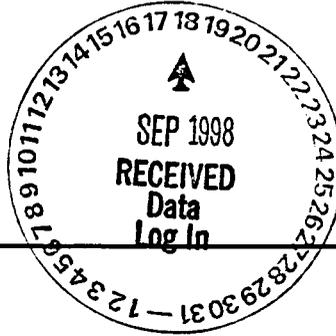


0050068

Thermo Nutech
W.O. No. N8-08-110-7494

Bechtel Hanford Inc.
SDG H0206



Case Narrative

1.0 GENERAL

Thermo Nutech Sample Delivery Group H0206 is comprised of two uranium metal oxide samples designated under SAF No. B98-108 with a Project Designation of :618-4 Burial Ground Drummed Waste Characterization - Ot.

The chain-of-custody requested an isotopic uranium analysis by alpha spectroscopy, however due to the high activity of the samples it was determined that U-235, and U-238 results should be obtained by gamma spectroscopy. After agreement from Mr. Rich Weiss and Ms. Joan Kessner the uranium results were obtained by gamma spectroscopy. Also, due to the nature of the samples (mostly uranium metal) and the high activity, very small aliquots were taken for dissolution and then aliquots of the dissolution volume were taken for the isotopic plutonium, and strontium-90 analyses. As a result the aliquots for Pu and Sr are very small and the resultant minimum detectable activities are much greater than the required detection limits. Counting times were increased to mitigate the effects of the small aliquots on the MDA's.

The samples were received as stated on the Chain-of-Custody documents.

2.0 ANALYSIS NOTES

2.1 Strontium-90 Analyses

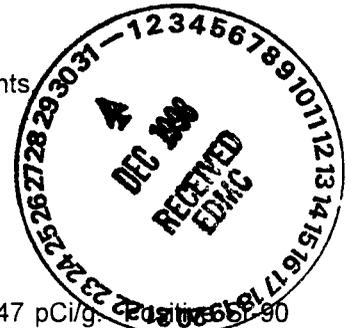
Sample aliquots were 5 mg and the MDA's ranged from 42 to 47 pCi/g. Positive Sr-90 activity was not detected in any of the samples. Strontium activity was detected in sample B0PP55 however the result was less than the MDA.

2.2 Isotopic Plutonium Analyses

Sample aliquots were 5 mg and the MDA's ranged from 7.2 and 7.5 pCi/g for Pu-238, and ranged from 2.1 and 2.7 pCi/g for Pu-232/240. Positive plutonium activity was not detected in any of the samples.

2.3 Gamma Scan Analyses

Sample aliquots were once again reduced in order to reduce the chance of any laboratory or detector contamination. Sample aliquots ranged from 15.3 g to 18.2 g. Positive U-235, 238 activity was detected.



TMA / RICHMOND
SAMPLE DELIVERY GROUP H0206

SDG 7494
Contact N. Joseph Verville

REPORT GUIDE

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0206

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.

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 09/16/98

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0206

SDG 7494
Contact N. Joseph Verville

GUIDE, cont.

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0206

ABOUT THE DATA SUMMARY SECTION

DUPLICATES

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

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SUMMARY DATA SECTION

Page 2

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 09/16/98

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

SAMPLE SUMMARY

SDG 7494

Contact N. Joseph Verville

Client Hanford

Contract TRB-SBB-207925

Case no SDG H0206

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB		CHAIN OF		COLLECTED
				SAMPLE ID	SAF NO	CUSTODY		
B0PP55	300-FF-1 Drum 300A980053	SOLID		N808110-01	B98-108	B98-108-126		08/18/98 07:19
B0PP56	300-FF-1 Drum 300A980050	SOLID		N808110-02	B98-108	B98-108-127		08/18/98 07:45
Method Blank		SOLID		N808110-04	B98-108			
Lab Control Sample		SOLID		N808110-03	B98-108			
Duplicate (N808110-01)	300-FF-1 Drum 300A980053	SOLID		N808110-05	B98-108			08/18/98 07:19

SAMPLE SUMMARY

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SUMMARY DATA SECTION

Page 3

Lab id TMANC

Protocol Hanford

Version Ver 1.0

Form DVD-CS

Version 3.06

Report date 09/16/98

TMA/RICHMOND
SAMPLE DELIVERY GROUP H0206

SDG 7494
Contact N. Joseph Verville

QC SUMMARY

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0206

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7494	B98-108-126	B0PP55	SOLID				08/21/98 3	N808110-01		7494-001
	B98-108-127	B0PP56	SOLID				08/21/98 3	N808110-02		7494-002
		Method Blank	SOLID					N808110-04		7494-004
		Lab Control Sample	SOLID					N808110-03		7494-003
		Duplicate (N808110-01)	SOLID				08/21/98 3	N808110-05		7494-005

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-QS
Version 3.06
Report date 09/16/98

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

SDG 7494
 Contact N. Joseph Verville

PREP BATCH SUMMARY

Client Hanford
 Contract TRB-SBB-207925
 Case no SDG H0206

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-
			BATCH	2σ %	CLIENT	MORE	RE BLANK	LCS	
Alpha Spectroscopy									
PU	SOLID	Plutonium, Isotopic in Soil	2785-123	5.0	2		1	1	1/1
Beta Counting									
SR	SOLID	Strontium, Total in Soil	2785-123	10.0	2		1	1	1/1
Gamma Spectroscopy									
GAM	SOLID	Gamma Scan	2785-123	15.0	2		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.

Lab id TMANC
 Protocol Hanford
 Version Ver 1.0
 Form DVD-PBS
 Version 3.06
 Report date 09/16/98

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

WORK SUMMARY

SDG 7494
 Contact N. Joseph Verville

Client Hanford
 Contract TRB-SBB-207925
 Case no SDG H0206

CLIENT SAMPLE ID	LAB SAMPLE ID									
LOCATION	MATRIX	COLLECTED	SUF-							
CUSTODY	SAF No	RECEIVED	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
B0PP55		N808110-01	7494-001	GAM		09/01/98	09/08/98	NJV	Gamma Scan	
300-FF-1 Drum	300A980053 SOLID	08/18/98	7494-001	PU		09/06/98	09/08/98	NJV	Plutonium, Isotopic in Soil	
B98-108-126	B98-108	08/21/98	7494-001	SR		09/02/98	09/08/98	NJV	Strontium, Total in Soil	
B0PP56		N808110-02	7494-002	GAM		09/01/98	09/08/98	NJV	Gamma Scan	
300-FF-1 Drum	300A980050 SOLID	08/18/98	7494-002	PU		09/06/98	09/08/98	NJV	Plutonium, Isotopic in Soil	
B98-108-127	B98-108	08/21/98	7494-002	SR		09/02/98	09/08/98	NJV	Strontium, Total in Soil	
Method Blank		N808110-04	7494-004	GAM		09/02/98	09/08/98	NJV	Gamma Scan	
	SOLID		7494-004	PU		09/06/98	09/08/98	NJV	Plutonium, Isotopic in Soil	
	B98-108		7494-004	SR		09/02/98	09/08/98	NJV	Strontium, Total in Soil	
Lab Control Sample		N808110-03	7494-003	GAM		09/01/98	09/08/98	NJV	Gamma Scan	
	SOLID		7494-003	PU		09/06/98	09/08/98	NJV	Plutonium, Isotopic in Soil	
	B98-108		7494-003	SR		09/02/98	09/08/98	NJV	Strontium, Total in Soil	
Duplicate (N808110-01)		N808110-05	7494-005	GAM		09/02/98	09/08/98	NJV	Gamma Scan	
300-FF-1 Drum	300A980053 SOLID	08/18/98	7494-005	PU		09/06/98	09/08/98	NJV	Plutonium, Isotopic in Soil	
	B98-108	08/21/98	7494-005	SR		09/02/98	09/08/98	NJV	Strontium, Total in Soil	

COUNTS OF TESTS BY SAMPLE TYPE											
TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
GAM	B98-108	Gamma Scan	GAMMAHI	2			1	1	1		5
PU	B98-108	Plutonium, Isotopic in Soil	PUPLATE	2			1	1	1		5
SR	B98-108	Strontium, Total in Soil	SR8990	2			1	1	1		5
TOTALS				6			3	3	3		15

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id TMANC
 Protocol Hanford
 Version Ver 1.0
 Form DVD-CWS
 Version 3.06
 Report date 09/16/98

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0206

N808110-04

Method Blank

METHOD BLANK

SDG <u>7494</u>	Client/Case no <u>Hanford</u>	SDG <u>H0206</u>
Contact <u>N. Joseph Verville</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N808110-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7494-004</u>	Material/Matrix _____	<u>SOLID</u>
	SAF No <u>B98-108</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Plutonium 238	13981-16-3	0.31	0.25	<u>0.38</u>	0.050	U	PU
Plutonium 239/240	15117-48-3	-0.063	0.083	<u>0.26</u>	0.050	U	PU
Total Strontium	SR-89/90	-0.49	1.7	<u>2.2</u>	1.0	U	SR
GAMMA SCAN ANALYTES		U					
Potassium 40	13966-00-2	U		0.054		U	GAM
Cobalt 60	10198-40-0	U		0.008	0.050	U	GAM
Cesium 137	10045-97-3	U		0.005	0.050	U	GAM
Europium 152	14683-23-9	U		0.012	0.10	U	GAM
Europium 154	15585-10-1	U		0.018	0.10	U	GAM
Europium 155	14391-16-3	U		0.007	0.10	U	GAM
Uranium 238	U-238	U		0.64		U	GAM
Uranium 235	U-235	U		0.011		U	GAM

618-4 Burial Ground Drummed Waste-Ot

QC-BLANK #28967

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

N808110-03

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7494
Contact N. Joseph Verville

Client/Case no Hanford SDG H0206
Case no TRB-SBB-207925

Lab sample id N808110-03
Dept sample id 7494-003

Client sample id Lab Control Sample
Material/Matrix SOLID
SAF No B98-108

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 LMMS (TOTAL)	PROTOCOL LIMITS
Plutonium 238	52	2.8	<u>0.34</u>	0.050	PU	50.6	2.0	103	87-113	80-120
Plutonium 239/240	53	2.9	<u>0.16</u>	0.050	PU	52.9	2.1	100	87-113	80-120
Total Strontium	150	7.0	<u>2.7</u>	1.0	SR	128	5.1	117	79-121	
GAMMA SCAN ANALYTES		U								
Cobalt 60	0.28	0.014	0.006	0.050	GAM	0.276	0.011	101	75-125	80-120
Cesium 137	0.31	0.011	0.007	0.050	GAM	0.299	0.012	104	75-125	80-120

618-4 Burial Ground Drummed Waste-Ot

QC-LCS #28966

TMA/RICHMOND
SAMPLE DELIVERY GROUP H0206

N808110-05

B0PP55

DUPLICATE

SDG <u>7494</u>	Client/Case no <u>Hanford</u>	SDG <u>H0206</u>
Contact <u>N. Joseph Verville</u>	Case no <u>TRB-SBB-207925</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>N808110-05</u>	Lab sample id <u>N808110-01</u>	Client sample id <u>B0PP55</u>
Dept sample id <u>7494-005</u>	Dept sample id <u>7494-001</u>	Location/Matrix <u>300-FF-1 Drum 300A980053 SOLID</u>
	Received <u>08/21/98</u>	Collected <u>08/18/98 07:19</u>
		Custody/SAF No <u>B98-108-126</u> <u>B98-108</u>

ANALYTE	DUPLICATE		MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ORIGINAL		MDA pCi/g	QUALI- FIERS	RPD %	3σ TOT	PROT LIMIT
	pCi/g	2σ ERR (COUNT)					pCi/g	2σ ERR (COUNT)					
Plutonium 238	1.7	4.0	<u>7.5</u>	0.050	U	PU	-1.9	3.2	<u>7.2</u>	U	-		
Plutonium 239/240	0.85	1.7	<u>2.7</u>	0.050	U	PU	1.1	1.1	<u>2.1</u>	U	-		
Total Strontium	8.9	30	<u>42</u>	1.0	U	SR	17	37	<u>47</u>	U	-		
GAMMA SCAN ANALYTES	U						U						
Potassium 40	U		21		U	GAM	U		30	U	-		
Cobalt 60	U		<u>2.6</u>	0.050	U	GAM	U		<u>3.7</u>	U	-		
Cesium 137	U		<u>6.8</u>	0.050	U	GAM	U		<u>9.6</u>	U	-		
Europium 152	U		<u>20</u>	0.10	U	GAM	U		<u>29</u>	U	-		
Europium 154	U		<u>7.8</u>	0.10	U	GAM	U		<u>11</u>	U	-		
Europium 155	U		<u>28</u>	0.10	U	GAM	U		<u>40</u>	U	-		
Uranium 238	250000	1200	670			GAM	250000	1700	940		0	32	
Uranium 235	1900	30	35			GAM	1900	43	50		0	32	

618-4 Burial Ground Drummed Waste-Ot

QC-DUP#1 28968

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0206

N808110-01

B0PP55

DATA SHEET

SDG <u>7494</u>	Client/Case no <u>Hanford</u>	SDG <u>H0206</u>
Contact <u>N. Joseph Verville</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N808110-01</u>	Client sample id <u>B0PP55</u>	
Dept sample id <u>7494-001</u>	Location/Matrix <u>300-FF-1 Drum 300A980053 SOLID</u>	
Received <u>08/21/98</u>	Collected <u>08/18/98 07:19</u>	
	Custody/SAF No <u>B98-108-126</u> <u>B98-108</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Plutonium 238	13981-16-3	-1.9	3.2	<u>7.2</u>	0.050	U	PU
Plutonium 239/240	15117-48-3	1.1	1.1	<u>2.1</u>	0.050	U	PU
Total Strontium	SR-89/90	17	37	<u>47</u>	1.0	U	SR
GAMMA SCAN ANALYTES		U					
Potassium 40	13966-00-2	U		30		U	GAM
Cobalt 60	10198-40-0	U		<u>3.7</u>	0.050	U	GAM
Cesium 137	10045-97-3	U		<u>9.6</u>	0.050	U	GAM
Europium 152	14683-23-9	U		<u>29</u>	0.10	U	GAM
Europium 154	15585-10-1	U		<u>11</u>	0.10	U	GAM
Europium 155	14391-16-3	U		<u>40</u>	0.10	U	GAM
Uranium 238	U-238	250000	1700	940			GAM
Uranium 235	U-235	1900	43	50			GAM

618-4 Burial Ground Drummed Waste-Ot

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>09/16/98</u>

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0206

N808110-02

B0PP56

DATA SHEET

SDG <u>7494</u>	Client/Case no <u>Hanford</u>	SDG <u>H0206</u>
Contact <u>N. Joseph Verville</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N808110-02</u>	Client sample id <u>B0PP56</u>	
Dept sample id <u>7494-002</u>	Location/Matrix <u>300-FF-1 Drum 300A980050 SOLID</u>	
Received <u>08/21/98</u>	Collected <u>08/18/98 07:45</u>	
	Custody/SAF No <u>B98-108-127</u> <u>B98-108</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Plutonium 238	13981-16-3	-1.7	3.4	<u>7.5</u>	0.050	U	PU
Plutonium 239/240	15117-48-3	0.56	1.1	<u>2.7</u>	0.050	U	PU
Total Strontium	SR-89/90	-5.6	32	<u>43</u>	1.0	U	SR
GAMMA SCAN ANALYTES		U					
Potassium 40	13966-00-2	U		35		U	GAM
Cobalt 60	10198-40-0	U		<u>4.2</u>	0.050	U	GAM
Cesium 137	10045-97-3	U		<u>11</u>	0.050	U	GAM
Europium 152	14683-23-9	U		<u>32</u>	0.10	U	GAM
Europium 154	15585-10-1	U		<u>12</u>	0.10	U	GAM
Europium 155	14391-16-3	U		<u>43</u>	0.10	U	GAM
Uranium 238	U-238	250000	1800	1100			GAM
Uranium 235	U-235	1300	42	51			GAM

618-4 Burial Ground Drummed Waste-Ot

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

METHOD SUMMARY

PLUTONIUM, ISOTOPIC IN SOIL
ALPHA SPECTROSCOPY

Test PU Matrix SOLID
SDG 7494
Contact N. Joseph Verville

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0206

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Plutonium PLANCHET	238	Plutonium 239/240
Preparation batch 2785-123						
BOPP55	N808110-01			7494-001	U	1.1 U
BOPP56	N808110-02			7494-002	U	0.56 U
Method Blank	N808110-04			7494-004	<u>0.31</u> U	U
LCS (QC ID=28966)	N808110-03			7494-003	ok	ok
Duplicate (N808110-01)	N808110-05			7494-005	- U	- U

Nominal values and limits from method RDLs (pCi/g) 0.050 0.050
618-4 Burial Ground Drummed Waste-Ot

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 2785-123 2σ prep error 5.0 % Reference Lab Notebook #2785 pg. 123																
BOPP55	N808110-01			<u>7.2</u>	<u>0.0050</u>			46	1826				19	09/04/98	09/06	SS-065
BOPP56	N808110-02			<u>7.5</u>	<u>0.0050</u>			44	1826				19	09/04/98	09/06	SS-066
Method Blank	N808110-04			<u>0.38</u>	0.100			31	1812					09/04/98	09/06	SS-003
LCS (QC ID=28966)	N808110-03			<u>0.34</u>	0.100			47	1812					09/04/98	09/06	SS-001
Duplicate (N808110-01)	N808110-05			<u>7.5</u>	<u>0.0050</u>			46	1812				19	09/04/98	09/06	SS-004

Nominal values and limits from method 0.050 0.100 20-105 10 100 180

PROCEDURES	REFERENCE	PUPLATE
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	<u>4.6</u> ± <u>7.7</u>
FOR 5 SAMPLES	YIELD	<u>43</u> ± <u>13</u>

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

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Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-CMS
Version 3.06
Report date 09/16/98

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

METHOD SUMMARY

STRONTIUM, TOTAL IN SOIL

BETA COUNTING

Test SR Matrix SOLID
SDG 7494
Contact N. Joseph Verville

Client Hanford
Contract TRB-SBB-207925
Case no SDG H0206

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	PLANCHET	Total Strontium
Preparation batch 2785-123					
B0PP55	N808110-01	7494-001			17 U
B0PP56	N808110-02	7494-002			U
Method Blank	N808110-04	7494-004			U
LCS (QC ID=28966)	N808110-03	7494-003			ok
Duplicate (N808110-01)	N808110-05	7494-005			- U

Nominal values and limits from method RDLs (pCi/g) 1.0
618-4 Burial Ground Drummed Waste-Ot

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- YZED	DETECTOR
Preparation batch 2785-123 2σ prep error 10.0 % Reference Lab Notebook #2785 pg. 123															
B0PP55	N808110-01			47	0.0050			72		400			15	09/02/98	09/02 GRB-201
B0PP56	N808110-02			43	0.0050			73		400			15	09/02/98	09/02 GRB-202
Method Blank	N808110-04			2.2	0.100			74		400				09/02/98	09/02 GRB-204
LCS (QC ID=28966)	N808110-03			2.7	0.100			76		400				09/02/98	09/02 GRB-203
Duplicate (N808110-01)	N808110-05			42	0.0050			71		400			15	09/02/98	09/02 GRB-205

Nominal values and limits from method 1.0 1.00 20-105 150 180

PROCEDURES	REFERENCE	SR8990
EP-060	Soil Preparation, rev 0	
EP-070	Soil Dissolution, rev 0	
EP-500	Strontium-89,90 - Purification, rev 0	

AVERAGES ± 2 SD	MDA 27 ± 46
FOR 5 SAMPLES	YIELD 73 ± 4

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Version 3.06
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0206

METHOD SUMMARY

GAMMA SCAN

GAMMA SPECTROSCOPY

Test GAM Matrix SOLID
 SDG 7494
 Contact N. Joseph Verville

Client Hanford
 Contract TRB-SBB-207925
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RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW SUP- TEST FIX	PLANCHET	Cobalt 60	Cesium 137	Uranium 238	Uranium 235
Preparation batch 2785-123							
B0PP55	N808110-01		7494-001	U	U	250000	1900
B0PP56	N808110-02		7494-002	U	U	250000	1300
BLK (QC ID=28967)	N808110-04		7494-004	U	U	U	U
LCS (QC ID=28966)	N808110-03		7494-003	ok	ok		
Duplicate (N808110-01)	N808110-05		7494-005	- U	- U	ok	ok
Nominal values and limits from method			RDLs (pCi/g)	0.050	0.050		
618-4 Burial Ground Drummed Waste-Ot							

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- YZED	DETECTOR
Preparation batch 2785-123 2σ prep error 15.0 % Reference Lab Notebook #2785 pg. 123														
B0PP55	N808110-01		<u>9.6</u>	<u>15.3</u>					203			14	08/31/98	09/01 SP,01,00
B0PP56	N808110-02		<u>11</u>	<u>18.2</u>					142			14	08/31/98	09/01 SP,01,00
BLK (QC ID=28967)	N808110-04		0.011	750					368				08/31/98	09/02 SP,01,00
LCS (QC ID=28966)	N808110-03		0.007	750					627				08/31/98	09/01 SP,01,00
Duplicate (N808110-01)	N808110-05		<u>6.8</u>	<u>15.3</u>					401			15	08/31/98	09/02 SP,01,00
(QC ID=28968)														
Nominal values and limits from method			0.050	750					100					180

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

AVERAGES ± 2 SD	MDA	<u>5.5</u>	±	<u>10</u>
FOR 5 SAMPLES	YIELD	_____	±	_____

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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, Method 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, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

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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 Method 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.

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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, Method 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.

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DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Method 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 Method 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 Method 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).

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DATA SHEET

If the MDA is blank, the ERROR is used as the limit.

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
- B A Method 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 method 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 Method 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.

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- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.
- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- * When reporting a Method 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.

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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.

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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.

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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.

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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

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MATRIX SPIKE

for the recovery.

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.

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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 Method 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 Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method 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'

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means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See 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.

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- * Count times are underlined if less than the nominal value 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, Method 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

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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. No sums are computed for Lab Control, Method 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.

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Bechtel Hanford Inc.	A 7	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				Page 1 of 1
Collector Doug Bowers	Company Contact Jeff Lerch	Telephone No. 373-5904	Project Coordinator TRENT, SJ	Data Turnaround 21 Days		
Project Designation 618-4 Burial Ground Drummed Waste Characterization - Ot	Sampling Location 300-FE-1 (618-4) DRUM #	300A-98-0050	SAF No. B98-108			
Ice Chest No.	Field Logbook No. EL1395-1	Method of Shipment Gov vehicle				
Shipped To JWD FWA/RECEA	Offsite Property No. Nutech	Bill of Lading/Air Bill No. COA				
Waste Designation Client determined no waste codes associated with this project.						
POSSIBLE SAMPLE HAZARDS/REMARKS Possible pyrophoric metals, radioactive, PCB's	Preservation None					
Special Handling and/or Storage Keep metals covered in oil	Type of Container aG					
	No. of Container(s) Volume 1 60mL					
SAMPLE ANALYSIS	Sample No.	Matrix *	Sample Date	Sample Time	See item (1) in Special Instructions.	
	B0PP56	Other Solid	08/18/98	0745	X	
CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS		
Relinquished By Renee Nelson	Date/Time 8/18/98	Received By Felix	Date/Time 8/18/98	** Drum numbers must be included on the Chain of Custody. ** METALS MUST BE KEPT COVERED WITH OIL. (1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Strontium-89,90 -- Total Sr; Activity Scan		
Relinquished By	Date/Time	Received By	Date/Time			
Relinquished By	Date/Time	Received By	Date/Time			
Relinquished By	Date/Time	Received By	Date/Time			
Relinquished By	Date/Time	Received By	Date/Time			
LABORATORY SECTION	Received By	Title		Date/Time		
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time		

10000ppm

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

Figure 1

SAMPLE CHECK-IN LIST

Date/Time Received: 8/21/98 / 1100 S.G.#: _____

Work Order Number: _____ SAF #: _____

Shipping Container ID: C96-072 Chain of Custody # B98-108-126 E-127

- 1. Custody Seals on shipping container intact? Yes No
- 2. Custody Seals dated and signed? Yes No
- 3. Chain-of-Custody record present? Yes No
- 4. Cooler temperature _____
- 5. Vermiculite/packing materials is Wet Dry
- 6. Number of samples in shipping container: 2
- 7. Sample holding times exceeded? Yes No

8. Samples have:
 tape hazard labels
 custody seals appropriate sample labels

9. Samples are:
 in good condition leaking
 broken have air bubbles

10. Where any anomalies identified in sample receipt? Yes No

11. Description of anomalies (include sample numbers): _____

Sample Custodian/Laboratory: [Signature] / TUN Date: 8/21/98

Telephoned To: _____ On _____ By _____