0
231	672	1	179	604	0	127	535	1	75	466	7	23	397	2
230	671	0	178	602	1	126	533	0	74	464	7	22	396	0
229	670	0	177	601	1	125	532	0	73	463	1	21	394	0
228	668	0	176	600	0	124	531	0	72	462	7	20	393	0
227	667	0	175	598	0	123	529	0	71	460	4	19	392	0
226	666	0	174	597	0	122	528	0	70	459	2	18	390	1
225	664	0	173	596	0	121	527	0	69	458	3	17	389	0
224	663	0	172	594	0	120	525	0	68	456	4	16	388	0
223	662	0	171	593	0	119	524	0	67	455	4	15	386	0
222	660	0	170	592	0	-118	523	0	66	454	0	14	385	0
221	659	0	169	590	0	-117	521	0	65	453	4	13	384	1
220	658	0	168	589	0	-116	520	0	64	451	1	12	382	0
219	656	0	167	588	1	-115	519	2	63	450	0	11	381	0
218	655	0	166	586	0	-114	517	2	62	449	2	10	380	1
217	654	0	165	585	0	-113	516	1	61	447	0	9	378	0
216	653	0	-164	584	0	-112	515	0	60	446	0	8	377	0
215	651	0	-163	582	0	-111	513	2	59	445	2	7	376	0
214	650	0	-162	581	1	-110	512	0	58	443	3	6	374	0
213	649	0	-161	580	0	-109	511	0	57	442	0	5	373	1
212	647	0	-160	578	0	-108	509	0	56	441	0	4	372	0
211	646	0	-159	577	0	-107	508	1	55	439	1	3	370	0
210	645	0	-158	576	1	-106	507	0	54	438	1	2	369	0
209	643	0	-157	574	1	-105	505	0	53	437	0	1	368	0

239
101- 118238
128- 144236
148- 1640
0- 0242
82- 100

record 97

Background spectrum for 6103- 5A1

Pu

0 0

BKG

71.005

2374.52 MIN

SS

40

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	640	0	156	571	4	104	502	0	52	434	0
0	0	0	207	639	0	155	570	5	103	501	0	51	432	0
0	0	0	206	637	2	154	569	5	102	500	0	50	431	0
0	0	0	205	636	2	153	567	5	101	498	1	49	430	0
256	704	0	204	635	0	152	566	2	100	497	0	48	428	0
255	702	0	203	633	4	151	565	0	99	496	0	47	427	0
254	701	0	202	632	5	150	563	1	98	494	0	46	426	0
253	700	0	201	631	4	149	562	0	97	493	0	45	424	0
252	698	0	200	629	4	148	561	0	96	492	0	44	423	0
251	697	0	199	628	0	147	559	1	95	490	0	43	422	0
250	696	0	198	627	1	146	558	0	94	489	0	42	420	0
249	694	0	197	625	0	145	557	0	93	488	0	41	419	0
248	693	0	196	624	0	144	555	0	92	486	1	40	418	0
247	692	0	195	623	0	143	554	0	91	485	0	39	416	0
246	690	0	194	621	0	142	553	1	90	484	0	38	415	0
245	689	0	193	620	0	141	551	2	89	482	0	37	414	0
244	688	0	192	619	0	140	550	2	88	481	0	36	412	0
243	686	0	191	618	1	139	549	4	87	480	0	35	411	1
242	685	1	190	616	0	138	547	2	86	479	0	34	410	0
241	684	5	189	615	0	137	546	3	85	477	0	33	408	0
240	682	4	188	614	0	136	545	3	84	476	0	32	407	0
239	681	0	187	612	2	135	543	9	83	475	0	31	406	0
238	680	4	186	611	2	134	542	7	82	473	1	30	404	0
237	678	1	185	610	1	133	541	4	81	472	0	29	403	0
236	677	0	184	608	0	132	539	2	80	471	0	28	402	0
235	676	0	183	607	0	131	538	2	79	469	0	27	400	0
234	674	0	182	606	0	130	537	2	78	468	0	26	399	0
233	673	1	181	604	0	129	535	2	77	467	0	25	398	0
232	672	0	180	603	0	128	534	6	76	465	0	24	396	0
231	670	0	179	602	0	127	533	1	75	464	0	23	395	0
230	669	0	178	600	0	126	531	0	74	463	0	22	394	0
229	668	0	177	599	1	125	530	0	73	461	0	21	392	0
228	666	0	176	598	1	124	529	0	72	460	0	20	391	0
227	665	0	175	596	1	123	528	1	71	459	0	19	390	0
226	664	0	174	595	0	122	526	0	70	457	0	18	389	0
225	663	0	173	594	0	121	525	0	69	456	0	17	387	0
224	661	0	172	592	0	120	524	0	68	455	0	16	386	0
223	660	0	171	591	0	119	522	0	67	453	0	15	385	0
222	659	0	170	590	0	118	521	0	66	452	0	14	383	0
221	657	0	169	588	0	117	520	0	65	451	0	13	382	0
220	656	0	168	587	0	116	518	0	64	449	0	12	381	0
219	655	0	167	586	0	115	517	1	63	448	0	11	379	0
218	653	0	166	584	1	114	516	1	62	447	0	10	378	0
217	652	0	165	583	0	113	514	1	61	445	0	9	377	0
216	651	0	164	582	0	112	513	0	60	444	0	8	375	0
215	649	0	163	580	0	111	512	0	59	443	0	7	374	0
214	648	0	162	579	1	110	510	0	58	441	0	6	373	0
213	647	0	161	578	0	109	509	0	57	440	0	5	371	0
212	645	0	160	576	0	108	508	1	56	439	0	4	370	0
211	644	0	159	575	1	107	506	0	55	437	0	3	369	0
210	643	0	158	574	2	106	505	0	54	436	0	2	367*****	
209	641	1	157	573	4	105	504	1	53	435	0	1	366*****	

Note: This background was analyzed using an earlier standard than was used for the sample and ROI's may be different

0 0 STD 72.736 27.55 MIN SS 40

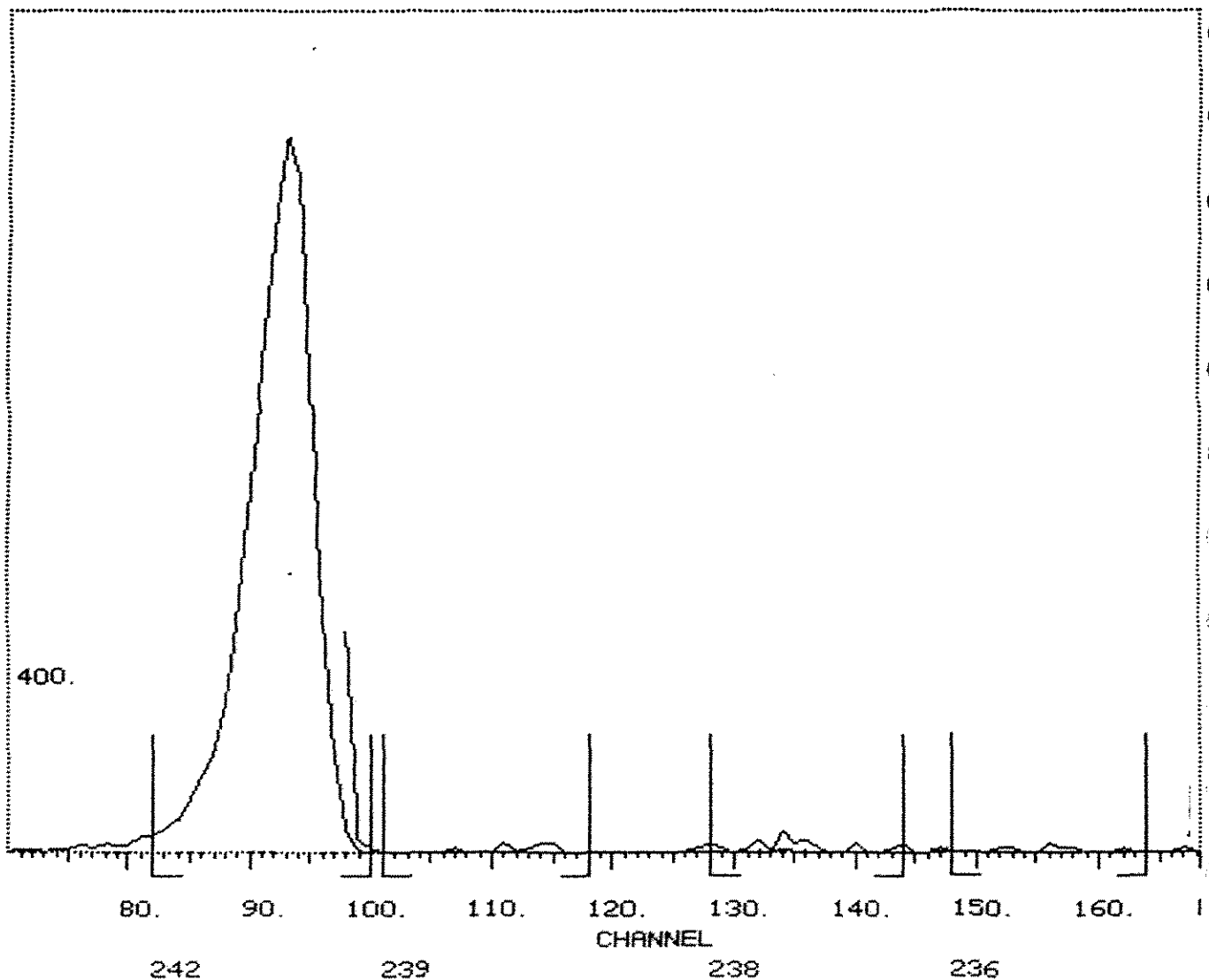
CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	0	0	156	0	394	104	0	161	52	0	3
0	0	0	207	0	1	155	0	257	103	0	106	51	0	12
0	0	0	206	0	0	154	0	150	102	0	65	50	0	6
0	0	0	205	0	1	153	0	122	101	0	70	49	0	5
256	0	0	204	0	0	152	0	74	100	0	57	48	0	3
255	0	0	203	0	0	151	0	51	99	0	176	47	0	3
254	0	0	202	0	0	150	0	57	98	0	531	46	0	6
253	0	0	201	0	0	149	0	42	97	0	1462	45	0	6
252	0	0	200	0	0	148	0	32	96	0	3105	44	0	6
251	0	0	199	0	0	147	0	73	95	0	4882	43	0	6
250	0	0	198	0	0	146	0	207	94	0	5956	42	0	5
249	0	0	197	0	0	145	0	559	93	0	5665	41	0	9
248	0	0	196	0	0	144	0	1106	92	0	4468	40	0	8
247	0	0	195	0	0	143	0	1875	91	0	3186	39	0	2
246	0	0	194	0	0	142	0	2860	90	0	2137	38	0	4
245	0	0	193	0	0	141	0	4018	89	0	1271	37	0	5
244	0	0	192	0	0	140	0	4626	88	0	738	36	0	6
243	0	0	191	0	0	139	0	4481	87	0	454	35	0	3
242	0	0	190	0	0	138	0	3730	86	0	305	34	0	4
241	0	0	189	0	0	137	0	2753	85	0	203	33	0	7
240	0	1	188	0	1	136	0	1651	84	0	131	32	0	3
239	0	0	187	0	0	135	0	1115	83	0	118	31	0	2
238	0	0	186	0	0	134	0	624	82	0	78	30	0	2
237	0	0	185	0	0	133	0	440	81	0	63	29	0	4
236	0	0	184	0	0	132	0	282	80	0	44	28	0	0
235	0	0	183	0	0	131	0	191	79	0	36	27	0	3
234	0	0	182	0	1	130	0	125	78	0	28	26	0	3
233	0	0	181	0	0	129	0	81	77	0	22	25	0	3
232	0	0	180	0	0	128	0	63	76	0	18	24	0	0
231	0	0	179	0	0	127	0	56	75	0	15	23	0	1
230	0	0	178	0	1	126	0	42	74	0	18	22	0	0
229	0	0	177	0	0	125	0	42	73	0	17	21	0	4
228	0	0	176	0	0	124	0	34	72	0	16	20	0	2
227	0	0	175	0	1	123	0	28	71	0	11	19	0	5
226	0	0	174	0	0	122	0	27	70	0	16	18	0	3
225	0	0	173	0	0	121	0	18	69	0	13	17	0	2
224	0	0	172	0	1	120	0	24	68	0	13	16	0	4
223	0	0	171	0	3	119	0	85	67	0	7	15	0	1
222	0	0	170	0	12	118	0	365	66	0	9	14	0	4
221	0	0	169	0	88	117	0	1084	65	0	10	13	0	2
220	0	0	168	0	372	116	0	2616	64	0	9	12	0	2
219	0	0	167	0	1407	115	0	4587	63	0	8	11	0	1
218	0	0	166	0	3250	114	0	5931	62	0	6	10	0	5
217	0	0	165	0	5516	113	0	5916	61	0	8	9	0	1
216	0	1	164	0	7386	112	0	4873	60	0	12	8	0	1
215	0	0	163	0	7731	111	0	3438	59	0	11	7	0	5
214	0	0	162	0	6588	110	0	2171	58	0	9	6	0	2
213	0	0	161	0	4698	109	0	1371	57	0	9	5	0	6
212	0	0	160	0	3088	108	0	848	56	0	3	4	0	2
211	0	0	159	0	1904	107	0	534	55	0	6	3	0	0
210	0	0	158	0	1171	106	0	329	54	0	6	2	0	1646
209	0	0	157	0	667	105	0	200	53	0	7	1	0	1652

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
S	40 EF EFF	72.736	34639	27.5	40.89	38.09 - 44.09	41.09	-0.2
SS	40 CA SLOPE	72.736	0	27.5	13.25	12.85 - 13.50	13.18	0.7
SS	40 CA OFFSET	72.736	0	27.5	3644.	3514. - 3750.	3664.	-0.4
SS	40 RE RES	72.736	0	27.5	68.82	52.07 - 88.95	68.99	-0.3
SS	40 BK Pu239	71.005	5	2374.5	0.002	0.000 - 0.008	0.002	0.0
SS	40 BK Pu238	71.005	45	2374.5	0.019	0.010 - 0.022	0.016	1.4
SS	40 BK Pu236	71.005	31	2374.5	0.013	0.007 - 0.020	0.014	-0.3
SS	40 BK Pu242	71.005	2	2374.5	0.001	0.000 - 0.007	0.001	-1.0

Previous 3 counts	Time	Detector	ID	Length	Cpm
81.697	22-MAR-95 8:43	SS 40	Pu 2851	6 \ 356.3 min	13.53
83.206	23-MAR-95 20:56	SS 40	Pu 2676	2 \ 43.8 min	10.79
83.241	23-MAR-95 21:47	SS 40	Am 2852	2 \ 31.0 min	1.68

SS 40 83.303 95 1014.00 MIN. 6103- 5A1 PU



24-MAR-95
16:29:48
N412026
LGG

TMA Corporation
Alpha Spectroscopy
ASPEC V 4.01

6103- 17 Pu
QC-BLANK #23526

Reviewed lg Date 3-27
Def 4/21/95

Counted on SS 44 1013.37 minutes
GMT 83.304 95
Zero time 83.304 95
GMT of std 58.953 95
Sep. time 0.000 0

Chemical yield (0.6004)

Tracer - Pu242 (H-B1-A-(5) 112.997-94)

39.60 Dpm X 1.0000 = 39.60 Corr. tracer DPM
Drift correction 1.3
(on 71.005 95 for 2378.88 Min.)

Gross cnts 9903.
Background 2
Net counts 9901 1.0%

FWHM Of tracer = 47. KeV

Divisor 2.5003E+02 (net counts / corr. tracer DPM)
Det. Eff 0.4109
Yield 0.6004 (net counts) / (eff. x corr. tracer DPM X time)

Pu239

Pu238

Pu236

Channels 105-122
Bkg CPM 0.00168

131-147
0.00378

151-167
0.00336

	Pu239	Pu238	Pu236
Gross cnts	0	5	3
Background	2	4	3
Tracer cts	0 0	0 0	0 0
Net counts	-2 1	1 3	0 2

	(7.7775E-08)	(2.2005E-05)	(6.6560E-04)
Decay corr	1.0000	1.0000	1.0000
Brnch ratio	1.0000	1.0000	1.0000

	-7.9992E-03	3.9996E-03	0.0000E-01
DPM of aliq	-7.9992E-03	3.9996E-03	0.0000E-01
Aliquot	1.0000E+00	1.0000E+00	1.0000E+00
Dpm/smpl	-7.9992E-03	3.9996E-03	0.0000E-01

	-3.603E-03	1.802E-03	0.000E-01
pCi /smpl	-3.603E-03	1.802E-03	0.000E-01

	50.0%	300.0%	0.0%
1 sigma Err	50.0%	300.0%	0.0%
pCi Err	1.802E-03	5.405E-03	3.603E-03

	100.0%	600.0%	0.0%
2 sigma Err	100.0%	600.0%	0.0%
pCi Err	3.604E-03	1.081E-02	7.206E-03

	< 2.97E-03	< 1.07E-02	< 5.95E-03
Limitng Vlu	< 2.97E-03	< 1.07E-02	< 5.95E-03
MDA	1.73E-02	2.22E-02	1.99E-02

QC-23526

Added = 0 kg 3/27/95

6103 17

Pu

83.304

1013.37 MIN

SS

44

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	640	0	-156	569	0	-104	499	1	52	429	0
0	0	0	207	638	0	-155	568	0	-103	498	0	51	427	0
0	0	0	206	637	0	-154	567	0	-102	496	0	50	426	1
0	0	0	205	636	0	-153	565	1	-101	495	0	49	425	0
256	705	0	204	634	0	-152	564	0	-100	494	0	48	423	0
255	703	0	203	633	2	-151	563	0	-99	492	22	47	422	0
254	702	0	202	632	0	150	561	0	-98	491	655	46	421	2
253	701	0	201	630	0	149	560	0	-97	490	2269	45	419	0
252	699	0	200	629	0	148	559	0	-96	488	2236	44	418	1
251	698	0	199	628	0	-147	557	0	-95	487	1431	43	417	0
250	697	0	198	626	0	-146	556	0	-94	486	1055	42	415	0
249	695	0	197	625	0	-145	555	0	-93	484	785	41	414	0
248	694	0	196	623	0	-144	553	0	-92	483	469	40	413	0
247	692	0	195	622	0	-143	552	0	-91	481	304	39	411	0
246	691	0	194	621	0	-142	550	0	-90	480	242	38	410	0
245	690	0	193	619	0	-141	549	0	-89	479	178	37	408	1
244	688	0	192	618	0	-140	548	0	-88	477	110	36	407	0
243	687	0	191	617	0	-139	546	0	-87	476	93	35	406	2
242	686	0	190	615	0	-138	545	1	-86	475	53	34	404	0
241	684	0	189	614	0	-137	544	0	85	473	52	33	403	0
240	683	0	188	613	0	-136	542	2	84	472	33	32	402	1
239	682	1	187	611	0	-135	541	2	83	471	24	31	400	0
238	680	1	186	610	0	-134	540	0	82	469	27	30	399	0
237	679	0	185	609	0	-133	538	0	81	468	20	29	398	1
236	678	0	184	607	0	-132	537	0	80	467	10	28	396	0
235	676	0	183	606	0	-131	536	0	79	465	9	27	395	1
234	675	0	182	605	0	130	534	1	78	464	8	26	394	0
233	674	0	181	603	0	129	533	0	77	463	9	25	392	0
232	672	0	180	602	0	128	532	0	76	461	9	24	391	1
231	671	0	179	600	0	127	530	0	75	460	3	23	390	0
230	669	0	178	599	0	126	529	1	74	458	7	22	388	0
229	668	0	177	598	0	125	527	0	73	457	1	21	387	0
228	667	0	176	596	0	124	526	0	72	456	4	20	385	0
227	665	0	175	595	0	123	525	1	71	454	1	19	384	0
226	664	0	174	594	0	-122	523	0	70	453	4	18	383	0
225	663	0	173	592	0	-121	522	0	69	452	2	17	381	0
224	661	0	172	591	0	-120	521	0	68	450	1	16	380	1
223	660	0	171	590	0	-119	519	0	67	449	1	15	379	1
222	659	0	170	588	0	-118	518	0	66	448	2	14	377	0
221	657	0	169	587	0	-117	517	0	65	446	1	13	376	0
220	656	0	168	586	0	-116	515	0	64	445	0	12	375	1
219	655	0	-167	584	0	-115	514	0	63	444	0	11	373	0
218	653	0	-166	583	0	-114	513	0	62	442	0	10	372	0
217	652	0	-165	582	0	-113	511	0	61	441	1	9	371	0
216	651	0	-164	580	0	-112	510	0	60	440	1	8	369	0
215	649	0	-163	579	0	-111	509	0	59	438	0	7	368	0
214	648	0	-162	577	0	-110	507	0	58	437	1	6	367	0
213	646	0	-161	576	1	-109	506	0	57	435	0	5	365	0
212	645	0	-160	575	0	-108	504	0	56	434	0	4	364	0
211	644	0	-159	573	0	-107	503	0	55	433	3	3	362	0
210	642	0	-158	572	0	-106	502	0	54	431	0	2	361	0
209	641	0	-157	571	1	-105	500	0	53	430	0	1	360	0

239
105- 122238
131- 147236
151- 1670
0- 0242
86- 104

0 0

BKG

71.005

2378.88 MIN

SS

44

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	638	0	156	568	1	104	497	1	52	427	0
0	0	0	207	637	0	155	566	0	103	496	0	51	426	1
0	0	0	206	635	0	154	565	0	102	495	1	50	424	0
0	0	0	205	634	0	153	564	0	101	493	0	49	423	0
256	703	0	204	633	0	152	562	1	100	492	0	48	422	0
255	701	0	203	631	1	151	561	1	99	491	0	47	420	0
254	700	0	202	630	1	150	559	0	98	489	0	46	419	0
253	699	0	201	628	0	149	558	0	97	488	0	45	417	0
252	697	0	200	627	0	148	557	0	96	486	2	44	416	0
251	696	0	199	626	0	147	555	0	95	485	0	43	415	0
250	695	0	198	624	0	146	554	0	94	484	1	42	413	0
249	693	0	197	623	0	145	553	1	93	482	0	41	412	0
248	692	0	196	622	0	144	551	0	92	481	0	40	411	0
247	691	0	195	620	0	143	550	0	91	480	0	39	409	0
246	689	0	194	619	0	142	549	0	90	478	0	38	408	0
245	688	0	193	618	0	141	547	0	89	477	0	37	407	0
244	687	0	192	616	0	140	546	0	88	476	0	36	405	0
243	685	0	191	615	0	139	545	2	87	474	0	35	404	0
242	684	0	190	614	0	138	543	0	86	473	0	34	403	0
241	683	0	189	612	0	137	542	3	85	472	0	33	401	0
240	681	0	188	611	0	136	541	1	84	470	0	32	400	0
239	680	0	187	610	0	135	539	1	83	469	0	31	399	1
238	679	1	186	608	0	134	538	0	82	468	0	30	397	0
237	677	0	185	607	0	133	537	0	81	466	0	29	396	0
236	676	0	184	605	0	132	535	1	80	465	0	28	395	0
235	674	0	183	604	0	131	534	1	79	463	0	27	393	0
234	673	0	182	603	0	130	532	1	78	462	0	26	392	0
233	672	0	181	601	0	129	531	0	77	461	0	25	390	0
232	670	0	180	600	0	128	530	0	76	459	0	24	389	1
231	669	0	179	599	0	127	528	0	75	458	0	23	388	0
230	668	0	178	597	0	126	527	0	74	457	0	22	386	0
229	666	0	177	596	0	125	526	0	73	455	0	21	385	0
228	665	0	176	595	0	124	524	0	72	454	0	20	384	0
227	664	0	175	593	0	123	523	0	71	453	0	19	382	0
226	662	0	174	592	0	122	522	0	70	451	1	18	381	0
225	661	0	173	591	0	121	520	0	69	450	0	17	380	0
224	660	0	172	589	0	120	519	0	68	449	0	16	378	0
223	658	0	171	588	0	119	518	0	67	447	1	15	377	0
222	657	0	170	587	0	118	516	0	66	446	0	14	376	0
221	656	0	169	585	0	117	515	0	65	445	0	13	374	0
220	654	0	168	584	0	116	514	1	64	443	0	12	373	0
219	653	0	167	582	0	115	512	0	63	442	0	11	372	0
218	651	0	166	581	0	114	511	0	62	440	0	10	370	0
217	650	0	165	580	1	113	509	0	61	439	1	9	369	0
216	649	0	164	578	0	112	508	1	60	438	0	8	367	0
215	647	0	163	577	0	111	507	0	59	436	0	7	366	0
214	646	0	162	576	0	110	505	1	58	435	0	6	365	1
213	645	0	161	574	0	109	504	0	57	434	0	5	363	0
212	643	0	160	573	1	108	503	1	56	432	0	4	362	0
211	642	0	159	572	0	107	501	0	55	431	0	3	361	0
0	641	0	158	570	1	106	500	0	54	430	0	2	359*****	
209	639	0	157	569	3	105	499	0	53	428	0	1	358*****	

0 0

STD

58.953

114.43 MIN

SS

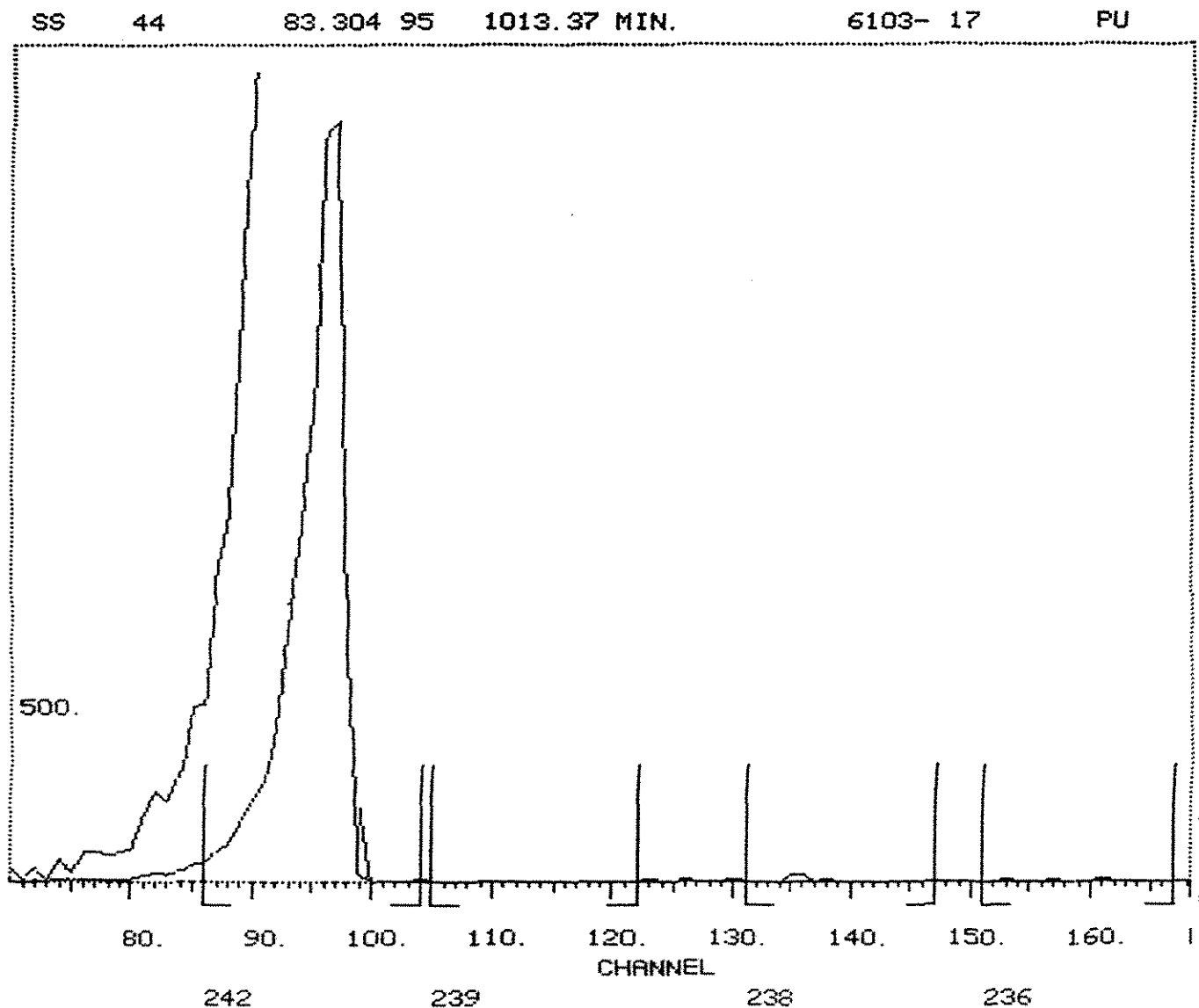
44

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	0	0	156	0	1312	104	0	336	52	0	16
0	0	0	207	0	0	155	0	892	103	0	226	51	0	10
0	0	0	206	0	0	154	0	673	102	0	203	50	0	20
0	0	0	205	0	0	153	0	420	101	0	135	49	0	15
256	0	0	204	0	2	152	0	317	100	0	106	48	0	18
255	0	0	203	0	2	151	0	211	99	0	101	47	0	14
254	0	0	202	0	1	150	0	151	98	0	6088	46	0	11
253	0	0	201	0	0	149	0	121	97	0	041976	45	0	13
252	0	0	200	0	2	148	0	83	96	0	034199	44	0	8
251	0	0	199	0	0	147	0	62	95	0	020566	43	0	14
250	0	0	198	0	1	146	0	315	94	0	015083	42	0	15
249	0	0	197	0	0	145	0	2976	93	0	09984	41	0	10
248	0	0	196	0	0	144	0	7039	92	0	05679	40	0	14
247	0	0	195	0	0	143	0	010970	91	0	03550	39	0	13
246	0	0	194	0	0	142	0	015665	90	0	02342	38	0	16
245	0	0	193	0	0	141	0	028956	89	0	01579	37	0	14
244	0	0	192	0	0	140	0	024519	88	0	01119	36	0	14
243	0	0	191	0	1	139	0	013925	87	0	0727	35	0	11
242	0	0	190	0	1	138	0	08991	86	0	0551	34	0	12
241	0	0	189	0	0	137	0	05621	85	0	0420	33	0	10
240	0	0	188	0	0	136	0	03406	84	0	0297	32	0	15
239	0	0	187	0	0	135	0	02236	83	0	0225	31	0	16
238	0	0	186	0	0	134	0	01533	82	0	0188	30	0	8
237	0	0	185	0	0	133	0	01115	81	0	0139	29	0	6
236	0	0	184	0	0	132	0	0738	80	0	085	28	0	7
235	0	0	183	0	1	131	0	0551	79	0	080	27	0	12
234	0	0	182	0	0	130	0	0328	78	0	075	26	0	11
233	0	1	181	0	0	129	0	0231	77	0	041	25	0	13
232	0	0	180	0	0	128	0	0181	76	0	038	24	0	11
231	0	0	179	0	0	127	0	0189	75	0	043	23	0	6
230	0	0	178	0	2	126	0	0148	74	0	035	22	0	12
229	0	0	177	0	1	125	0	0100	73	0	036	21	0	10
228	0	1	176	0	0	124	0	071	72	0	034	20	0	12
227	0	0	175	0	1	123	0	067	71	0	028	19	0	5
226	0	0	174	0	1	122	0	058	70	0	029	18	0	10
225	0	1	173	0	2	121	0	038	69	0	022	17	0	12
224	0	0	172	0	3	120	0	033	68	0	015	16	0	10
223	0	0	171	0	2	119	0	034	67	0	016	15	0	7
222	0	0	170	0	2	118	0	0393	66	0	020	14	0	7
221	0	0	169	0	1	117	0	010720	65	0	017	13	0	10
220	0	0	168	0	1	116	0	044039	64	0	025	12	0	11
219	0	0	167	0	8	115	0	035392	63	0	016	11	0	9
218	0	0	166	0	1845	114	0	019538	62	0	022	10	0	7
217	0	0	165	0	041399	113	0	012018	61	0	021	9	0	8
216	0	1	164	0	056494	112	0	08413	60	0	019	8	0	5
215	0	0	163	0	033041	111	0	04933	59	0	019	7	0	8
214	0	0	162	0	022857	110	0	03039	58	0	011	6	0	5
213	0	0	161	0	015638	109	0	02035	57	0	010	5	0	8
212	0	0	160	0	08586	108	0	01344	56	0	012	4	0	12
211	0	1	159	0	04943	107	0	0925	55	0	013	3	0	6
210	0	0	158	0	03061	106	0	0646	54	0	012	2	0	6774
209	0	0	157	0	01934	105	0	0508	53	0	020	1	0	6859

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
S	44 EF EFF	58.953	143665	114.4	41.09	38.01 - 44.01	41.03	0.1
SS	44 CA SLOPE	58.953	0	114.4	13.52	13.23 - 13.88	13.55	-0.3
SS	44 CA OFFSET	58.953	0	114.4	3571.	3429. - 3729.	3577.	-0.1
SS	44 RE RES	58.953	0	114.4	33.87	20.00 - 49.04	33.66	0.0
SS	44 BK Pu239	71.005	4	2378.9	0.002	0.000 - 0.008	0.002	0.0
SS	44 BK Pu238	71.005	9	2378.9	0.004	0.000 - 0.008	0.002	0.8
SS	44 BK Pu236	71.005	8	2378.9	0.003	0.000 - 0.008	0.002	0.5
SS	44 BK Pu242	71.005	5	2378.9	0.002	0.000 - 0.007	0.001	0.4

Previous	3 counts	Time	Detector	ID	Length	Cpm
80.767	21-MAR-95	10:24	SS 44	Am 2851	5 \ 2874.1 min	1.43
83.207	23-MAR-95	20:58	SS 44	Pu 7428	2 \ 44.3 min	9.53
83.241	23-MAR-95	21:47	SS 44	Am 2852	6 \ 31.4 min	8.91



24-MAR-95
16:30:47
N412026
LGG

TMA Corporation
Alpha Spectroscopy
ASPEC V 4.01

6103- 18 Pu
QC-LCS #23527

Reviewed F Date 3-27
3-30
J. P. Pappas

Counted on SS 45 1013.37 minutes
GMT 83.304 95
Zero time 83.304 95
GMT of std 58.953 95
Sep. time 0.000 0

Chemical yield 0.6798

Tracer - Pu242 (H-B1-A-(5) 112.997-94)
39.60 Dpm X 1.0000 = 39.60 Corr. tracer DPM
Channels 85-103 Drift correction 1.4
Bkg CPM 0.00210 (on 71.005 95 for 2378.88 Min.)
Gross cnts 11175.
Background 2
Net counts 11173 / 0.9% / FWHM of tracer = 48. KeV
Divisor 2.8215E+02 (net counts / corr. tracer DPM)
Det. Eff 0.4096
Yield 0.6798 (net counts) / (eff. x corr. tracer DPM X time)

	<u>Pu239</u>	<u>Pu238</u>	Pu236
Channels	104-120	129-144	148-163
Bkg CPM	0.00168	0.00294	0.00126
Gross cnts	600	610	3
Background	2	3	1
Tracer cts	0 / 0	0 / 0	0 0
Net counts	598 25	607 25	2 2
Lambda	(7.7775E-08)	(2.2005E-05)	(6.6560E-04)
Decay corr	1.0000	1.0000	1.0000
Brnch ratio	1.0000	1.0000	1.0000

DPM of aliq	2.1195E+00	2.1514E+00	7.0885E-03
Aliquot	1.0000E+00	1.0000E+00	1.0000E+00
Dpm/smpl	2.1195E+00	2.1514E+00	7.0885E-03

pCi /smpl	<u>9.547E-01</u> ✓	<u>9.691E-01</u> /	3.193E-03
1 sigma Err	4.3%	4.2%	100.0%
pCi Err	4.093E-02	4.096E-02	3.193E-03
2 sigma Err	8.6%	8.5%	200.0%
pCi Err	8.186E-02	8.192E-02	6.386E-03
Limitng Vlu	< 1.02E+00	< 1.04E+00	< 8.46E-03
MDA	1.53E-02	1.76E-02	1.22E-02

QC-23527 Pu-239 2σ Pu-238 2σ
Added = 0.9261 pCi (±4%) 1.040 pCi (±4%)
F/A = 1.031 (±9%) 0.932 (±9%) Ky 3/27/95

6103 18

Pu

83.304

1013.37 MIN

SS

45

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	647	0	-156	574	0	-104	501	5	52	428	1
0	0	0	207	645	0	-155	572	2	-103	499	1	51	427	1
0	0	0	206	644	0	-154	571	0	-102	498	1	50	425	0
0	0	0	205	642	0	-153	569	0	-101	497	1	49	424	2
256	714	0	204	641	0	-152	568	0	-100	495	4	48	422	1
255	712	0	203	640	0	-151	567	0	-99	494	0	47	421	0
254	711	0	202	638	0	-150	565	0	-98	492	66	46	420	0
253	710	0	201	637	0	-149	564	0	-97	491	1308	45	418	0
252	708	0	200	635	0	-148	562	0	-96	490	2679	44	417	0
251	707	0	199	634	0	147	561	0	-95	488	2218	43	415	0
250	705	0	198	633	0	146	560	1	-94	487	1490	42	414	0
249	704	0	197	631	0	145	558	0	-93	485	1158	41	413	1
248	703	0	196	630	0	-144	557	0	-92	484	731	40	411	0
247	701	0	195	628	0	-143	555	0	-91	483	502	39	410	0
246	700	0	194	627	0	-142	554	0	-90	481	319	38	408	0
245	698	0	193	625	0	-141	553	12	-89	480	253	37	407	1
244	697	0	192	624	0	-140	551	105	-88	478	165	36	406	0
243	696	0	191	623	0	-139	550	164	-87	477	116	35	404	0
242	694	0	190	621	0	-138	548	103	-86	476	87	34	403	0
241	693	0	189	620	0	-137	547	72	-85	474	76	33	401	0
240	691	0	188	618	0	-136	546	53	84	473	51	32	400	0
239	690	1	187	617	0	-135	544	36	83	471	41	31	399	0
238	689	0	186	616	0	-134	543	24	82	470	35	30	397	0
237	687	0	185	614	0	-133	541	13	81	469	25	29	396	0
236	686	0	184	613	0	-132	540	12	80	467	18	28	394	0
235	684	1	183	611	0	-131	539	9	79	466	15	27	393	2
234	683	1	182	610	0	-130	537	3	78	464	14	26	392	0
233	682	0	181	609	0	-129	536	4	77	463	9	25	390	0
232	680	0	180	607	0	128	534	3	76	462	7	24	389	0
231	679	0	179	606	0	127	533	4	75	460	9	23	387	0
230	677	0	178	604	1	126	532	1	74	459	5	22	386	0
229	676	0	177	603	0	125	530	3	73	457	3	21	385	0
228	675	0	176	602	0	124	529	1	72	456	6	20	383	0
227	673	0	175	600	0	123	527	0	71	455	7	19	382	0
226	672	0	174	599	0	122	526	0	70	453	3	18	380	0
225	670	0	173	597	0	121	525	0	69	452	1	17	379	0
224	669	0	172	596	0	-120	523	0	68	450	1	16	377	0
223	668	0	171	595	0	-119	522	0	67	449	4	15	376	1
222	666	0	170	593	0	-118	520	0	66	448	2	14	375	0
221	665	0	169	592	0	-117	519	1	65	446	1	13	373	0
220	663	0	168	590	0	-116	518	12	64	445	3	12	372	0
219	662	0	167	589	0	-115	516	122	63	443	3	11	370	0
218	661	0	166	588	0	-114	515	150	62	442	0	10	369	0
217	659	0	165	586	0	-113	513	104	61	441	2	9	368	0
216	658	0	164	585	0	-112	512	76	60	439	2	8	366	3
215	656	0	-163	583	0	-111	511	41	59	438	0	7	365	0
214	655	0	-162	582	0	-110	509	32	58	436	1	6	363	0
213	654	0	-161	581	0	-109	508	18	57	435	1	5	362	0
212	652	0	-160	579	0	-108	506	17	56	434	0	4	361	0
211	651	0	-159	578	1	-107	505	9	55	432	0	3	359	0
210	649	0	-158	576	0	-106	504	8	54	431	0	2	358	0
209	648	0	-157	575	0	-105	502	5	53	429	1	1	356	0

239
104- 120238
129- 144236
148- 1630
0- 0242
85- 103

0 0

BKG

71.005

2378.88 MIN

SS

45

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	645	1	156	572	0	104	499	0	52	426	0
0	0	0	207	643	0	155	570	1	103	497	0	51	425	0
0	0	0	206	642	0	154	569	1	102	496	1	50	423	0
0	0	0	205	640	0	153	567	0	101	495	0	49	422	0
256	712	0	204	639	0	152	566	0	100	493	0	48	420	0
255	710	0	203	638	0	151	565	0	99	492	0	47	419	0
254	709	0	202	636	0	150	563	0	98	490	0	46	418	0
253	708	0	201	635	0	149	562	0	97	489	1	45	416	0
252	706	0	200	633	0	148	560	0	96	488	0	44	415	0
251	705	0	199	632	0	147	559	0	95	486	0	43	413	0
250	703	0	198	631	0	146	558	2	94	485	2	42	412	0
249	702	0	197	629	0	145	556	0	93	483	1	41	411	0
248	701	0	196	628	0	144	555	0	92	482	0	40	409	0
247	699	0	195	626	0	143	553	0	91	481	0	39	408	0
246	698	0	194	625	0	142	552	0	90	479	0	38	406	0
245	696	0	193	623	0	141	551	0	89	478	0	37	405	0
244	695	0	192	622	0	140	549	0	88	476	0	36	404	0
243	694	0	191	621	0	139	548	1	87	475	0	35	402	0
242	692	0	190	619	0	138	546	0	86	474	1	34	401	0
241	691	0	189	618	0	137	545	0	85	472	0	33	399	0
240	689	0	188	616	0	136	544	4	84	471	0	32	398	0
239	688	0	187	615	0	135	542	2	83	469	0	31	397	0
238	687	0	186	614	0	134	541	0	82	468	0	30	395	0
237	685	0	185	612	0	133	539	0	81	467	0	29	394	0
236	684	0	184	611	0	132	538	0	80	465	0	28	392	0
235	682	0	183	609	0	131	537	0	79	464	0	27	391	1
234	681	1	182	608	0	130	535	0	78	462	0	26	390	0
233	680	1	181	607	1	129	534	0	77	461	0	25	388	0
232	678	0	180	605	0	128	532	0	76	460	0	24	387	0
231	677	0	179	604	1	127	531	0	75	458	0	23	385	0
230	675	1	178	602	0	126	530	0	74	457	0	22	384	0
229	674	0	177	601	0	125	528	0	73	455	0	21	383	0
228	673	0	176	600	0	124	527	1	72	454	0	20	381	0
227	671	0	175	598	0	123	525	0	71	453	0	19	380	0
226	670	0	174	597	0	122	524	0	70	451	0	18	378	0
225	668	0	173	595	0	121	523	0	69	450	0	17	377	0
224	667	0	172	594	0	120	521	0	68	448	0	16	375	0
223	666	0	171	593	0	119	520	0	67	447	0	15	374	0
222	664	0	170	591	0	118	518	0	66	446	0	14	373	0
221	663	0	169	590	0	117	517	1	65	444	0	13	371	0
220	661	0	168	588	0	116	516	0	64	443	0	12	370	0
219	660	0	167	587	0	115	514	1	63	441	0	11	368	0
218	659	0	166	586	0	114	513	0	62	440	0	10	367	0
217	657	0	165	584	0	113	511	1	61	439	0	9	366	0
216	656	0	164	583	0	112	510	0	60	437	0	8	364	1
215	654	0	163	581	0	111	509	0	59	436	0	7	363	0
214	653	0	162	580	0	110	507	1	58	434	0	6	361	0
213	652	0	161	579	0	109	506	0	57	433	0	5	360	0
212	650	0	160	577	1	108	504	0	56	432	0	4	359	0
211	649	0	159	576	0	107	503	0	55	430	0	3	357	0
210	647	0	158	574	0	106	502	0	54	429	0	2	356*****	
209	646	0	157	573	0	105	500	0	53	427	0	1	354*****	

0 0

STD

58.953

114.43 MIN

SS

45

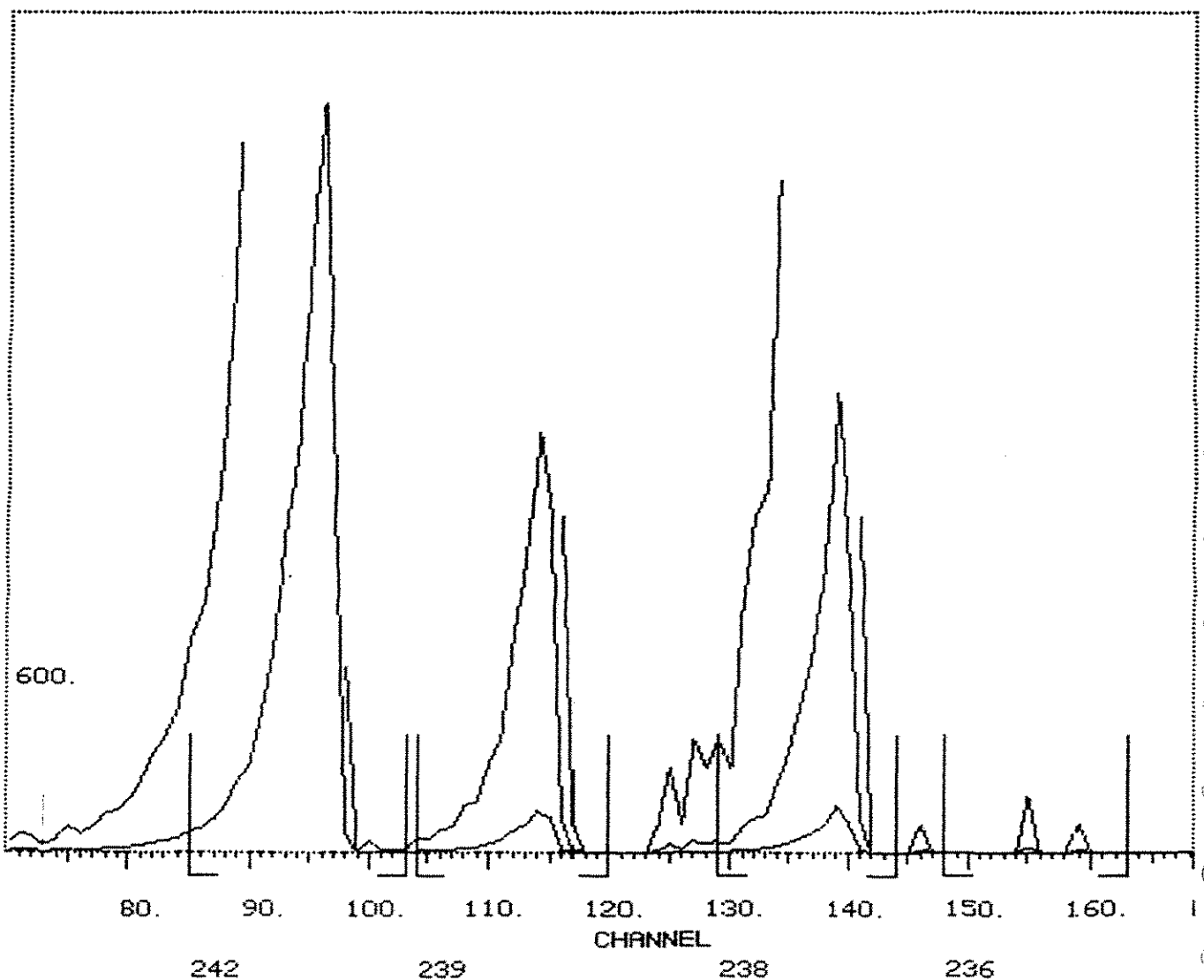
CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	0	0	156	0	5906	104	0	525	52	0	28
0	0	0	207	0	0	155	0	3664	103	0	377	51	0	28
0	0	0	206	0	2	154	0	2336	102	0	252	50	0	23
0	0	0	205	0	1	153	0	1575	101	0	178	49	0	28
256	0	0	204	0	0	152	0	1059	100	0	147	48	0	18
255	0	0	203	0	0	151	0	725	99	0	113	47	0	23
254	0	1	202	0	0	150	0	501	98	0	327	46	0	14
253	0	0	201	0	0	149	0	341	97	0	20526	45	0	24
252	0	1	200	0	0	148	0	228	96	0	047651	44	0	18
251	0	0	199	0	0	147	0	159	95	0	029239	43	0	26
250	0	1	198	0	0	146	0	138	94	0	019365	42	0	17
249	0	1	197	0	0	145	0	94	93	0	014295	41	0	22
248	0	0	196	0	1	144	0	122	92	0	08220	40	0	12
247	0	0	195	0	1	143	0	1805	91	0	04834	39	0	27
246	0	0	194	0	0	142	0	6299	90	0	03002	38	0	15
245	0	2	193	0	0	141	0	11560	89	0	02050	37	0	25
244	0	0	192	0	0	140	0	016032	88	0	01422	36	0	13
243	0	0	191	0	0	139	0	031199	87	0	0965	35	0	8
242	0	1	190	0	0	138	0	032212	86	0	0651	34	0	19
241	0	0	189	0	0	137	0	018190	85	0	0467	33	0	16
240	0	0	188	0	1	136	0	011527	84	0	0376	32	0	13
239	0	0	187	0	0	135	0	07424	83	0	0266	31	0	20
238	0	0	186	0	1	134	0	04374	82	0	0172	30	0	15
237	0	0	185	0	0	133	0	02808	81	0	0161	29	0	22
236	0	0	184	0	0	132	0	01903	80	0	0114	28	0	24
235	0	1	183	0	2	131	0	01309	79	0	0114	27	0	12
234	0	1	182	0	0	130	0	0818	78	0	083	26	0	12
233	0	0	181	0	1	129	0	0598	77	0	064	25	0	18
232	0	0	180	0	1	128	0	0404	76	0	064	24	0	9
231	0	0	179	0	0	127	0	0292	75	0	063	23	0	14
230	0	0	178	0	2	126	0	0259	74	0	048	22	0	16
229	0	0	177	0	2	125	0	0238	73	0	058	21	0	19
228	0	0	176	0	1	124	0	0183	72	0	048	20	0	11
227	0	0	175	0	1	123	0	0126	71	0	052	19	0	15
226	0	0	174	0	0	122	0	096	70	0	033	18	0	21
225	0	0	173	0	1	121	0	084	69	0	047	17	0	13
224	0	0	172	0	0	120	0	043	68	0	042	16	0	19
223	0	1	171	0	0	119	0	061	67	0	031	15	0	17
222	0	0	170	0	2	118	0	053	66	0	028	14	0	20
221	0	0	169	0	3	117	0	0130	65	0	028	13	0	10
220	0	0	168	0	1	116	0	04230	64	0	024	12	0	9
219	0	0	167	0	3	115	0	039526	63	0	039	11	0	14
218	0	0	166	0	1	114	0	044723	62	0	036	10	0	18
217	0	1	165	0	5	113	0	024942	61	0	023	9	0	14
216	0	0	164	0	20	112	0	015051	60	0	023	8	0	18
215	0	1	163	0	1132	111	0	010147	59	0	034	7	0	8
214	0	0	162	0	044326	110	0	05949	58	0	043	6	0	12
213	0	1	161	0	071002	109	0	03816	57	0	029	5	0	19
212	0	1	160	0	041810	108	0	02363	56	0	020	4	0	8
211	0	0	159	0	028978	107	0	01576	55	0	017	3	0	12
210	0	1	158	0	019236	106	0	01047	54	0	024	2	0	6763
209	0	1	157	0	010436	105	0	0747	53	0	018	1	0	6859

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
J	45 EF EFF	58.953	154488	114.4	40.96	37.92 - 43.92	40.94	0.0
SS	45 CA SLOPE	58.953	0	114.4	14.01	13.69 - 14.48	14.07	-0.5
SS	45 CA OFFSET	58.953	0	114.4	3536.	3400. - 3682.	3533.	0.1
SS	45 RE RES	58.953	0	114.4	38.49	20.00 - 49.89	35.15	0.7
SS	45 BK Pu239	71.005	4	2378.9	0.002	0.000 - 0.008	0.002	-0.2
SS	45 BK Pu238	71.005	7	2378.9	0.003	0.000 - 0.010	0.003	-0.2
SS	45 BK Pu236	71.005	3	2378.9	0.001	0.000 - 0.013	0.003	-1.8
SS	45 BK Pu242	71.005	5	2378.9	0.002	0.000 - 0.012	0.002	0.0

Previous 3 counts	Time	Detector	ID	Length	Cpm
80.767	21-MAR-95 10:24	SS 45	Am 2851	6 \ 2874.1 min	1.91
83.207	23-MAR-95 20:58	SS 45	Pu 7428	3 \ 44.3 min	8.49
83.241	23-MAR-95 21:47	SS 45	Am 2852	7 \ 31.4 min	1.72

SS 45 83.304 95 1013.37 MIN. 6103- 18 PU



27-MAR-95
10:52:43
N412026
LGG

TMA Corporation
Alpha Spectroscopy
ASPEC V 4.01

6103- 17 Th
QC-BLANK #23526

Reviewed ☒ Date 3-27-95

Counted on SS 18 541.23 minutes
GMT 84.324 95
Zero time 81.767 95
GMT of std 83.806 95
Sep. time 81.767 95

** RECALCULATED DATA **

Chemical yield 0.5956

Tracer - Th229 (B1-C

128.795-84)

11.82 Dpm X 0.9990 = 11.81 Corr. tracer DPM

Channels 78-112*
Bkg CPM 0.00526

(on 78.044 95 for 2469.63 Min.

Gross cnts 1166.
Background 3
Th228 corr 0
Net counts 1163 / 2.9%

FWHM Of tracer = 67. KeV

Divisor 9.8494E+01
Det. Eff 0.3056
Yield 0.5956

(net counts / corr. tracer DPM)

(net counts) / (eff. x corr. tracer DPM X time)

Th227

Th228

Th230

Th232

Channels 137-182
Bkg CPM 0.00810

113-136*
0.00567

51- 77*
0.00283

9- 37
0.00000

Gross cnts 22
Background 4
Tracer cts 4 1
Net counts 14 5

4
3
0 0
1 / 3

25
2
3 1
20 / 5

0
0
1 0
-1 / 1

Lambda (3.8085E-02)
Decay corr 0.9072
Brnch ratio 1.0000

(9.9358E-04)
0.9975
1.0000

(2.4645E-08)
1.0000
1.0000

(1.3555E-13)
1.0000
1.0000

DPM of aliq 1.5204E-01
Aliquot 1.0000E+00
Dpm/smpl 1.5204E-01

1.0179E-02
1.0000E+00
1.0179E-02

2.0306E-01
1.0000E+00
2.0306E-01

-1.0153E-02
1.0000E+00
-1.0153E-02

pCi /smpl 6.849E-02

4.585E-03

9.147E-02

-4.573E-03

1 sigma Err 36.9%
pCi Err 2.528E-02

300.0%
1.376E-02

25.2%
2.302E-02

100.0%
4.575E-03

2 sigma Err 73.8%
pCi Err 5.057E-02

600.0%
2.751E-02

50.3%
4.605E-02

200.1%
9.151E-03

Limitng Vlu < 1.10E-01
MDA 6.75E-02

< 2.73E-02
5.07E-02

< 1.29E-01
5.06E-02

< 7.55E-03
3.50E-02

QC-23526

Added = 0 Ky 3/27/95

6103 17

Th

84.324

541.23 MIN

SS

18

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	650	0	-156	577	2	-104	504	34	-52	431	0
0	0	0	207	649	0	-155	576	0	-103	502	24	-51	429	0
0	0	0	206	648	1	-154	574	0	-102	501	35	50	428	0
0	0	0	205	646	1	-153	573	2	-101	500	43	49	426	0
256	718	0	204	645	1	-152	572	0	-100	498	57	48	425	2
255	717	2	203	643	1	-151	570	0	-99	497	64	47	424	0
254	715	0	202	642	0	-150	569	0	-98	495	59	46	422	0
253	714	1	201	641	1	-149	567	1	-97	494	84	45	421	0
252	712	1	200	639	0	-148	566	1	-96	493	82	44	419	0
251	711	0	199	638	2	-147	564	0	-95	491	103	43	418	0
250	710	0	198	636	0	-146	563	1	-94	490	88	42	416	0
249	708	0	197	635	1	-145	562	0	-93	488	85	41	415	0
248	707	0	196	634	0	-144	560	1	-92	487	52	40	414	0
247	705	0	195	632	1	-143	559	0	-91	486	52	39	412	0
246	704	0	194	631	0	-142	557	0	-90	484	33	38	411	0
245	703	0	193	629	0	-141	556	0	-89	483	21	-37	409	0
244	701	0	192	628	0	-140	555	0	-88	481	22	-36	408	0
243	700	0	191	627	0	-139	553	0	-87	480	15	-35	407	0
242	698	0	190	625	0	-138	552	1	-86	479	18	-34	405	0
241	697	0	189	624	0	-137	550	0	-85	477	11	-33	404	0
240	696	0	188	622	0	-136	549	0	-84	476	10	-32	402	0
239	694	0	187	621	1	-135	548	0	-83	474	8	-31	401	0
238	693	0	186	619	2	-134	546	0	-82	473	8	-30	400	0
237	691	0	185	618	0	-133	545	1	-81	471	3	-29	398	0
236	690	0	184	617	1	-132	543	0	-80	470	3	-28	397	0
235	689	1	183	615	0	-131	542	0	-79	469	7	-27	395	0
234	687	0	182	614	0	-130	541	0	-78	467	3	-26	394	0
233	686	1	181	612	1	-129	539	0	-77	466	1	-25	393	0
232	684	0	180	611	0	-128	538	0	-76	464	3	-24	391	0
231	683	0	179	610	2	-127	536	1	-75	463	3	-23	390	0
230	681	0	178	608	0	-126	535	0	-74	462	3	-22	388	0
229	680	0	177	607	0	-125	533	0	-73	460	1	-21	387	0
228	679	0	176	605	0	-124	532	0	-72	459	2	-20	385	0
227	677	0	175	604	0	-123	531	0	-71	457	1	-19	384	0
226	676	0	174	603	0	-122	529	0	-70	456	1	-18	383	0
225	674	0	173	601	0	-121	528	0	-69	455	0	-17	381	0
224	673	0	172	600	0	-120	526	0	-68	453	2	-16	380	0
223	672	0	171	598	0	-119	525	0	-67	452	0	-15	378	0
222	670	0	170	597	0	-118	524	0	-66	450	0	-14	377	0
221	669	0	169	596	0	-117	522	0	-65	449	0	-13	376	0
220	667	0	168	594	0	-116	521	0	-64	447	1	-12	374	0
219	666	0	167	593	1	-115	519	1	-63	446	0	-11	373	0
218	665	0	166	591	0	-114	518	1	-62	445	0	-10	371	0
217	663	0	165	590	1	-113	517	0	-61	443	1	-9	370	0
216	662	0	164	588	1	-112	515	5	-60	442	1	8	369	0
215	660	0	163	587	2	-111	514	10	-59	440	1	7	367	0
214	659	0	162	586	1	-110	512	11	-58	439	0	6	366	0
213	658	0	161	584	1	-109	511	15	-57	438	1	5	364	0
212	656	0	160	583	1	-108	510	24	-56	436	0	4	363	0
211	655	0	159	581	0	-107	508	25	-55	435	0	3	362	0
210	653	0	158	580	2	-106	507	26	-54	433	3	2	360	0
209	652	0	157	579	0	-105	505	26	-53	432	0	1	359	0

227
137- 182228
113- 136230
51- 77232
9- 37229
78- 112

0 0

BKG

78.044

2469.63 MIN

SS

18

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	640	0	156	568	0	104	496	0	52	423	0
0	0	0	207	639	0	155	566	0	103	494	2	51	422	0
0	0	0	206	637	0	154	565	0	102	493	1	50	421	0
0	0	0	205	636	0	153	564	1	101	491	1	49	419	0
256	707	0	204	635	1	152	562	3	100	490	0	48	418	0
255	706	0	203	633	1	151	561	0	99	489	0	47	416	0
254	704	0	202	632	0	150	560	3	98	487	1	46	415	0
253	703	0	201	630	0	149	558	0	97	486	0	45	414	0
252	701	0	200	629	0	148	557	1	96	484	0	44	412	1
251	700	0	199	628	0	147	555	0	95	483	0	43	411	0
250	699	0	198	626	0	146	554	1	94	482	0	42	409	0
249	697	0	197	625	0	145	553	1	93	480	1	41	408	0
248	696	0	196	623	0	144	551	1	92	479	0	40	407	0
247	694	0	195	622	0	143	550	0	91	478	0	39	405	0
246	693	0	194	621	0	142	548	4	90	476	0	38	404	0
245	692	0	193	619	0	141	547	2	89	475	0	37	402	0
244	690	0	192	618	0	140	546	0	88	473	1	36	401	0
243	689	0	191	617	0	139	544	0	87	472	0	35	400	0
242	687	0	190	615	0	138	543	1	86	471	1	34	398	0
241	686	0	189	614	0	137	541	2	85	469	1	33	397	0
240	685	1	188	612	0	136	540	0	84	468	0	32	395	0
239	683	0	187	611	0	135	539	0	83	466	0	31	394	0
238	682	0	186	610	0	134	537	0	82	465	0	30	393	0
237	681	0	185	608	0	133	536	1	81	464	0	29	391	0
236	679	0	184	607	0	132	535	0	80	462	1	28	390	0
235	678	0	183	605	0	131	533	1	79	461	0	27	389	0
234	676	0	182	604	0	130	532	1	78	459	0	26	387	0
233	675	0	181	603	0	129	530	0	77	458	0	25	386	0
232	674	0	180	601	0	128	529	1	76	457	0	24	384	0
231	672	0	179	600	0	127	528	0	75	455	0	23	383	0
230	671	0	178	598	0	126	526	0	74	454	0	22	382	0
229	669	0	177	597	1	125	525	0	73	452	1	21	380	0
228	668	0	176	596	1	124	523	0	72	451	0	20	379	0
227	667	0	175	594	0	123	522	0	71	450	0	19	377	0
226	665	0	174	593	0	122	521	0	70	448	0	18	376	0
225	664	0	173	592	0	121	519	0	69	447	0	17	375	0
224	662	0	172	590	1	120	518	0	68	446	0	16	373	0
223	661	0	171	589	0	119	516	0	67	444	0	15	372	0
222	660	0	170	587	0	118	515	0	66	443	0	14	370	0
221	658	0	169	586	0	117	514	1	65	441	0	13	369	0
220	657	0	168	585	1	116	512	0	64	440	0	12	368	0
219	655	0	167	583	1	115	511	0	63	439	0	11	366	0
218	654	0	166	582	0	114	509	2	62	437	0	10	365	0
217	653	0	165	580	1	113	508	1	61	436	1	9	364	0
216	651	0	164	579	1	112	507	0	60	434	0	8	362	1
215	650	1	163	578	0	111	505	2	59	433	0	7	361	0
214	649	0	162	576	0	110	504	0	58	432	0	6	359	1
213	647	0	161	575	1	109	503	1	57	430	0	5	358	0
212	646	0	160	573	0	108	501	0	56	429	1	4	357	0
211	644	0	159	572	1	107	500	0	55	427	0	3	355	0
210	643	0	158	571	0	106	498	0	54	426	0	2	354*****	
209	642	0	157	569	0	105	497	0	53	425	0	1	352*****	

Note: This background was analyzed using an earlier standard than was used for the sample and ROI's may be different

0 0

STD

83.806

106.05 MIN

SS

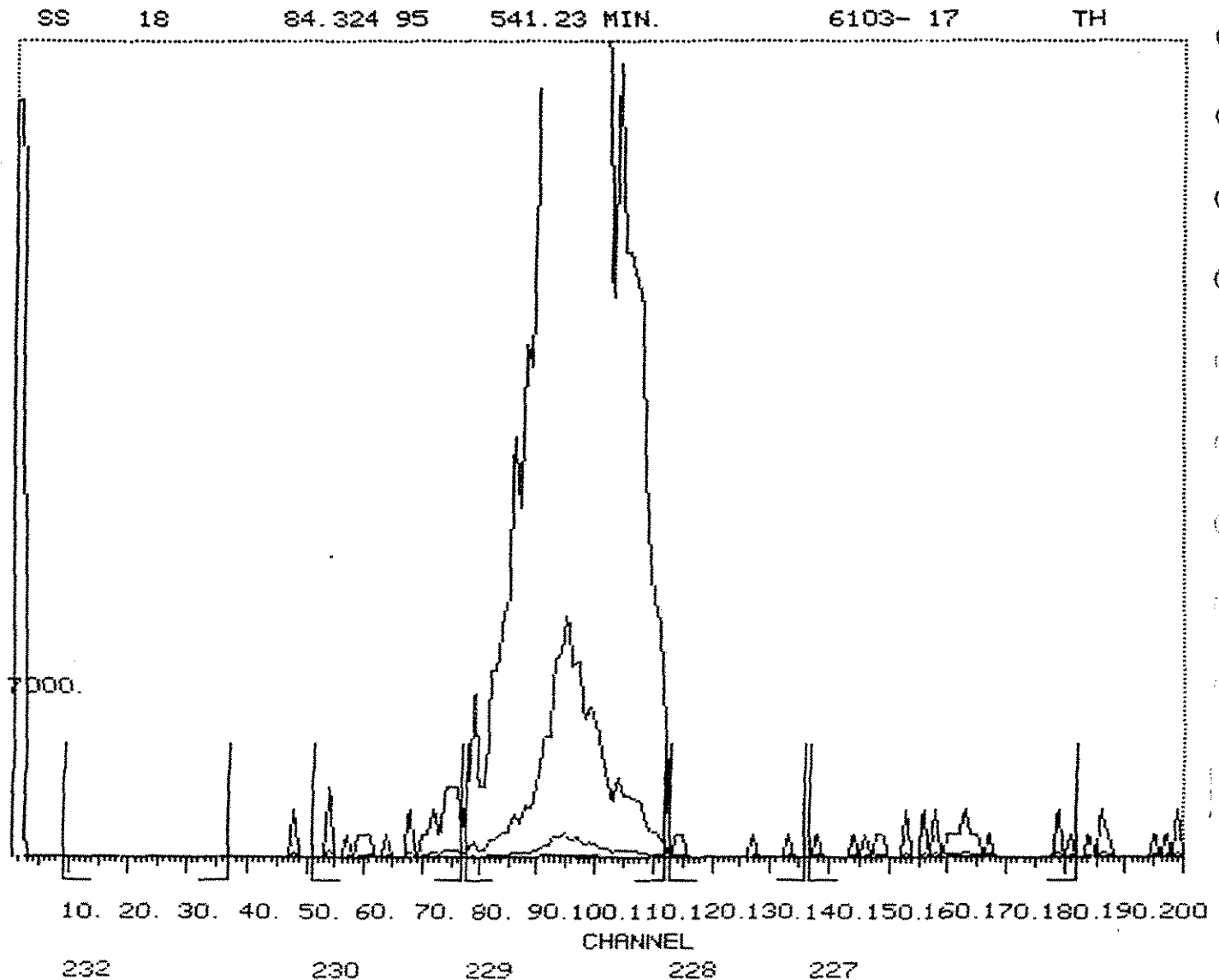
18

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	0	0	156	0	6712	104	0	496	52	0	34
0	0	0	207	0	0	155	0	4291	103	0	398	51	0	43
0	0	0	206	0	0	154	0	2708	102	0	290	50	0	33
0	0	0	205	0	0	153	0	1449	101	0	240	49	0	30
256	0	1	204	0	0	152	0	851	100	0	188	48	0	37
255	0	0	203	0	0	151	0	514	99	0	232	47	0	37
254	0	0	202	0	0	150	0	341	98	0	548	46	0	26
253	0	0	201	0	1	149	0	262	97	0	1871	45	0	23
252	0	0	200	0	0	148	0	209	96	0	5245	44	0	27
251	0	0	199	0	1	147	0	138	95	0	010504	43	0	29
250	0	0	198	0	0	146	0	137	94	0	014084	42	0	16
249	0	1	197	0	0	145	0	104	93	0	014447	41	0	33
248	0	0	196	0	1	144	0	117	92	0	011681	40	0	28
247	0	0	195	0	0	143	0	150	91	0	8285	39	0	22
246	0	0	194	0	0	142	0	439	90	0	5394	38	0	21
245	0	0	193	0	0	141	0	1094	89	0	3137	37	0	24
244	0	0	192	0	0	140	0	2371	88	0	1840	36	0	33
243	0	0	191	0	0	139	0	4333	87	0	1105	35	0	25
242	0	1	190	0	0	138	0	7193	86	0	780	34	0	18
241	0	0	189	0	0	137	0	010019	85	0	470	33	0	29
240	0	0	188	0	0	136	0	011460	84	0	408	32	0	26
239	0	1	187	0	0	135	0	010499	83	0	305	31	0	25
238	0	0	186	0	0	134	0	8116	82	0	292	30	0	19
237	0	0	185	0	0	133	0	5352	81	0	203	29	0	25
236	0	1	184	0	0	132	0	3188	80	0	201	28	0	19
235	0	0	183	0	1	131	0	1970	79	0	171	27	0	15
234	0	1	182	0	1	130	0	1167	78	0	159	26	0	14
233	0	0	181	0	0	129	0	832	77	0	144	25	0	9
232	0	0	180	0	0	128	0	516	76	0	103	24	0	19
231	0	0	179	0	0	127	0	372	75	0	117	23	0	21
230	0	0	178	0	0	126	0	295	74	0	97	22	0	21
229	0	1	177	0	0	125	0	229	73	0	84	21	0	23
228	0	0	176	0	0	124	0	193	72	0	111	20	0	21
227	0	0	175	0	1	123	0	158	71	0	82	19	0	17
226	0	0	174	0	0	122	0	145	70	0	91	18	0	25
225	0	0	173	0	1	121	0	125	69	0	73	17	0	13
224	0	1	172	0	0	120	0	115	68	0	73	16	0	6
223	0	0	171	0	1	119	0	105	67	0	70	15	0	14
222	0	0	170	0	1	118	0	94	66	0	74	14	0	27
221	0	0	169	0	0	117	0	183	65	0	78	13	0	17
220	0	0	168	0	1	116	0	648	64	0	66	12	0	10
219	0	0	167	0	1	115	0	2262	63	0	47	11	0	14
218	0	1	166	0	0	114	0	5692	62	0	74	10	0	14
217	0	0	165	0	2	113	0	010202	61	0	54	9	0	9
216	0	0	164	0	26	112	0	012752	60	0	50	8	0	23
215	0	0	163	0	154	111	0	012050	59	0	45	7	0	14
214	0	1	162	0	847	110	0	8946	58	0	50	6	0	10
213	0	0	161	0	2848	109	0	5910	57	0	52	5	0	15
212	0	0	160	0	6178	108	0	3573	56	0	51	4	0	12
211	0	0	159	0	9438	107	0	2208	55	0	37	3	0	10
210	0	0	158	0	010380	106	0	1228	54	0	46	2	0	6324
209	0	0	157	0	9334	105	0	759	53	0	43	1	0	6356

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
SS	18 EF EFF	83.806	67597	106.1	30.56	24.21 - 35.00	29.87	0.5
SS	18 CA SLOPE	83.806	0	106.1	14.10	13.63 - 14.49	14.07	0.2
SS	18 CA OFFSET	83.806	0	106.1	3578.	3400. - 3700.	3554.	0.6
SS	18 RE RES	83.806	0	106.1	66.18	48.67 - 82.87	65.83	0.1
SS	18 BK Th227	78.044	20	2469.6	0.008	0.000 - 0.025	0.009	-0.4
SS	18 BK Th228	78.044	14	2469.6	0.006	0.000 - 0.025	0.007	-1.0
SS	18 BK Th230	78.044	7	2469.6	0.003	0.000 - 0.025	0.001	0.3
SS	18 BK Th232	78.044	0	2469.6	0.000	0.000 - 0.025	0.001	-3.0
SS	18 BK Th229	78.044	13	2469.6	0.005	0.000 - 0.025	0.005	-0.1

Previous 3 counts	Time	Detector	ID	Length	Cpm
83.311	23-MAR-95 23:27	SS 18	U 2237 15R1 \	473.4 min	1.31
83.806	24-MAR-95 11:20	SS 18	STD \	106.1 min	2638.99
84.070	24-MAR-95 17:40	SS 18	Th 6103 8A1 \	362.1 min	0.14



23-MAR-95

12:15:15

N412026

LGG

TMA Corporation
Alpha Spectroscopy
ASPEC V 4.01

6103- 18

Th

QC-LCS #23527

Reviewed *acc* Date *3/23*

Counted on SS 20 612.20 minutes
 GMT 82.347 95
 Zero time 81.767 95

GMT of std 81.844 95
 Sep. time 81.767 95

Chemical yield 0.5364

Tracer - Th229 (B1-C

128.795-84)

11.82 Dpm X 0.9990 = 11.81 Corr. tracer DPM

Channels 87-113
 Bkg CPM 0.00648

(on 78.044 95 for 2469.63 Min.

Gross cnts 1085.
 Background 4
 Th228 corr 0
 Net counts 1081

3.1%

FWHM Of tracer = 39. KeV

Divisor 9.1549E+01
 Det. Eff 0.2788
 Yield 0.5364

(net counts / corr. tracer DPM)

(net counts) / (eff. x corr. tracer DPM X time)

Th227

Th228

Th230

Th232

Channels 142-187
 Bkg CPM 0.00729

114-141
 0.01579

56- 86
 0.00324

13- 41
 0.00121

Gross cnts 25
 Background 4
 Tracer cts 4 1
 Net counts 17 5

8
 10
 0 0
 -2 4

412
 2
 3 1
 407 20

1
 1
 1 0
 -1 1

Lambda (3.8085E-02)
 Decay corr 0.9782
 Brnch ratio 1.0000

(9.9358E-04)
 0.9994
 1.0000

(2.4645E-08)
 1.0000
 1.0000

(1.3555E-13)
 1.0000
 1.0000

DPM of aliq 1.8984E-01
 Aliquot 1.0000E+00
 Dpm/smpl 1.8984E-01

-2.1859E-02
 1.0000E+00
 -2.1859E-02

4.4457E+00
 1.0000E+00
 4.4457E+00

-1.0923E-02
 1.0000E+00
 -1.0923E-02

pCi /smpl 8.551E-02

-9.846E-03

2.003E+00

-4.920E-03

1 sigma Err 29.6%
 pCi Err 2.529E-02

200.0%
 1.969E-02

5.8%
 1.158E-01

100.0%
 4.923E-03

2 sigma Err 59.1%
 pCi Err 5.057E-02

400.0%
 3.939E-02

11.6%
 2.317E-01

200.1%
 9.845E-03

Limitng Vlu < 1.27E-01
 MDA 6.74E-02

< 3.25E-02
 8.72E-02

< 2.19E+00
 5.44E-02

< 8.12E-03
 3.76E-02

QC-23527

Th-230

20

Added = 1.794 pCi ($\pm 4\%$)F/A = 1.116 ($\pm 12.9\%$) *14y 3/27/95*

6103 18

Th

82.347

612.20 MIN

SS

20

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	643	0	-156	570	1	-104	497	29	52	424	0
0	0	0	207	642	0	-155	569	1	-103	496	30	51	423	1
0	0	0	206	640	0	-154	567	0	-102	495	48	50	422	0
0	0	0	205	639	1	-153	566	0	-101	493	43	49	420	0
256	710	4	204	638	2	-152	565	0	-100	492	50	48	419	0
255	709	1	203	636	1	-151	563	1	-99	490	58	47	417	0
254	708	2	202	635	4	-150	562	0	-98	489	76	46	416	0
253	706	2	201	633	2	-149	560	1	-97	488	72	45	415	0
252	705	0	200	632	1	-148	559	0	-96	486	81	44	413	0
251	703	0	199	631	1	-147	558	0	-95	485	96	43	412	0
250	702	0	198	629	1	-146	556	0	-94	483	82	42	410	0
249	701	1	197	628	2	-145	555	2	-93	482	95	-41	409	0
248	699	0	196	626	0	-144	553	0	-92	481	68	-40	408	0
247	698	0	195	625	1	-143	552	1	-91	479	44	-39	406	0
246	696	0	194	624	0	-142	551	0	-90	478	43	-38	405	0
245	695	1	193	622	1	-141	549	0	-89	476	21	-37	403	0
244	694	0	192	621	0	-140	548	0	-88	475	17	-36	402	0
243	692	0	191	619	0	-139	546	1	-87	474	17	-35	401	0
242	691	0	190	618	0	-138	545	1	-86	472	14	-34	399	0
241	689	0	189	617	0	-137	544	0	-85	471	17	-33	398	0
240	688	0	188	615	0	-136	542	2	-84	469	30	-32	396	0
239	687	0	-187	614	0	-135	541	0	-83	468	51	-31	395	0
238	685	0	-186	612	0	-134	539	0	-82	467	51	-30	394	0
237	684	0	-185	611	0	-133	538	0	-81	465	59	-29	392	0
236	682	0	-184	610	0	-132	537	0	-80	464	44	-28	391	0
235	681	0	-183	608	0	-131	535	0	-79	462	30	-27	389	1
234	680	1	-182	607	0	-130	534	0	-78	461	38	-26	388	0
233	678	0	-181	605	1	-129	532	0	-77	460	21	-25	387	0
232	677	0	-180	604	0	-128	531	0	-76	458	16	-24	385	0
231	675	0	-179	603	0	-127	530	0	-75	457	15	-23	384	0
230	674	0	-178	601	0	-126	528	0	-74	455	9	-22	382	0
229	673	0	-177	600	1	-125	527	0	-73	454	5	-21	381	0
228	671	0	-176	598	0	-124	525	0	-72	453	5	-20	380	0
227	670	0	-175	597	0	-123	524	0	-71	451	3	-19	378	0
226	668	0	-174	596	0	-122	523	0	-70	450	1	-18	377	0
225	667	0	-173	594	0	-121	521	1	-69	448	0	-17	375	0
224	666	0	-172	593	0	-120	520	0	-68	447	2	-16	374	0
223	664	0	-171	591	0	-119	518	0	-67	446	0	-15	373	0
222	663	0	-170	590	0	-118	517	0	-66	444	0	-14	371	0
221	661	0	-169	588	0	-117	516	0	-65	443	0	-13	370	0
220	660	0	-168	587	0	-116	514	1	-64	441	1	12	368	0
219	659	0	-167	586	2	-115	513	0	-63	440	0	11	367	0
218	657	0	-166	584	2	-114	511	2	-62	439	0	10	366	0
217	656	0	-165	583	1	-113	510	3	-61	437	0	9	364	0
216	654	0	-164	581	2	-112	509	4	-60	436	0	8	363	0
215	653	0	-163	580	0	-111	507	13	-59	434	0	7	361	0
214	652	0	-162	579	3	-110	506	14	-58	433	0	6	360	0
213	650	0	-161	577	0	-109	504	20	-57	431	0	5	359	0
212	649	0	-160	576	1	-108	503	16	-56	430	0	4	357	0
211	647	0	-159	574	4	-107	502	9	55	429	0	3	356	0
210	646	0	-158	573	0	-106	500	13	54	427	1	2	354	0
209	645	0	-157	572	1	-105	499	23	53	426	0	1	353	0

227

142- 187

228

114- 141

230

56- 86

232

13- 41

229

87- 113

0 0

BKG

78.044

2469.63 MIN

SS

20

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	640	0	156	568	2	104	496	0	52	423	1
0	0	0	207	639	0	155	566	1	103	494	0	51	422	0
0	0	0	206	637	0	154	565	2	102	493	0	50	421	0
0	0	0	205	636	0	153	564	1	101	491	0	49	419	0
256	707	1	204	635	0	152	562	0	100	490	1	48	418	0
255	706	0	203	633	0	151	561	1	99	489	2	47	416	0
254	704	0	202	632	0	150	560	1	98	487	1	46	415	0
253	703	0	201	630	2	149	558	0	97	486	0	45	414	0
252	701	0	200	629	0	148	557	0	96	484	1	44	412	0
251	700	0	199	628	2	147	555	0	95	483	1	43	411	1
250	699	0	198	626	0	146	554	0	94	482	1	42	409	0
249	697	0	197	625	0	145	553	0	93	480	0	41	408	0
248	696	0	196	623	0	144	551	1	92	479	0	40	407	1
247	694	0	195	622	0	143	550	1	91	478	1	39	405	1
246	693	0	194	621	0	142	548	1	90	476	1	38	404	0
245	692	0	193	619	0	141	547	1	89	475	0	37	402	0
244	690	0	192	618	0	140	546	0	88	473	0	36	401	0
243	689	0	191	617	0	139	544	3	87	472	0	35	400	0
242	687	0	190	615	0	138	543	4	86	471	0	34	398	0
241	686	0	189	614	0	137	541	2	85	469	1	33	397	0
240	685	0	188	612	0	136	540	2	84	468	0	32	395	0
239	683	0	187	611	0	135	539	2	83	466	0	31	394	0
238	682	0	186	610	0	134	537	4	82	465	1	30	393	0
237	681	0	185	608	0	133	536	0	81	464	1	29	391	0
236	679	2	184	607	0	132	535	3	80	462	0	28	390	0
235	678	1	183	605	0	131	533	1	79	461	1	27	389	0
234	676	0	182	604	0	130	532	2	78	459	0	26	387	1
233	675	1	181	603	0	129	530	2	77	458	2	25	386	0
232	674	0	180	601	0	128	529	1	76	457	0	24	384	0
231	672	1	179	600	0	127	528	2	75	455	0	23	383	0
230	671	0	178	598	0	126	526	1	74	454	1	22	382	0
229	669	0	177	597	0	125	525	1	73	452	0	21	380	0
228	668	0	176	596	0	124	523	0	72	451	0	20	379	0
227	667	0	175	594	0	123	522	2	71	450	0	19	377	0
226	665	0	174	593	0	122	521	0	70	448	0	18	376	0
225	664	0	173	592	0	121	519	1	69	447	1	17	375	0
224	662	0	172	590	0	120	518	0	68	446	0	16	373	0
223	661	0	171	589	0	119	516	1	67	444	0	15	372	0
222	660	0	170	587	0	118	515	3	66	443	0	14	370	0
221	658	0	169	586	0	117	514	0	65	441	0	13	369	0
220	657	0	168	585	0	116	512	0	64	440	0	12	368	0
219	655	0	167	583	0	115	511	0	63	439	0	11	366	0
218	654	0	166	582	2	114	509	1	62	437	0	10	365	0
217	653	0	165	580	0	113	508	2	61	436	0	9	364	0
216	651	0	164	579	0	112	507	0	60	434	0	8	362	0
215	650	0	163	578	1	111	505	0	59	433	0	7	361	0
214	649	0	162	576	0	110	504	0	58	432	0	6	359	0
213	647	0	161	575	3	109	503	2	57	430	0	5	358	0
212	646	0	160	573	0	108	501	1	56	429	0	4	357	0
211	644	0	159	572	2	107	500	0	55	427	0	3	355	0
0	643	0	158	571	0	106	498	1	54	426	0	2	354*****	
209	642	0	157	569	0	105	497	0	53	425	0	1	352*****	

Note: This background was analyzed using an earlier standard than was used for the sample and ROI's may be different

0 0

STD

81.844

101.20 MIN

SS

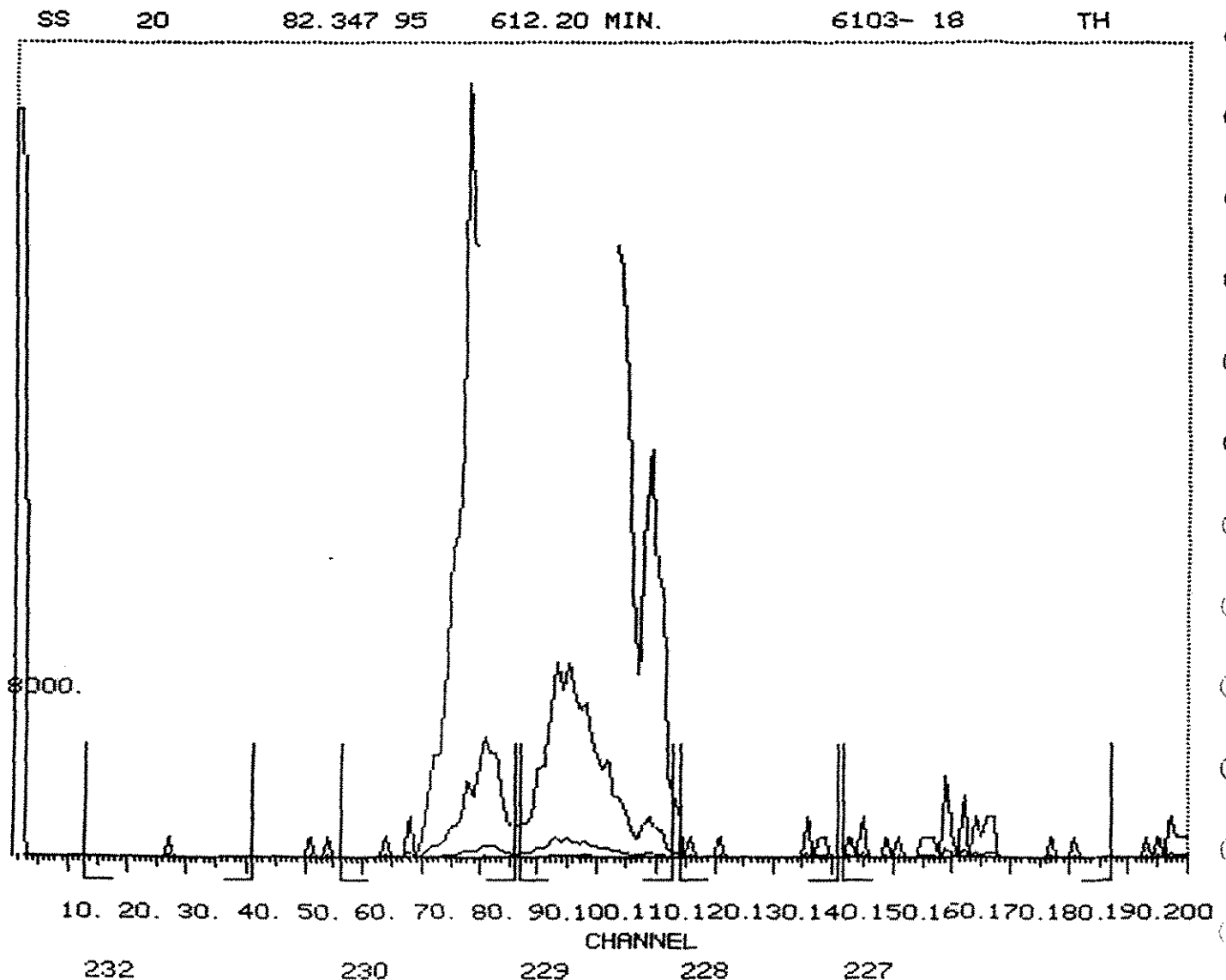
20

CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS	CH	MEV	CTS
0	0	0	208	0	1	156	0	228	104	0	116	52	0	30
0	0	0	207	0	0	155	0	168	103	0	132	51	0	25
0	0	0	206	0	0	154	0	137	102	0	371	50	0	19
0	0	0	205	0	0	153	0	111	101	0	1839	49	0	24
256	0	0	204	0	0	152	0	73	100	0	6205	48	0	21
255	0	0	203	0	0	151	0	73	99	0	012805	47	0	20
254	0	0	202	0	0	150	0	55	98	0	015459	46	0	19
253	0	1	201	0	0	149	0	59	97	0	013147	45	0	17
252	0	0	200	0	0	148	0	100	96	0	08731	44	0	19
251	0	1	199	0	0	147	0	251	95	0	05336	43	0	22
250	0	0	198	0	1	146	0	744	94	0	03169	42	0	22
249	0	0	197	0	1	145	0	1823	93	0	01616	41	0	21
248	0	0	196	0	1	144	0	3523	92	0	0784	40	0	14
247	0	0	195	0	0	143	0	6102	91	0	0476	39	0	11
246	0	0	194	0	1	142	0	9212	90	0	0293	38	0	19
245	0	0	193	0	0	141	0	11793	89	0	0244	37	0	16
244	0	1	192	0	1	140	0	010571	88	0	0220	36	0	10
243	0	2	191	0	0	139	0	6964	87	0	0177	35	0	18
242	0	0	190	0	0	138	0	4001	86	0	0161	34	0	16
241	0	0	189	0	0	137	0	2165	85	0	0115	33	0	19
240	0	0	188	0	0	136	0	1277	84	0	0132	32	0	10
239	0	0	187	0	0	135	0	732	83	0	0107	31	0	16
238	0	1	186	0	2	134	0	446	82	0	0107	30	0	12
237	0	0	185	0	2	133	0	304	81	0	094	29	0	13
236	0	0	184	0	1	132	0	231	80	0	0100	28	0	20
235	0	0	183	0	0	131	0	180	79	0	077	27	0	7
234	0	2	182	0	0	130	0	134	78	0	072	26	0	13
233	0	0	181	0	0	129	0	115	77	0	074	25	0	17
232	0	0	180	0	0	128	0	112	76	0	075	24	0	21
231	0	0	179	0	1	127	0	92	75	0	069	23	0	14
230	0	0	178	0	0	126	0	86	74	0	060	22	0	9
229	0	0	177	0	1	125	0	102	73	0	047	21	0	14
228	0	0	176	0	0	124	0	74	72	0	049	20	0	13
227	0	0	175	0	0	123	0	68	71	0	045	19	0	14
226	0	0	174	0	1	122	0	62	70	0	055	18	0	12
225	0	0	173	0	1	121	0	154	69	0	043	17	0	14
224	0	0	172	0	2	120	0	712	68	0	043	16	0	11
223	0	0	171	0	2	119	0	3056	67	0	034	15	0	9
222	0	0	170	0	4	118	0	8136	66	0	029	14	0	3
221	0	0	169	0	6	117	0	012908	65	0	045	13	0	12
220	0	0	168	0	67	116	0	013011	64	0	039	12	0	12
219	0	0	167	0	498	115	0	9271	63	0	037	11	0	13
218	0	0	166	0	2366	114	0	5245	62	0	042	10	0	6
217	0	0	165	0	6529	113	0	2901	61	0	029	9	0	9
216	0	0	164	0	010320	112	0	1500	60	0	031	8	0	7
215	0	0	163	0	010555	111	0	851	59	0	040	7	0	11
214	0	0	162	0	07633	110	0	470	58	0	031	6	0	10
213	0	0	161	0	04927	109	0	306	57	0	029	5	0	7
212	0	0	160	0	02800	108	0	256	56	0	028	4	0	8
211	0	0	159	0	01377	107	0	156	55	0	038	3	0	10
210	0	0	158	0	0701	106	0	168	54	0	020	2	0	6034
209	0	0	157	0	0386	105	0	138	53	0	023	1	0	6064

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
SS	20 EF EFF	81.844	59163	101.2	27.88	24.69 - 30.69	27.72	0.2
SS	20 CA SLOPE	81.844	0	101.2	14.02	12.00 - 14.50	13.95	0.5
SS	20 CA OFFSET	81.844	0	101.2	3521.	3400. - 3750.	3523.	-0.1
SS	20 RE RES	81.844	0	101.2	56.2	20.0 - 100.0	54.4	0.1
SS	20 BK Th227	78.044	18	2469.6	0.007	0.000 - 0.025	0.006	0.3
SS	20 BK Th228	78.044	39	2469.6	0.016	0.000 - 0.025	0.013	1.2
SS	20 BK Th230	78.044	8	2469.6	0.003	0.000 - 0.025	0.004	-0.5
SS	20 BK Th232	78.044	3	2469.6	0.001	0.000 - 0.025	0.001	0.1
SS	20 BK Th229	78.044	16	2469.6	0.006	0.000 - 0.025	0.006	0.2

Previous 3 counts	Time	Detector	ID	Length	Cpm
81.646	22-MAR-95 7:30	SS 20	U 2237 9	\ 220.7 min	2.12
81.845	22-MAR-95 12:16	SS 20	STD	\ 101.2 min	2405.85
82.107	22-MAR-95 18:34	SS 20	U 2676 1	\ 300.0 min	3.22





TMA
Thermo Analytical

2030 Wright Avenue

P.O. Box 4040

Richmond, CA 94804-0040

(510) 235-2633 Fax: 235-0438

April 21, 1995

Mr. Alex Klein
Rockwell International Corp.
Rocketdyne Division
6633 Canoga Ave.
Canoga Park, CA 91309-7922

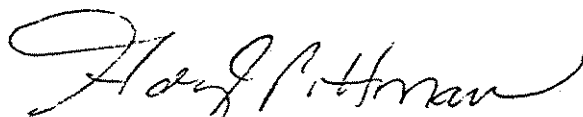
Ref: Customer P.O. No. R44PJZ94034044
TMA/Richmond Report N4-12-026-6104A

Dear Mr. Klein:

Enclosed is a revised final data report for radiochemical analyses on the two water samples collected November 22 through November 30, 1994 and received at TMA/Richmond December 9, 1994. Sample A4CM-94-0012B was re-analyzed along with a new LCS and reagent blank for Strontium-90 Analyses. The re-analyzed data has been reviewed and compared to the original data. The conclusions are presented in the case narrative; the re-analyzed data sheets are being submitted along with the revised report.

If you have any questions regarding this data, please call me at (510) 235-2633.

Sincerely,



Italy E. Pittman
Program Manager

Enclosure: Data Package 6104A (rev)
Copies of Data Sheets

TMA/Richmond

Report N4-12-033-6104
Sample Delivery Group 6104(rev)

Rockwell International Corp.
Contract R44PJZ94034044

Case Narrative

April 21, 1995

1.0 GENERAL

TMA/Richmond Delivery Group 6104A consists of two liquid samples received with the ten soil samples for SDG 6104 received on December 9, 1994.

2.0 ANALYTICAL NOTES

The internal quality control consists 5% each of laboratory control samples, blanks and replicates. The QC samples are prepared by the Quality Control Department, and copies of the QC Notebook pages are included in the data package.

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- but is not added since KCl contains natural ⁴⁰K which raises the gamma background spectra considerably.

2.1 Strontium-90 Re-Analyses

Sample A4CM-94-0012B was reanalyzed along with a new laboratory control sample and reagent blank. No problems were associated with this analyses. After comparing the original to the re-analyzed data, the following differences between the two data sets were found. The original LCS was underlined in the original report because the percent recovery of the LCS (82%) fell outside the 85-115% 2 sigma range.

T M A / R I C H M O N D
REPORTING GROUP 6104A

SDG 6104A
Contact Leah G. Guerrero

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
Prep Batch Summary	.	.	.	.	3
Work Summary	.	.	.	.	4
Method Blanks	.	.	.	.	6
Lab Control Samples	.	.	.	.	8
Data Sheets	.	.	.	.	10
Method Summaries	.	.	.	.	12
End of Section	.	.	.	.	17

Las J. P. Hoffman 4/21/95
Prepared by
David R. Lopez 4/21/95
Reviewed by

Lab id TMAN
Protocol ROCKETDYNE
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contract Leah G. Guerrero

SAMPLE SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB SAMPLE ID	SAS NO	CHAIN OF CUSTODY	COLLECTED
A4CM-94-0012A	SSFL AREA 4	WATER		N412033-01			11/22/94
A4CM-94-0012B	SSFL AREA 4	WATER		N412033-02			11/22/94
Method Blank		WATER		N412033-17			
Method Blank		WATER		N412033-20			
Lab Control Sample		WATER		N412033-16			
Lab Control Sample		WATER		N412033-21			

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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

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		
0104		A4CM-94-0012A	WATER				12/09/94	17	N412033-01	0104-001
		A4CM-94-0012B	WATER				12/09/94	17	N412033-02	0104-002
		Method Blank	WATER						N412033-17	0104-017
		Method Blank	WATER						N412033-20	0104-020
		Lab Control Sample	WATER						N412033-16	0104-016
		Lab Control Sample	WATER						N412033-21	0104-021

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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

PREP BATCH SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

			PREPARATION	ERROR	PLANCHETS ANALYZED				QUALI-			
TEST	MATRIX	METHOD	BATCH	2σ %	CLIENT	MORE	RE	BLANK	LCS	DUP/ORIG	MS/ORIG	FIERS
Alpha Spectroscopy												
PU	WATER	Plutonium, Isotopic in Water	2781-024A	5.0	1			1	1			
TH	WATER	Thorium, Isotopic in Water	2781-024A	5.0	1			1	1			
U	WATER	Uranium, Isotopic in Water	2781-024A	5.0	1			1	1			
Beta Counting												
SR	WATER	Strontium, Total in Water	2781-024A	10.0	1			2	2			
Gamma Scan												
GAM	WATER	Gamma Emitters	2781-024A	15.0	1							
Liquid Scintillation												
H	WATER	Tritium in Water	2781-024A	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.

PREP 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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

WORK SUMMARY

Client Rocketdyne

Contract R44PJZ94034044

CLIENT SAMPLE ID		LAB SAMPLE ID		SUF-						
LOCATION	MATRIX	COLLECTED	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD		
CUSTODY	SAS no	RECEIVED	PLANCHET							
A4CM-94-0012A		N412033-01	0104-001	H	12/22/94	01/12/95	LGG	Tritium in Water		
SSFL AREA 4	WATER	11/22/94								
		12/09/94								
A4CM-94-0012B		N412033-02	0104-002	GAM	01/14/95	01/20/95	LGG	Gamma Emitters		
SSFL AREA 4	WATER	11/22/94	0104-002	PU	01/14/95	01/23/95	LGG	Plutonium, Isotopic in Water		
		12/09/94	0104-002	SR	A1 03/22/95	04/12/95	IEP	Strontium, Total in Water		
			0104-002	TH	01/13/95	01/23/95	LGG	Thorium, Isotopic in Water		
			0104-002	U	01/14/95	01/17/95	LGG	Uranium, Isotopic in Water		
Method Blank		N412033-17	0104-017	H	12/29/94	01/12/95	LGG	Tritium in Water		
	WATER		0104-017	PU	01/18/95	01/23/95	LGG	Plutonium, Isotopic in Water		
			0104-017	SR	01/14/95	01/23/95	LGG	Strontium, Total in Water		
			0104-017	TH	01/19/95	01/23/95	LGG	Thorium, Isotopic in Water		
			0104-017	U	01/15/95	01/17/95	LGG	Uranium, Isotopic in Water		
Method Blank		N412033-20	0104-020	SR	03/22/95	04/12/95	IEP	Strontium, Total in Water		
	WATER									
Lab Control Sample		N412033-16	0104-016	H	12/22/94	01/12/95	LGG	Tritium in Water		
	WATER		0104-016	PU	01/18/95	01/23/95	LGG	Plutonium, Isotopic in Water		
			0104-016	SR	01/13/95	01/23/95	LGG	Strontium, Total in Water		
			0104-016	TH	01/18/95	01/23/95	LGG	Thorium, Isotopic in Water		
			0104-016	U	01/13/95	01/17/95	LGG	Uranium, Isotopic in Water		
Lab Control Sample		N412033-21	0104-021	SR	03/22/95	04/12/95	IEP	Strontium, Total in Water		
	WATER									

WORK 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 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

SDG 6104A

Contact Leah G. Guerrero

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 Emitters	ASTM 3649-85; EPA 901.1	1						1
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			2	2		5
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 2

SUMMARY DATA SECTION

Page 5

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CWSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-17

METHOD BLANK

Method Blank

SDG 6104A

Client Rocketdyne

Contact Leah G. Guerrero

Contract R44PJZ94034044

Lab sample id N412033-17

Client sample id Method Blank

Dept sample id 0104-017

Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-76	160	300	500	U	H
Strontium 90	10098-97-2	0.026	0.10	0.09	0.5	U	SR
Thorium 230	14269-63-7	0	0.036	0.06	0.5	U	TH
Thorium 232	7740-29-1	0.018	0.036	0.05	0.5	U	TH
Uranium 233/234	11-08-5	-0.051	0.17	0.3	0.5	U	U
Uranium 235	14117-96-1	0	0.082	0.2	0.5	U	U
Uranium 238	7440-61-1	-0.051	0.068	0.2	0.5	U	U
Plutonium 238	13981-16-3	0.059	0.049	0.08	0.1	U	PU
Plutonium 239/240	10-12-8	0.010	0.020	0.05	0.1	U	PU

QC BLANK 22666-22671

THOD BLANKS

Page 1

SUMMARY DATA SECTION

Page 6

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-DS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-20

METHOD BLANK

Method Blank

SDG 6104AContact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-20Client sample id Method BlankDept sample id 0104-020Material/Matrix WATER

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Strontium 90	10098-97-2	-0.063	0.13	0.2	0.5	U	SR

QC-BLANK #23549

METHOD BLANKS

Page 2

SUMMARY DATA SECTION

Page 7

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-16

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-16

Client sample id Lab Control Sample

Dept sample id 0104-016

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	9000	420	300	500		H	9320	370	97	83-117	
Strontium 90	16	0.52	0.2	0.5		SR	19.6	0.78	82	85-115	
Thorium 230	4.5	0.37	0.05	0.5		TH	4.10	0.16	110	83-117	
Thorium 232	0	0.022	0.04	0.5	U	TH					
Uranium 233/234	23	1.6	0.8	0.5		U	24.3	0.97	95	86-114	
Uranium 235	18	1.4	0.1	0.5		U	18.6	0.74	97	85-115	
Uranium 238	24	1.7	0.7	0.5		U	24.2	0.97	99	86-114	
Plutonium 238	-0.009	0.086	0.2	0.1	U	PU	0	0			
Plutonium 239/240	1.8	0.25	0.08	0.1		PU	1.80	0.072	100	77-123	

QC LCS 22660-22665

LAB CONTROL SAMPLES

Page 1

SUMMARY DATA SECTION

Page 8

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.2

Form DVD-LCS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-21

Lab Control Sample

LAB CONTROL SAMPLE

SDG 6104A

Contact Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

Lab sample id N412033-21

Dept sample id 0104-021

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
Strontium 90	20	0.70	0.3	0.5		SR	19.6	0.78	102	82-118	

QC-LCS #23550

CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 9

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-LCS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-01

A4CM-94-0012A

DATA SHEET

SDG 6104AContact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-01Client sample id A4CM-94-0012ADept sample id 0104-001Location/Matrix SSFL AREA 4 WATERReceived 12/09/94Collected 11/22/94

Chain of custody id _____

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium		-21	160	300	500	U	H

ATA SHEETS

Page 1

SUMMARY DATA SECTION

Page 10

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

N412033-02

A4CM-94-0012B

DATA SHEET

SDG 6104A

Contact Leah G. GuerreroClient RocketdyneContract R44PJZ94034044Lab sample id N412033-02Client sample id A4CM-94-0012BDept sample id 0104-002Location/Matrix SSFL AREA 4 WATERReceived 12/09/94Collected 11/22/94

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	-0.047	0.21	0.3	0.5	U	SR
Thorium 230	14269-63-7	0.025	0.065	0.1	0.5	U	TH
Thorium 232	7740-29-1	0.008	0.033	0.06	0.5	U	TH
Uranium 233/234	11-08-5	-0.012	0.073	0.1	0.5	U	U
Uranium 235	14117-96-1	0	0.059	0.1	0.5	U	U
Uranium 238	7440-61-1	0.037	0.049	0.09	0.5	U	U
Plutonium 238	13981-16-3	-0.014	0.041	0.1	0.1	U	PU
Plutonium 239/240	10-12-8	0	0.014	0.05	0.1	U	PU
A SCAN ANALYTES		U					
Cesium 40		U		60		U	GAM
Chromium 51		U		100		U	GAM
Manganese 54		U		5		U	GAM
Cobalt 58		U		8		U	GAM
Iron 59		U		20		U	GAM
Cobalt 60		U		7		U	GAM
Zinc 65		U		10		U	GAM
Niobium 94		U		5		U	GAM
Ruthenium 103		U		10		U	GAM
Ruthenium 106		U		40		U	GAM
Tin 113		U		7		U	GAM
Cesium 134		U		5		U	GAM
Cesium 137		U		5	5	U	GAM
Cerium 144		U		30		U	GAM
Europium 152		U		10		U	GAM
Europium 154		U		7		U	GAM
Europium 155		U		10		U	GAM
Radium 226		U		10		U	GAM
Thorium 232		U		20		U	GAM

DATA SHEETS

Page 2

SUMMARY DATA SECTION

Page 11

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-DSVersion 3.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test PU Matrix WATER

SDG 6104A

ict Leah G. Guerrero

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
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Preparation batch 2781-024A

A4CM-94-0012B	N412033-02	0104-002	U	U
BLK (QC ID=22670)	N412033-17	0104-017	U	U
LCS (QC ID=22664)	N412033-16	0104-016	ok U	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 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 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	0.1	0.500	66	510	53	01/10/95	01/14	SS-027
BLK (QC ID=22670)	N412033-17	0.08	0.500	87	529	01/10/95	01/18	SS-038	
LCS (QC ID=22664)	N412033-16	0.2	0.500	48	529	01/10/95	01/18	SS-036	

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	0.1	=	0.1
FOR 3 SAMPLES	YIELD	67	=	39

AD SUMMARIES

Page 1

SUMMARY DATA SECTION

Page 12

Lab id	TMA
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DIC-CMS
Version	3.05
Report date	04-21/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test TH Matrix WATER

IDG 6104A

t Leah G. Guerrero

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 2781-024A

4CM-94-0012B	N412033-02	0104-002		U	U	
BLK (QC ID=22668)	N412033-17	0104-017		U	U	
LCS (QC ID=22662)	N412033-16	0104-016		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
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Preparation batch 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024

4CM-94-0012B	N412033-02	0.1	0.500	78	528	52	01/12/95	01/13	SS-019
BLK (QC ID=22668)	N412033-17	0.06	0.500	71	503	01/12/95	01/19	SS-034	
LCS (QC ID=22662)	N412033-16	0.05	0.500	76	527	01/12/95	01/18	SS-034	

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	0.07	±	0.05
FOR 3 SAMPLES	YIELD	75	±	7

METHOD SUMMARIES

Page 2

SUMMARY DATA SECTION

Page 13

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test U Matrix WATER

SDG 6104A

act Leah G. Guerrero

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 (%) 1+3 2σ 2+3 2σ
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Preparation batch 2781-024A

A4CM-94-0012B	N412033-02	0104-002		U	U	U	
BLK (QC ID=22669)	N412033-17	0104-017		U	U	U	
LCS (QC ID=22663)	N412033-16	0104-016		ok	ok	ok	

Nominal values and limits from method	RDLs (pCi/L)	0.5	0.5	0.5	Averages	100	4
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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
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Preparation batch 2781-024A 2σ prep error 5.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	0.1	0.200					69	680			53	01/11/95	01/14	SS-042
BLK (QC ID=22669)	N412033-17	0.3	0.200					66	704				01/11/95	01/15	SS-003
LCS ID=22663)	N412033-16	0.8	0.200					75	543				01/11/95	01/13	SS-042

Nominal values and limits from method	0.5	0.200	30-105	300	100	180
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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 ± 0.7
FOR 3 SAMPLES	YIELD	70 ± 9

SD SUMMARIES

Page 3

SUMMARY DATA SECTION

Page 14

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test SR Matrix WATER

SDG 6104A

Act Leah G. Guerrero

METHOD SUMMARY

STRONTIUM, TOTAL IN WATER

BETA COUNTING

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Strontium 90
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Preparation batch 2781-024A

A4CM-94-0012B	N412033-02	A1	0104-002	U
BLK (QC ID=22667)	N412033-17		0104-017	U
BLK (QC ID=23549)	N412033-20		0104-020	U
LCS (QC ID=22661)	N412033-16		0104-016	LOW
LCS (QC ID=23550)	N412033-21		0104-021	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 2781-024A 2σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	A1	0.3	0.460				89	206			120	03/22/95	03/22	LEG-001
BLK (QC ID=22667)	N412033-17		0.09	1.00				74	749				01/14/95	01/14	LEG-001
BLK (QC ID=23549)	N412033-20		0.2	1.00				85	270				03/22/95	03/22	LEG-015
LCS (QC ID=22661)	N412033-16		0.2	1.00				85	170				01/13/95	01/13	LEG-014
LCS (QC ID=23550)	N412033-21		0.3	1.00				85	174				03/22/95	03/22	LEG-002

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	0.2	=	0.2
FOR 5 SAMPLES	YIELD	84	=	11

SUMMARIES

Page 4

SUMMARY DATA SECTION

Page 15

Lab id TMAN

Protocol ROCKETDYNE

Version Ver 1.0

Form DVD-CMS

Version 3.06

Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

Test GAM Matrix WATERSDG 6104AAct Leah G. Guerrero

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
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Preparation batch 2781-024A

A4CM-94-0012B	N412033-02	0104-002	U	U
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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 2781-024A 2σ prep error 15.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012B	N412033-02	5	0.460					2504				53	01/14/95	01/14	MB,02,00
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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 5 ±

FOR 1 SAMPLES

YIELD ±

AD SUMMARIES

Page 5

SUMMARY DATA SECTION

Page 16

Lab id TMANProtocol ROCKETDYNEVersion Ver 1.0Form DVD-CMSVersion 1.06Report date 04/21/95

TMA/RICHMOND

REPORTING GROUP 6104A

METHOD SUMMARY

TRITIUM IN WATER
LIQUID SCINTILLATION

Test H Matrix WATER

SDG 6104A

act Leah G. Guerrero

Client Rocketdyne

Contract R44PJZ94034044

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST FIX	SUF- PLANCHET	Tritium
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Preparation batch 2781-024A

A4CM-94-0012A	N412033-01	0104-001	U
BLK (QC ID=22671)	N412033-17	0104-017	U
LCS (QC ID=22665)	N412033-16	0104-016	ok

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 2781-024A 2 σ prep error 10.0 % Reference Lab Notebook 2781 pg. 024

A4CM-94-0012A	N412033-01	300	0.0100	50	30	12/22/94	12/22	LSC-004
BLK (QC ID=22671)	N412033-17	300	0.0100	50	12/29/94	12/29	LSC-004	
LCS (QC ID=22665)	N412033-16	300	0.0100	50	12/22/94	12/22	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 $\pm$ 2 SD	MDA 300 $\pm$ 0
FOR 3 SAMPLES	YIELD $\pm$

METHOD SUMMARIES

Page 6

SUMMARY DATA SECTION

Page 17

Lab id	TMAN
Protocol	ROCKETDYNE
Version	Ver 1.0
Form	DVD-CMS
Version	3.06
Report date	04/21/95

31-MAR-95
16:20:56
N412033
LGG

TMA Corporation
Beta Counting Data
AUTOB V 2.06

6104- 2A1 Sr
A4CM-94-0012B

Reviewed GCW Date 4/12/95

Sr 90

Counter LBG 1
Length of count 206.9 Min.
Gross counts = 113.

JLP
4/12/95

Zero time 326.334 94
Separation time 81.877 95
-0.038 CPM ON DAY 89.843 95

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = $\text{EXP}(-\text{SR} \times \text{T}) - \text{EXP}(-\text{Y} \times \text{T})$
B = SR EFF/Y EFF
C = $\text{EXP}(\text{SR} \times \text{T})$

FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 81.877 95 = -0.017 (Y/Sr eff ratio = 1.411)

Elapsed time (days) = 120.543
Lambda = 6.863E-05 Reciprocal days
 $\text{exp}(-\text{lambda} \times \text{t})$ (1) = 9.918E-01
Chemical yield (2) = 0.8927
PPT. correction (3) = 1.0135 (recovery = 16.39 mgs)
Aliquot (4) = 0.4600 1

Product (1X2X3X4) = 4.127499E-01

C-zero	P-factor	dpm/l	dpm error	1 sigma	percent sigma
-4.1049E-02	2.5560	-1.0492E-01	-2.3564E-01		224.59 %

pCi /l	1 sigma	2 sigma
-4.7262E-02	1.0615E-01	2.0805E-01

LTV 1.7514E-01

MDA 3.1927E-01

DPM OF ALIQUOT -4.826E-02

Saved answer = -4.826E-02 -224.59% (DPM of aliquot) (10756)

27-MAR-95 15:26:32

Counting Data Summary
6104- 20 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	83.096	LBG	1	174.19	89	-0.03	222.2%	0.5460	0.9800 0
2.	84.714	LBG	15	105.18	75	0.06	137.8%	0.6310	1.0330 0
3.	85.777	LBG	15	270.16	150	-0.09	77.6%	0.6410	1.0330 0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
LBG	1 EF SF	78.754	45410	17.2	0.985	0.950 - 1.050	0.980	-0.3
LBG	15 EF SF	84.699	36649	15.5	1.030	1.003 - 1.050	1.033	-0.3
LBG	15 EF SF	84.699	36649	15.5	1.030	1.003 - 1.050	1.033	-0.3
LBG	1 BK BK	78.038	1301	2468.7	0.527	0.300 - 0.800	0.546	-0.4
LBG	15 BK BK	84.310	362	560.3	0.646	0.300 - 0.800	0.631	0.4
LBG	15 BK BK	85.053	1547	2297.6	0.673	0.300 - 0.800	0.641	0.8

Counting Log(s)

Previous	3 counts	Time	Detector	ID	Length	Cpm
82.793	23-MAR-95	11:01	LBG	1 Sr 2237 26	\ 130.6 min	0.01
82.890	23-MAR-95	13:21	LBG	1 Tc 3947 2	\ 129.8 min	0.21
82.890	23-MAR-95	13:21	LBG	1 Tc 3947 2	\ 294.4 min	0.23
84.101	24-MAR-95	18:25	LBG	15 Sr 3949 1	\ 298.8 min	0.23
84.310	24-MAR-95	23:26	LBG	15 BK	\ 560.3 min	0.00
84.699	25-MAR-95	8:46	LBG	15 SF	\ 15.5 min	0.00
84.890	25-MAR-95	13:21	LBG	15 500	\ 102.5 min	0.00
84.962	25-MAR-95	15:05	LBG	15 (50)9116 9	\ 106.6 min	4.28
85.054	25-MAR-95	17:17	LBG	15 BK	\ 2297.6 min	0.00

04-APR-95
08:50:12
N412033
.GG

TMA Corporation
Beta Counting Data
AUTOB V 2.06

6104- 21 Sr
GC-LCS #23550

Reviewed GG Date 4/4

Sr 90

Counter LBG 2
Length of count 174.2 Min.
Gross counts = 3809.

JP
4/12/95

Zero time 81.877 95
Separation time 81.877 95
21.165 CPM ON DAY 83.096 95

SR90 AT SEP TIME = OBSERVED CPM(SR90 + Y90) / ((A/B) + C)
WHERE A = $\text{EXP}(-\text{SR} \times \text{T}) - \text{EXP}(-\text{Y} \times \text{T})$
B = SR EFF/Y EFF
C = $\text{EXP}(\text{SR} \times \text{T})$

FORMULA DERIVATION IN SR K-FACTOR FILE. 2/28/61 D JONES
ASSUMES NO SR89 AND Y90 IS ZERO AT SEP TIME.

SR90 AT 81.877 95 = 15.322 (Y/Sr eff ratio = 1.407)

Elapsed time (days) = 0.000
Lambda = 6.863E-05 Reciprocal days
 $\text{exp}(-\text{lambda} \times \text{t})$ (1) = 1.000E+00
Chemical yield (2) = 0.8464
PT. correction (3) = 1.0169 (recovery = 15.54 mgs)
Aliquot (4) = 1.000 smpl

Product (1X2X3X4) = 8.607035E-01

C-zero	P-factor	dpm/smpl	1 sigma dpm error	percent sigma
1.7801E+01	2.5560	4.5500E+01	7.7477E-01	1.70 %

pCi /smpl	1 sigma	2 sigma
2.0496E+01	3.4900E-01	6.8403E-01

LTV 2.1071E+01 *JP*

MDA 2.8266E-01 *JP*

DPM OF ALIQUOT 4.550E+01

QC-23550

25
Added = 19.56 pCi ($\pm 4.7\%$)

F/A = 1.048 ($\pm 5.4\%$) *Ky 4/4/95*

04-APR-95 08:50:22

Counting Data Summary
6104- 21 Sr

Counting Data

	GMT	Det	Min.	Counts	CPM	Error	BKG	SF	CF
1.	83.096	LBG	2	174.21	3809	21.17	1.7%	0.6140	0.9960 0
2.	88.082	LBG	1	44.23	1469	31.91	2.7%	0.5820	0.9780 0
3.	89.899	LBG	15	74.96	2533	34.19	2.0%	0.6610	1.0320 0

Quality Control Summary

Detector	Continuing Calibr:	Date (GMT)	Gross Cnts	Time (min)	Value	Control Limits	New Avg	Norm dev
LBG	2 EF SF	78.754	48791	17.3	1.000	0.950 - 1.050	0.996	0.3
LBG	1 EF SF	87.947	46094	17.3	0.971	0.950 - 1.010	0.978	-0.9
LBG	15 EF SF	89.718	25839	10.9	1.025	1.003 - 1.050	1.032	-0.8
LBG	2 BK BK	78.038	1476	2468.8	0.598	0.300 - 0.800	0.614	-0.3
LBG	1 BK BK	85.053	1438	2297.6	0.626	0.300 - 0.800	0.582	0.8
LBG	15 BK BK	88.813	300	406.1	0.739	0.300 - 0.800	0.661	1.8

Counting Log(s)

Previous	3 counts	Time	Detector	ID	Length	Cpm
84.699	25-MAR-95	8:46	LBG	2 SF	\ 15.5 min	0.00
84.714	25-MAR-95	9:08	LBG	2 Sr 6103 1S	\ 54.5 min	0.00
82.890	23-MAR-95	13:21	LBG	2 Sr(DIR)3949 1A	129.8 min	0.21
87.824	28-MAR-95	11:46	LBG	1 SF	\ 43.2 min	0.00
87.947	28-MAR-95	14:43	LBG	1 SF	\ 17.3 min	0.00
87.959	28-MAR-95	15:00	LBG	1 BK	\ 151.8 min	0.00
89.639	30-MAR-95	7:20	LBG	15 (50)9115 4	\ 105.6 min	3.31
89.718	30-MAR-95	9:13	LBG	15 SF	\ 10.9 min	0.00
89.756	30-MAR-95	10:08	LBG	15 Sr 5601 1A1	\ 203.3 min	3.85

C

C

C